DAIRY MARKETING CHAINS ANALYSIS: THE CASE OF SHASHEMANE, HAWASSA AND DALE DISTRICT'S MILK SHED, SOUHERN ETHIOPIA

M.Sc. Thesis

BY

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DAIRY MARKETING CHAINS ANALYSIS: THE CASE OF SHASHEMANE, HAWASSA AND DALE DISTRICTS' MILK SHED, SOUTHERN ETHIOPIA

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As members of examining Board of the Final M.Sc. Open Defense, we certify that we have read and evaluated the thesis prepared by Woldemichael Somano entitled "**Dairy Marketing Chains Analysis:** The Case of Shashemane, Hawassa and Dale district's milk shed, Southern Ethiopia"and recommended that it be accepted as fulfilling the thesis requirement for the degree of Master of Science in Agriculture (Agricultural Economics).

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DEDICATION

This thesis manuscript is dedicated to my mother, Aresssie Herabo and my father, Somano Ewalo who had committed with strong prayer for the betterment and success of my life.

STATEMENT OF THE AUTHOR

First, I declare that this thesis is my glimmer work and that all sources of materials used for this thesis have been duly acknowledged. This thesis has been submitted in partial fulfillment of the requirements for an advanced M.sc. degree at Haramaya University and is deposited at the University Library to be made available to borrowers under rules of the Library. I soberly declare that this thesis is not submitted to any other institution anywhere for the award of any academic degree, diploma, or certificate.

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ACRONYMS AND ABBREVIATIONS

AADDP	Addis Ababa Dairy Development Project
AADI	Addis Ababa Dairy Industry
ARDU	Arsi Rural Development Unit
AWARDO	Awassa Woreda Agriculture and Rural Development Office
CADU	Chilalo Agricultural Unit
CC	Contigency Coefficient
C^o	Degree Celsius
CI	Condition Index
CSA	Central Statistical Authority
DDA	Dairy Development Agency
DRDP	Dairy Rehabilitation and Development Project
ETB	An Ethiopian Birr
FAO	Food and Agricultural Organization
GDP	Gross Domestic Product
GMMft	Gross marketing margin for farmer trader
GMMit	Gross marketing margin for itinerate traders
GMMsws	Gross marketing margin for semi-wholesaler
GMMrt	Gross marketing margin for retailer
GMMP	Gross Marketing Margin for Producer
ILRI	International Livestock Research Institute
Km	Kilometer

ACRONYMS AND ABBREVIATIONS (CONTNIUED)

LAM Livestock Marketing Authority

LIMDEP Limited Dependent Variable

Lit Litter

m.a. s.l Meter above seal level

mm millimeter

MEDac Ministry of Economic Development and Cooperation

MOA Ministry Of Agriculture

MoARD Ministry of Agriculture and Rural Development

NGOS Non-Governmental Organization

NMM Net Marketing Margin

NMMft Net marketing margins for farmer traders

NMMit Net marketing margin for itinerate traders

NMMsws Net marketing margin for semi-wholesaler

NMMrt Net marketing margin for retailers

RMA Rapid Marketing Appraisal

S-C-P Structure, Conduct and Performance

SDDP Smallholders' Dairy Development Programme

SNNRS-RSA South Nations Nationalities Reginald Government Regional Statistical Agency

SPSS Statistical Package for Social Science

Sq.km Square kilometer

SWARDO Shashemane Woreda Agriculture and Rural Development Office

ACRONYMS AND ABBREVIATIONS (CONTNIUED)

TCP	Technical Cooperation Programme
TGMM	Total Gross Marketing Margin
TGMMr	Total Gross Marketing Margin for retailer
VIF	Variance Inflation Factor
UNRRA	United Nations Relief and Rehabilitation Administration
UNICEF	United Nations International Children's' Education Fund
WFP	World Food Programme
St.	Standard

BIOGRAPHY

The author was born from his mother Aressie Herabo and Somano Ewalo in Mudaula town in 1973 G.C. He attended his primary and junior secondary education at Mudula and Durgi primary and Junior Secondary schools, respectively from 1980-1988. The Author attended 9^{th} –12^{th} grade at Gimbichu Senior Secondary School from 1989-1992. He joined Awassa college of Agriculture in 1993 and completed his diploma in Animal Production and Range Land Management in 1994. Then after, he was employed in Bureau of Agriculture and was working in Mereka district (Dawuro Zone in Southern Ethiopia) Bureau of Agriculture in 1995 as expert of livestock and fishery development, in Omosheleko district Bureau of Agriculture (Kembata Tembaro zone in Southern Ethiopia) from 1996-2000 as expert of livestock production. The author joined Debub Univesity in 2001 in the field of Animal Production and Range Land Management and completed his study in 2002. He again returned to his former office (Omosheleko district) in 2003/04 and was working as head livestock desk for earlier 2 years and the rest as head Agriculture and Rural Development office until he joined Haramaya University in September 2005 to pursue his M.Sc. programme in Agricultural Economics.

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ABSTRACT

The study was initiated with the objectives of analyzing dairy marketing chains in the Hawassa, Shashemane and Yergalem milk shed in southern Ethiopia. The milk shed encompasses Hawassa, Shashemane and Yergalem towns. Milk and butter were the two most important dairy products marketed in the areas. Data came from 180 dairy producing households, 97 butter traders, and 81 milk traders. The Heckman two-stage econometric estimation procedure was employed to identify factors that determine milk market participation decision and milk sale volume of the farm household in the area. The first step of the Heckman two stages procedures results showed that dairy household milk market entry decision was strongly and significantly affected by age of the household head, family size, education level, experience in dairy production, number of cross breed milking cows owned and distance from milk market center. In addition, the second stage estimation result revealed that marketable milk volume was found to be strongly and significantly affected by the number of cross breed milking cows owned, family size, age squared and annual non-dairy income source of sampled dairy household. Eighty five percent of sampled dairy household were identified to be milk market participants and about 65% of milk produced by sampled household was supplied to market. Dairy producers, retailers, farmer traders, ierate traders, dairy producers' cooperatives and semi-wholesale were found to be important milk and butter market intermediaries of the milk shed. The crossbreed and local breed dairy farm owner are respectively 67.4% and 32.6%. The S-C-P model identified that the markets for milk and butter in the study area was non-competitive type. The highest and the lowest net profit/lit in milk marketing respectively obtained by dairy producers and milk semi-wholesaler. In butter market, butter retailers enjoyed the highest net profit. Generally, milk and butter market in the study area seemed to be inefficient and underdeveloped. Thus, dairy development interventions should be aimed at addressing both dairy production technological gaps and marketing problems. The study further suggested that dairy processing industries formation, dairy producers and trader cooperatives, and improving access to services should receive due attention in order to improve dairy production in general and dairy marketing in

1. INTRODUCTION

1.1. Background of the Study

The important roles of livestock in the developing countries within the agricultural sector in contributing to rural livelihoods and particularly those of the poor are well recognized (Upton 2004). Livestock and their products are estimated to make up about a third of the total value of agricultural gross output in the developing countries, and this share is rising from time to time. Livestock production in these countries is increasing rapidly in response to the fast growing demand for livestock products resulting from increasing population especially that of urban areas, and rising consumer income and the sector is found to play an increasing role in peri– urban systems. These systems are driven by growth of urban demand and efficiency of market chains linking more remote producers to these markets and also frequently provide income opportunities for landless poor, who provide fodder, collect waste to feed to animals and engage in distribution and marketing of outputs through informal systems (ILRI, 2005).

Livestock production is an integral part of Ethiopian agricultural system. The sub-sector is estimated to contribute about 12-16% of the total GDP and 30-35% of total agricultural GDP, and 60-70% livelihoods of the Ethiopia population (Halderman, 2004). The major Livestock population in Ethiopia is estimated to be 39,714, 653 cattle, 14, 326, 206 sheep and 11, 155, 218 goat (CSA, 2006). Of these resources, 20% of cattle and 25% of sheep are found in the lowland pastoral areas of the country (Belachew *et al.*, 2003). The estimated annual growth rates are 1.2% for cattle, 1% for sheep and 0.5% for goats (CSA, 2006). The percentage of total livestock population found in highlands of Ethiopia including peri-urban and urban areas are 70-80% of the cattle, 48%-75% of sheep and 27%-55% of goats (Halderman, 2004).

Understanding the role of agriculture as major source of economic development endeavor, the government of Ethiopia designed agricultural development strategy known as Agricultural Development Led Industrialization (ADLI) (2001). The strategy considers agriculture as the engine of growth on account of its potentiality to create linkages with other sectors, surplus

generation, potential market creation, provision of raw materials and foreign exchange earnings. The strategy further pointed out that the success of ADLI could be assured mainly by improving the performance of agricultural marketing system. At present, the Federal and Regional governments are doing their level best to transform the existing subsistence agriculture into market oriented commercial production system.

The major species used for milk production in Ethiopia are cattle, camel and goats. Cattle produce 83% of the total milk and 97 % of the cow milk comes from indigenous cattle breeds (MOARD, 2004). The total population of animals used for milk production is 13,632,161 TLU. Although milk production is increasing by 1.2% per annum, the demand-supply variance for fresh milk is ever widening and the per capita consumption is diminishing. The key development issues in dairy are low milk production complicated by widespread food insecurity, growing gap between supply and demand in urban areas, and low average milk productivity (MOARD, 2004).

In the high potential areas, the economic importance of the cow has increasingly shifted to commercial milk production while at the same time retaining the complementary role of sustaining soil fertility for sustainable agricultural production. In such areas, increasing population pressure interacting with the need to sustain soil fertility has driven the change in production structure with dairying becoming an important component of agricultural production.

In Ethiopia, dairying is a means of providing an additional source of employment and income to small and marginal producers. The smallholders produce about 93% of dairy product, but it is only small quantity of this production that is marketed in the form of liquid milk; the larger volume is processed into different dairy products for home consumption and sales. Large scale marketing and processing of milk is limited to the area around Addis Ababa, which is the Addis Ababa milk shed. It appears that butter dominates dairy marketing, and the transaction in the form of raw milk is limited around major urban centres. There are a few milk-processing plants in Ethiopia, one is owned and operated by the government (Dairy Development Enterprise) and others are private. The processed products of these plants are

pasteurised fluid milk, table butter, hard cheese, yoghurt and *ayib* (cottage cheese) (Zegeye, 2003).

The low marketable milk output in Ethiopia poses limitations on the possibilities of exploring distant but rewarding markets due to high transaction costs arising from transportation and high opportunity cost of labor involved. Again, dependable marketing system is not yet developed to market milk and milk products. Producers and consumers are spatially separated; most producers are found in the rural areas while consumers or profitable market is found in urban areas. Most of the milk supply is distributed from producer to consumer through informal marketing channels in both rural and urban areas. Market infrastructures and marketing facilities are not well developed in the country. This, in turn, reduces incentives to participate in economic transactions and results in subsistence rather than market-oriented production systems. 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).

In Ethiopia, fresh milk sales by smallholder producers are important only when they are close to formal milk marketing facilities, such as government enterprise or milk groups. Producers far from formal marketing outlets prefer to produce other dairy products instead, such as cooking butter and cottage cheese. The vast majority of milk produced outside urban centres in Ethiopia is processed into dairy products by the households, and sold to traders or other households in local markets (Muriuki et al., 2001).

