MARKETING AND FINANCIAL ANALYSIS OF MILK PRODUCTION- A VALUE CHAIN PERSPECTIVE

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ABSTRACT

Livestock is the premier animal protein supply cradle to human dietary menu and milk is considered as one of the best diets for human nutrition. Gap between demand for and supply of milk is acute in the country. Triggering these views, the study taken objectives were to estimate profitability of milk production and to determine value addition at different levels of milk marketing. Study areas were selected from three districts namely Panchagarh, Chittagong and Sylhet, purposively considering the representation of normal milk available area, milk pocket area and milk deficit area. Total sample size was 390 (300 farmers and 90 traders). Simple random sampling technique was followed for selecting the respondents. Field survey method was adopted to collect primary data from January to March/2016. The study reveals that the production cost of milk for cross-bred cattle was estimated BDT 43,673/ ton. Per ton net return was estimated for cross-bred cattle BDT 2,543. Average gross margin and net margin per 100 liters of milk for milkmen was estimated BDT 5,479 and BDT 969, respectively. In case of sweet seller, average gross margin and net margin per 100 liters of milk (equivalent to 67 kg sweets) were estimated BDT 11,888 and BDT 4,875, respectively. For tea sellers, average gross margin and net margin was also estimated BDT 12,537 and BDT 6,194, respectively. It was observed that value chain actors i.e. milkmen, sweet seller and tea seller added value. On average, milkmen added value 29%, sweet seller 150% and tea seller 175%.

Contribution/ Originality: This study is one of very few studies which have investigated the current status of profitability of milk production and its marketing channels where various market actors are involved. It has also estimated the marketing margins and value addition of by the actors.

1. INTRODUCTION

Milk is an ideal food and enriched with a high nutritional value. It contains all components that are required by the human body in appropriate amount and in a very easily digestible way. Moreover, intake of milk increases the digestibility of other types of food. Livestock is the premier sources of milk and integral part in the economy of Bangladesh. Livestock creates employment generation 20 per cent directly and 50 per cent partially and livestock population in Bangladesh was 539.72 lakh where cattle are 236.36 lakh and buffaloes are 14.64 lakh (DLS, 2015). In fiscal year 2014-15, total milk production was 69.70 lakh metric tonns whereas demand for milk was 144.81 lakh metric tonns. Per capita milk availability was 122 ml/day and deficiency was 75.11 lakh metric tonns (DLS, 2015).

Therefore, there is a huge gap between demand for milk and supply of milk. Sufficient milk production and its marketing needed proper attention to minimize the gap. Uddin and Islam (2011) in a study stated that number of dairy cattle per family decreased overtime. Irrespective of regions, per household average production of milk varied from 311 to 762 liters. In the same study, he stated that intake of milk did not show any consistent trend over time and the amount of intake was much higher than the national average. Rabbani *et al.* (2004) performed a socioeconomic study on the participation of rural people in dairy enterprise and showed that large farmers raised the cross-bred cows and small farmers raised the indigenous cows. Kuddus (2006) performed a study to know the profitability of dairy farming, milk consumption pattern and marketing system of dairy owners and found from the study that net return of dairy milk in commercial region was significantly higher than that of other regions due to rearing of cross-bred cows and feeding them high quality feed. It was observed the milk production in Bangladesh is increasing over the year i. e. in financial year 2003-04, production was 1.99 million tons whereas in 2012-13, production was 5.07 million tons (BBS, 2013).Though the demand for milk and milk products are increasing due to rapid population growth and educated people are much conscious about nutrition. In fact, in most of the cities and towns, milk supply is scanty instead of its high demand. But research in this arena is limited. The present study will be able to find out the handicrafts of milk production and marketing, the comparative advantage of milk and suggests policy guidelines which will assist the researchers, academicians and planners.

1.1. Objectives of the Study
    i.   To estimate profitability of milk production; and
    ii.   To determine value addition at different levels of milk marketing by market actors.

