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An analysis of the fresh milk chain in Ha Nam province of Vietnam

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ABSTRACT : *This study aimed at analysis the fresh milk chain in Ha Nam province and provided some suggestion to improve the milk chain in this area. The data came from standard questionnaires in a survey of all chain actors in the region in the first quarter of 2017. The result showed that milk chain in the study site included 196 dairy farmers, 05 milk collector, 01 dairy plant, and many milk distributors. Formal milk distribution channel started from dairy farms to milk collector, dairy plants, to wholesalers/retailers and to the consumers. In absolute value, dairy farmers achieved the highest proportion of added value along the chain. Although the added value per kg of milk gained by milk collectors was relatively low, the actual benefit they received was quite high. In relative terms, distributors were the most profitable agents. Dairy farmers have a good motivation to develop their dairy herds but they suffer from high feed cost. The dairy plant has the highest power. The study also presents some recommendation in order to improve the milk chain.*

Keywords: *Milk chain analysis, dairy farmer, milk production*

I. INTRODUCTION

With a tropical monsoon climate and an average relative humidity of 84–100%, always suffers from many natural disasters such as storms, flooding, drought, etc., often following an annual cyclical pattern, natural conditions do not weigh in favor of the dairy industry in Vietnam, in general, and in Ha Nam province, in particular. Being unfavorable geographic areas for dairy farming at lowland areas with quite hot climate, Ha Nam dairy farmers have less experience, and consider as getting low productivity and facing many difficulties in milk production. Although dairy farming has not reached the expected growth rate, and still many small scale livestock producers who consider livestock as a secondary occupation so their economic efficiency is not high with many diseases and risks, Ha Nam is considered as one of the provinces with high dairy growth rate after a short time (Vtv, 2016). In addition, dairy farming has played an important role in the sustainable development of the rural area in Ha Nam province. It creates stable and permanent employment and income for 5 to 6 thousand rural residents in Ha Nam annually. It also contributes to promote the new rural development, which in turn, enhance the economic development in this province (HPCR, 2016). In order to understand the real situation and provide some suggestion to promote the fresh milk chain in Ha Nam province, this paper explores the contribution of each actor in the chain, evaluate chain process, analyze the value that the chain actors receive, and find out the main points to improve the added value for the whole chain actors in the region.

II. METHODOLOGY

The study is concerned with the qualitative features of the value chain for the selected households, and quantitative information about chosen value chains, in particular, technical and economic data of the dairyman's milk production. The methodology was designed to collect these data at critical stages in the value chain, beginning with input supply, through to farm production, collection, processing, and distribution. Structured questionnaire sets were designed to interview three sets of actors in the chain – farmers, milk collectors, and milk distributors – to collect qualitative and quantitative information about the dairy industry. The interview was carried out at two different times and with two different approaches:

The first one was the semi-structured interview. Its main objectives are to collect qualitative data and information in order to define and describe the milk chain in its actual stages: fresh milk production, collection, processing, and distribution. Besides, it would help to describe the characteristics of the chain actors, flow of information, flow of products, and supporting system. This step would also help to analyze the overall value chain.

The survey started with the dairymen and finished at the retailers.

The main results of this step were intended to:

- Comprehend the general situation of the study sites. Understand the geography, the habits, the working hours, methods of transportation used on the study sites, the difficulties and challenges before the survey was actually carried out.
- Define the overall characteristic of chain actors.
- Test the questionnaire: A pre-test of the questionnaire was conducted before starting the household interviews and was used to develop the formal version of the questionnaire. Three farmers were selected for the pre-test of the questionnaire that is fleshed out in the formal interviews.
- Establish the official questionnaire: After the survey, certain corrections or modifications had to be made to finalize the questionnaire for the survey.

- Collect data and information about the dairy plant.

The second approach was the structured interview with a standard questionnaire. Its main objective was to collect qualitative and quantitative data for technical, economic, and financial analysis.

Data in farms, milk collectors, and distributors would be collected mainly through the standard questionnaire. In addition, observation was used to add the information.

The questionnaire was broken down into three parts, as follows:

- Information about the socio-economic status and characteristics of the dairy farmer.
- Information on milk production, including herd size, characteristics of cow's milk production; inputs and outputs from cow milk production, expenses, feed resources.
- Market and linkages for the milk produced, and socioeconomic issues related to improved milk production.