Given the considerable potential for smallholder income and employment generation from high-value dairy products, development of the dairy sector in Ethiopia can contribute significantly to poverty alleviation and nutrition in the country. FAO (2001) estimates that about 51 percent of the population of Ethiopia is undernourished and over two million people are considered to be chronically food insecure. Compared to other countries in Africa, Ethiopians consume less dairy products. Per capita consumption of milk in Ethiopia is as low as 17 kg per head while the average figure for Africa is 26 kg per head. Besides providing income-earning opportunities for the poor, dairy development, especially at the smallholder

sector level, can improve the nutritional status of Ethiopian children by making available milk for consumption and increasing household income.

The existing excess demand for dairy products in the country is expected to induce rapid growth in the dairy sector. Factors contributing to this excess demand include the rapid population growth (estimated at 3 percent annually), increased urbanization and expected growth in incomes. With the shift towards market economy and liberalization policies, private entrepreneurs are expected to respond to the increased demand through increased investment in dairying and milk processing. While the response of the private sector to the increased demand for dairy is expected to be significant, the small-scale household farms in the highlands hold most of the potential for dairy development (Mohammed et al., 2004).

Encouraging intensified dairying is one strategy of the Ethiopian governments to address the low productivity problem of indigenous cattle and to enable resource-poor smallholder mixed crop-livestock farmers to raise incomes. Market-oriented smallholder dairy farms are concentrated close to urban consumption centers because the effects of the market over-ride many production factors. Less proximate production occurs only in those regions where there is an efficient market infrastructure. As infrastructure develops, markets become more efficient and urban consumers develop stronger preferences for pasteurized milk, the advantages of proximity will be reduced and production may well move away from intensive peri-urban systems and shift to more extensive systems.

1.2. Statement of the Problem

Emphasis in development policy has usually been placed on increasing agricultural production to serve as a base for rural development. Nevertheless, in the absence of well-functioning markets, agricultural production can experience severe drawbacks. If the surplus resulting from increased production cannot enter the market, neither the producer nor the country will benefit. If scarce resources are used to produce output that cannot be sold, it might have a reverse effect on development (Cloudis and Muller, 1961).

An efficient, integrated and responsive market mechanism that is marked with good performance is of crucial importance for optimal allocation of resources in agriculture and for stimulating producer to increase output (Jones, 1972; FAO, 1999; Acharya and Agarwal, 1999). It has also an impact upon the income of herders, traders, exporters and other market participants in particular and the national economy in general. Its impact is more serious in areas where livestock are the dominant sources of livelihood of the community. Therefore, without having favorable marketing conditions, the possible increment in output, incomes, and foreign exchange earning resulting from the introduction of improved production technologies could not be realized. Thus, agricultural marketing efficiency has attracted the attention of many countries and it is viewed as an important national development strategy.

Ethiopia has the leading livestock population in Africa, estimated to be 81 million livestock population (CSA, 2006) and the sector plays a vital role in the overall development of the country's economy. Yet, the existing income generating capacity of livestock and livestock products as compared to its immense potentials in the country has not been exploited. The primary reason among others seems to be the inefficient livestock and livestock product marketing characterized by high margins and poor marketing facilities and services. The price gap between terminal and primary markets seems to be too wide (CSA, 2006). Under these conditions, producers have no incentives to improve the quality of their animals' products through appropriate management practices.

Like most developing countries in Africa, Ethiopia did not have a clear livestock and livestock development policy for many years up until the establishment of Livestock Marketing Authority (LMA) in 1998. Livestock development projects are formulated on the basis of the overall government policy in the Agricultural sector. In many instances, policy decisions on livestock product marketing in the country seem to be taken in the absence of vital information. Furthermore, dairy product marketing channels and their characteristics have not yet been studied and analyzed for different parts of the country. This seems the case because there were very few researches done on livestock and livestock products marketing. Earlier studies on local and regional dairy products market in the country include Holloway et al., (2000); Yigezu (2000); Muriuki and Throne (2001); Redda (2001) and Mohammed et al.

(2004). Consequently, dairy product marketing studies become essential to provide vital and valid information on the operation and efficiency of dairy product marketing system for effective research, planning and policy formulation. This study therefore has attempted to contribute to filling the information gap by investigating the milk and butter marketing chains and factors affecting milk supply in Shashemane, Hawassa and Dale districts' milk shed in southern Ethiopia.

1.3. Research Questions

The thesis attempted to answer the following research questions:

1. Which dairy marketing channel is most efficient in the milk shed?
2. Who gets most of the marketing margin from the dairy marketing of the study area?
3. How is dairy marketing organized and performing in the milk shed?
4. What are the factors affecting volume of milk supply and milk market participation decision by dairy household?

1.4. Objectives of the Study

The overall objective of this study is to analyze dairy marketing chains in the Shashemane, Hawassa and Dale/Yergalem District's milk shed, southern Ethiopia. The specific objectives are:

1. To identify the major dairy marketing channels, the role and linkages of marketing agents in the Shashemane, Hawassa and Dale/ Yergalem district's milk shed, in southern Ethiopia;
2. To analyze dairy marketing costs and margins for key marketing channels of the area;
3. To identify factors affecting milk supply in the study area; and
4. To identify key dairy production and marketing constraints in the study area

1.5. Significance of the Study

The study would generate valuable information on dairy marketing that would assist policy-makers in designing appropriate policies for intervention. Governmental and non-governmental organizations that are engaged in the development of livestock sub-sector would benefit from the results of this study.

The findings of this study are also believed to be useful to dairy producers, traders and marketing agents to make informed decisions. The work also serves as a reference document for researchers to embark on studies of the same or related kinds in other parts of the country.

1.6. Scope and Limitation of the Study

Area considered for this study was selected from southern Ethiopia, namely Shashemane town, Hawassa town and Yergalem town. Due to financial and time constraints, not all dairy derivatives found in the study area were covered. However, the study focused on only major dairy derivatives (fluid milk and cooking butter) supply and marketing chains analysis in the study area.

1.7. Organization of the Study

The thesis is organized into five chapters. In chapter two, review of theoretical and empirical works related to the study are presented. Chapter three discusses the research methodology used in the study. Results and discussions are presented in chapter four. Chapter five summarizes the findings of the study and presents policy implications.

2. REVIEW OF LITERATURE

2.1. Basic concepts

Marketing channel: Formally, a marketing channel is a business structure of interdependent organizations that reach from the point of product origin to the consumer with the purpose of moving products to their final consumption destination (Koler et al., 2003). This channel may be short or long depending on kind and quality of the product marketed, available marketing services, and prevailing social and physical environment (Islam et al., 2001).

A marketing chain: Defines the flow of commodities from producers to consumers that brings into place economic agents who perform complementary functions with the aim of satisfying both producers and consumers (Islam et al., 2001). A marketing chain may link both formal and informal market agents. A marketing chain may connect one or more milk or dairy sheds.

Milk shed: Is an area where milk production is a major activity. Milk shed may serve one or more consumption centers or cities. In addition, a consumption center may be served by more than one milk shed. For example, in Addis Ababa, raw milk comes from the Addis Ababa milk shed comprising about 100 km radius around Addis, but butter in Addis market comes from several milk sheds located up to 600 km away (Tsehay, 2001).

Marketable and Marketed Surplus: Marketable surplus is the quantity of the produce left out after meeting the farmers' consumption and utilization requirements for kind payments and other obligations such as gifts, donation, charity, etc. Thus, marketable surplus shows the quantity left out for sale in the market. The marketed surplus shows the quantity actually sold after accounting for losses and retention by the farmers, if any and adding the previous stock left out for sale. Thus, marketed surplus may be equal to marketable surplus, it may be less if

the entire marketable surplus is not sold out and the farmers retain some stock and if losses are incurred at the farm or during transit (Thakur *et al.,* 1997*)*.

The importance of marketed and marketable surplus has greatly increased owing to the recent changes in agricultural technology as well as social pattern. In order to maintain the balance between demand for and supply of agricultural commodities with rapid increase in demand due to higher growth in population, urbanization, industrialization and over all economic development, accurate knowledge on marketed/marketable surplus is essential in the process of proper planning for the procurement, distribution, export and import of agricultural products (Malik *et al*., 1993).

2.2. Approaches to the Study of Agricultural Marketing

The study of marketing involves various approaches. The most common are the functional, the institutional, and the commodity approaches.

2.2.1. Functional approach

Functional approach studies marketing in terms of the various activities that are performed in getting farm product from the producer to the consumer. These activities are called functions (Cramers and Jensen, 1982). Using the functional approach, it is feasible to "cost" these functions and to compare them against others (middlemen) doing the same job or against standard of performance (Cramers and Jensen, 1982). And this approach helps to compare cost and benefits of different functions. The widely accepted functions are: a) exchange (buying and selling), b) physical (processing, storage, and transportation), and c) facilitating (standardization, financing, risk bearing, and market information). Most of these functions are performed in the marketing of nearly all commodities.

Marketing of agricultural products consists primarily of moving products from production sites to points of final consumption. In this regard, the market performs exchange functions as

well as physical and facilitating functions. The exchange function involves buying, selling and pricing. Transportation, product transformation and storage are physical functions, while financing, risk bearing and marketing information facilitate marketing.

2.2.2. Institutional approach

Institutional approach examines the activities of business organizations or people in marketing. The institutional approach focuses on the study of the various institutions, which perform the marketing activities. These organizations or people are middlemen who perform the operations necessary to transfer goods from the producer to consumer, because of the benefit of specialization and scale that exist in marketing as well as production (Cramers and Jensen, 1982).

2.2.3. Commodity approach

In a commodity approach, a specific commodity or groups of commodities are taken and the functions and institutions involved in the marketing process are analyzed. This approach focuses on what is being done to the product after its transfer from its original production place to the consumer (Kohls and Uhl, 1985). It helps to pinpoint the specific marketing problems of each commodity as well as improvement measures. The approach follows the commodity along the path between producer and consumer and is concerned with describing what is done and how the commodity could be handled more efficiently. This approach has been used in this study as a guideline to identify different aspects of the problem.

2.3. Methods of Evaluating Marketing Performance

Market performance can be evaluated by analysis of costs and margins of marketing agents in different channels. A commonly used measure of system performance is the marketing margin or price spread. Margin or spread can be useful descriptive statistics if it used to show how the consumer's food price is divided among participants at different levels of marketing system (Getachew, 2002).

Marketing costs: Marketing costs are the embodiment of barriers to access to market participation by resource poor smallholders. It refers to those costs which are incurred to perform various marketing activities in the transportation of goods from producer to consumers. Marketing costs includes handling cost (packing and unpacking, costs of searching for a partner with whom to exchange, screening potential trading partners to ascertain their trustworthiness, bargaining with potential trading partners (and officials) to reach an agreement, transferring the product, monitoring the agreement to see that its conditions are fulfilled, and enforcing the exchange agreement (Holloway et al., 2002).

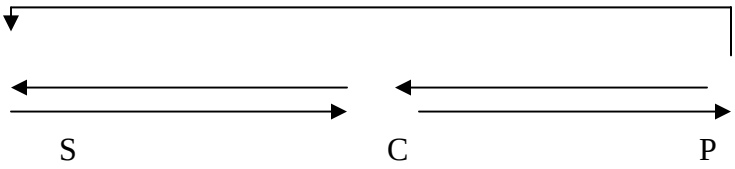
Marketing margin: A marketing margin is the percentage of the final weighted average selling price taken by each stage of the marketing chain. The total marketing margin is the difference between what the consumer pays and what the producer/farmer receives for his product. In other words, it is the difference between retail price and farm price (Cramers and Jensen, 1982). A wide margin means usually high prices to consumers and low prices to producers. The total marketing margin may be subdivided into different components: all the costs of marketing services and the profit margins or net returns. The marketing margin in an imperfect market is likely to be higher than that in a competitive market because of the expected abnormal profit. But marketing margins can also be high, even in competitive market due to high real market cost (Wolday, 1994).

