

THE SMALL-SCALE DAIRY VALUE CHAIN ANALYSIS: CHALLENGES AND OPPORTUNITIES FOR DAIRY DEVELOPMENT IN MYMENSINGH DISTRICT OF BANGLADESH

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ABSTRACT

This study examined the prevailing dairy value chain based on primary data collected from 70 small-scale milk producers of Mymensingh district of Bangladesh. The total cost and net return per month per cow were Tk. 4024.30 and Tk. 3165.70, respectively. The net value additions of Tk. 2091.42, Tk. 495.00, Tk. 655.00, Tk. 503.25, Tk. 309.70 were estimated for milk producers, collectors, *Faria*, *Bepari* and retailers respectively. Different actors spent highest marketing cost ranged from Tk.49 to Tk.80 for transportation compared to other marketing functions. Actors mostly dependent on the on-going market prices for setting price of milk in the value chain. A value chain map was developed showing the relationships and linkages among value chain actors of small-scale dairy. The study identified some critical factors for successful dairy marketing. The factors were understanding consumer behaviour, technology and transportation, improved business relationships, reduced transaction costs, and improved information flow, and organized market structure. Milk producer's share in consumers' price was highest for channel- I followed by channel- V. Expensive, inadequate, low quality feed, lack of grazing land, green grass, inadequate capital, knowledge about cost of production, weak extension services, high fees and unavailability of veterinary doctors, were some of the major problems of milk producers. Supply of adequate feed at subsidized price, ensuring easy access to institutional credit at a lower interest rate, adequate medicine and veterinary services, allocation of *khas* land for producing fodder/grass, were suggested to solve the problems.

Keywords: Small-scale dairy, Value chain, Milk producer, Marketing

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INTRODUCTION

In all developed countries, dairy sector is receiving special attention from the government. It is because the milk and dairy products help building up vitally strong nations by developing brain and bone of its people. Dairy enterprise is considered as Treasure for the economy of Bangladesh, particularly for rural areas (Kabir and Talukder, 1999). In Bangladesh, the contribution of livestock sector to agriculture share of Gross Domestic Product was 13% during 2014-15. Besides, according to FAO (2011), the per capita average yearly milk consumption in Bangladesh is only 13 kg and it is the lowest in South Asia because of higher cost of production and lower yield compared to any other south Asian countries. FAO statistics further reveals that the per capita daily calorie intake through milk in Bangladesh is only 24 Kcal, while in Sri Lanka it is 57, in Nepal it is 82, 104 in India, and 265 in Pakistan (FAO, 2011).

Rearing dairy cow is one of the most important investments a farmer can make to improve their socio-economic condition because of the valuable nutritional milk produced and diversify farming activities. It is estimated that more than 750 million people are engaged in milk production worldwide. The production of one million liters of milk per year on smallholder dairy farms creates approximately 200 on-farm jobs (ILRI, 2010). In Bangladesh, the annual national production of milk is 5.23 million tons and the annual demand is 17 million tons, out of which 97% is produced in rural areas. The quantity of national milk production can only meet about 30% of the actual demand for milk of the population (DLS, 2014).

Dairying is a biological system that converts large quantity of feeds and roughage into milk. It is more efficient and intensive system in terms of nutrient and protein production for human consumption from a given quantity of resources than beef or sheep farming (Michael, 1991). A farmer having not more than 10 cows will be fallen under small-scale category (DLS, 2014). However, small-scale dairying is very important for income generating activity to the poorer section of this country and reduction of the poverty. Traditionally, little attention has been paid to the value chains by which agricultural products reach final consumers and to the intrinsic potential of such chains to generate value added and employment opportunities (UNIDO, 2009). A value chain is a high-level model used to describe the process by which businesses receive raw materials, add value to the raw materials through various processes to create a finished product, and then sell the end product to customers (Porter and Michael, 1985). The livestock value chain can be defined as the full range of activities required to bring product (e.g. live animals, meat, milk, eggs, leather, fiber, manure) to final consumers passing through different phases of production, processing and delivery. Value chain analysis is essential to an understanding of markets, their relationships, the participation of different actors, and the critical constraints. The development of the dairy sector in the country is hindered by a number of technical, institutional and socioeconomic constraints. Development

of small scale dairy sector through the assessment of dairy market is necessary to create employment opportunity for the people in rural areas.

