Structure Conduct and Performance of Milk Market in Sululta Woreda, Ethioipia

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Abstract

This article investigated the structure conduct and performance of milk market in Sululta *Woreda*, using survey data for 2015/16. The study used the structure-conduct-performance model to determine the structure conduct and performance of milk market. Primary data was collected from randomly selected 150 milk producers and 40 traders. Concentration ratio and gross margin were used for this analysis. Following the four firms' criteria of concentration ratio, Sululta *Woreda* milk market showed highly oligopolistic nature with concentration ratio of 87.16% which was dominated by four traders including dairy cooperative union and three processing plants. The maximum total gross marketing margin in the channels was about 54.55% and the highest producers' share of consumers' price was along producers – consumers' market channel in channel VI. Therefore, the study recommends that promoting potentially collective organizations (groups of traders) which plays important role in reducing the level of oligopolistic nature of market should be in place. This should be coupled by strategies that improve competitiveness and efficiency of milk market.

Keywords: Milk market, Structure conduct performance, Concentration ratio, marketing margin

1. Introduction

Ethiopia's economy is based on subsistence agriculture accounting for almost half of the gross domestic product (GDP), 60% of exports, and 80% of total employment (LMD, 2013). Livestock production contributes 30-35% of the GDP and more than 85% of farm cash income. In this respect, milk production is playing a major role in the livelihoods of the people of Ethiopia (Anteneh, 2006). The sub-sector also accounts for 19% to the export earnings (BoFED, 2006). Given the considerable potential for increasing smallholder income and employment generation from high-value milk products, development of the milk sector in Ethiopia can contribute significantly to poverty alleviation and improved nutrition in the country (Kebede, 2009**)**.

There are about10 million dairy cows in Ethiopia producing 3.2 billion liters of milk per year. The production per cow is estimated at approximately 1.54 liters per day for an average lactation period of six months. In fact, national milk production for the period of 1966 to 2001 increased by only 1.6% per year and per capita production declined by 0.8% per year (Staal *et al* 2008). Despite this large number of dairy cows, the milk marketing system is not yet well developed. There are only limited formal marketing and grading systems that are geared towards matching the quality of milk and milk products to market prices.

Although currently milk and milk products are channeled to consumers through both formal and informal marketing systems, above 95% of the national marketed milk volume is channeled through the informal system. The term informal is often used to describe marketing systems in which the government does not intervene substantially in marketing. Such marketing systems are also referred to as parallel markets where as the term formal is thus used to describe government; the marketing system which is dominated by the government; government controlled dairy development enterprises or official marketing system and the share of milk sold in the formal market is only about 2%. In informal marketing system, milk and milk products may pass from producers to consumers directly or through one or more market agents. Producers sell the surplus milk to their neighbors and/or in the local markets, either as liquid milk or in the form of butter or cheese. This system is characterized by no license to operate, low cost of operation, high producer prices as compared with formal market and no regulation of operation (Yilma and Inger, 2011).

Lack of access to markets reduces incentives to participate in market-oriented production and perpetuates subsistence production systems. In most rural areas of the region, the produced milk is transported to the market by locally available means that may include transport on foot, by donkey or public transport. Milk can be collected either by the buyers or taken by the producers to the sales point, but generally, with the exception of a few commercial farms, farmers are responsible for the delivery of their milk into the market chain. Few farmers would travel longer distances to supply milk to urban markets or to earn higher prices (LMD, 2013).

Therefore, improving the position of smallholders to actively engage in the dairy market is one of the

most important development challenges of the country (Holloway *et al.*, 2002). Putting in place a functional quality control system is an important tool to bring about improvement in the dairy sector. Milk marketing is an incentive for farmers to improve production. It stimulates production, raise milk farmers' income and living standards and create employment in rural areas (Tassew, 2007). Provision of improved and sustainable milk marketing arrangement in villages is therefore important in the aspiration for advancement of the sector.

Although Sululta *woreda* contributes the highest amount of milk in Oromia region as well as for the country, the milk and milk products are not adequately market-oriented and the competitiveness of smallholder milk producers is limited. While there are a number of both formal and informal milk channels in the region, neither the number of buyers and sellers of milk nor the relationship between them have been evaluated if indeed they significantly contribute to milk marketing. Thus, this study determined the structure conduct and performance of milk market in Sululta *Woreda*.