2.4. Approaches to Measure Marketing Efficiency

Early attempts at assessing marketing efficiency focused on the internal technical and operational efficiency of marketing firms. In this approach, management structures, motivation and incentive arrangements, and decision-making rules and processes were considered as important factors that influence the efficiency of operations (French, 1977).

Economists also recognized that, by their very nature, markets are systemic and all elements within them are interlinked. Therefore, analyses often emphasized the behavior of groups of similar firms, and the influence that the relationships among these firms has on market performance. This approach came to be known as the 'industrial organization' or 'structure-

conduct-performance' approach to market analysis. The basic tenet of this approach is that, given certain basic conditions, the structure of an industry or market determines the conduct of its participants (buyers and sellers) which in turn influence its performance. Basic conditions refer to characteristics which are exogenous to the market, for example infrastructure, legal and policy environment and available technology. Efficiency factors can be evaluated by examining marketing enterprises for structure, conduct and performance (Abbott et.al., 1979). The performance of a certain market or industry depends on the conduct of its sellers and buyers which, in turn, is strongly influenced by the structure of the relevant markets (Scarborough et al., 1992; Margrath, 1992). Variables relevant in appraising firm's behavior can be put into three general categories: Structure, Conduct, and Performance related variables (Clodius and Mueller, 1961).



S	C	P
Buyer and seller	Price policy,	Allocative efficiency,
Concentration,	Output policy,	Technical efficiency,
Product differentiation,	Legal tactics,	Equity, etc.
Barriers to entry, etc.	Advertising policy, etc.	

Figure 1. Relationship among Marketing Structure, Conduct, and Performance

All the three parameters do not have unidirectional movement but rather have an interdependent relationship as shown in the above figure. Hence, market structure does not only influence market performance but also has an impact on market conduct. Further more, performance also affects the development of market structure and market conduct. The latter limits a similar effect on the structure of the marketing system.

Structure of the market: Is defined as those characteristics of the organization of the market that seem to exercise strategic influence on the nature of competition and pricing within the market (Bain, 1968). Structural characteristics like market concentration; industry maturity, government participation and barriers to entry were some of the basis considered. The perfect market model was used as a benchmark to study of the structure of the market.

Market concentration which refers to the number and size distribution of sellers and buyers in the market, the firm's objectives, barriers to entry, economies of scale, and assumptions about rival firm's behaviors are relevant in determining the degree of concentration and behaviors and performance (Schere, 1980).

Conduct of the market: Conduct refers to the market behavior of all firms. In what way do they compete? Are they looking for new techniques and do they apply them as practicable? Are they looking for new investment opportunities, or are they disinvesting and transferring funds elsewhere? Market conduct also deals with the behavior of firms that are price-searchers and are expected to act differently than those in a price-taker type of industry (Cramers and Jensen, 1982). Price-searchers can determine their selling prices or quantity of output they sell. In addition, they could use their market power to weaken or eliminate competitors example reducing price. Further, conduct refers to strategies of the actors operating in the market or pattern of behavior which enterprises follow in adopting or adjusting to the market in which they sell or buy (Meijer, 1994)

Performance of the market: It is commonly measured in terms of productive and allocative efficiency**.** Progressiveness or innovation is also sometimes considered. Where equity and employment creation are national objectives, these are also considered as criteria for performance assessment (Marion and Mueller, 1983).

Productive efficiency usually calculated at the firm or enterprise level, is the combined result of technical and operational efficiency. Technical efficiency is measured in terms of physical input: output ratios. Theoretically, technical efficiency may be measured as the ratio of actual output to potential maximum output per unit of input, given technology, locational and environmental conditions. In practice, technical efficiency is measured in relative terms by comparing differences in input-output ratios of firms with similar resources.

Operational efficiency, also referred to as firm level allocative or price efficiency, is defined as the level of output at which the value of marginal product equals marginal factor cost for each factor of production or marketing. This is also the profit maximizing level of output.

Allocative efficiency, also referred to as pricing or economic efficiency, is usually measured at the market level. A market is considered economically efficient if (a) all enterprises in the market are productively efficient, (b) the distribution of enterprises, plants and infrastructure are organized in a manner which enables scale and location economies to be exploited, (c) prices provide incentives to producers and consumers that are consistent with available resources and demand. Economic efficiency is achieved when the sum of consumers' and producers' surplus is the maximum, and when Pareto optimality prevail i.e., No change in the economy or market can be made whereby an individual can be made better off without reducing the welfare of another individual. It is assumed that competitive market maximizes the efficiency of resource allocation (French, 1977).

The most important hypothesis generated by the structure - conduct - performance school of thought, and tested by a wide range of marketing economists, is that as market or industry structure moves away from perfect competition, output and allocative efficiency will decrease and prices will rise.

2.5. Overview of the Dairy Sector in Ethiopia

2.5. 1. Dairy Production systems

Livestock are kept in all of the farming systems of Ethiopia by pastoralists, agro- pastoralists, and crop-livestock farmers. Following Redda (2001), milk production systems can be broadly categorized into urban, peri-urban and rural milk production systems, based on location. Both the urban and peri-urban systems in Ethiopia are located near or in proximity of Addis Ababa and regional towns and take the advantage of the urban markets. The urban milk system consists of 5,167 small, medium and large dairy farms producing about 35 million liters of milk annually. Previous studies conducted by Mohammed et.al (2003) show that of the total urban milk production, 73 percent is sold, 10 percent is left for household consumption, 9.4 percent goes to calves and 7.6 percent is processed into butter and ayib (cheese). In terms of marketing, 71 percent of the producers sell milk directly to consumers (Redda 2001). The peri-urban milk system includes smallholder and commercial dairy farmers in the proximity

of Addis Ababa and other regional towns. This sector controls most of the country's improved dairy stock. The rural dairy system is part of the subsistence farming system and includes pastoralists, agro- pastoralist, and mixed crop-livestock producers mainly in the highland areas. The system is non-market oriented and most of the milk produced in this system is retained for home consumption. The level of milk surplus is determined by the demand for milk by the household and its neighbors, the potential to produce milk in terms of the herd size and production season, and access to a nearby market. The surplus is mainly processed using traditional technologies and the processed milk products such as butter, ghee, ayib and sour milk are usually marketed through the informal channels after the households satisfy their needs (Redda, 2001).

The dairy sector in Ethiopia can also be categorized based on market orientation, scale and production intensity. Accordingly, three major production systems have been identified as traditional smallholders, privatized state farms and urban and peri-urban systems. Among these, the traditional smallholder system refers to the rural milk production system and produces 97% of the total national milk production and 75% of the commercial milk production. This sector is largely dependent on the indigenous breeds such as native Zebu cattle, which are characterized by low productivity, yielding about 400-680 kg of milk /cow per lactation period (Alemu *et al*., 2000). The out put of descriptive statistics used by (Holloway et.al. 2002) show that the state dairy farms now privatized or in the process of privatization, use grade animals (those with more than 87.5% exotic blood) and are concentrated within 100 kms radius around Addis Ababa.

The urban and peri-urban milk production system, the third production system, includes small and larger private farms in urban and peri-urban areas, concentrated in the central highland plateaus (Getachew and Gashaw, 2001). This sector is commercial and mainly based on the use of grade and cross breed animals that have the potential to produce 1120-2500 liters over a 279 days lactation period (Holloway *et al*., 2002).

In Ethiopia, according to Central Statistics Authority (CSA, 2003), cattle are the main source of milk production, although small quantities of milk are also obtained from goat and camel in pastoral areas. The total cattle population is estimated at about 41.5 million out of which 189

thousand (0.47%) and 56 thousand (0.13%) are cross and pure breeds, respectively. The total urban cattle population is estimated at about 888 thousand of which 2,354 (0.26%) and 9,792 (1.1%) are cross breed and pure exotic breeds, respectively. The population of milking cows is estimated at about 9.3 million and 259 thousand exist in urban areas. The total milk production of the nation is estimated to be over 2.5 billion liters and this corresponds to an average milk production of 1.284 liters per cow per day. In the urban areas, the total milk production is estimated to be 112 million liters and this gives an average daily production per cow of 2.1 liters (CSA, 2003).

2.5. 2. Milk marketing systems in Ethiopia

As is common in other African countries (e.g., Kenya and Uganda), dairy products in Ethiopia are channeled to consumers through both formal and informal dairy marketing systems (Mohammed et.al., 2004). Until 1991, the formal market of cold chain, pasteurized milk was exclusively dominated by the DDE (Dairy development Enterprises) which supplied 12 percent of the total fresh milk in the Addis Ababa area (Holloway et al. 2000). The DDE remains the only government enterprise involved in processing and marketing dairy products. The DDE collects milk for processing from different sources, including large commercial farms and collection centers that receive milk from smallholder producers. The enterprise operates 25 collection centers located around Addis Ababa, 13 of them near Selale, 5 near Holetta and 7 around Debre Brehane (Mohammed et al., 2004).

Unlike the early phases, the formal market appears to be expanding during the last decade with the private sector entering the dairy processing industry. Recently, private businesses have begun collecting, processing, packing and distributing milk and other dairy products. However, the proportion of total production being marketed through the formal markets remains small (Muriuki and Thorpe 2001). Formal milk markets are particularly limited to peri-urban areas and to Addis Ababa.

The sale price of pasteurized milk changed from time to time. Until the 1980's, the DDE charged a price of 0.7 Birr per litter. The price of milk increased from 1.00 Birr in 1985/1986

to 1.70 Birr in 1990. However, the wide gap between production and sale of milk by DDE during the 1980-1990 reflects the failure of DDE to efficiently market its products. During the last decade, the period of transition to a market-oriented system, the marketing situation has improved and almost all the output was marketed.

However, since its inception, the enterprise has only utilized its full capacity during the four-year period from 1987 to 1990 (Staal, 1995). The reasons for low capacity utilization include management problems, financial difficulties, and unstable and low consumption levels of processed milk in the society due to fasting that prohibits the orthodox Christians (about 35-40 percent of the population) from consuming dairy products for almost 200 days every year (Yigezu, 2000).

The survey result conducted by Mohammed et al. (2004) revealed that in addition to DDE, several private milk-processing plants have been established in Addis Ababa, two of which Sebeta Agro Industry and Dinsho dairy industries have already started marketing their products. Although their share of the market is still small compared to DDE.s, the entry of private firms in the formal milk market is a significant development indicating the profitability and potential of private investment in dairy in Ethiopia and that the policy environment is facilitating such entry.

The informal market involves direct delivery of fresh milk by producers to consumer in the immediate neighborhood and sale to itinerant traders or individuals in nearby towns. In the informal market, milk may pass from producers to consumers directly or it may pass through two or more market agents. The informal system is characterized by no licensing requirement to operate, low cost of operations, high producer price compared to formal market and no regulation of operations. The relative share and growth of the formal and informal market in the three phases was different. In all three phases, the informal (traditional) market has remained dominant in Ethiopia (Redda, 2001). The traditional processing and trade of dairy products, especially traditional soured butter, dominate the Ethiopian dairy sector. Of the total milk produced, only 5 percent is marketed as liquid milk due to underdevelopment of infrastructures in rural areas.