Modalities of such impact have been described in a good number of literatures. An attempt has been made in this section to review the previous studies related to the present study. Kabir and Talukder (1999) examined the financial performance of small scale dairy farms participating in the government subsidy programme. Significant increase in production and consumption of milk as well as in labor employment was observed. Shamsuddoha (2000) carried out a study on problems and prospects of dairy industry in Bangladesh. He described the main problems concerning feeding, management, diseases and marketing for which dairy development is unsatisfactory. O'Lakes (2010) carried out a study on dairy value chains, end markets and food security for Ethiopia. A majority of the dairy households in Ethiopia directly consume most of their animals' milk production (85%) and the informal market channel handles 90% of milk and milk products. Achchuthan and Kajanathan (2012) conducted a study on the value chain analysis in dairy sector in Kilinochchi District, Sri Lanka. Weindmaler (2003) investigated the milk value chain: concept, possibilities of optimization and areas of conflict. The importance of supply chain for the milk value chain and its effect on consumer response are discussed. Mandal (2006) carried out a study on supply chain analysis of wholesale milk market in selected areas of Dhaka district. The study also revealed that the value addition of sweet meat shop owners were higher than that of other intermediaries. Seifu and Doluschitz (2014) conducted a study to characterize the dairy value chain and to identify challenges and opportunities for development of the dairy industry in Dire Dawa, Eastern Ethiopia.

More study was conducted on the value chain of commercial dairy farmers and other agricultural products. There was no study on value chain of small scale dairy farmers living in rural areas that provides lion's share of milk to the consumers in the country. The milk yield, reproductive performance of cows, the transformation, marketing and final sale of the dairy products to consumers does not reach their full potential because of various challenges associated with each value chain actors that need to be identified. Therefore, the present study was aimed identify the key actors, map the value chain and emerging challenges in dairy production.

MATERIALS AND METHODS

The study was conducted in at three *Upazilas* namely Gafargaon, Bhaluka and Trishal under Mymensingh district where different market actors were available. A total of 30 milk producers and 40 traders were selected as sample. Among the traders, milk collector, *Faria*, *Bepari* and retailer were 10 individually in number. Market actors were interviewed using structured interview schedule for collection of data and information through face-to-face interview method.

Analytical Techniques

Descriptive statistics were used to analyse key actors with functions and the value chain map of small scale dairy farmer.

Measurement of value addition

To achieve the third objective of the study, the following equation was used to assess the profitability of milk producers and value addition by traders.

i) Net Return of milk producer

$$\Pi = \sum_{i=1}^n (P_{Y_i} \cdot Y_i) - \sum_{i=1}^n (P_{X_i} \cdot X_i) - TFC$$

Where,

Π = Profit of producers per month per quintal of milk;

P_{Y_i} = Per unit price of milk (Tk./litre);

Y_i = Quantity of milk (litre/day);

P_{X_i} = Per unit price of i-th input (Tk.);

X_i = Quantity of i-th input per day per cow (kg);

TFC = Total fixed costs (Tk.); and

$i = 1, 2, 3 \dots, n$ (number of items).

Value addition by an independent farmer = Selling price – Production cost

Value addition by the traders = Selling price – Purchase price

Net value addition by independent farmers or traders = Value addition – Marketing cost

Actor's share in consumers' price

Farmer's share in consumer's price = (Farmer's selling price / Consumer's purchasing price) * 100

Wholesaler's share in consumer's price = (Total market margin of wholesalers / Consumer's purchasing price) * 100

Retailer's share in consumer's price = (Total market margin of retailers / Consumer's purchasing price) * 100

Measurement of milk marketing efficiency

There are several types of measures that have some values and limitations in measuring marketing efficiency, but no single one can tell the whole story. However, the following formula was used to measure the milk marketing efficiency (Acharya and Agarwal,

2004) of a particular marketing chain. The higher value of marketing efficiency denotes higher level of efficiency and vice versa.

$$\text{Marketing efficiency (ME)} = \frac{FP}{MC+MM}$$

Where,

FP = Net price received by producer (Tk/ton)

MC= Total marketing cost incurred by intermediaries (Tk/ton)

MM = Total net marketing margin received by intermediaries (Tk/ton)

SWOT Analysis

ASWOT analysis was done in this study which identified the internal and external factors that are favorable and unfavorable to small-scale dairy sector. A SWOT analysis is usually in the form of a 2x2 matrix or a grid with four sections. The top two sections list the strengths and weaknesses and the lower two sections list the opportunities and threats.

