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A CASE STUDY OF PUNGDZONG DAIRY FARMER'S GROUP: ANALYSIS OF MILK VALUE CHAIN

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ABSTRACT: This applied research is an attempt to analyse the effectiveness of milk marketing and facilitate developing a sustainable milk value chain for dairy farmer's groups in Punakha district. Both quantitative and qualitative methods of survey, key informant interviews and focus group discussion were used as research strategies to obtain relevant information. The survey was conducted using both open and closed-ended structured questionnaire in seven subdistricts of Barp, Dzomi, Guma, Kabisa, Shelnga-Bjemi, Talog and Toedwang. A total of 60 respondents; 30 existing milk suppliers and 30 non-milk suppliers were drawn using a simple random sampling technique. One-to-one interviews were conducted following semi-structured questions with eight key informants in the chain. One focus group interview was conducted with the existing dairy farmer groups representatives to triangulate and discover in-depth information about the situation of the milk value chain in the district. The survey data was analysed using the Statistical Package for Social Sciences software version 20. A method of grounded theory design was used to analyse the qualitative data of interviews and focus group discussion. Value chain mapping was employed for assessing the operational situation of the current milk chain. The mean cost of milk production was estimated at Nu.27.53 per litre and the maximum expenses were incurred in animal feeds which were estimated to be 46.34% of the total cost of milk production. In this study, milk producers had the highest share of added value and profit which were estimated at 45.45% and 44.85% respectively. Limited information and coordination amongst stakeholders have contributed to slow progression in the formal milk market. The finding reveals that 90% of non-dairy farmer groups respondents were interested in joining formal milk marketing. The average morning milk available for supply from this group would be 4.41 ± 3.07 litres daily by each household. The study also found that 50% of the respondents were interested in supplying evening milk with an average of 4.43 ± 2.25 litres per day per household. Based on the result of this study, it was concluded that there are possibilities of expanding the milk value chain in the district. However, there is a need to enhance consistent milk supply through a quality-based milk payment system, access to reasonable input supplies, and facilitate strong multi-stakeholder processes along the milk value chain.

Keywords: Dairy farmer groups; milk; stakeholders; value chain.

1. INTRODUCTION

Dairying in Bhutan is a very important economic activity to the farmers and a flourishing sector with various resources and potentials. By volume, 21.88% of liquid milk is consumed in the country out of 50,250.50 MT of milk produced in 2017 (Department of Livestock [DoL] 2018). It has also reported that self-sufficiency for fresh milk, butter and cheese combined is 88.80% as of 2017 (DoL 2019). The average per capita milk consumption for Bhutan stands over 68 kg of milk per year, while the average global milk consumption according to Hemme and Otte (2010) was about 100 kg of milk per year, indicating significant differences between developed and underdeveloped countries.

The scenarios of a future dairy value chain in developed countries are intended towards producing differentiated raw milk with improved manufacturing practices, reduced the production of individualistic dairy products and shift towards environmentally sustainable dairy farming with improved animal welfare (Demeter et al. 2009). However, for developing countries, the

scenarios of a dairy value chain are still in infant stages. The study conducted by Muhamma et al. (2014) on dairy supply chain management and critical investigations on dairy informal channel partners in Pakistan revealed that without formal dairy value chain, most of the milk producers and consumers are facing economic, social and health losses due to informal dairy supply chain partners. The United Nations Development Programme (2016) reported that the surplus milk and milk products produced by the typical Bhutanese dairy farmers' are sold both through the informal and formal markets. The author refers informal system for the sells of milk and milk products to neighbours and in the local market, while formal system refers to the collection of milk through organised dairy farmers' group initiative at the milk processing unit.

The milk value chain in Punakha district has both formal and non-formal milk marketing system. The formal market is functioned mainly by organised Dairy Farmer Groups (DFGs) and links the market in a coordinated chain. The informal market is primarily practised by individualist dairy farmers that are not registered in a group. The district recognises collective action thorough DFGs as a positive force for developing the dairy sector and has formed 19 DFGs so far. In the year 2017, five DFGs from four subdistricts of Dzomi, Guma, Kabisa and Toedwang with a total of 99 members have started fresh milk supply and marketing at Khuruthang town in Punakha district.