2. Theoretical Framework

In order to determine structure conduct and performance of milk market in Sululta *Woreda* of Ethiopia, structure, conduct and performance model framework is used which looks at the relationship between market structure, conduct and performance of firms. The theoretical framework was first developed by Edward Mason in 1939 where as the empirical work was started by his student Jeo S.Bain in 1951 (Kaong, 2015).

The structure- conduct-performance paradigm attempts to establish the link between market structure and performance. In terms of market structure, the more concentrated an industry, the more market power would be exercised in the industry. The approach stipulates that an industries successful performance in producing benefits for consumers depends critically on the conduct and the competitive behavior of firms in the market. It is argued that when competition amongst firms is almost nonexistent, firms with market power in an industry would lead to worst market outcome for consumers. In turn, firm conduct hinged upon market structure and is more likely to occur when the number of firms in the industry is few and when there are barriers to entry in to the market. On the other hand, when there are many firms in the market, firms are free to enter and they are more likely to compete with each other. Following this reasoning an industry's performance are determined by the conduct of the firms which in turn depend on the structure of the market (Kaong, 2015).

3. Research Methodology

3.1. Study Area

The study covered Sululta *Woreda* which is the central part of Ethiopia. Sululta is one of the *Woredas* in special zone surrounding Addis Ababa in Oromia Regional state. Sululta is bordered by Wuchale and Yaya-Gulale *Woreda* in the north, Addis Ababa city administration and Wolmera *Woreda* in the south, Jida and Bereh *Woreda* in the east and Mulo *Woreda* in the west direction (SWAO, 2015). Geographically, the area is situated between $9.07 - 9.52^0$ northing and $38.53 - 38.98^0$ easting while the altitude is ranging from 2851-3700 meters above sea level. Agriculture is the main source of income of the population in the *Woreda*. Livestock husbandry and crop production are the predominant economic activities and the major sources of livelihood in the area.

3.2. Sampling Procedures

Multi-stage sampling techniques was used to select the respondents. Sululta was purposely selected because it is the district where milk was mostly produced. Simple random sampling was used to select 150 producers and 40 milk traders, total of 190 respondents.

3.3. Analytical Techniques

Market structure was determined based on market concentration exercised by traders and barriers to market entry for potential traders. Concentration is defined as the number and size of distribution of sellers and buyers in the market. The greater the degree of concentration, the greater is the possibility of noncompetitive behavior in the market. For an efficient market, there should be sufficient number of buyers and sellers. Kohls and Uhl (1985) bring into play as rule of thumb, the four largest enterprises' concentration ratio of 50% or more (an indication of a strongly oligopolistic industry), 33-50% (a weak oligopoly) and less than that (competitive industry). Therefore concentration in the market was estimated using the common method of market concentration ratio, which refers to relative size and number of buyers in the market. The concentration ratio was calculated by the following formula.

$$S_i = \frac{V_i}{\sum V_i}$$

Where

S_i = market share of buyers i

V_i = amount of product handled by buyer i

$\sum V_i$ = total amount of product handled by buyers

$C = \sum_{i=1}^{m} S_i$ Where i=1,2,3,…,m

Where c= concentration ratio

Si= percentage share of the ith firm

m= the number of largest firms for which the ratio is going to be collected.

Market conduct

Since market conduct is the patterns of behavior that firms following in adapting or adjusting to the market in which they buy or sell. This is the implications that are not readily identifiable, obtainable or quantifiable (pomeroy, 1989). Therefor market conduct was treated in a descriptive manner. Market conduct was determined based on pricing strategies and buying and selling practices.

Market performance

Market performance was determined by using marketing costs and margins. Market institutions move milk and milk products from dairy producers to consumers. In this way, every functions or services involve cost. In the marketing of milk, the difference between the price paid by consumers and the price received by the dairy producers for an equivalent quantity of product is known as marketing margin. Prices at successive stages of marketing at the producers', wholesalers and retailers was compared.

Estimation of Marketing Margin

Marketing margin for the various milk traders was estimated using the following formulas.

$$TGMM = \left[{}^{(cp - pp)}/_{cp} \right] * 100$$

$$GMMP = \left[{}^{(cp - MGM)}/_{cp} \right] * 100$$

Where

TGMM = total gross marketing margin

Cp = consumer price

Pp = producer price

GMMp = producers gross marketing margin

MGM = gross marketing margin

The producer's share of consumer price was determined as

$${}^{cp - pp)}/_{cp}$$

Where cp = consumer price

Pp = producer price (taken as producers selling price per unit less producer's marketing costs)

Average milk prices received by producers and paid by consumers during on-peak and off-peak was used for this calculation.