RESULTS AND DISCUSSION

Marketing Functions of Small Scale Dairy Value Chain Actors

Buying and selling

Small scale dairy farmers sold 60% of their milk to collector and *Faria* and the remaining 40% sold to the consumers directly. About 30% of milk was sold to the *Bepari* by collectors and 70% to *Faria*. *Faria* sold 75% of milk to *Bepari*, 18% to consumer and 7% to retailer. *Bepari* sold 27% of milk to the local retailers at Upazila level and rest to the district level buyers. Finally, retailer sold their milk to the ultimate consumers (Field survey, 2017).

Pricing practices, market information and financing

Most of the farmers (80%) and collectors (60%) practiced on-going market price; *Faria* (70%) and retailer (60%) followed open bargaining and *Bepari* (80%) practiced prefixed prices for selling milk to different market actors (Table 1). Farmers (80%), collectors (70%), *Faria* (80%), *Bepari* (75%) and retailer (90%) got most of their market information from milk market and the rest was from other traders. The main financial source for farmers (70%), collectors (85%), *Faria* (75%), *Bepari* (40%) and retailers (70%) was own fund to run dairy business. They also borrowed little amount of money from bank, NGO, friends and relatives. Different mode of transportation like van, rickshaw, bus, bicycle, pickup, and train was used to transfer milk to market actors. Farmer did not use train, collector did not use van and rickshaw, and *Faria* did not use rickshaw. *Bepari* only use pickup and train. Consumers directly buy milk from producers, *Faria* or retailers (Table 1).

Table 1. Price fixing, market information, sources of finance and mode of transportation of dairy value chain actors

Particulars	Percent of responses				
	Farmer	Collector	Faria	Bepari	Retailer
A. Price fixing strategies					
Open bargaining	0	30	70	0	60
Based on-going market price	80	60	30	20	40
Prefixed price	20	10	--	80	--
B. Market information sources					
Collect information from market	80	70	80	75	90
Other traders	20	30	20	25	10
C. Financial sources					
Own fund	70	85	75	40	70
Bank	15	--	5	30	7
NGO	10	5	15	20	8
Friends and relatives	5	10	5	10	15
D. Mode of transportation					
Van	20	--	5	--	--
Rickshaw	2	--	--	--	--
Bus	10	30	10	--	--
Bicycle	8	40	20	--	--
Pickup	10	20	40	50	--
Train	-	10	25	30	--
Others	50	--	--	20	--

Source: Field survey, 2017

Packaging

Polythene or plastic bottle was used for packaging by farmer and retailer, large metal drums were used by *Bepari* for milk transportation. They used banana leaf to reduce perishability of milk.

Dairy Value Chain Governance

In the study area, most farmers feed low quality feed to cows and try to earn more profit by mixing water with milk. The marketing of milk was conducted following traditional rules and regulations.

Mapping of Small-scale Dairy Value Chain and Critical Success Factors of Value Chain

Mapping value chain of small scale dairy

Value chain of dairy started from dairy producer then collector, *Faria*, *Bepari* and finally retailer who added value to the marketing channel of milk.

Channel I: Farmer→ Local Consumer (home delivery)

Channel II: Farmer→ Collector→ Bepari→ Retailer→ Consumer

Channel III: Farmer→ Bepari→ Retailer→ Consumer

Channel IV: Farmer→ Collector→ Faria→ Bepari→ Retailer→ Consumer

Channel V: Farmer→ Collector→ Faria→ Consumer

Channel VI: Farmer→ Collector→ Faria→ Retailer→ Consumer

Small scale producer utilized milk by home consumption and selling. When milk is transferred to wholesalers (Collector, Faria, Bepari), they either sell it to retailers or traditional processors (who make sweet and curd) or to distant larger wholesale market (Mymensingh, Dhaka, and Gazipur) for urban consumers. In figure 5.1, the distribution channel, actors involved in milk business and their percentage of net value addition was shown.