The main constraint of this milk value chain is insufficient milk supply. As a result, the milk processor is not able to use maximum plant capacity to collect, process and sell milk and milk products for better economic gains. Thus, this study will respond to the need for a clear analysis of the milk value chain in the district. The research will also enhance the decision-making ability of the milk processor, other chain actors and supporters to invest in expanding the milk value chain.

2. MATERIALS AND METHODS

2.1 Study area

The study was conducted at seven subdistricts; four existing subdistricts (Dzomi, Guma, Kabisa, Toedwang) currently supplying the milk and three new subdistricts (Barp, Shelnga-Bjemi, Talo) which are near and having potentials to deliver milk in the milk processing unit (Figure 1).

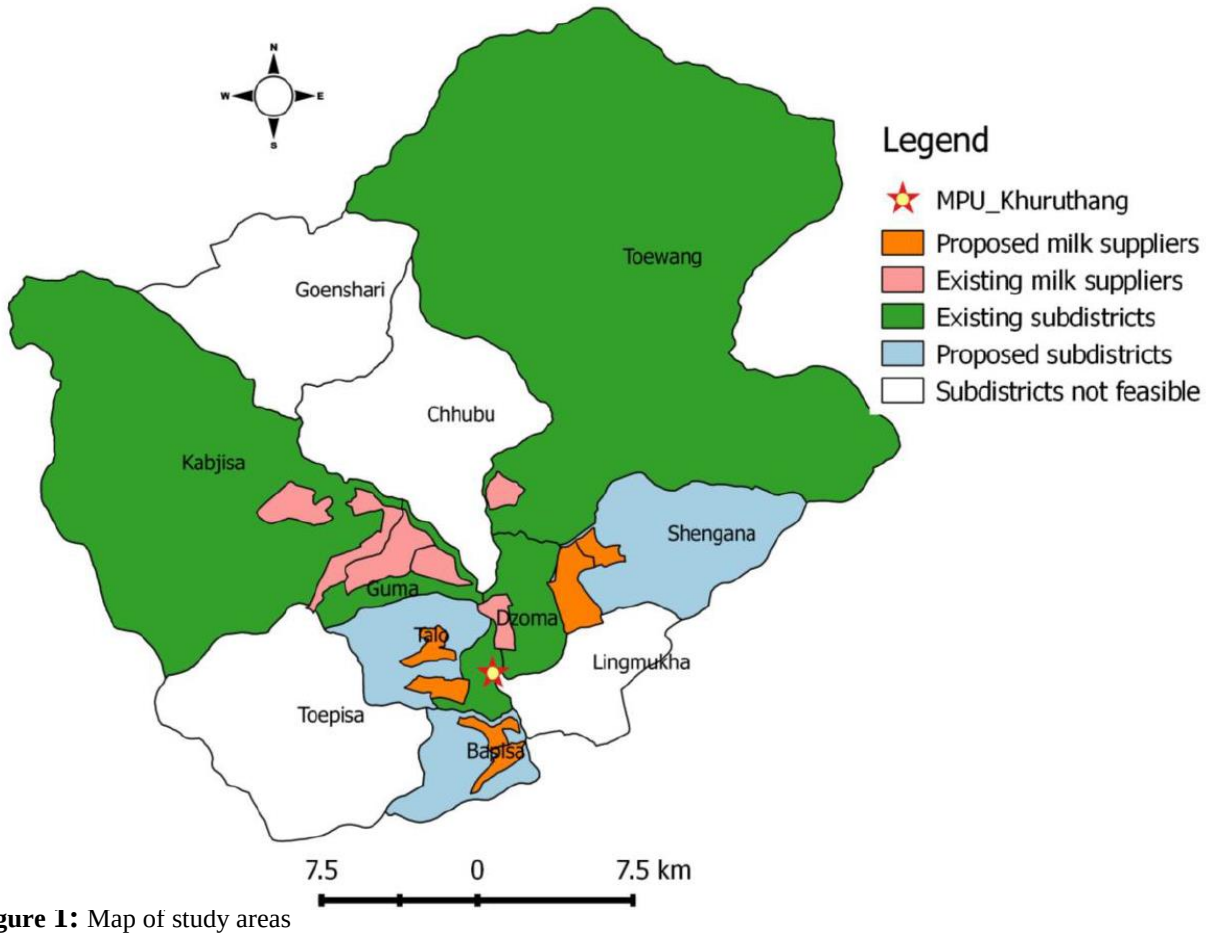

Figure 1: Map of study areas

2.2 Research methods and sample size

2.2.1 Survey

A sample of 30 respondents was drawn using simple random sampling technique from 108 registered Pungdzong dairy group members currently engaged in milk supply and marketing chain from four subdistricts of Dzomi, Guma, Kabisa and Toedwang. Similarly, a total of 30 respondents out of 76 non-dairy group farmers from three subdistricts of Barp, Shelnga-Bjemi and Talog. This technique had been proposed confirming each member had an equal probability of being chosen through random draws using random calculating function Microsoft Excel 2016. The top 30 samples drawn from the sampling frame were surveyed from both groups

2.2.2 Key Informant Interviews

One-to-one interviews were conducted following semi-structured questions to gather as much information as possible. The conduct of these interviews with key informants assisted to collect a varied and wide range of open-ended, both qualitative and quantitative data required to identify possibilities towards increasing milk supply. Purposive sampling technique was considered to conduct key informant interviews with milk transporters, processor and supporters in the chain as mentioned in Table 1.

2.2.3 Focus group discussion