About two thirds of the questions were closed-ended, meaning that the responses were classified into pre-determined codes. The other questions were open-ended, allowing the respondent to answer in any form. The responses were recorded either in notebooks or by filling in the questionnaire blanks.

In addition, data was also collected through informal conversational interviews. In-depth interviews provide qualitative and quantitative information on the value chain and are particularly useful for different participants in the value chain to understand their complementary relationships. This method is used for finding information useful for the upgrading and promoting strategy.

Key informant interviews are used with some successful dairy farmers and dairy cattle specialists to find out the method they use to promote the milk value chain. Observation is used to obtain qualitative and quantitative data from local markets on transactions, interactions, processes, and embedded services. Observations are also a simple tool to cross-check information obtained from other sources. Direct observation on farms is used for collecting related information about infrastructure, hygienic conditions, and the attitude of those interviewed in the survey, etc.

Totally, data from 40 dairy farmers (accounted for 20.4% total dairy farms in the province), 1 milk collecting center (over 5 centers), 3 wholesalers, 5 retailers were collected through structure interview. Moreover, information from 14 dairy farmers, 8 local authorities were collected through interview through 4 field trips.

III. RESULTS

3.1 Overview of milk production in Ha Nam province

In Ha Nam province, animal husbandry accounts for 50%, cultivation accounts for 45%, and service accounts for 5% agricultural value. In animal husbandry, Ha Nam farmers raised 750,000 pig heads, 6.5 million poultry heads and more than 30 thousands ruminant heads, mostly yellow, beef cows and buffalo. Ha Nam started a dairy industry in 2001 with 150 dairy cows in the same time with the national dairy project of Vietnam. However, they faced many difficulties and almost dairy farms disappeared after that. In 2013, Ha Nam authorities committed to improve the dairy production again. In 2014, they launched the dairy project (2nd period) with the support of 2 dairy processing companies who commit to consume all dairy milk for farmers. Therefore, in this year, 500 dairy cows that imported from Australia and bought from Moc Chau, were raised in Ha Nam. In 2016, Ha Nam approved a dairy project for the period 2016-2020 with many supported dairy farmers to promote dairy production By 22nd February 2017, there were 196 farmers raising 2,562 dairy cows in Ha Nam province, produced average 20.6 ton milk per day. In which, Duy Tien district had 109 farms raising 1,457 dairy cows which produced 12.8 ton milk per day. Ly Nhan district had 23 farms raising 605 dairy cows and produced 3 ton milk per day. Kim Bang district had 57 farms raising 249 dairy cows and produced 2.6 ton milk per day. Thanh Liem district had 3 farms raising 24 dairy cows. In addition, there is a company raising 75 dairy cows and 2 nuclear farms of Friesland Campina raising 152 dairy cows and produced 2.2 ton milk per day.

Table 1. Milk production in Ha Nam province in February 2017

District	Commune	Numbers of farm	Numbers of new bought cow in 2017	Numbers of newborn calves in 2017	Numbers of lactating cow	Milk collecting
		Farm	Head	Head	Head	Ton/day
1. Duy Tien	Total	109	16	21	1,457	12.8 ton
	Moc Bac	78	5	21	950	In Moc Bac commune: 9 ton
	Chuyen Ngoai	21	0	0	245	
	Trac Van	13	11	0	203	In Chuyên Ngoại: 3.8 ton
	Yen Nam	4	0	0	59	
2. Ly Nhan	Total	24	8	30	605	In Nhan Binh: 03 ton
	Nguyen Ly	8	0	1	149	
	Chinh Ly	4	8	02	101	
	Xuan Khe	2	0	0	42	
	Nhan Đao	2	0	0	35	

	Nhan Binh	5	0	04	112	
	Hoa Hau	1	0	19	129	
	Nhan My	1	0	04	35	
	Vinh tru	1	0	0	02	
3. Kim Bang	Total	57	4	5	249	
	Ba Sao	33	0	4	148	
	Kha Phong	21	4	1	81	
	Tan Son	2	0	0	16	
	Lien Son	1	0	0	4	In Ba Sao: 2.6 ton
4. Thanh Liem	Total	3	0	0	24	
	Liem Tuc	3	0	0	24	
5. Ha Nam Dairy milk Join stock company		1	0	0	75	
6. Friesland Campina		2	0	3	152	2.2 ton
Total: 17 Communes + 02 companies		**196**	**23**	**59**	**2,562**	**20.6 ton**

Source: Dairy report by Ha Nam Department of Agriculture and Rural Development, 2017

3.2 Milk production in survey farms

Almost the head of farms were male and had an average age of over 40 years old. Middle-aged farmers accounted for a high proportion because young people did not want to be farmers because of hard work, time consuming and unstable market. Almost farmers (95%) had a high school level. In the dairy industry, in addition to technical factors, experience plays a very important role. But farmers in Ha Nam had only some year of experience from 2 to 9 years.