The Critical Success Factors of Dairy Value Chain

Henry Ford reported that “coming together is a beginning. Keeping together is progress. Working together is success” (Brainy Quote, 2005). The key success factors are discussed below:

Understanding Consumer Behavior Properly

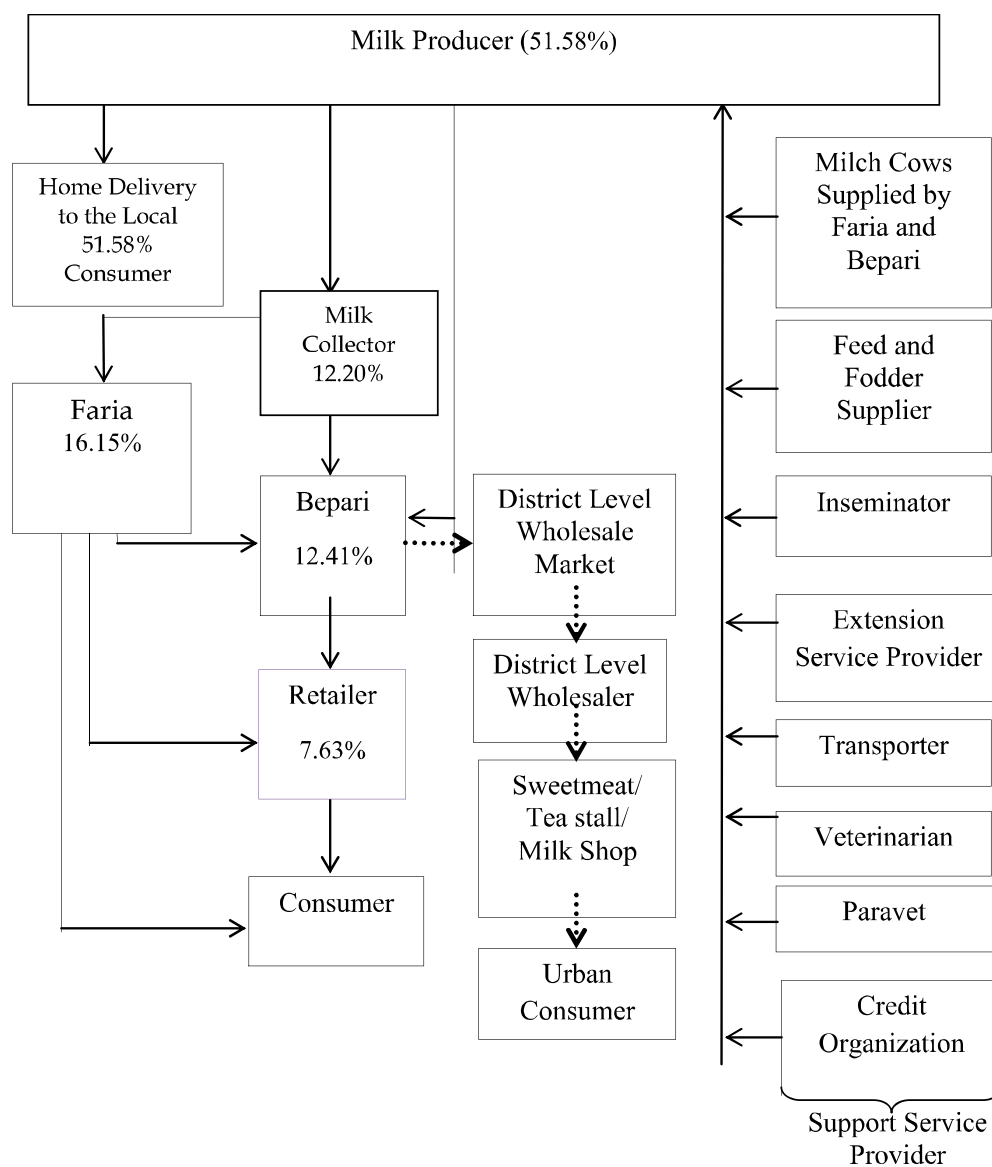
The actors fail to anticipate the market demand for milk due to less education and less awareness of changing consumer behaviour.