One group discussion (focus group) was initiated between the representatives of existing DFG having similar characteristics or experiences. It was aimed to discover in-depth information about how groups think about expanding the milk value chain in the district and triangulate on varying information gathered during the survey and key informant interviews. Thus, focus group discussion was organised using checklist questions after the completion of the survey and interviews and shared results of the survey and key informant interviews for further triangulation.

Table 1: Overview of key informant interview respondents

No/Code	Function of interviewee	Current Address
KI1	Milk transporter	Dzomi-Toedwang area
KI2	Milk transporter	Guma-Kabisa area
KI3	Processor	MPU- Khuruthang
KI4	Livestock Extension Officer	Toedwang
KI5	Livestock Extension Officer	Kabisa
KI6	District Livestock Officer	Punakha
KI7	Head of Livestock Regulatory Unit	BAFRA, Punakha
KI8	Head of Feed & Fodder Unit	RLDC, Wangdue

2.3 Data Analysis

2.3.1 Quantitative data

The data collected from the survey was computed using MS Microsoft Office Professional Excel 2016, and the coded data were analysed using Statistical Package for Social Sciences (SPSS) IBM statistics version 20.

Both descriptive (mean, proportion, crosstab) and inferential (Chi-square) statistics were used to analyse the data. Simple bar graph, pie charts and contingency tables were used where appropriate to interpret and present the survey findings.

2.3.2 Qualitative data

A method of grounded theory design was used to analyse the qualitative data of interviews and focus group discussion following five logical steps of organising data in fragments, determining the relevance, open coding, axial coding and selective coding (Baarda 2014). The findings of grounded theory were organised around the key dimensions identified in the conceptual framework.

2.3.3 Other analytical tools

This study had used simple value chain mapping to chart existing and future milk value chain in the district. Through this chain mapping, clear segmentation of the various actors, supporters and facilitators involved in the chain were mapped.

3 RESULTS AND DISCUSSIONS

3.1 Analysis of existing milk value chain

The value chain in Punakha district has both formal and non-formal milk marketing system (Figure 2). The formal market is functioned mainly by organized DFGs and links the market in a coordinated chain. The informal market is primarily practiced by individualist dairy farmers that are not registered in a group. The total milk production in the district was 1261 MT in the year 2018 recording a growth every year (DoL 2019).