In recent years, promotional efforts have focused on dairy marketing. Milk marketing cooperatives have been established by the SDDP (Smallholders Dairy Development Program) with the support of Finnish International Development Association. These groups buy milk from both members and non-members, process it and sell products to traders and local consumers. The units also process milk into cream, skim milk, sour milk, butter and cottage cheese. The number of these milk cooperatives reached to 32 in total, 2 established by FAO/TCP (Technical Cooperation Programme) and World Food Programme (WFP) while 30 by SDDP (Redda, 2001).

Setting up a new dairy cooperative would clearly reduce the travel time to group, and the actual number of households that would benefit depends on local population densities. It is also important to keep newly emerging milk groups small and geographically limited to ensure proximity and avoid large groups that would tend to increase average travel times (Holloway et al., 2002). Another study showed that the creation of new market outlets for fluid milk brought major improvement in the production, marketing and consumption behavior of small dairy households. The new marketing outlets may also promote involvement in more intensive dairying (Nicholson et al., 2000). Further more, cooperatives, by providing bulking and bargaining services, increase easy access to market and help producers avoid hazard of being encumbered with a perishable product (Jaffee, 1994). In short, participatory cooperatives are very helpful in overcoming access barriers to asset, services and markets within which smallholders wish to produce high value items (Jaffee, 1994).

2.5.3. Butter marketing in Ethiopia

Butter and some dairy products are called yellow fats, which contains a number of products for spreading onto bread or for indirect consumption as ingredients in other foods. There is some debate over product definition, and different systems of classification have distinguished products according to a variety of characteristics: the source of their raw

material (dairy fat, animal fat, and vegetable fat); their total fat content; their polyunsaturated fat content; and whether they are hard or soft (Traill et al., 1994).

In developed countries, there has been a long–term movement away from yellow fats in general and in particular from butter. For example, per capita consumption by households more than halved during the 1980's alone in the UK (Traill et al., 1994). The market for newer spreads continues to grow as a share of the market. Part of the shift away from butter may be attributed to concern about health and inconvenience.

Traditional Ethiopian butter is always made from soured milk; cream is not used. The sour milk is placed in a clay churn or a bottle gourd (calabash). Churns are usually spherical and may have different diameters of a neck and a vent depending up on volume of milk to be processed. The churn may have previously been smoked with Olea Africana. Besides imparting a distinct flavor to the butter, this practice has a bacteriostatic effect, and may reduce processing time by heating the churn. After filling, the churn is Stoppard with a plug, a false banana leaf, or a piece of skin or leather stretched over the mouth and securely tied (AOAC, 1980).

Fat extraction is an important factor determining the efficiency and profitability of smallholder dairy enterprises in the Ethiopian highlands. At present, nearly 50% of traditional processors recover between 50 and 67% of the butterfat from whole milk, and a further 12.5% of producers recover less than 50% (Foley et al, 1976). Ephraim and Tarik (1987) in Addis Ababa identified that direct butter sale to consumer by main city market (Marketo Market) traders accounts for 87% where as direct sales by traders in other part of the city markets account for 3.6% and 1.7%, respectively. Direct sales to consumers by producers, itinerate traders and small private shops/ kiosks accounts for 2.6%, 3% and 2%, respectively.

Butter is sold in rural markets and at the central, public butter market in Addis Ababa. In rural markets the butter is sold by volume, the weight of which can vary considerably. In the Addis Ababa market butter is sold by weight. The moisture content varied from 2 to 43%, most samples having less than 16% moisture. The content of free fatty acids in the butter sold

in rural markets varied from 0.23 to 1.20%. Older butter sold in the Addis Ababa market had free fatty acids content of as high as 23% (Ephraim and Tarik, 1987).

The retail price in Addis Ababa market for butter fluctuates depending on its quality and on market demand, which is high at Easter and during other feasts but low during the fasting periods prescribed by the Coptic Church. No premium is paid for any fat remaining in the main byproduct of butter making the local cottage cheese called *ayib.* When the cheese is sold or, in the extreme case, wasted, poor fat recovery in butter can lead to considerable loss of income; however, when it is consumed at home, the fat remaining in *ayib* is a valuable addition to the diet, contributing in this way to the income of smallholders. A 10% increase in butterfat recovery could be expected to increase income by about 5.00 Birr ($ 2.5) per 100 litters of whole milk processed (Ephraim and Tarik, 1987).

Study conducted by Gizachew (2005) on dairy marketing patterns and efficiency in Ada'ha Liben district in Oromia region identified that itinerate traders purchase fresh butter and cheese from producers in the district and neighbouring regions for resale in urban and rural market. They buy butter of better shelf life from producers at farm gate or at market place. About 5.5% of butter reaches the final consumer through itinerate butter traders. Price is used as a sign of quality. At the wholesale market in Addis Ababa butter is standardized on the basis of quality. Implicitly expensive butter is assumed to be of better quality, while cheaper ones are inferior. Sometimes quality is compromised and tradeoffs are commonly observed between quality and price, and for obvious reasons good quality butter fetches higher price.

2.5.4. Historical profile of the dairy sector in Ethiopia

2.5.4.1. The Emergence of modern dairying in Ethiopia (1960 -1974)

During the first half of the 20th century, dairying in Ethiopia was mostly traditional. Modern dairying started in the early 1950s when Ethiopia received the first batch of dairy cattle from United Nations Relief and Rehabilitation Administration (UNRRA). With the introduction of these cattle in the country, commercial liquid milk production started on large farms in Addis

Ababa and Asmara (Ketema and Tsehay, 2000). Government intervened through the introduction of high-yielding crossbred dairy cattle on the highlands in and around major urban areas. The Government also established modern milk processing and marketing facilities to complement these input oriented production effort. Most interventions during this phase focused on urban-based production and marketing including the introduction of exotic dairy cattle, feeding with high ratio of dairy concentrated feed, modern dairy infrastructure and high management level.

To facilitate growth of the sector, UNICEF established a public sector pilot processing plant at Shola on the outskirt of Addis Ababa in 1960. The plant started by processing milk produced by the large farms. The plant significantly expanded in a short period and started collecting milk from smallholder producers in addition to large farms. This led to further expansion of large dairy farms. During the second half of the 1960s, dairy production in the Addis Ababa area began to develop rapidly because of the expansion in large private dairy farms and the participation of smallholder producers with indigenous cattle facilitated by establishment of the milk collection centers.

With the advent of modern dairying, the government of Ethiopia established the Addis Ababa Dairy Industry (AADI) in 1966 to control and organize the collection, processing and distribution of locally produced milk. Further, with the help of UNICEF, the Shola plant was expanded in 1969 and several government-owned dairy farms were established to supply the formal market and to serve as demonstration centers for the large commercial farms. In addition, the government introduced regular programs and projects for dairy development. The first effort, initiated by the governments of Ethiopia and Sweden, was the establishment of the Chilalo Agricultural Unit (CADU), later named Arsi Rural Development Unit (ARDU), between 1970 and1980. The unit produced and distributed crossbred heifers, provided artificial insemination (AI) services and animal health service, in addition to forage production and marketing (Staal, 1995).

To create an autonomous body responsible for dairy development, the government of Ethiopia established the Dairy Development Agency (DDA) in 1971. The DDA took over the

responsibilities of AADI and assumed more tasks as well, including provision of services for increasing milk production and creating formal milk markets in urban areas outside Addis Ababa. Further, the Addis Ababa Dairy Development Project (AADDP) was launched by the World Bank in 1971 with the objective of developing commercial dairy production and providing support for smallholder producers in the form of credit, imported cattle, and technical services. By 1972, the DDA was receiving about 21,000 liters/day for processing, of which 57 percent came from 65 large farms (Staal 1995). In addition to collecting milk, the DDA sold milk and dairy products through its kiosks and shops as well as to institutions. It also facilitated the creation of dairy cooperatives to ease the provision of credit and technical and extension service to dairy producers.

Milk production in Ethiopia increased significantly during 1960s. Between 1961 and 1974, milk production from all species increased by 16.6 percent from 637,375 metric tons to 743,100 metric tons, an average annual growth rate of 1.63 percent. This growth was largely due to the economies of scale in production as well as marketing, subsidies in transport to the formal market, secured land tenure and an active free market for feed and other inputs (Staal et al. 1996). On a per capita basis, however, milk production declined during the 1961–1974 period at an average rate of 0.87 percent per annum. During this period, butter and cheese processed using the traditional methods grew only slowly by about 0.1 percent. Processed milk production has stagnated in the early 1960s but expanded significantly in the second half of 1960s and early 1970s.

2.5.4.2. Dairying during Dergue Regime (1974-91)

Following the 1974 revolution, economic policy in Ethiopia shifted towards socialism. The DDA continued to operate until 1979 when it was merged with numerous other nationalized dairy farms to establish the Dairy Development Enterprise (DDE). The DDE was established to operate the nationalized state farms, establish a milk collection network, process and market dairy products, provide advisory and limited technical service to farmers, and sell veterinary medicaments and feed to farmers. The enterprise had a capacity to process 60,000 liters of milk at its inception (Yigezu, 2000).

During this phase, the government shifted attention from urban producers to rural producers. However, substantial resources remained devoted to establishing large-scale state farms to provide liquid milk for urban consumers. This phase was characterized by intensive effort by the government and donors towards developing the dairy sector through producers' cooperatives. The dairy development effort was geared towards rural producers who in fact were members of producer cooperatives. Projects and programs implemented to improve dairy development focused on producer and service cooperatives and peasant associations as major implementing partners. All the programs intended to bring about improvement in milk production and an increment in income through introduction of improved feeding, breeding and health development programs while less attention was given to marketing and processing.

The programs and projects implemented included the Minimum Package Program (MPP), Addis Ababa Dairy Development Project (AADDP), Dairy Rehabilitation and Development Project (DRDP), Artificial Insemination Service (AIS) and Selale Peasant Dairy Development Pilot Project. Although the programs or projects implemented differed in their intensity, most of the efforts were input-oriented. As a result of these promotional efforts, total milk production increased significantly during this phase with the exception of mid 1980s when the country experienced a debilitating three-year drought (Mohamed et.al., 2004). Despite the significant increase in aggregate milk production, per capita milk production was declining. This phase was characterized by low producer prices which discouraged production, emphasis on cooperatives in rural areas, and neglect of most important producers in urban areas. To bridge the gap between supply and demand, dairy imports increased significantly during second phase beginning from 1978. This was partly due to increased food aid, World Food Programme (WFP) milk powder imports, and a level of dairy production development that lagged far behind the demand (Reda, 2001). Imports reached a peak of 279,651 and 314,726 metric tons in 1985 and 1986, respectively during the drought period. Reda (2001) also indicated that import dependency rose steadily during this phase. For instance, dairy imports as a percent of total consumption increased from 4.1 percent to 12.8 percent between 1977 and 1989. Commercial imports grew rapidly at 24.18 percent per year (Felleke and Geda,

2001). Further, it is estimated that imported milk powder accounted for 23 percent of Addis Ababa market.