2. METHODOLOGY
The methodology followed for the study was as follows:

Study areas were selected from three districts namely Panchagarh, Chittagong and Sylhet of Bangladesh representing normal milk available area, milk pocket area and milk deficit area in terms of native milk producton. The selected Upazilas were Tetulia and Debiganj under Panchagarh district, Anwara and Patiya under Chittagong district and Jaintiapur and Gowainghat under Sylhet district. The selected samples were consisted of 300 farmers and 90 market actors. The total sample size was 390 (Table 1& 2). In this study, we selected those farmers who reared dairy cattle for their livelihood and the traders who had supplied fresh milk and milk made products to the consumers.

Table-1. Distribution of sample farmers and traders in the study areas

Sample Types	Panchagarh		Chittagong		Sylhet		Total
	Tetulia	Debiganj	Anwara	Patiya	Jaintiapur	Gowainghat	
Farmers	50	50	50	50	50	50	300
Market actors	30		30		30		90
Total							**390**

(**Source:** Field survey 2016).

Table-2. Sample distribution of market actors in the study areas

Market Actors	Panchagarh	Chittagong	Sylhet
Milkmen	11	19	6
Sweet seller	9	6	9
Tea seller	10	5	15
Sub-total	30	30	30
Total	**90**		

(**Source:** Field survey 2016).

Simple random sampling technique was followed for selecting the respondents. Field survey method was followed to collect primary data from January/2016 to March/2016. Data were collected from respondents by using structured interview schedule and conducting FGD (Focus Group Discussion) for group information. The structured interview schedules were developed and field-tested for necessary rearrangement and modifications before starting data collection. Data were collected through direct interviews making personal visits to the house of selected farmers. Secondary data and information were collected and discussed for this research from different handouts, reports, publications, notifications, etc.

2.1. Profitability Analysis

In this study, costs and returns analysis was done on total cost basis. The following equation was used to assess the profitability of the milk producers.

$$\prod i = \sum_{i=1}^{n} P_i Q_i - TC = \sum_{i=1}^{n} P_i Q_i - (VC + FC)$$

Where,

$\prod i =$ Profit from i^{th} dairy farm

$Q_i =$ Quantity of the ith milk production (Lit./lactation period)

$P_i =$ Average price of ith milk product (BDT/Lit.)

TC= Total cost (BDT/ton milk production)

FC= Fixed cost (BDT/ton milk production)

i= 1, 2, 3,........, n

Per ton profitability of milk production from the view point of individual farmers was measured in terms of gross return and gross margin.

2.2. Marketing System

Network analysis mainly graphical technique was performed for this identification. First, market actors were identified. Second, volume of trade through each actor was measured. Third, a market chain was drawn.

2.3. Calculation of Marketing Margin and Net Margin of Value Chain Actors

The marketing margin and net margin of different value chain actors were estimated by the following formulae:

$$GM_i = P_{R_i} - P_{P_i}$$

Where,

$GM_i =$ Gross margin (BDT/Lit) for i^{th} intermediaries

$P_{R_i} =$ Price received (BDT/Lit) by i^{th} intermediaries

$P_{P_i} =$ Price paid (BDT/Lit) by i^{th} intermediaries

$$NM_i = GM_i - MC_i$$

Where,

$NM_i=$ Net margin (BDT/Lit) for i^{th} intermediaries

$MC_i =$ Marketing cost incurred (BDT/Lit) for i^{th} intermediaries

2.4. Estimation of Value Addition by Value Chain Actors

$$Value\ addition(\%) = \frac{(Sales\ price - Purchased\ price)}{Purchased\ price} \times 100$$

3. RESULTS AND DISCUSSION

3.1. Milk Marketing Value Chain Actors and the Value Chain Map

Milk markets attempts to identify the actors involved in the milk value chain to construct value chain map and to estimate the value addition by market actors and milk processors. Value addition is primarily explained as the difference between total expenses involved in processing or buying of a specific goods and the total revenue accruing from its sales. Value addition activities are mainly concerned with the changes of utilities. When any product passes through distribution channels, it creates place, time, and form utilities. For this reasons, in this section, the study dealt with identifying the actors involved in value chain and their function of milk marketing.