The statistics also indicated that 108 MT of milk was sold as fresh milk through formal and informal milk market. Similarly, the data maintained by District Livestock Sector recorded a little over 86 MT of milk collection by MPU in 2018 through the formal milk market which is 79.63% of the total estimated fresh milk marketed in the district**.**

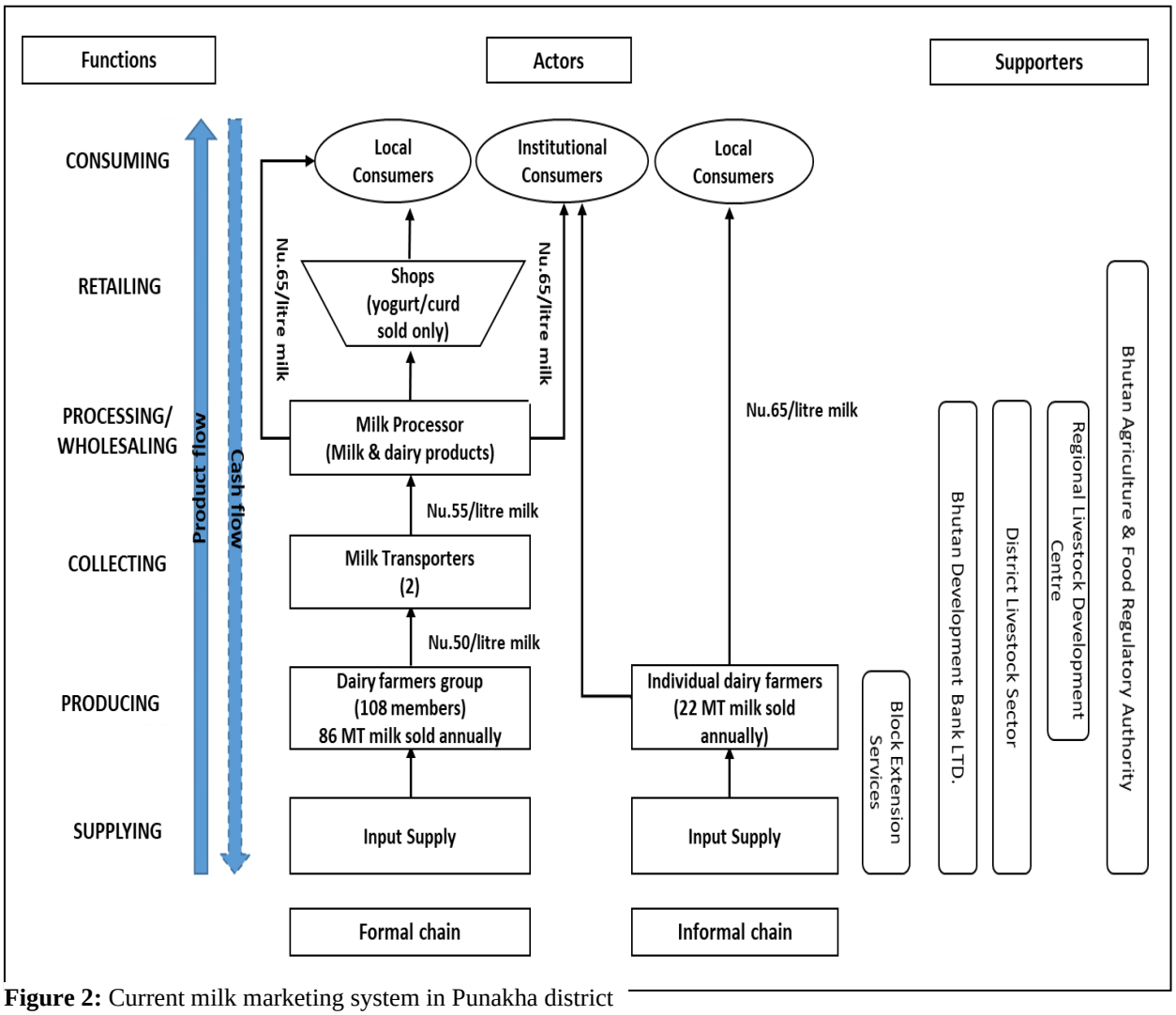

Figure 2: Current milk marketing system in Punakha district

3.2 Cost of producing milk

The maximum milk production expenses as illustrated in Figure 3 were incurred in animal feeds (46.34%) and minimum (12.80%) for the cost of other expenses that includes depreciation and maintenance of dairy sheds, and interest of herd value. The COP was estimated at Nu.27.53 per litre milk in the study area. The variable costs shared most of the total production costs and are like the findings of Kaur et al. (2012) and Kumawat et al. (2014). It is quite complex to compare the milk COP and economic performance of the milk value chain. There is variation in calculating the COP of milk from one producer area to the next and mainly depends on costs and availability of resources to manage the dairy farming.

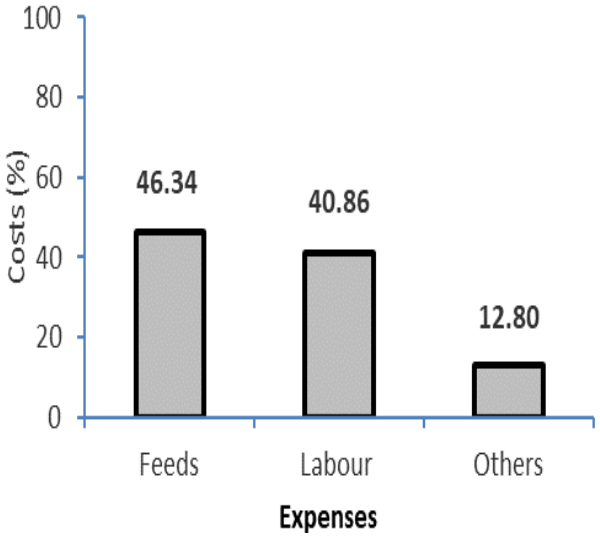