4.   Result and Discussion

4.1. Milk market structure in the study area

The degree of market concentration ratio was used to evaluate the structure of milk market. It was calculated by taking the annually purchased volume of milk by traders at main milk market places (including Sululta, Chancho, Gorfo and Derba). Concentration ratio was measured by the percentage of milk handled by the largest four traders in liters and interpreted as an indicator for the degree of competitiveness among the traders.

The results showed that the concentration ratio of milk market in Sululta *Woreda* was 87.16%. According to Kohls and Uhl (1985), the four largest enterprises' concentration ratio of 50% or more is an indication of a strongly oligopolistic industry, 33-50% is a weak oligopoly and less than that shows competitive industry. Therefore, the estimated market concentration ratio (87.16%) in Sululta *Woreda* shows that the structure of the milk market was strongly oligopolistic. The top four traders dominating milk markets were Selale dairy cooperative union and three milk processing plants (Elemtu dairy processing plant, Life milk processing enterprise and Lame dairy processing plant) (Table 1).

Table 1: Concentration ratio of milk buyers

Trader	Volume of milk purchased in liters/year	% share of purchase	% cumulative share of purchase
Dairy cooperative union	3,324,230	44.87	44.87
Elemtu dairy processing	1,312,000	17.71	62.58
Life milk processing enterprise	924,500	12.47	75.05
Lame dairy processing plant	897,345	12.11	87.16
Semi-wholesalers	781,200	10.55	97.71
Retailers	168,860	2.28	100
Total	7,408,135	100	

Barriers to entry and exit in milk market: The barriers to entry is something that blocks or impedes the ability of the traders to enter into the market and the barriers to exit is something that blocks or impedes the ability of the traders to leave the market. The traders in Sululta *Woreda* have mentioned two barriers to entry in the milk marketing systems. These were level of trader's formal education, and initial capital which were used to explain barriers to entry of traders into milk market in the *Woreda*.

Traders reported that without education, it was impossible to enter in trading milk. Likewise, the result revealed that the mean initial capital required to engage in retailing was Ethiopian Birr 2865.52. The mean initial capital required for semi-wholesalers was ETB 4333.33. In general, minimum of ETB 2000 was required for milk traders to enter milk market. This indicates that initial capital was the barrier for milk traders (Table 2).

Table 2: Barriers to entry in milk market

Barrier		Retailers	Semi-wholesalers	Processors	Dairy cooperatives union
Education	%	100	100	100	100
Initial capital	Mean	2865.52	4333.33	22666.66	39,000
	Minimum	2000	3000	20,000	39,000
	Maximum	4000	5000	25,000	39,000

4.2. Milk market conduct

Market conduct refers to the patterns of behavior of the buyers and sellers. This implies that analysis of human behavioral patterns that are not readily identifiable, obtainable and quantifiable (Pomeroy and Trinidad, 1995). Market conduct of milk market was analyzed in terms of price setting strategies, purchasing and selling behavior. The supply of milk from producing households to traders was in the form of raw milk. The purchasing process did not involve cash transactions but deferred payments. For logistical reasons, cash payment was not possible on a daily basis but was made twice a month through commission agents.

Traders bought milk by themselves from producers or through local milk collectors as commission agents. There was no formal contractual agreement between traders and producers but were based on informal oral agreement and personal relation.

Table 3 presents the perception of traders on how milk prices were set. A small proportion (7.5%) of traders reported that milk purchase price was set by the sellers. About 35% traders understood that purchase price was set by buyers. Another 35% and 22.5% of traders reported that purchase price was set by market and negotiation respectively. The result suggests that purchase price was mostly set by both buyers and market reflecting an imperfect market with information asymmetry.

Table 3: Perception of pricing strategy in the milk market

Pricing strategies	Number	Percent
set by sellers	3	7.5
set by buyers	14	35
set by market	14	35
set by negotiation	9	22.5
Total	40	100

4.3. Performance of milk market

Marketing margins: Marketing margins are the difference between prices at two different levels and most commonly used to refer the difference between producer and other points in the chain. Margin calculation were carried out for the following marketing channels.