2.5.4.3. Dairying during the transition to a market-oriented economy (1991-Present)

With the downfall of the Dergue regime in 1991, Ethiopia has embarked on policy reforms that aim to bring about a market-oriented economic system. Several macroeconomic policy changes were implemented. The exchange rate policy was altered from a fixed-rate system to a more market determined system. Similarly, a new land policy was declared. Although land remained in the hands of the government, the new constitution, drawn up in 1994, allows temporary leases. In addition to these major policy reforms, the new federal government launched a new national development strategy namely, Agricultural Development-Led Industrialization. The national strategy seeks to bring about an improvement in the livestock sector by enhancing the quality and quantity of feed, providing improved animal feed and improved extension services, increasing livestock health services and improving productivity of local cows by artificial insemination while preserving the indigenous breeds (Benin et al. 2002; cited in Mohamed et al., 2004). Although, no clearly defined dairy development policy existed, it was envisaged that dairy policy would move increasingly towards private sector-led development. The policy recognizes the potential of smallholder dairy production and accords due attention to small producers although it also leaves room for the development of medium and large-scale dairy farms in peri urban areas. Activities undertaken include: utilization of the potential adaptive genetic merit of animals, raising the quantity of the feed available to livestock, improving health service, breeding and husbandry services, encouraging the participation of private investors by improving income tax, improving the delivery of artificial insemination, developing and expanding efficient marketing system in remote areas and organizing farmers into milk producing, processing and marketing cooperatives (Felleke and Geda, 2001).

In the third phase of post-Dergue market-oriented development, the private sector has begun to enter the dairy market as an important actor. Several private investors have now established milk-processing plants in Addis Ababa to supply fresh milk. Currently, privately held Sebeta

Agro- industry is competing with DDE in supplying milk to urban consumers. DDE remains, however, an important actor in the formal dairy market. In 1993, the producer price paid by DDE increased from Birr 0.65 per litter to Birr 1.00 per litter and later to Birr 1.25. Meanwhile, government privatized inefficient state farms, reducing the number of state farms from fourteen to only two. Moreover, the government accorded attention to the urban dairy producers and began serving them after they officially registered by the Ministry of Agriculture (MOA).

Post 1991 producer groups such as the Addis Ababa Dairy Producers Association (AADPA) emerged encompassing 90 percent of all urban dairy producers and a large proportion of peri-urban producers within a radius of 100 kms of Addis Ababa (Staal, 1995). Dairy development efforts in the post reform period have focused on smallholder dairy producers. The two major donor-funded SDDPP and SDDP projects focused exclusively on improving dairy production at smallholder level. Unlike the projects implemented during Dergue regime, these two projects addressed marketing problem of smallholder producers in addition to provision of inputs.

Milk production grew faster in the post reform period, at an annual growth rate of 3.0 percent. Although per capita milk production stagnated during this period and grew at a positive but insignificant rate after the policy reform, this represents a reversal or termination of the negative trend in the growth of per capita production during the previous two phases. However, production of butter and cheese stagnated in the post reform period.

In order to gain insight into possible sources of growth in the third phase, an attempt was made to disaggregate the total consumption of milk into different production systems. According to Mohamed (2004), the contribution of imports of milk to total consumption of milk declined from 24 percent in 1985 to less than 1 percent in the year 2000. At the same time, the share of government-owned enterprises in total milk production decreased markedly. In contrast, the share of smallholder production in total consumption increased by about 30 percent from 71 to 96.6 percent. Of the total milk production from smallholders, only 1.2 percent comes from improved cattle. This is not surprising because the sector only contains

32,204 head or 25 percent of the total improved cattle. Similarly, the contribution of large private farms increased from 21,750 tons in 1985 to 33,182 tons in 2000. The increase in private sector production is mainly due to government policies such as privatization of state enterprises, removal of input market controls and increased use of improved livestock that were in the hands of producer cooperatives and state farms (Mohamed et al., 2004).

The total milk production in Ethiopia increased during the 1961-2000 period at an average annual rate of 1.55 percent, though per capita production declined as a result of the high population growth rate. However, during the last decade production is growing at even higher rate (3.0 percent). The increased coverage of extension services (such as better management skills) and increased use of improved inputs (improved breeds and feed) and policy changes promoting dairy production have contributed to faster growth of output. Dairy product imports during this phase were relatively smaller than in the two earlier phases. Most of the growth during the third phase is concentrated in the peri-urban and rural production systems. The emergence of private processing industries and marketing units is likely to stimulate producers in the peri urban areas and rural production systems as it offered producers a new market for their milk production (Mohamed et al., 2004).

2.6. Empirical Evidences

2.6.1. Empirical evidences on milk supply

There is scanty literature on milk supply and marketing in Ethiopia. However, in this thesis, attempts have been made to review the available findings.

Study conducted by different scholars on milk market supply and milk market entry decision identified that number of dairy cows, education level of the dairy household head, visits by extension agents and distance from nearest market centers were found to be vital to milk market entry decisions and sale volume. The impacts of these variables on dairy household's milk market entry decision and marketable milk surplus were confirmed by the studies of Holloway et.al. (2002) and Gizachew (2005). Holloway et.al. (2002) analyzed factors

affecting volume of milk supply and milk market entry decision by dairy households using data from 68 sampled dairy households in Ethiopia high lands (Lemu Ariya, Arsi and Shoa regions) using Probit and Tobit models. Their findings indicated that number of cross breed and local breed dairy cows owned, education level of the household head, and number of extension visits exhibited positive relationship with milk market entry decisions and marketed milk surplus; however, distance from milk market centers exhibited negative relationship with milk market entry decision and marketed surplus. However, Holloway et.al., (2002) failed to take the importance of dairy household's access to credit service, market information service, income source and demographic factors of the dairy household into consideration in his study.

Similarly, Gizachew (2005) analyzed factors affecting dairy household milk market entry decision using Logit model and marketed milk surplus using Tobit model in Ada'ha Liben district in Oromiya region by using data from 61 sampled dairy households. His study revealed that education level of the dairy household head, extension visits and income from non-dairy sources had positive relationship with household milk market entry decision. Gizachew (2005) also found that dairy cow breed, loan, income and extension visit, education level of spouse and distance from milk market were related to marketed surplus positively; however, distance from district and education level of the household head were related negatively with marketed milk supply. Nevertheless, the study did not consider the contribution of dairy household access to milk market information, dairy production credit source and the separate contribution of modern and traditional production techniques to market participation and marketed milk surplus. More over, the study considered the dairy cow breed variable as dummy which is very difficult to see the marginal contribution of local and cross breed dairy cows.

2.6.2. Empirical evidences on dairy product marketing

Studies conducted by different scholars on different agricultural commodities marketing based on market concentration ratios, marketing costs, margin and profit analysis indicated that margin and profit received by different marketing actors and level of market efficiency varied with respect to location and size of marketing channel (number and type of

intermediaries involved). In line with these, study conducted by Scott (1995) on potato marketing using marketing margin analysis in Bangladesh indicated that producer's price and margin were 1.27 and 67 %, respectively. Similarly, study conducted by Pomerory (1989) on four fish market using concentration ratio (market share ratio) in Philippines found that 50% of the industry made 80% of the fish purchases. In the Gulf of Nicoya study, Scheid and Sutinen (1981) reported that the fisher's share of retail prices was 41%, where as the wholesale and retail sector received 22% and 37%, respectively.

Rehima (2006) conducted study on pepper marketing chains analysis in Alaba and Siltie Zones in southern Ethiopia using marketing margin analysis found that the gross marketing margin obtained by pepper retailers was 43.08% of the consumer's price. The same study reported that producer's share and net marketing margins obtained by retailers were 50.7% and 29.47% of the consumer's price.

Study conducted by ILCA (1989) on potato marketing channels in the north Chuquisaca and Bolivia using marketing margin analysis indicated that, total gross marketing margin (TGMM), total gross marketing margin of rural assembler (TGMMRA), gross marketing margin of retailers (GMMr) and producer participation was respectively estimated to be 46%, 25%, 21%, 8% and 17% of consumer prices. Yocab (2002) found that butcheries operating in Addis Ababa got total gross margins of 31.7% from average purchase price; more over the study identified that the increase in the profit margin was not transferred to the producer. He further noted that the producer's share of the retail price was decreased from 76% in 1983/84 to 55% in 1995.

Solomon (2004) conducted a study using marketing cost and margin analysis on performance of cattle marketing system in southern Ethiopia with especial emphasis on Borena found that butchers at Addis Ababa (Kera) market received relatively a larger share from total gross marketing margin amounting to 69.5%, 63.4% and 61.6% for cattle supplied from Yabelo, Negelle and Dubluk markets, respectively. Regarding producers' portion, which is the portion of the price paid by the end consumer that goes to the producers, he found that the highest percentage was found for cattle supplied from Dubluk market (21.9%), and followed by

Negelle and Yabelo characterized with gross margins of 20.6% and 18.6%, respectively. The study conducted by Gizachew (2005) in Ada'liben in district of Oromiya Region using concentration ratio identified milk market to be weakly oligopsonistic of 41.2%, where the four firms dominating milk market. The dairy cooperative got 28.3% of market share and the three processing industries combined have a market share of 12.9%. Itinerate traders got net marketing margin of 7.6% for butter and the dairy processing enterprises got the highest net marketing margin (19.9% of retail price) while the least marketing margin (1.05% of the retail price) was obtained by the dairy cooperative.

The empirical analyses carried out by the scholars on agricultural commodities marketing chains analysis suggest that there is a need for institutional innovations to catalyze market entry. More over, a mix of other inputs including infrastructure, knowledge, and assets accumulation in the household must accompany these institutional innovations. Thus, this study attempted to analyze dairy product marketing cost and margins, and identify major factors affecting volume of milk supply and milk market entry decision by sample dairy household in the milk shed, in southern Ethiopia.