Figure 3: Distribution of milk production costs

3.3 Economic performance of the milk value chain

Figure 4 illustrates the distribution of profit and added value share among the chain actors in the milk value

chain. This value chain is a typical chain in which the milk producers lead the chain forward and the majority (45.45%) of the added value of the chain is captured by the milk producers. The result also shows that milk producers receive the largest share (44.85%) of the profit, while the milk transporters get the marginal profit of only 1.83% of the total profit made in the chain.

Milk processor who has a constant risk of meeting the consumer demands in terms of quality products compounded by competition for the insubstantial market from other districts for the same brand of dairy products takes the second position in the profit share. It should also be justified that milk processor has to bear fixed costs (staff salaries, rental charge, interest, depreciation) which constituted the maximum proportion of costs for the milk processor. This contradicts the findings of Ishaq

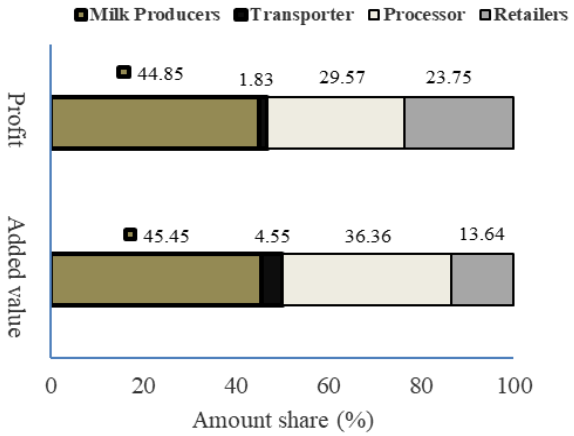

Figure 4: Distribution of profits and added value in the formal milk marketing system