Table 4: The milk marketing channels identified in Sululta

No	Milk marketing channels

I   Producer ➤ Semi- wholesaler ➤ Processor ➤ Retailers ➤ Consumer

II   Producer ➤ Semi- wholesaler ➤ Retailer ➤ Consumer

III Producer ➤ Dairy   cooperative ➤ Processor ➤ Retailer ➤ Consumer

IV   Producer ➤ Processor ➤ Consumer

V   Producer ➤ Processor ➤ Retailer ➤ Consumer

VI   Producer ➤ Consumer

As results show in Table 5, the greatest gross marketing margins were 54.55% and 52.17% in channel III (producer - dairy cooperative union – processors – retailers - consumers) and in channel I (producers - semi-wholesalers – processors – retailers – consumers) respectively, of consumers' price (Table 5).

Among different marketing agents semi-wholesalers received the highest gross marketing margin in channel II (producers – semi-wholesalers – retailers – consumers) which accounted for 40.54% of consumers' price followed by dairy cooperative union in channel III (producers – dairy cooperative union – processors – retailers – consumers) which accounted for 35.48% of consumers' price (Table 5).

In general, producers' share of consumers' price was the highest in channel VI (producers – consumers) which accounted for 100% of consumers' price and it is direct sell to consumers and channel IV (producers – processors – consumers) which accounted for 77.5% of consumers' price. Likewise, among different agents, semi-wholesalers obtained the highest net marketing margin of consumers' price in channel II (producers – semi-wholesalers – retailers – consumers) which accounted for 36% followed by dairy cooperative union in channel III (producer - dairy cooperative union – processors – retailers – consumers) which accounted for 30.02% of consumers' price (Table 5). Therefore, the sixth and fourth channels was very important for producers due to high producers' share of consumers' price in this channels. This happens because of the fact that producers sell their produce direct to consumers and processors in this two channels.

These results clearly give indication of where the government could introduce policy interventions. In most cases, governments have interest in social welfare of citizens and the key areas to help achieve this should be policies geared towards fourth and sixth channels.

Table 5: Performance of milk market of different channels

Milk market agents		Milk marketing channels					
		I	II	III	IV	V	VI
Producer	Selling price	11	11	10	12	12	12.5
	Cost of production	6.15	6.15	6.15	6.15	6.15	6.15
	GMMp (%)	48	48.5	45.5	77.5	54.6	100
	NMM (%)	8	7.41	16	26.3	3.35	50.8
Semi-wholesaler	Purchase price	11	11	-------	------	-------	-------
	Market cost	0.845	0.845	------	-------	-------	-------
	Selling price	16.5	18.5	------	-------	-------	-------
	GMMw (%)	33.33	40.54	------	-------	-------	-------
	NMM (%)	28.2	36	------	-------	-------	-------
Dairy cooperative union	Purchase price	------	--------	10	------	------	------
	Market cost	------	---------	0.85	------	------	-----
	Selling price	------	---------	15.5	------	------	-----
	GMMc (%)	-----	---------	35.48	------	------	-----
	NMM (%)	----	-------	30.02	------	------	-----
Processors	Purchase price	16.5	---------	15.5	12	12	-----
	Market cost	1.90	---------	1.90	1.9	1.9	-----
	Selling price	19	--------	18.2	15.5	15.5	-----
	GMMpr (%)	13.16	--------	14.84	22.58	22.58	-----
	NMM (%)	3.2	--------	4.4	10.3	10.3	-----
Retailers	Purchase price	19	18.5	18.2	------	18.2	-----
	Market cost	1.6	1.6	1.6	------	1.6	-----
	Selling price	23	22.70	22	------	22	-----
	GMMrt (%)	17.39	18.50	17.27	------	17.27	-----
	NMM (%)	10.43	11.45	10	------	10	-----
	TGMM (%)	52.17	51.54	54.55	22.58	45.45	0.00
	Producers portion	48	48.5	45.5	77.5	54.6	100
Rank of channels by producers' share		6	4	5	3	1	2

Where GMMp is the gross marketing margin of producers, GMMw is gross marketing margin of semi-wholesalers, GMMc is the gross marketing margin of dairy cooperative union, GMMpr is the gross marketing margin of processors, GMMrt is the gross marketing margin of retailers, TGMM is the total gross marketing margin and NMM is the net marketing margin.