Table 2. General information of the survey farmers

Indicator	**Number of farms**	**Percentage (%)**
1. Gender		100
Male	39	97.5
Female	1	2.5
2. Age of the farm owner		100
Less than 30	2	5
From 30 to 50	26	65
More than 50	12	30
3. Education level		100
Primary school	1	2.5
High school	38	95
College	1	2.5

Source: Aggregated from survey data

In Ha Nam province, the largest scale farms had 40 dairy cows with 7 beef cattle. Of which, a half was lactating cows. The smallest scale farm had only 3 heads. Most of dairy cows in the region were Holstein Friesland. There were some farms who raised both Holstein Friesland and crossed breed. All of them milked the cows twice a day.

Table 3. Farms' information

	Numbers of dairy cow	**Beef/male calves**	**Female calve/ heifers**	**Milking cows**	**Breed**	**Time of milking per day**	**Preservation at the farm**	**Duration of milk delivery**
	Head	**Head**	**Head**	**Head**		**Time**	**Minutes**	**Minutes**
Max	40	7	20	20	HF and crossed breed	2	60	60
Min	3	0	1	2		2	0	3
Average	15.4	0.5	6.5	8.4		2	37	28

Source: Aggregated from survey data

For livestock, scale is very important because it directly affects the investment process, costs and results. The size of dairy herd depends on many factors such as: capital, food, technical level, education level.... The scale of raising of farms in Ha Nam is considered to be small as 77.5% farms had less than 20 dairy cows, while there are only 4 over 40 farms (10%) raised more than 40 cows.

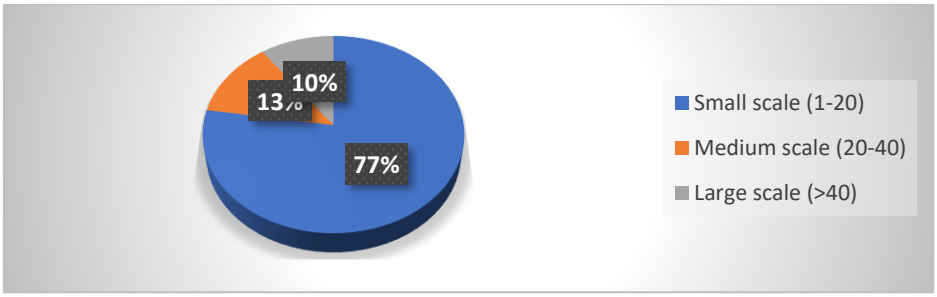


Fig 1: Dairy cow scale at survey farms

Source: Aggregated from survey data

According to the survey results, milk yield in survey farms in Ha Nam were still low. Although in the first and second lactation period, average milk productivity was only 18.8 kg of milk per day, maximum was 26 kg milk per day and minimum was only 10.7 kg milk per day. These number were lower than those of other regions in northern area of Vietnam (Bui Thi Nga, 2014; Bui Thi Nga, Philippe Lebailly, Tran Huu Cuong, 2011).

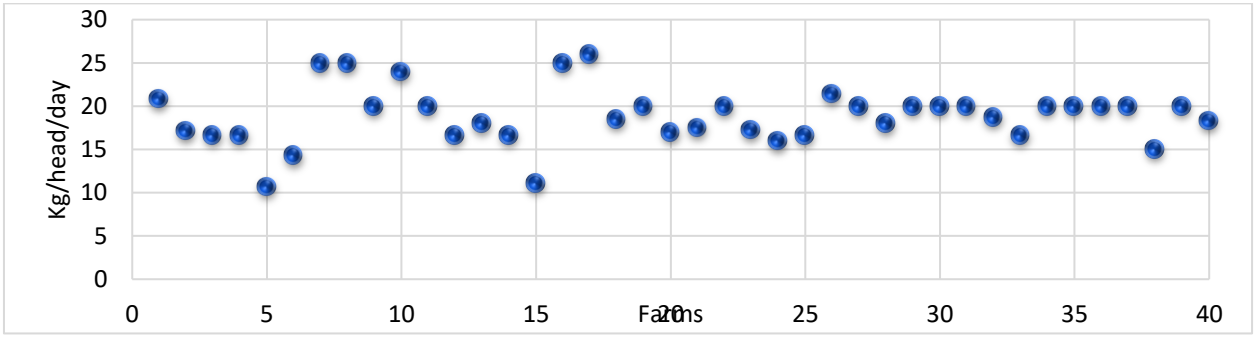


Fig 2: Average productivity of milk production (per day)