Technology and Transportation

The major technological constraint was the absent of processing plant. About 50% of the farmers and 75% of the traders opined that the transportation system of milk marketing was good.

Improved Business Relationships

Gooch observed that respect, not trust, is one of the fundamental pillars upon which many successful agro-food value chains are founded. According to the survey, 30% of the respondent actors complained adopting unethical activities like mixing water and powder milk with liquid milk that hampers the dairy business of others.



Note: Dotted line represents the local dairy value chain and Straight line represents overall small scale dairy value chain in the selected areas. % = Total value addition

Source: Field survey, 2017

Figure 1. Mapping the relationships and linkages between value chain actors of small scale dairy

Reduced Transaction Costs

Hobbs (1996) categorized transaction costs into three types. These are information costs, negotiation costs, and monitoring costs. In small-scale dairy value chain while prices are often the main focus of commodity there was no attempt to reduce the transaction costs.

Improved Information Flow

About 30% of the dairy actors opined that they didn't have enough access to accurate, timely and relevant information which increases transaction costs and results in inappropriate resource allocation.

Organized Market Structure

Small-scale dairy market is not well organized due to no fixed chain and price fluctuation hampers efficiency of value chain stated by 20% actors.

Governance

There was no market monitoring authorities opined by 65% actors to control the price variation; maintain quality feed, and healthy handle of bulk milk.

Cost, Return and Value Addition Analysis

Production cost and return of dairy

For calculating total production cost, both variable and fixed costs were taken into consideration. The components of variable cost were the feed cost (paddy straw, green grass, oil cake, molasses, bran and salt), labour cost, doctor cost, medicine cost, interest on operating capital and miscellaneous cost. Fixed cost items for milk production were land use cost, cowshed and maintenance cost. It is evident that total variable cost and fixed cost of milk production was Tk. 3715.02 and Tk. 309.28 per month per cow which was 92% and 8% of total cost. Among variable components, feed incurred the highest cost (79.13% of total cost) followed by interest on operating capital (5.53%) and labour. Net margin per quintal of milk was Tk. 2638.08 (Table 2).

Table 2. Total cost and return for small-scale dairy farming

Particulars	Tk. /month/cow	Percent of total
Production cost		
1.Variable cost	3715.02	92.31
A.Feed cost	3184.6	79.13
Paddy straw	219.3	5.45
Green grass	988.9	24.58
Oil cake	287.5	7.14
Molasses	264.3	6.56

Particulars	Tk. /month/cow	Percent of total
Bran	1080.0	26.83
Salt	216.6	5.38
B. Labour cost	166.66	4.14
C. Doctor cost	31.25	0.77
D. Medicine cost	104.16	2.58
E. Interest on operating capital	222.756	5.53
F. Miscellaneous cost	5.60	0.13
2.Fixed cost	309.28	7.68
A. Land use cost	186.4	4.63
B. Cowshed and maintenance	122.88	3.05
Total cost (Tk./month/cow) (1+2)	4024.30	100
Total cost (Tk./100 Litre)	3353.58	-

Gross return of per month per dairy cow

Particulars	Unit	Amount	Price/unit	Gross return (Tk/month)	Percent of total
Milk	Litre	120	50	6000	83.46
Cow dung	Kg	180	2	360	5
Calf	-	-	-	830	11.54
Total				7190	100

Gross margin and net return per month per dairy cow

Particulars	Amount per month
a. Gross return	7190
b. Variable cost	3715.02
c. Total cost	4024.30
d. Gross margin (a-b)	3474.98
e. Net margin (a-c)	3165.7
Net margin per 100 litre of milk (Tk.)	2638.08

Source: Field survey, 2017

Marketing Cost and Value Addition

Different items were associated with marketing cost of milk. The major marketing cost for milk producer was packing of milk with poly bag (48.40%). On the other hand, milk collector, *Faria*, and *Bepari* incurred the highest cost for transportation (47.62%, 55.17% and 50.40%) as a part of marketing cost. Milk retailer spent larger

portion of total cost for paying rent. Among different marketing actors, the highest cost was incurred by milk producers (Tk. 155/100 litre) followed by *Faria* (Tk.145) and milk collector. Total value addition and net value addition were highest for milk producer (Tk. 2246.42 and Tk. 2091.42 per 100 litre) compared to other marketing actors (Table 3).