3. METHODOLOGY

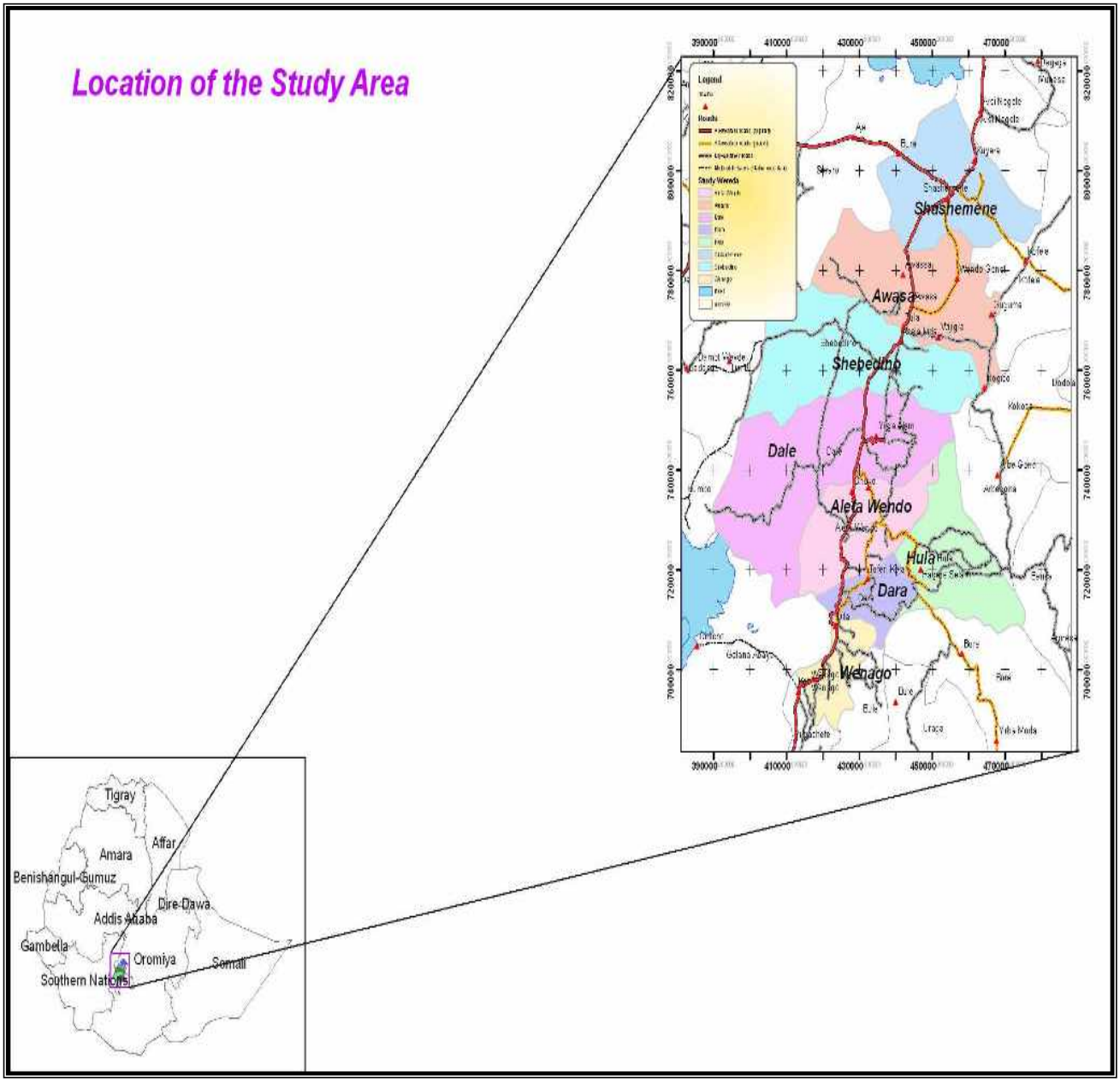
3.1. Description of the Study Areas

In this study, dairy marketing chains analysis was conducted for butter and milk in the Shashemane, Hawassa and Dale/Yergalem districts' milk shed in southern Ethiopia. The areas have high potential for livestock production which is mainly undertaken by smallholder subsistence producers. Livestock production is an important economic activity in the agricultural development and has historically played multiple roles both in economic life and in socio-cultural traditions of the study areas. There are also growing numbers of commercial farms and agro-processing industries in the area. Despite this potential and huge demand in the urban areas and in the suburbs, current income generating capacity of dairying is not encouraging and share of final price going to the producer is apparently small.

The study was conducted in the area extending from Shashemene to Yergalem in the southern Ethiopia along the main way to Moyale. The area lies on the Addis Ababa– Moyale highway ranging from 250 -315 km south of the capital of the country encompassing of Shashemane, Hawassa and Yergalem towns. Average annual rain fall and mean annual temperature of the study area is 983 mm and 19.25 c^0, respectively. Human population of the area is estimated to be 640, 813 heads. It is the area where livestock farming is an important component of farming system and one of the high potential areas for milk production in southern Ethiopia from which 39, 222.5 litter of milk produced per day or 1,176,673.5 litter of milk per month or 14, 120,082 litters of milk per annum from 2, 353 dairy farms comprising of 1, 586 local and 767 cross dairy farms. The proportion of cross and local dairy breed dairy farms is 32.6% and 67.4%, respectively. Among others, there are three major local languages spoken, which are defined by geographic location and ethnic groups in the study areas vis-à-vis, Gedio-language in Dilla area, Sidama-language in Yergalem and Hawassa area, and Oromiffa in Shashemene area. Amharic, the federal working language was commonly spoken in all the towns. Informal discussion made with

key informants identified that there was no linkage between rural and town areas through supply of and demand for raw milk in the area during the survey period.

Figure 2. Location of the study areas



There was surplus milk production both in Shashemane and Yergalem. This surplus milk production was observed being transported to Hawassa by milk semi-wholesaler where lucrative market prevails. Milk was also observed being transported from Yergalem to Dilla

towns by producer him self where better price can be fetched. However, the study areas in general were lacking cooking butter. As a result, several types of butter traders were engaged in transporting cooking butter from Wolyita areas, Sidama areas, and Addis Ababa (from Gojam Berenda) to the study areas to fill the supply-demand gap.

In addition to different dairy derivatives supply sources, there were large numbers of supper markets selling pasteurized mama milk from Addis Ababa, imported skimmed and cream milk powder; and cheese and different forms of butter oil which directly compete for raw milk and milk derivatives. There are three dairy produucers'cooperative which were established with the aim of facilitating input delivery (feed, medicament, AI etc.) and sustainable market out let for milk.

3.2. Source and Data Requirements

In this study, both primary and secondary data are used. The primary data were collected using two types of questionnaire, one for dairy producer focusing to identify factors affecting milk market supply and dairy household milk market participation; the other for milk and butter traders focusing to identify major marketing channels, marketing cost and margins, and production and marketing constraints of the study area. Data collected from the dairy household include size of milk out put, access to market, extension service, credit and market information, annual income from non-dairy sources and the demographic characteristics of the dairy household.

Further, the primary data collected from milk and butter traders include demographic characteristics of trader, trading activities and marketing costs, purchase and sale price, marketing channel arrangements, volume and direction of trade, buying and selling strategies, the role of milk and butter marketing actors, marketing facilities and services, and other relevant information were collected from butter market place, butter selling kiosks/shops and itinerant butter traders, and fluid milk selling premises. Pre-tested questionnaires and checklist were also used to guide the informal discussion designed to probe inquiry and helps to make the interviews more consistent.

3.3. Sample Size and Method of Sampling

Sampling procedure

The study areas were selected on the basis of milk production potential and the presence of various dairy marketing actors that contributes to value addition of the dairy commodities in the area. The areas selected for this study are Shashemene, Hawassa, and Yirgalem towns.

A three stage stratified random sampling procedure was used to select 180 specific farm households for this study. During the first stage, study sites were purposively selected based on milk production potential. Prior to dairy household sampling, an initial complete listing (census) of all the dairy farms in the towns was obtained. During the census, breed type (local and cross) and herd sizes were recorded for all households owning dairy farm. In this study, the dairy farms were categorized into small, medium and large farm based on the herd size. The technique used to classify dairy farm categories and herd size by Anthony *et al.* (2004) in Hawassa and the surrounding peri-urban areas into the three size categories was adopted to categorize cross breed and local breed dairy farms in this study. Accordingly, farms owning 1-5, 6-10 and greater than 10 dairy cows were classified as small, medium and large farms, respectively. Thus, based on the breed type and number of dairy cows, the farms which owned local and cross breed cows in each of the farm size categories were identified. The result of this assessment indicated that there were very small number of both local and cross breed large dairy farms across the study area and very few numbers of medium local dairy farms in Shashemane. Therefore, these dairy farms were not considered for further data collection. During the second stage, dairy farms were categorized into small (both cross and local small) and medium size (both cross and local medium) farms based on herd size. Local small and cross small dairy farms in Hawassa, Shashemane and Yergalem respectively were identified to be 573, 431 and 179; and 283, 166 and 119. Where as 300 dairy farms in Hawassa and 103 dairy farms in Yergalem were categorized as local medium, and 100, 53 and 55 dairy farms in Hawassa, Shashemane and Yergalem, respectively were categorized as cross medium. The total number of small and medium dairy farms identified during the

survey were found to be 1571 and 602, respectively totaling 2, 353 dairy farms in the milk shed.

During the third stage, 60% (108) of small and 40% (72) of medium dairy farms were purposively selected. During the same stage, 73 (68% of 108 small sample dairy farm) local small, 35 (32% of 108 sample small dairy farm) cross small, 48 (67% of 72 sample medium dairy farm) local medium, and 24 (33% of 72 sample medium dairy farm) cross medium totaling 180 dairy farm owners from the three milk sheds were randomly selected and distributed across the sample locations using the probability proportional to sample size (Table 1).

Table 1. Sample distribution of the dairy farms

Locations	Type and size of dairy farm				Sample size of dairy farm			
	Local small (1-5) cows	Local medium (6-10 cows)	Cross small (>10 cows)	Cross medium (6-10 cows)	Local small	Local medium	Cross small	Cross medium
Hawassa	573	300	283	100	34	36	17	12
Shashemane	431	-	166	53	26	-	10	6
Yergalem	179	103	119	46	13	12	8	6
Total	1183	403	568	199	73	48	35	24

Milk and butter traders in the milk shed were recorded during the census. Nine restaurants and sixty-nine retailers were randomly selected. In the same procedures, three semi-wholesalers and three dairy producer's cooperative societies were purposively selected. Since the number of milk retailers in Yergalem town was only 11, the population as a whole is considered for the study. With regard to butter traders, 96 retailers were randomly selected where as the butter semi-wholesalers were purposively selected (Table 2).

The sites for these traders were market places, kiosks (small private shops selling dairy products besides other consumer items), bars/ restaurants, and catering shops. The formal survey was made with randomly selected dairy farm owners, and butter and fluid milk traders using pre-tested semi-structured questionnaires. In addition to questionnaire survey, an informal survey in the form of Rapid Market Appraisal (RMA) technique was employed using the checklist for both dairy owners and traders to obtain additional supporting information for the study which could help for cross checking the survey result and to control the consistence of the responses. The discussions were made with key informant dairy producers group, traders and agricultural and relevant experts from governmental and non-governmental institutions.

Table 2. Sample distribution of butter and milk traders

	Population					Sample sizes				
	Butter traders		Milk traders			Butter traders		Fluid milk traders		
Locations	Retailers	Semi-wholesalers	Bars&restuarant	Semi-whole seller	Retailers	Retailers	Semi-whole salers	Bars&restuarant	Semi-wholesalers	Retailers
Hawassa	53	1	20	3	276	32	1	3	3	29
Shasheman	38	-	15	-	145	32	-	3	-	29
Yergalem	32	-	6	-	11	32	-	3	-	11
Total	123	1	41	3	435	96	1	9	3	69

Based on drawn sample, dairy household survey was carried out by selected enumerators who had good experience and communication ability. Extensive training was given to the enumerators to make them acquainted with the questionnaire. All the enumerators were able to understand the language, culture, and tradition of the area which enable them to overcome barriers of communication with the interviewees. In the course of data collection, there was an appropriate supervision to ensure collection of high quality information.

3.4. Method of Data Analysis

Two types of data analysis, namely descriptive statistics and econometric analysis were used for analyzing the data collected from dairy producers and traders of the study areas.

3.4.1. Descriptive statistics

This method of data analysis refers to the use of ratios, percentages, means, and standard deviations in the process of comparing socio-economic and institutional characteristics of the dairy household and dairy product traders of the study areas.

3.4.1.1. Market concentration measure

The concentration of firms in the market was estimated using the common measure of market concentration ratio. Concentration ratio is one of the commonly used measure of market structure, which refers to the number, and relative size distribution of buyers and sellers in the market.

It is given as:

$$C = \sum_{i=1}^{r} S_i \quad \text{i= 1,2,3,4.} \qquad (1)$$

Where, S_i is the percentage market share of the i^{th} firm and r is the number of relatively larger firms for which the ratio is going to be calculated.

Kohls and Uhl (1985) bring into play as a rule of thumb, 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). The problem associated with this index is the arbitrary selection of r (the number of firms that are taken to compare the ratio).

3.4.1.2. Marketing margin

Computing the total gross marketing margin (TGMM) is always related to the final price paid by the end buyer and is expressed as a percentage (Mendoza, 1991).

$$TGMM = \frac{\text{End buyer price - First seller price}}{\text{End buyer price}} \times 100 \quad (2)$$

where, TGMM is total gross marketing margin. It is useful to introduce the idea of 'producer's participation', 'farmer's portion', or 'producer's gross margin (GMMP) which is the portion of the price paid by the consumer that goes to the producer.