Input suppliers: Milk value chain starts from input suppliers. Concentrate, green fodder, artificial insemination service providers, veterinary health care service from Upazila veterinary hospital etc. are the prime inputs for milk production. So, inputs providers play a vital role in the milk value chain as they supply those inputs to the farmers.

Dairy farmers: Dairy farmers are the production points from where the milk supply is started. Dairy farmers depend on input suppliers for producing milk to the market actors.

Milk processors: Milk processors are market actors who have permanent infrastructure with milk processing equipment. They have huge amount of operating capital. They processed milk and supply it to retail shop for retailing. Prime milk processors in Bangladesh are Milk vita, PRAN, Fresh milk etc.

Sweet seller: Sweet sellers are milk processors. They made sweet meat from milk. Sweet seller, on average, bought from 20-100 liters of milk and processed for sale. Most of the time, it has seen that, they have permanent shop structure and sometimes not.

Tea seller: As a milk value chain actor, tea seller had a significant role. Tea seller bought milk and made tea with those milk. Besides, sometimes, they sold hot milk to the consumers and the consumer drunk milk instantly. Tea seller had permanent shop structure. On average, they purchased from 5to 10 liters of milk per day.

Milkmen: Milkmen were market actors who purchased milk from the dairy farmers and sold it to sweet seller, tea seller, and to the ultimate consumers. They had no permanent infrastructure for selling milk. Actually they were a vendor.

Consumers: Consumers were the last segment in the milk value chain actors. They purchased sometimes processed milk and raw milk from dairy farmers milkmen.
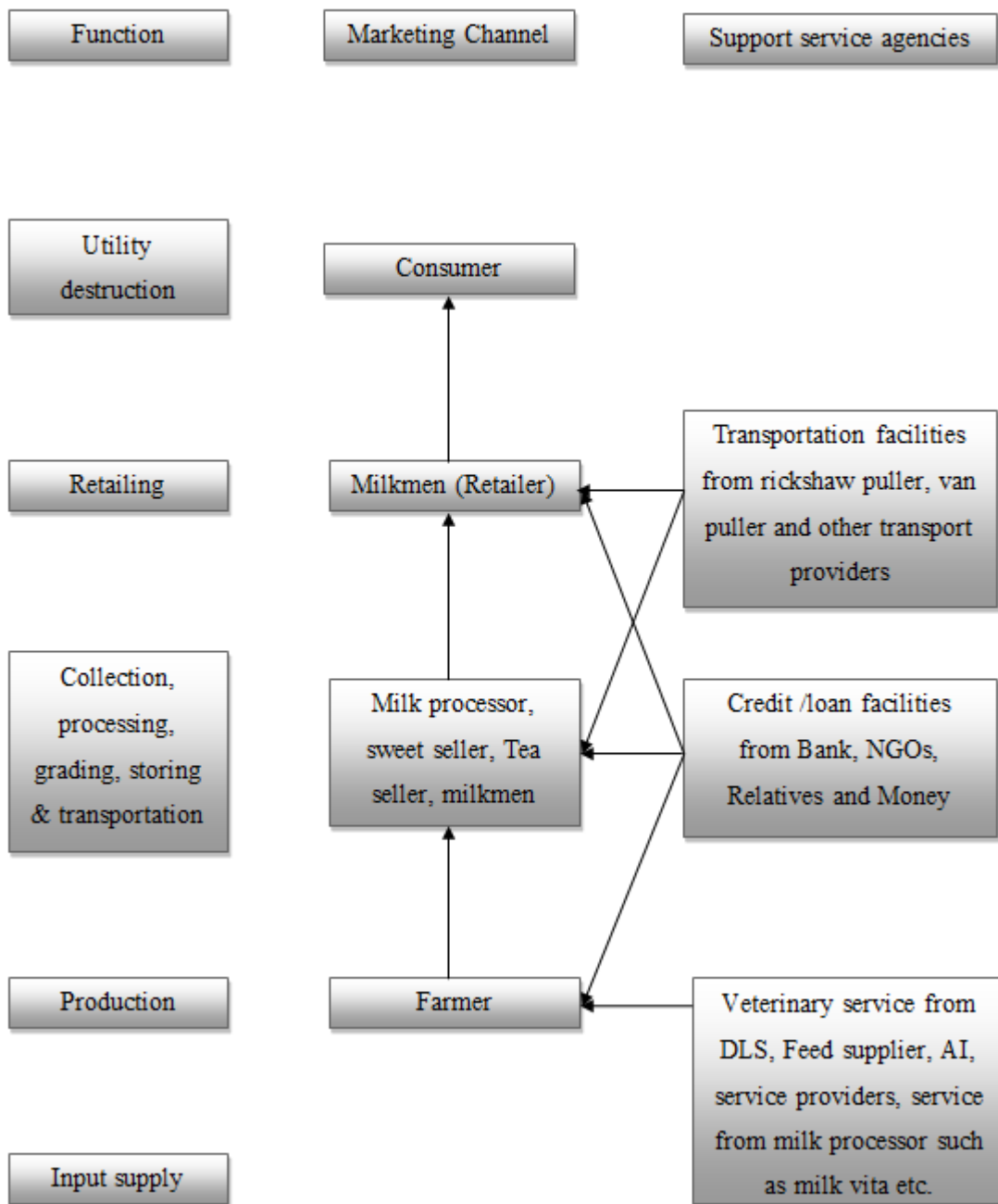
Value Chain Map