Source: Aggregated from survey data

In this region, farmers received average of nearly 65 million Vietnam dong (VND[1]) per farm per month or 16.3 million VND per cow per month annually. They got receipts of 14,480 VND per kg of milk, mainly from milk, which occupied 90.3% total receipts. These numbers are higher than those in Cu Chi district in Ho Chi Minh city of Vietnam (Bui Thi Nga, 2017).

Table 4. Cash receipts of dairy production

[1] VND is Vietnam currency. 1 USD= 22,700 VND by 23/7/2017, source: formal exchange rate of Vietnam at https://www.vietcombank.com.vn/exchangerates/

CASH RECEIPTS	1000VND/kg milk	1000VND/cow/month	1000VND/farm/month
Related milk receipts	***13.08***	***14,738.7***	***58,955***
Milk Receipts	13.08	14,738.7	58,955
Stock sales - dairy	0.06	65.8	263
Stock sales - other	1.33	1,504.2	6,017
Other dairy receipts(*)	0.00	0.0	0
Other receipts	***0.00***	***4.4***	***18***
Non milk receipts	1.40	1,574.4	6,298
Total Farm Receipts	**14.48**	**16,313.1**	**65,252**

(*) Because farmers did not sell other dairy products

Source: Aggregated from survey data

Almost farmers fed their cow with purchase concentrated feed and their homegrown king grass. The total purchased feed was 7,840 VND per kg of milk, which accounted for 60% total milk receipts. This number is lower than those in our other previous researches in the North (Bui Thi Nga, 2014; Bui Thi Nga, Philippe Lebailly, Tran Huu Cuong, 2011) but higher than those in the South of Vietnam (Bui Thi Nga, 2017). Total feed related cost accounted for 84.5% total farm's variable cost and 64% total milk receipts.