Table 3: Marketing cost and value addition by different marketing actors of dairy value chain

Particulars	Tk. per 100 litre of milk				
	Milk producer	Milk collector	Faria	Bepari	Retailer
Marketing cost items					
Poly bags	75	-	-	-	-
Transportation	60	50	80	48.75	-
Milk container	20	15	15	0.50	-
Others (spoilage, gift, grant)	-	20	20	5	5
Personal expenses	-	20	30	20	-
Labour	-	-	-	17.50	-
Market toll	-	-	-	5	4
Rent	-	-	-	-	50
Electricity	-	-	-	-	11.30
Plastic bottle	-	-	-	-	20
Total marketing cost	155	105	145	96.75	90.3
Value addition items					
a. Production cost/Purchasing price	3353.58	5000	5600	6400	6600
b. Marketing cost	155	105	145	96.75	90.3
c. Selling price	5600	5600	6400	6600	6800
d. Total value addition (c-a)	2246.42	600	800	600	400
e. Net value addition (d-b)	2091.42	495	655	503.25	309.7
f. Total value addition (%)	51.58	12.20	16.15	12.41	7.63

Source: Field survey, 2017.

Note: For direct selling producers got Tk.56/litre of milk

Table 4 shows that milk producer's share in consumers' price was highest for channel- I and second highest for channel- V. Wholesaler's share in consumers' price was highest for channel- II, III, IV, and retailer's share in consumers' price was

highest for channel- VI. On the other hand, channel was ranked on the basis of marketing efficiency; the first and last ranked channel was channel I and channels VI.

Table 4. Actor's share in consumers' price and marketing efficiency of small scale dairy value chain

Channel	Milk producer's share in consumers' price	Wholesaler's share in consumers' price	Retailer's share in consumers' price	Marketing efficiency (ME)	Channel Ranking(On the basis of ME)
Channel I	100	-	-	5.02	1
Channel II	82.35	14.71	2.94	4.13	5
Channel III	82.35	14.71	2.94	4.41	3
Channel IV	82.35	14.71	2.94	3.79	2
Channel V	87.50	12.50	-	4.24	4
Channel VI	82.35	11.76	5.88	4.01	6

Source: Field survey, 2017.

Challenges and Opportunities for Dairy Production and Marketing

The weaknesses and threats of the small-scale dairy sector were more or less to all the sample farmers under the present study. Strengths and opportunities of this sector were similar too to the compatibilities of the small-scale dairy sector of these areas (Table 5).

Table 5. SWOT analysis of the small-scale dairy sector

Strengths	Weaknesses
<ul style="list-style-type: none"> • Large cattle population reared by vast rural population. • Growing milk demand in urban areas for changing life style due to education and income. • Availability of <i>Khas</i>, <i>Char</i> and high lands for pasturing cows. • Lower price of forage compared to other feeds. • Well communication among marketing actors. 	<ul style="list-style-type: none"> • Limited supply, poor quality and higher price of feed. • Mostly reared local breed cows. • Absence of quality control and improved milk production technology. • Absence of farmer's consciousness, animal husbandry and nutrition strategies. • Shortage of skilled and trained technical staff. • Insufficient artificial insemination facilities. • Lack of milk collection centers, dairy cooperatives and milk processing plant.

Strengths	Weaknesses
	<ul style="list-style-type: none"> Existing cultural indifferences milk is for children and the sick people. Lack of reliable and up-to-date information.
Opportunities	Threats
<ul style="list-style-type: none"> Increased demand for milk in various forms. Institutional market segments (such as hotels, hospitals, schools and universities) for dairy and dairy products are available. Existence of political stability and conducive investment climate. Undeveloped and low competition among producers. Access to well-developed train and road transport systems. 	<ul style="list-style-type: none"> Shortage of green grass during natural disaster. Higher prices of improved breeds. Weak financial base of the small scale dairy farmers. Loss of milk due to perishable nature. Unequal demand during rainy season and fasting period (month of Ramadan).