Fig-1. Value Chain Map of Milk
(**Source:** Field survey 2016).

3.2. Value Chain Governance

Milk distribution channels: In the study area, the highest amount (39%) of milk was flowed from dairy farmers to consumers through retailer (milkmen) followed by 28% sweet seller, 26% directly flowed from dairy farmers to consumers, 5% tea seller and only 2% milk processors respectively. Beyond dairy farmers sweet seller and tea seller were collected milk from milkmen also. Among 39% milk of milkmen, 1% flowed to tea seller, 9% to sweet seller and the remaining amount (29%) to the consumers.
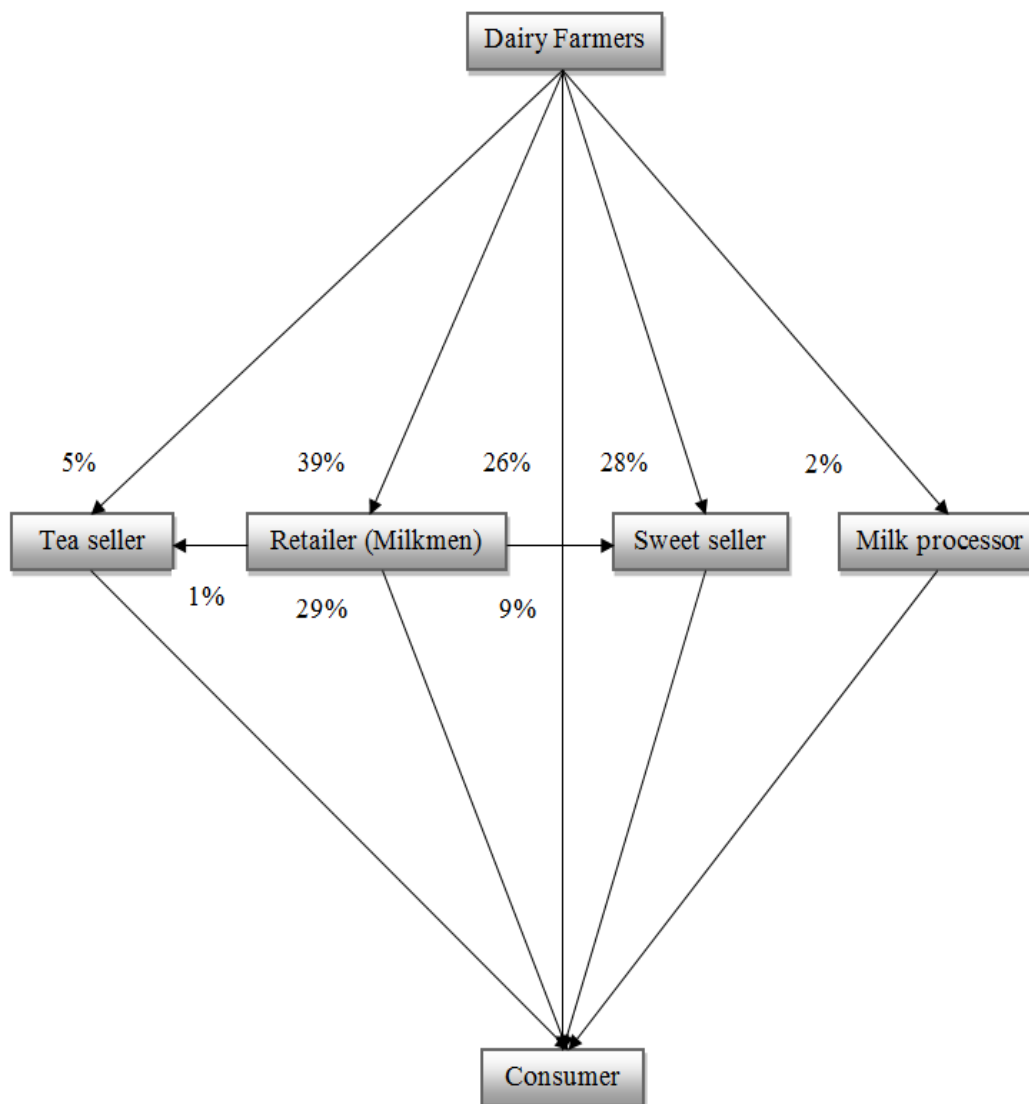
Fig-2. Milk Marketing Flow Chart

(**Source:** Field survey 2016)

Marketing channels: Study found seven (7) marketing channels. Among these, channel IV was the leading followed by channel II, channel I, channel III and channel V, respectively. It was the prime cause for milk market volatility and price instability.

Production cost of Milk (cross-bred): The study revealed that the production cost of milk for cross-bred cattle was estimated BDT 43,673/ton where variable cost was BDT 41,381/ton and fixed cost was BDT 2,291/ton. In variable cost items, feed cost BDT 23,529/ton that was 54% of