5.   Conclusions

Several intermediaries are involved in milk marketing at different levels. Producers, semi-wholesalers, processors, dairy cooperative unions and retailers are all identified milk market role players. The structure of the market showed a strongly oligopolistic market structure dominated by few traders. Conduct showed that milk purchase price was set by both market and buyers.

The analysis of market performance revealed that the gross marketing margin was highest in channel which starts from producer through dairy cooperative union, processors, and retailers to consumers. The channel with the lowest margins starts from producers through processor to consumers. Semi-wholesalers got the highest gross marketing margin whereas processors have got the lowest marketing margin implying that there is no equal distribution of profits among traders. Therefore the performance of milk market in Sululta Woreda is seems to be inefficient.

Promoting potentially collective organizations (groups of traders) which plays important role in reducing the level of oligopolistic nature of market should take place in Sululta *Woreda*. This should be coupled by strategies that improve competitiveness and efficiency of milk market. Hence this would enhance the possibility of the presence of efficient and competitive type of market structure in the area.

Suggested future works include: There are different types of dairy products in the area. However, due to time the study considered only the market of raw milk. In the same way the study considered only Sululta *Woreda*. Hence there is a need of study which will consider different types of dairy products and more market at *Woreda* and Zonal levels. It is obvious that the dairy products' marketing system will be improved with better level of efficiency than the current level.

References

Anteneh, B. (2006). *Studies on cattle milk and meat production in Fogera district: Production systems,*

constraints and opportunities for development. Hawassa, Ethiopia: University of Hawassa.

Bureau of Finance and Economic Development. (2006). *Development indicators of Amhara region* (4th edition). Bahir Dar, Ethiopia: Federal government of Ethiopia.

Holloway, G. C., Nicholson, C. Delgado, S.S., and Ehui, S. (2000). How to make a milk market: A case study from the Ethiopian Highlands (ILRI Working Paper No. 28). Nairobi, Kenya: ILRI (International Livestock Research Institute).

Holloway, G., and Ehui, S. (2002). Expanding market participation among smallholder livestock producers: A collection of studies employing Gibbs sampling and data from the Ethiopian highlands (ILRI Working Paper No.48). Nairobi, Kenya: ILRI (International Livestock Research Institute).

Kaonga, K. (2015). *Market structure, conduct and performance of firms in the insurance industry: Evidence from Zambia*. Zambia: University of Zambia.

Kebede, A. (2009). Characterization of milk production systems, marketing and on-farm evaluation of the effect of feed supplementation on milk yield and milk composition of cows at Bure District, Ethiopia. M. Sc Thesis. Ethiopia: Bahir Dar University.

Kohl, R. L., and Uhl, J.N. (1985). *Marketing of agricultural product* (5th Edition). USA: Collier Macmillan.

Livestock Market Development - Agricultural Growth Project. (2013). *Value chain analysis for Ethiopia: Expanding livestock market for the smallholder producers*. USA: USIAD (United States Agency for International Development).

Pomeroy, R.S. (1989). *The economics of production and marketing in a small-scale fishery*. Matalon, Leyte, Philippines: ICLARM (International Center for Living Aquatic Resource Management).

Pomeroy, R.S., and Trinidad, A.C. (1995). Industrial organization and market analysis: Fish marketing. In Gregory, J. Scott (Eds.), Prices, products and people: Analyzing agricultural markets in developing countries (PP. 217-238). London, England: Lynne Rienner Publisher.

Staal, S.J., Pratt, A.N., and Jabbar, M. (2008). Dairy development for the resource poor part 2: Kenya and Ethiopia case studies (Pro-poor Livestock Initiative Working Paper No. 44). Nairobi, Kenya: International Livestock Research Institute.

Sululta Woreda Rural and Agricultural Development Office. (2015). Agricultural plan for the year 2015/2016. Sululta, Ethiopia: Ministry of agriculture.

Tassew, A. (2007). Production, handling, traditional processing practices and quality of milk in Bahir Dar milk shed Area, Ethiopia. M.Sc. Thesis. Ethiopia: Alemaya University.

Yilma, Z., and Inger, L. (2011). Milk production, processing, marketing and the role of milk and milk products on smallholder farmers' income in the central highlands of Ethiopia (Working paper No. 8). Addis Ababa, Ethiopia: LRRD (Livestock research for rural development).