The producer's margin is calculated as a difference:

$$GMMp = \frac{\text{End buyer price - marketing gross margin}}{\text{End buyer price}} \times 100 \quad (3)$$

where, GMM_p is the producer's share of consumer price

Because of precise marketing costs are frequently difficult to determine in many agricultural marketing chains for the reasons that costs are often cash and imputed, the gross and not the net marketing margin is calculated. Thus, the marketing margin in this study should be understood as gross marketing margin (Scott, G.J., 1995; cited in ILCA, 1989). Accordingly, in this specific study as it is difficult to obtain precise cash and imputed marketing cost for butter and milk marketing chains, marketing margin (even the calculated net marketing margin) should be understood as gross marketing margin.

The net marketing margin (NMM) is the percentage over the final price earned by the intermediary as his net income once his marketing costs are deducted. The equation tells us that a higher marketing margin diminishes the producer's share and vice-versa. It also provides an indication of welfare distribution among production and marketing agents.

$$NMM = \frac{\text{Gross margin – Marketing costs}}{\text{End buyer price}} \times 100 \quad (4)$$

where, NMM is net marketing margin

From this measure, it is possible to see the allocative efficiency of markets. Higher NMM or profit of the marketing intermediaries reflects reduced downward and unfair income distribution, which depresses market participation of smallholders. An efficient marketing system is where the net margin is near to normal or reasonable profit.

3.4.1.3. Structure-Conduct-Performance (S-C-P) model

The model examines the causal relationship between market structure, conduct, and performance, and is usually referred to as the structure conduct and performance (S-C-P) model. In agricultural economics, the most frequently used model for evaluating market performance is based on the industrial organization model. Wolday (1994) also used this model to evaluate food grain market in Alaba Siraro district. Furthermore, study conducted by Hakobyan (2004) used the Structure-Conduct-Performance analysis for identifying factors that determine the competitiveness of dairy market, behavior of firms, and the success of dairy industry in meeting performance goals. Thus, this study used S-C-P model to evaluate the efficiency of dairy market in the study area.

3.4.2. Econometric analysis

If a data set that is used for a regression suffers from selectivity bias, then the regression analysis, for example Ordinary Least Squares (OLS), which computes the effects of some characteristics of this population on other characteristics, will be biased. Heckman has developed a two-step estimation procedures model that corrects for sample selectivity bias. If two decisions are involved, such as participation and volume of supply, Heckman (1979) two-step estimation procedure is appropriate. The first stage of the Heckman two-stage model a 'participation equation', attempts to capture factors affecting participation decision. This equation is used to construct a selectivity term known as the 'inverse Mills ratio' (which is added to the second stage 'outcome' equation' that explains factors affecting volume of milk supply. The inverse Mill's ratio is a variable for controlling bias due to sample selection (Heckman, 1979). The second stage involves including the Mills ratio to the milk supply

equation and estimating the equation using Ordinary Least Square (OLS). If the coefficient of the 'selectivity' term is significant then the hypothesis that an unobserved selection process governs the participation equation is confirmed. Moreover, with the inclusion of extra term, the coefficient in the second stage 'selectivity corrected' equation is unbiased (Zaman, 2001).

Specification of the Heckman two-step procedure, which is written in terms of the probability of milk market participation, MMP, and marketed milk volume, WMS is:

The participation Equation/the binary probit equation

$$Y_{1i} = \chi_{1i}\beta_1 + u_{1i} \qquad u_{1i} \sim N(0,1) \tag{5a}$$

$$MMP = 1 \text{ if } Y_{1i} > 0 \tag{5b}$$

$$MMP = 0 \text{ if } Y_{1i} \leq 0$$

where: γ_{1i} is the latent dependent variable which is not observed

χ_{1i} is vectors that are assumed to affect the probability of sampled dairy household milk market participation

β_1 is vectors of unknown parameter in participation equation

u_{1i} are residuals that are independently and normally distributed with zero mean and constant variance

The observation equation/the supply equation

$$WMS = Y_{2i} = \chi_{2i}\beta_2 + u_{2i} \qquad u_{2i} \sim N(0, \delta^2) \tag{6}$$

Y_{2i} is observed if and only if $MMP = 1$. The variance of u_{1i} is normalized to one because only MMP, not Y_{1i} is observed. The error terms, u_{1i} and u_{2i}, are assumed to be bivariat, normally distributed with correlation coefficient, ρ. β_1 and β_2 are the parameter vectors.

Y_{2i}, is regressed on the explanatory variables, χ_{1i}, and the vector of inverse Mills ratios (λ_i) from the selection equation by ordinary least squares.

where: γ_{2i} is the observed dependent variable

χ_{2i} is factors assumed to affect sale volume

β_2 is vector of unknown parameter in the supply equation

u_{2i} is residuals in the supply equation that are independently and normally distrusted with zero mean and constant variance.

$$\lambda_i = \frac{f(\chi\beta\ )}{1 - F(\chi\beta\ )}\ \ ) \qquad (7)$$

$f(\chi\beta)$ is density function and 1-F ($\chi\beta$) is distribution function

3.5. Hypothesis and Variable Definition

The data covered information necessary to make farm level indices of social, economic, demographic and efficiency indicators comparable across different categories of dairy farm and dairy market in the milk shed.

In order to explain producer's fluid milk market participation, continuous and discrete variables were identified based on economic theories and the findings of different empirical studies. Accordingly, in order to investigate the research questions of this study, the following variables were constructed:

3.5.1. Dependent variables

Milk Market Participation decision (MMP): Is a dummy variable that represents the probability of market participation of the household in the milk market that is regressed in the first stage of two stages estimation procedure. For the household who participate in milk market the variable takes the value of one where as it take the value of zero for the household who did not participate in milk market.

Marketed Milk Volume (**MMV):** It is continuous dependent variable in the second step of the Heckman selection equation. It is measured in litters and represents the actual supply of milk

by dairy farm household to the market which is selected for regression analysis that takes positive values.

3.5.2. Independent (Explanatory) Variables (Xi)

Size of milk output (SMP): It is continuous variable measured in litters. The variable is expected to have a positive contribution to smallholder dairy market participation decision and level of milk market participation. A marginal increase in dairy production has obvious and significant effect in motivating market participation. Production beyond consumption has two fates based on various reasons; either sold as fluid milk or processed into different dairy derivatives. The processed part of the product may be used for home consumption or sales. Production in turn varies directly with the number of lactating dairy cows. As the number of dairy cow increases, production also increases and the percentage share of consumption declines and sales increases (Holloway et al., 2002). Study conducted by Singh and Rai (1998) identified factors affecting marketed surplus of buffalo milk in Haryana. They observed that milk production significantly affected marketed surplus positively. In addition, Wolday (1994) observed that output of food grains (wheat *teff* and maize) has positive effect on quantity supplied to the market. Thus, size of milk out put variable is assumed to have positive relation with dairy household milk market entry decision and level of milk market participation.

Distance to nearest dairy product market (DNMM): Is location of the dairy household from the nearest milk market and is measured in kilometer**.** The closer the dairy market to dairy household, the lesser would be the transportation charges, loss due to spoilage and better access to market information and facilities. This improves return to labour and capital; increases farm gate price and the incentives to participate in economic transaction. A study conducted by Holloway et al (2002) on expanding market participation among smallholder livestock producers in the Ethiopia high lands revealed that distance to milk market was negatively related to milk market participation decision of dairy households. Similarly, study conducted by Wolday (1994) on food grain market in Alaba Siraro indicated negative relationship between distance from household residence to grain market and volume of

marketed food grain. Further more, study conducted by Abonesh (2005) and Rehima (2006) indicated similar results. Therefore, in this study, distance from nearest milk market is hypothesized to be negatively related to market participation decision and marketable milk surplus.

Number of milking cows (CB for cross breed, LB for local breed): This variable is continuous and is measured in number of milking cow owned. The entry to milk market and marketed milk volume are assumed to be positively influenced by the number of milking cows owned. The study conducted by Holloway et al. (2002) in the Ethiopian high lands on expanding market participation among smallholder livestock producers indicated positive and significant relation between milking cow numbers and market participation and marketable milk volume. Further, study conducted by Gizachew (2005) confirmed positive and significant relation between market participation decision by dairy household and marketable milk volume.

Education Level of the Household Head (ELHH): It is continuous variable and is measured in years of formal schooling of the household head. Education plays an important role in the adoption of innovations/new technologies. Further, education is believed to improve the readiness of the household to accept new idea and innovations, and get updated demand and supply price information which in turn enhances producers' willingness to produce more and increase milk market entry decision and volume of sale. Study conducted by Holloway et al. (1999) indicated positive relationship between education and dairy household milk entry decision and marketed milk volume. Similarly, study conducted by Gizachew (2005) and Rehima (2006) showed that formal education was positively related to household market participation and marketed volume. Therefore, in this specific study, formal education is hypothesized to affect milk market participation decision and sale volume of milk positively.

Age of the household head (AGE): It is a continuous variable and measured in years. Age is a proxy measure of farming experience of household. Aged households are believed to be wise in resource use, and it is expected to have a positive effect on market participation and marketable surplus. Tshiunza et al. (2001) identified age as the major farms' characteristics

that significantly affected the proportion of cooking banana planted for market. He found that younger farmers tended to produce and sale more cooking banana than older farmers did.

AGESQ (Age squared of the dairy household head): The study hypothesized that the relationship between dairy household market participation decision and level of decision, and age squared of the dairy household may not be linear through out. It is assumed that at some point the relationship may become non-linear or parabolic (U-shaped).

Sex of the household head (SEX): This is dummy variable that takes a value of one if the household head is male and zero otherwise. The variable is expected to have a positive relation with milk market entry decision and milk sale volume.

In mixed farming system, both men and women take part in livestock management. Generally, women contribute more labour input in area of feeding, cleaning of barns, milking, butter and cheese making and sale of milk and other dairy products. However, obstacles such as lack of capital, and access to institutional credit and extension service, may affect women's participation and efficiency in ruminant livestock production (Tanga et al., 2000). Tshiunza et al. (2000) analyzed the determinants of market production of cooking banana in Nigeria. In their study, the male farmers tended to produce cooking banana for market and therefore participated in banana market more than female farmers. Further, study conducted by Gizachew (2005) indicated negative relation between sale volume of milk and male-headed household. Study conducted by Rehima (2006) confirmed the same result. However, in this specific study, being male household head is expected to affect milk market participation decision and sale volume positively.

Family size (FSHH): It is a continuous variable and measured in adult equivalent. As dairying is labour intensive activities, dairy production in general and marketable surplus of dairy products in particular is a function of labour. Accordingly, families with more household members tend to have more labor which in turn increase milk production and then milk market participation of the dairy household. In the same way, the variable is assumed to

have positive impact on the milk market participation and level of milk market participation of the sampled dairy household.

Financial income from the non-dairy sources (FINDS): It is continuous variable measured in Ethiopian Birr (ETB). The variable represents income originating from different sources other than dairy. Obtained by household head, spouse and other household members. Through improving liquidity, this income makes the household to expand production and or/ purchase from market. It also strengthens the household position in coping with different forms of risks. Thus, income from non-dairy source is hypothesized to affect milk market entry decision by household and sale volume of milk positively.

Access to credit (ACCR): Access to credit is measured as a dummy variable taking a value of one if the household has access to credit and zero otherwise. This variable is expected to influence the marketable supply of milk and milk market entry decision by dairy household positively on the assumption that access to credit improves the financial capacity of dairy households to buy more improved dairy cows, there by increasing milk production and milk market participation.