the total cost. Human labour cost hold the second highest cost and which was 39% of the total cost. Among total cost variable and fixed cost was found 94.75% and 5.25%, respectively (Table 4).

Table-4. Cost of producing milk in Bangladesh (Cross-bred)

Cost		BDT/ton	
A. Variable cost		Fresh milk	Percentage (%)
Human labour		16953	38.82
Feed cost	Dry roughage	3816	8.74
	Green fodder	4002	9.16
	Concentrate	15711	35.97
Medicine & vitamin		854	1.96
Vaccination		45	0.10
Total variable cost		**41381**	**94.75**
B. Fixed cost			
Capital cost of housing		91	0.21
Capital cost of Animal before first calving		2200	5.04
Total fixed cost		**2291**	**5.25**
Total cost		**43673**	**100.00**

Source: Field survey2016 and author's calculation.

Profitability: It was found from that variable cost was incurred BDT 41,381 for per ton milk production by rearing cross-bred cattle where fixed cost was BDT 2,291. Per ton gross cost was estimated BDT 43,673 and gross return was estimated was BDT 46,206, respectively. Per ton net return was estimated BDT 2,543. The BCR (undiscounted) was calculated 1.06, if considered only milk production. If the study added the value of a one year old calf, the BCR went up and it was 1.42 (Table 5).