Table 5. Cost of production

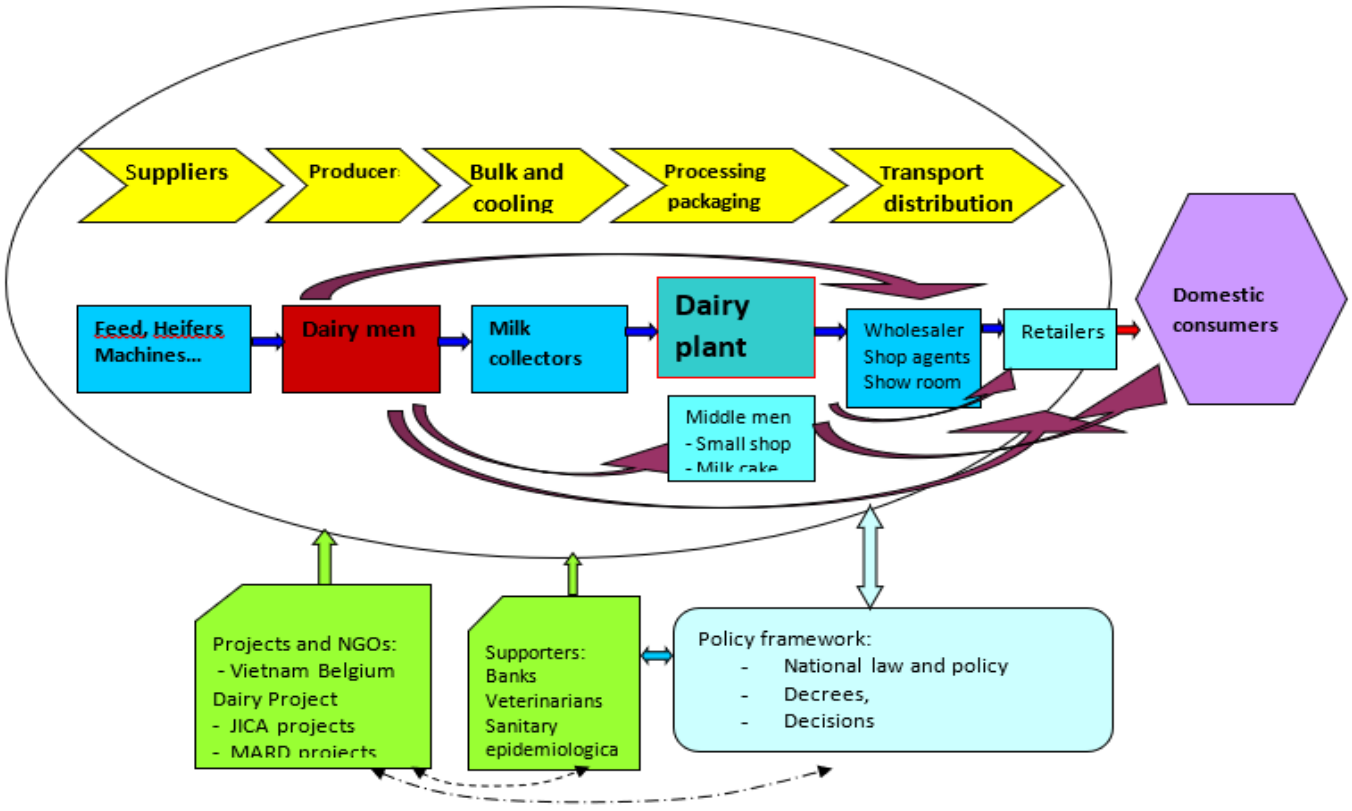
PRODUCTION COSTS	VND/Kg	VND/cow	Total Spent
Purchased feed	7.84	8,836.6	35,346
Fertilizers	0.54	603.9	2,415
Feed Related costs	***8.38***	***9,440.5***	***37,762***
Margin over feed related costs	***4.70***	***5,298.2***	***21,193***
Herd Costs	0.81	917.8	3,671
Shed Costs	0.69	777.0	3,108
Sundry Variable Costs (miscellaneous)	0.04	44.1	176
Other variable costs	***0.04***	***44.1***	***176***
Total Variable Costs	***9.92***	***11,179.4***	***44,718***

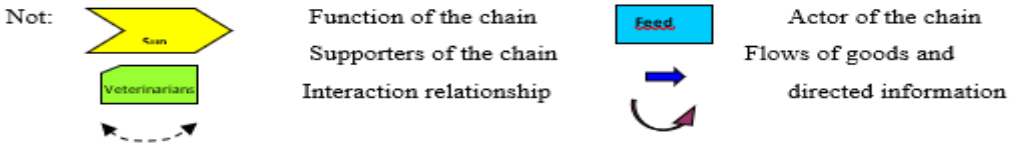
Source: Aggregated from survey data

3.3 Analysis of milk value chain

There are many suppliers who provide the inputs for milk production such as: forage and concentrated feed, heifers, machinery for milk producers, etc., in the study site. There is not any dominant supplier of heifers, grasses, feed, proteins, etc., for dairy farmers in the region. This result is quite different from our previous study in Sonla province (Bui Thi Nga, Tran Huu Cuong and Philippe Lebailly, 2012).

There were 196 dairy producers in this province. They are considered to be the main actors in the chain. They play the most important role in the production chain. All other actors depend on their operation. Milk collectors are actors who collect milk from dairy farmers, bulk and cool it, then deliver it to dairy processors, dairy distributors, or customers. There is only one milk collector in this region (called collecting centers). He works independently without any power with other actors of the chain.





The dairy plant (Friesland Campina) receives milk from milk collectors and goes on to process and package it. Theoretically, it depends on the dairy farmers. Even so, in reality, it has become the decision-making actor for the chain. It is not the most powerful actor in the milk chain as in our previous research (Bui Thi Nga, 2014). It links dairy farmers with input suppliers, milk collectors, and distributors.