Table 2: Stakeholders analysis for the milk value chain in Punakha district

Stakeholders	Key Roles	Supporting forces to expand the milk value chain	Hindering forces to expand the milk value chain
Dairy producers	Fresh milk production and delivery	Trained farmers on milk production and quality control. Strong Government support to DFGs	Limited landholding for feed and fodder development. Low yielding dairy cattle. Difficulty in land leasing.
Milk transporters	Milk collection and transportation	A reliable source of income	Insufficient milk collection particularly during winter Late delivery of milk at the collection point by dairy producers. Less profitable during winter because of high transportation costs and less milk collection. Difficulty in maintaining milk quality especially during the rainy season without the proper milk collection sheds.
Processor	Milk bulking, processing, packaging and sales	Income and employment opportunities. Trade policy and regulation	Insufficient milk supply Inconsistent milk supply
District/Extension Officer (subdistrict)	Provide livestock extension, animal health services and capacity development	Clearly defined roles, functions and institutional setup (DoL, 2016) Aligned in 12th FYP documents at the district level.	Fewer linkages between the chain actors and supporters. Lack of technical expertise on the milk value chain and product diversification. Limited landholding for dairy farmers to facilitate improved fodder development.
RLDC	Post-production and marketing activities	Clearly defined roles, functions and institutional setup (DoL, 2016). Aligned in 12th FYP documents at a regional level.	Limited approved budget to perform post-production activities in the region. Poor marketing system in place (congesting the already limited market place by competing on similar products between the DFGs in the region).
BAFRA	Quality control and food safety measures	Food rules and regulation of Bhutan 2017	Limited manpower to conduct the frequent regulatory check. Limited budget to conduct milk quality standards and educational program for the chain actors.

et al. (2016) who had reported that dairy processing in the existing value chain plant has a larger share of profit in the formal milk marketing system. It should be noted that this unequal distribution of profit and added value share proves the captive governance led by milk producers and may raise concerns about the sustainability of the formal milk market in particular. At present, the procurement price of milk is determined subjectively on quantity and market forces without considering the COP. The result of this analysis is important to recognise that the COP is considered as a benchmark upon which to base their milk supply decisions in the district. It is also important to note that this information will justify the persistent perception and claims by milk producers that milk price payment does not cover milk COP on their farm.

3.4 Gap analysis of stakeholders in the formal milk market

As shown in Table 2, the institutional framework of different respondents was identified and analysed according to chain functions and their supporting roles in the functioning of the milk value chain in the district. The study found that fresh milk supply and marketing activity is new in the study area and there are overlapping functions in carrying out milk value chain activities. What was revealed from all key informant interview respondents were that limited information and coordination amongst stakeholders have contributed to slow progression in the milk supply and marketing chain. Poor stakeholder linkages were also raised during FGD. Many respondents also agreed that there is limited participation from local government in this chain although they were instituted to support the active participation of people in their own development. All the key informants interviewed agreed on not having even a single stakeholder meeting conducted regarding milk value chain in the district.

Although milk producers, transporters and processor are the core stakeholders in this formal value chain, external supporters have an important role to play in supporting the milk value chain in order to realise the common benefit. It is only possible through greater coordination and cooperation between the stakeholders. The question now is about the changes that the milk chains need to undergo to mainstream value chain approach in the district. The District Livestock Sector who is the main supporters of the chain has to become effective chain facilitator between other supporters and to even third sector partners. A similar conclusion was reached by Nyokabi et al. (2018) who mentioned that the government is the most powerful actor in the dairy sector, as it designs and implements policies in collaboration with stakeholders. The Local Government of the area which has a limited role in the existing chain requires attention as they are charged with both administrative and financial role to bring development in people. Thus, it is important to highlight that one of the best models is through a co-governance system where every stakeholder accepts and plays an important role in mainstreaming milk value chain in the district.

3.5 Opportunities towards increased milk supply

3.5.1 The readiness of Non-DFGs in the formal milk market

Contingency table showing the Non-DFGs respondents' problem in selling fresh milk and their interest in joining the formal milk market is shown in Table 3. Statistically, the result showed a significant correlation between the problem in selling fresh milk and their interest in joining the formal milk market, χ^2 (1) = 6.00, p = 0.01. Among 30 respondents; 25 respondents had reported having a problem in selling fresh milk and the other 5 respondents mentioned having no problem in selling fresh milk. When asked about respondents' interest in joining the formal milk market, 27 (90%) respondents show interest in joining formal milk marketing with Pungdzong DFGs, while 3 respondents have no interest in joining formal milk marketing. The study showed that the daily average morning milk available for supply by each household was 4.41 ± 3.07 litres of milk. It is almost impossible for smallholder Non-DFGs milk producers to acquire a strong position in the dairy value chain. By joining forces to supply milk in the formal milk market, farmers can enjoy a range of benefits such as transporting milk in bulk, gaining access to new