Source: Field survey, 2017.

CONCLUSIONS

The significance of dairy value chain analysis at small-scale is high as dairy sector is the means of livelihood of a large number of small farmers and traders; and it provides lion's share of the protein to the population of Bangladesh. It is found that dairy farming is profitable at small scale. The net value addition is positive and high at each level and profitable for traders. Farmers contributed to the highest value addition and *Faria* was the second highest contributor for their different services among all the actors of the value chain. Farmers and collectors practiced mostly on-going market price; *Faria* and retailer followed open bargaining and *Bepari* dependent on prefixed price for selling milk. Milk producer's share in consumers' price was highest in different channel. The highest share of marketing cost for milk producer was packing of milk which needs to be reduced for lowering cost of milk. Again, milk collector, *Faria*, and *Bepari* incurred the highest cost for transportation. There are both challenges and opportunities exist in the dairy sector.

REFERENCES

- Acharya, S.S. and Agarwal, N.L. (2004). *Agricultural Marketing in India* (4th Edition), Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, India.
- Achchuthan, S. and Kajanathan, R. (2012). A Study on Value Chain Analysis in Dairy Sector Kilinochchi District, Sri Lanka. *Global Journal of Management and Business Research* 12 Issue 21 Version 1.0.

- DLS (2014): Department of Livestock Services, *An overview*, DLS, Dhaka, Bangladesh.
- FAOSTAT (2011): Food and Agricultural Organization of the United Nations, *Statistical database* FAO, Rome, Italy. Retrieved from <<http://faostat.fao.org/>>. (Accessed on 30 April 2017.)
- Hobbs, J. (1996). A Transaction Cost Approach to Supply Chain Management. *International Journal of Supply Chain Management* 1(2): 15-27.
- ILRI (2010). FAO action program for the prevention of food losses. Milk and dairy products, post-harvest losses and food safety in sub-Saharan Africa and the near east. Regional approaches to national challenges. Synthesis report ILRI, Nairobi, Kenya.
- Kabir, M.H. and Talukder, R.K. (1999). Economics of small-scale dairy farming in Bangladesh under the government support programme. *Asian-Australian Journal of Animal Science*, 12 (3), 429-434.
- Land O'Lakes (2010). The Next Stage in Dairy Development, Dairy Value Chains, End Markets and Food Security. Land O'Lakes, Inc, IDD. Addis Ababa, Ethiopia.
- Mandal, A.K. (2006). Supply Chain Analysis of Wholesale Milk Market in Selected Areas of Dhaka District. M.S. Thesis, Department of Co-operation and Marketing, Bangladesh Agricultural University, Mymensingh.
- Michael, J. (1991). "Dairy Development in Sub-Saharan African-A study of issues and options", World Bank Technical paper, Number 135, The World Bank, Washington, D.C., U.S.A. cited from Pandit 1993.
- O'Lakes, L. (2010). The next stage in dairy development for Ethiopia: Dairy Value Chains, End Markets and Food Security. Cooperative agreement 663-a-00-05-00431-00. USAID and Land O'Lakes. Addis Ababa, Ethiopia.
- Porter, M. and Michael, E. (1985). *Competitive Advantage*. The Free Press, New York. pp.11-15.
- Shamsuddoha, A.K. and Edwards, G. (2000). Dairy Industry in Bangladesh: Problems and Prospects. Paper for AARES 2000 Conference, Dhaka-1209, March 20, 2000.
- Seifu, E. and Doluschitz, R. (2014). Analysis of the dairy value chain: Challenges and opportunities for dairy development in Dire Dawa, Eastern Ethiopia. *International Journal of Agricultural Policy and Research*, 2(6): 224-233.
- UNIDO. (2009). United Nations Industrial Development Organization, Annual Report 2009 UNIDO, Vienna, Austria.
- Weindlmaier, H. (2003). The milk value chain. Concept, possibilities of optimization and areas of conflict. *Deutsche Milk chwrirts chaft*, 54(3): 109-111.