Table-5. Profitability of producing fresh milk in Bangladesh (Cross-bred)

Costs & Returns	Fresh milk /ton
A. Variable cost	41381
B. Fixed cost	2291
C. Gross cost (A+B)	43673
D. Gross return	46206
E. Gross margin (D-A)	4825
F. Net return (D-C)	**2534**
G. BCR (Undiscounted)	**1.06**

Source: Field survey2016 and author's calculation.

Margins of Market Intermediaries: Average gross margin and net margin per 100 liters of milk for milkmen was estimated BDT 5,479 and BDT 969, respectively. In case of sweet seller, average gross margin and net margin per 100 liters of milk (equivalent to 67 kg sweets) were estimated BDT 11,888 and BDT 4,875, respectively. Tea sellers` average gross margin and net margin was also estimated BDT 12,537 and BDT 6,194, respectively in the study areas (Table 6).

Table-6. Margins of market intermediaries in the study areas

Areas	Actors	A. Gross margin	B. Purchase value	C. Marketing cost	BDT/100 liters
					D. Net margin
Panchagarh	Milkmen	4338	3577	157	604
	Sweet seller	10878	4202	1725	4951
	Tea seller	12624	4355	922	7347
Chittagong	Milkmen	6187	4332	494	1361
	Sweet seller	11840	4632	2245	4963
	Tea seller	13153	4873	1975	6305
Sylhet	Milkmen	5913	4827	144	942
	Sweet seller	12946	5496	2739	4711
	Tea seller	11833	4469	2435	4929
All Average	Milkmen	5479	4245	265	969
	Sweet seller	11888	4776	2236	4875
	Tea seller	12537	4567	1777	6194

Source: Field survey2016 and author's calculation.

Value Addition: Value addition among the milk value chain actors in the selected areas was estimated in this study. It is observed that the all value chain actors i.e. milkmen, sweet seller and tea seller added different types of value. On an average, milkmen added value 29%, sweet seller 150% and tea seller 175% (Table 7).

Table-7. Value addition by market actors in the study areas

Areas	Actors	Sales price	Purchase price	BDT/100 liters
				Value addition (%)
Panchagarh	Milkmen	4338	3577	21
	Sweet seller	10878	4202	159
	Tea seller	12624	4355	190
Chittagong	Milkmen	6187	4332	43
	Sweet seller	11840	4632	156
	Tea seller	13153	4873	170
Sylhet	Milkmen	5913	4827	22
	Sweet seller	12946	5496	136
	Tea seller	11833	4469	165
All average	Milkmen	5479	4245	29
	Sweet seller	11888	4777	150
	Tea seller	12537	4566	175

Source: Field survey 2016 and author's calculation.

4. CONCLUSION AND RECOMMENDATION

The study reveals that the production cost of milk for cross-bred cattle was estimated BDT 43,673/ ton where variable cost was BDT 41,381/ ton and fixed cost was BDT 2,291/ton. In variable cost items, human labour occupied the highest (16953/ton). Per ton net return was estimated for cross-bred cattle BDT 2,543. Average gross margin and net margin per 100 liters of milk for milkmen was estimated BDT 5,479 and BDT 969, respectively. In the case of sweet seller, average gross margin and net margin per 100 liters of milk (equivalent to 67 kg sweets) were estimated BDT 11,888 and BDT 4,875, respectively. Tea sellers` average gross margin and net margin was also estimated BDT 12,537 and BDT 6,194, respectively in the study areas. Value addition among the milk value chain actors in the selected areas was estimated in this study. It is observed that the all value chain actors i.e. milkmen, sweet seller and tea seller added different types of value. On average, milkmen added value 29%, sweet seller 150% and tea seller 175%. GOs-NGOs along with other organizations should come forward to invest more for R & D and to boost up livestock sector in developing high yielding milk breeds and pay attention for milk market stabilization through establishing mini milk processing plant throughout the country which would be a sustainable development approach in milk sector.

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