Table 3: Contingency table showing the interest and morning milk for supply by Non-DFGs

Particulars	Interest in joining the formal milk market (n = 30)		
	Yes	No	Total
The problem in selling fresh milk	24	1	25
No problem in selling fresh milk	3	2	5
Total	27	3	30

	Morning milk available for supply (Litres)			
	Average milk supply	Minimum	Maximum	Total
Morning milk	4.41 ± 3.07	0.50	15.00	119.00

technologies, financial loans and other dairy husbandry inputs.

3.5.2 Readiness in supplying evening milk

The respondents from both DFGs and Non-DFGs were asked how they were managing with evening milk and their readiness to supply if MPU is willing to collect from them. As indicated in Figure 5, the respondents reported that 71% (n = 60) of the evening milk produced is processed into butter and cheese, while 26% of evening milk is being used for household consumption as fresh milk and preparing butter tea, the other 3% is being sold to their neighbour. Similarly, the respondents from both DFGs and Non-DFGs were questioned if they were willing to supply evening milk to MPU. The study found that 50% of the respondents were interested in supplying evening milk. The daily average evening milk available for supply was 4.43 ± 2.25 litres from each household. This result confirms that this is a good choice for the milk processor to grab the opportunity to address the current gap between milk demand and supply for maximum utilisation of processing plant capacity. This is one way of linking smallholder dairy farmers to modern dairy value chains (Wouters and Lee 2010) and will be a special feature in encouraging milk supplier to increase their milk production and supply.