Distributors can be wholesalers, retailers, and middlemen who provide milk to the end customers. Because Vietnam does not export milk and is considered to be an importer of milk and milk products, this chain stops at the borders and does not concern itself with the export market. There are many participants referred to as small milk shops, milk candy shops, some showrooms and supermarkets, and many agents and retailers in the region. There are not tight linkages among the chain actors as in our previous research (Tran Huu Cuong, Bui Thi Nga, 2012), which tend to decrease benefits for the actors and the chain as a whole. Besides the main actors in the chain, some stakeholders will be viewed as supporters in the chain. Friesland Campina support farmers the technique of breeding cows through training course. Although the veterinarian and outreach[2] initiatives helped farmers to deal with their specialized problems such as disease control, protecting dairy cows from harsh conditions, preventing them from suffering the effects of natural disasters, etc. However, according to the feedback of farmers, these supports were still not effective. Financial institutions such as the Bank for Agriculture and Rural Development (AgriBank), along with the Policy and Social Bank provided them with small loans for keeping cattle. The Government and local authorities created the environment to produce milk through decisions, resolutions, directives, decrees, etc. Most of the milk produced from the dairy farms is collected by only one collecting center in the region. A small amount is used for self-consumption and collected by retailers or milk shops within the local region. All of the milk at the collecting centers is to be transferred to the dairy plant. The dairy plant processes, pasteurizers, and packages mainly fresh milk. Almost all milk was delivered to wholesalers, showrooms, and supermarkets. These agencies supply mostly to retailers or sell directly to consumers. This chain is similar to most of our previous research in another region in Vietnam (Bui Thi Nga, Luong Thu Ha, 2016). The dairy farmers in Ha Nam have a good motivation to develop their dairy herds but they suffer from high feed cost, which lead to low economic efficiency. The dairy plant has the highest power to impose many regulations and rules on other actors in the chain, controlling almost the whole chain unofficially. Lack of knowledge and technique for quality control, but the milk collector has a good relationship and communication with farmers and has a chance to get high income with easy work. Milk distributors have a large, expanding potential market, but they have to face with the high competitive pressure in the market, especially with substitute and imported milk products competitors. According to the results of the study, it seems that the added value were in favor of dairy farmers with the proportion of 40.6%. Following was the distributors, which earned 32.1%, the processor obtained 22.2% and the collector received only a small portion of 5.1% of the added value along the chain. However, it is a fact that, to get the added value per kg of milk, the farmers had to invest a lot of fixed costs, calculated to 2,560 VND per kg milk. In addition, they had to invest in a relatively long time, on average, it took about 3 months to build the breeding facilities and took 2 years to raise cattle until the time of milking. Meanwhile, although the value added ratio of collectors was quite low (5.1%), their initial investment cost was very low (only 55 VND / kg of milk). In addition, they collected 2 to 2.5 tons of milk per day. Thus, if the added value per kg of milk is relatively low, but the actual benefit they receive was quite high.

Box 1. Value added distribution along the fresh milk chain (count on a kg of milk)

	Dairy farmers	Milk collectors	Dairy plant	Distributors
Value added (USD)	4550	572	2484	3600
Share of value added (%)	40.6	5.1	22.2	32.1

Source: Aggregated from survey data

[2] Mostly from the dairy plant

Distributors received a high proportion, reaching 32.1% of added value of the chain, while they had to spend relatively low level of investmenet in a short period of time. In relative terms, they were the most profitable agents on the dairy value chain in this region.

VI. CONCLUSION AND RECOMMENDATION

The milk chain in Ha Nam province of Vietnam includes 196 dairy farmers, 05 milk collectors, 01 dairy plant, and many milk distributors. Each actor has a specific role in the chain and they link together quite well to be a chain. Besides, there are stakeholders who will facilitate the chain's development from outside. In absolute term, added value were in favor of dairy farmers in absolute term with the proportion of 40.6%. Following was the distributors, which earned 32.1%, the processor obtained 22.2% and the collector received only a small portion of 5.1% of the added value along the chain. However, in reality, while the added value per kg of milk of milk collector was relatively low, the actual benefit they receive was quite high. In relative terms, milk distributors were the most profitable agents on the dairy value chain in this region. In order to improve the milk chain, farmers had better increase using the local residual products (rice straw, sugarcane…), improve their skill of farm management, invest more in equipment farmers, modernize their farms; enhance technique and farm management skill, improve capacities to become professional dairy farmers. The milk collector had better improve their knowledge and technique of milk contents and storages. Dairy plant should improve their competitiveness capacities, enhance their trademark to increase the customers' believe and compete with potential competitors. Distributors had better improve their capacities, sales skills, problem solving to be more professional and more effective. Finally, all milk actors should cooperate and links together in a more formal type through contract farming to enhance the whole chain. They could call for policy support from the local government, financial support from the financial institutions, technical support from the NGOs or universities.

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