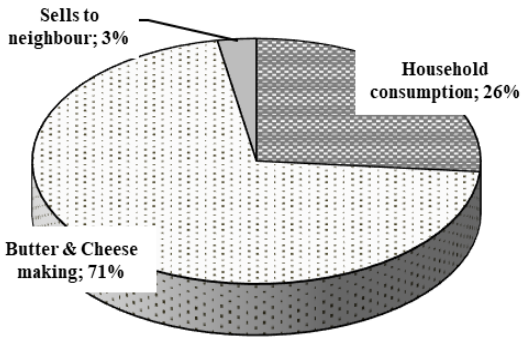

Figure 5: The proportion of evening milk usage

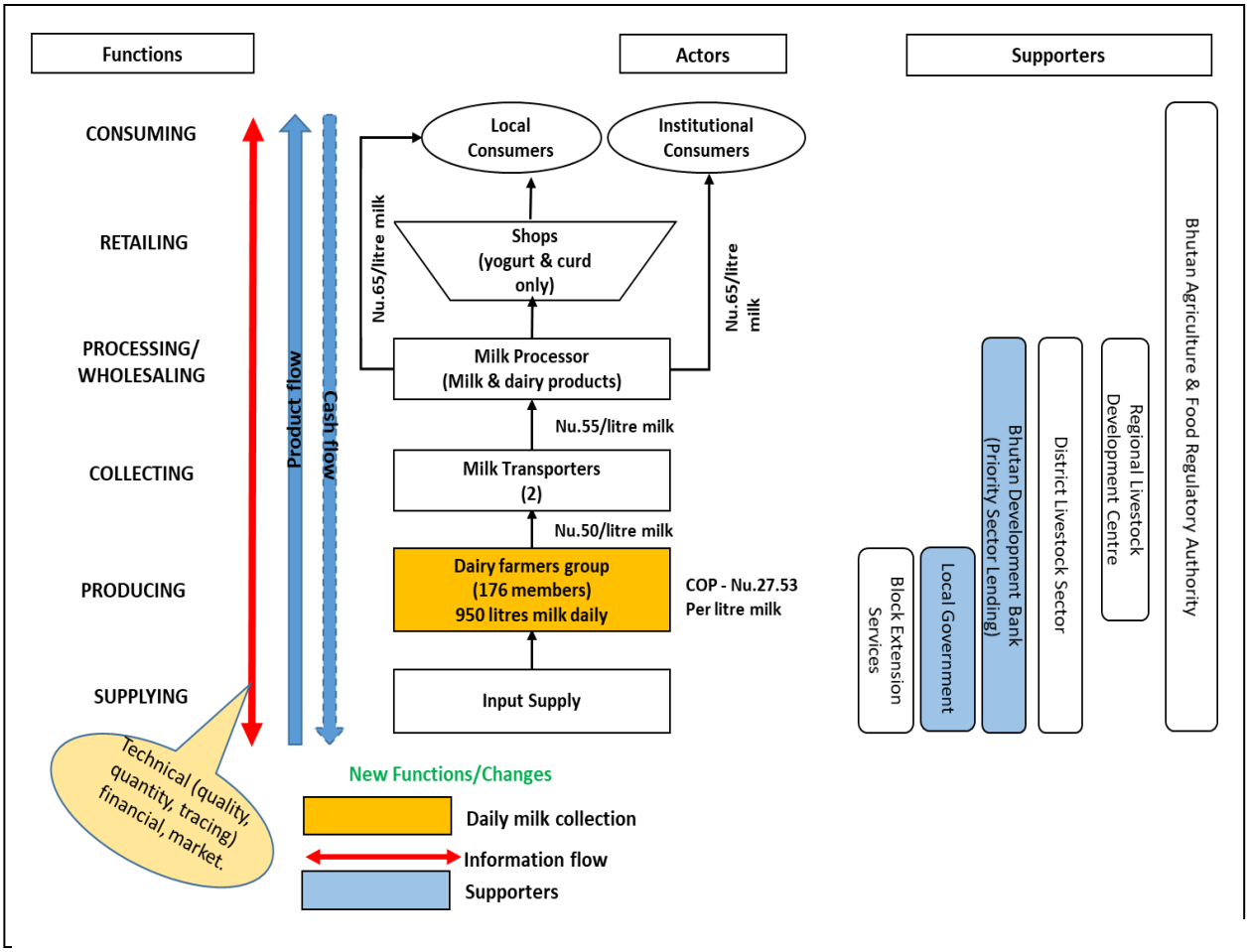

Figure 6: Recommended future of milk value chain in Punakha

4. CONCLUSION & RECOMMENDATIONS

The formal milk value chain concept is new in the district, only a few producers' groups and its members actively participate now. The major share in the total cost of milk production was of variable cost and is important to recognise that the cost of milk production should be taken into consideration as a benchmark upon which to base their milk supply decisions. Many milk producers prefer formal milk marketing instead of the informal distribution system due to irregular consumer demands and not being able to sell surplus milk. There are overlapping functions in mainstreaming milk value chain approach. The most significant findings are on the distribution of the added value and profit share, where milk producer is leading the chain with a maximum share of profit. This study concludes that there is scope for expanding the milk value chain in the district by implementing the following applied recommendations presented in Figure 6. Since the milk supply and marketing business is multi-faceted involving multi-stakeholder in the value chain processes, stakeholders' relationship matters in the smooth transition of the business venture. The District Livestock Sector which is the main supporter in the chain should take a lead role in nurturing chain coordination and information flow on quality milk production, supply, processing and marketing. The DFGs should consider entering into an agreement with Non-DFGs for increased milk collection as the overall goal of organising formal milk market is to link milk producers to the market and increase the income of the actors involved in the milk value chain. The DFGs should consider the possibilities of collecting evening milk. This could be done by developing a simplified milk collection system which is suitable for all the parties involved in the chain. In the absence of milk collection sheds, the quality of milk collected is being compromised during unfavourable weather conditions. Therefore, the milk processor should initiate the construction of milk collection sheds in strategic locations with the support of key partners. Public-Private Partnership (PPP) model is suitable for this program by involving Local Government and other relevant stakeholders to ensure necessary investment and effective resource management. The concept of the dairy value chain is gaining popularity in Bhutan particularly in the execution of the 12th FYP. It is imperative that the capacity of the staff on value chain development is provided for appropriate dissemination of planned activities.

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