Access to Dairy production Extension service (ACEXT). This variable is measured as a dummy variable taking a value of one if the dairy household has access to dairy production extension service and zero otherwise. It is expected that extension service widens the household's knowledge with regard to the use of improved dairy production technologies and has positive impact on milk market participation decision and sale volume of milk. Number of extension visits improves the household's intellectual capitals, which improves dairy production and divert dairy production resources. Different studies conducted by different scholars revealed that extension visit has direct relationship with market entry decision and marketable out put. In this line, study conducted by Holloway (2002) identified that extension visit was directly related to dairy household milk market entry decision and marketed milk volume. Further more, Rehima (2006) identified that extension visit was positively related to pepper market entry decision and marketed pepper volume. Therefore,

number of extension visits is hypothesized to impact dairy household milk market entry decision and marketed volume of milk positively.

Table 3. Description of the dependent and independent variables used in the model

Variables	Description	Types	Values
AGE	Age of household head	Continuous	Number of years
SMP	Size of Milk Produced	Continuous	Litter
FSHH	Family size of household	Continuous	Man equivalent
ELHH	Education level of household head	Continuous	Years of schooling
EXHH	Experience in dairy production	Continuous	Number of years
DNMM	Distance from dairy market	Continuous	Kilometer
CB	Cross bred	Continuous	Number of cross breed dairy cow
LB	Local bred	Continuous	Number of local breed dairy cow
MMV	Marketed Milk Volume	Continuous	Litter
ACEXT	Access to extension service	Dummy	0=not visited, 1= visited
INFDS	Income from non dairy sources	Continuous	Birr
SEX	Sex of the household head	Dummy	0=female, 1=male
ACCR	Access to credit	Dummy	0=no,1= Yes
ACMINF	Access to milk market information	Dummy	0=no,1= Yes
MMP	Milk market participation	Dummy	0=no, 1=yes
AGESQ	Age of squared of the dairy household	Continuous	Number of Years

Access to Market information (ACMIF**):** Farmers marketing decisions are based on market price information, and poorly integrated markets may convey inaccurate price information, leading to inefficient product movement. Therefore, it is hypothesized that market information is positively related to market participation and marketable surplus. Study conducted by Goetz (1992) on food marketing behavior showed that better information significantly raises the probability of market participation for potential selling households.

Before fitting important variables into the models for analysis, it was necessary to test multicolinearity problem among continuous variables and check associations among discrete variables, which seriously affects the parameter estimates. As Gujarati, (2003) indicates, multicolliniarity refers to a situation where it becomes difficult to identify the separate effect of independent variables on the dependent variable because existing strong relationship among them. In other words, multicollinearity is a situation where explanatory variables are highly correlated. There are two measures that are often suggested to test the existence of multicollinearity. These are: Variance Inflation Factor (VIF) for a continuous variables association and Contingency Coefficients (CC) for dummy variables association.

Thus, Variance Inflation Factor (VIF) is used to check multicollinearity among continuous variables. The larger the value of VIF, the more troublesome or collinear is the variable X_i. As a rule of thumb, if the VIF is greater than 10 (this will happen if R^2 is greater than 0.91), the variable is said to be highly collinear (Gujarati, 2003).

$$\text{VIF } (X_i) = \left(1 - R_j^{\,2}\right)^{-1} \tag{9}$$

Where, $R_j^{\,2}$ is the multiple correlation coefficients between explanatory variables, the larger the value of R_j^2 is, the higher the value of VIF (X_i) causing higher collinearity in the variable (X_i). Contingency coefficient is used to check multicollinearity between discrete variables. The value ranges between 0 and 1, with 0 indicating no association between the variables and value close to 1 indicating a high degree of association between variables.

$$\text{CC} = \sqrt{\frac{\chi^2}{\text{N} + \chi^2}} \tag{10}$$

where, CC is contingency coefficient, χ^2 is chi-square test and N is total sample size.

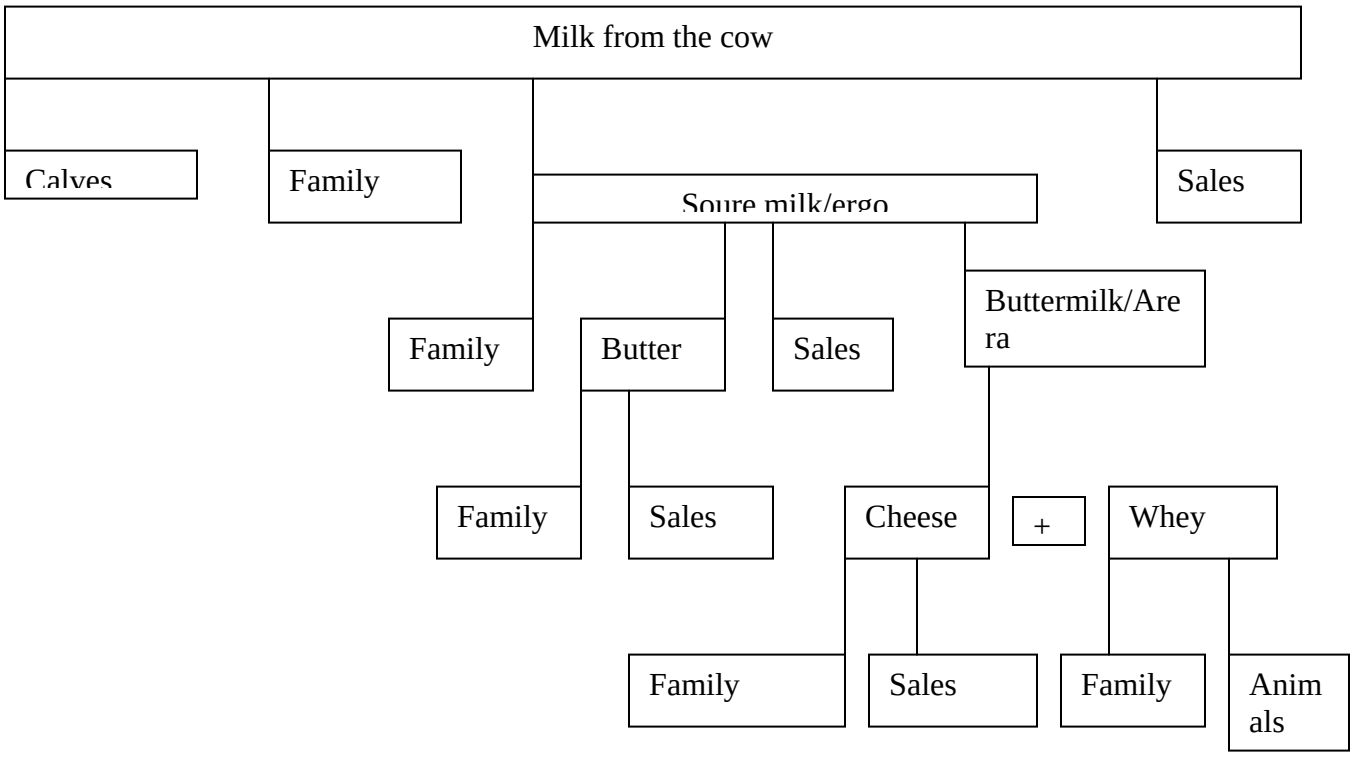
If the value of CC is greater than 0.75, the variables are said to be collinear.

4. RESULTS AND DISCUSSION

This chapter presents the results of descriptive and econometric analysis of the study. The descriptive analysis employed to describe the general characteristics of sampled farm households and butter and milk traders. The econometric analysis employed to identify factors that affect farm households' decision to participate in milk market and milk sale volume of the sampled dairy household in the Hawassa, Shashemane and Yergalem milk shed.

Milk and butter were chosen for this study because they were the two most important traded dairy products in the milk shed during the survey period. Butter was used for household consumption and cosmetics, while milk was used as food only.

Figure 3. Smallholder Milk Utilization in Shashemane, Hawassa and Yergalem



4.1. Milk Production and Market Supply Characteristics

4.1.1. Description of the sampled dairy farms and herd size

Local and cross breed dairy farm herd size in the milk shed were found o be 1586 and 767, respectively.

Table 4. Dairy farm (TLU) by sample location.

Location	Dairy farm type by size			
	Local small (1-5 cows)	Local medium (6-10 cows)	Cross-small (1-5 cows)	Cross medium (6-10 cows)
Hawassa	573	300	283	100
Shashemane	431	-	166	53
Yergalem	179	103	119	46
Average	2.5	7	3	6
Total	1183	403	568	199

The result also indicated that there were 1, 751 small size and 602 medium sizes dairy farms in the milk sheds. The average herd size of small size and medium size dairy farms TLU were 2.75 and 6.5, respectively, where as the average herds for small and medium size categories of cross breed and local breed dairy farms were 3, 6, 2.5 and 7, respectively (Table 4). The average herd sizes of local and cross breed dairy farms respectively were found to be 4.75 and 4.5, respectively.

4.1.2. Productivity of dairy cattle breeds

The independent samples t-statistics in Table 5 indicated that there was strong and statistically significant difference between local and cross breed milking cows on their average milk yield per day. The percentage share of marketed milk per cross breed and local breed dairy cow was estimated to be 71% and 54%, respectively.

Table 5. Productivity of dairy cattle breeds and the household market participation

Items	Local breed dairy cow	Cross breed dairy cow	t-value
Mean milk sold/per day (litter)	1.01(1.86)	5.34 (5.96)	-5.97*
% of milk marketed	54	71.3	

Milk yield and Milking days of dairy cows: The survey result showed that the average milking days/lactation period in the study areas was found to be 240 days for local zebu breed dairy cows and 232 days for cross breed dairy cows. This was because of the fact that some of the local dairy farm owners reported that they have milked their cow even during the whole pregnancy period which is not economical (prolongs the next heat period). The average milking days of a cow for medium and small size cross breed dairy farm groups was 215 and 249.9 days, respectively. However, a cow in local small farm and local medium farm had nearly equal lactation period. In general, average lactation period for cross breed cow was found to be lower than that of local zebu breed (Table 6). This is because of the fact that medium size dairy farm owners seemed to be more market oriented and therefore they were more economical. With regard to milk yield, average milk yield per day per cow for local small, local medium, cross small and cross medium was respectively estimated to be 434.8, 510.5, 2293.8 and 2103 litters. Moreover, the survey result revealed that total milk production per local small, local medium, cross small and cross medium dairy farms per day in the study area was respectively calculated to be 2153.06 lit, 858.4 lit, 5208.56 lit and 2034.24 lit of milk which totals 10254.42 litter of milk per day or 307632.6 litters of milk per month.

Table 6. Milk production and milking days per cow by dairy farm type

Location	Productivity and milking days of dairy farms							
	Local small		Local medium		Cross small		Cross medium	
	Lactation period	Ave.milk yield	Lactation period	Ave.milk yield	Lact. period (day)	Ave.milk yield	Lact. period (day)	Ave.milk yield
Hawassa	247.7	444.4	232.5	484	245.8	2669.5	241	3073
Shashemane	200	360	-	-	211.9	1635	193	1603
Yergalem	270	500	248	537	292	2577	211	1635
Average	239	434.8	240	510.5	249.9	2293.8	215	2103

Source: survey result, 2007

4.1.3. Milk production and its importance for dairy households

Market participation by dairy household with respect to dairy farm sizes: The most marketable dairy product in the area was milk in terms of volume and value. Because of the small volume processed production of butter, cheese and yogurt from milk of crossbred dairy cows, households tended to sell liquid milk without processing into other dairy derivatives.

The share of milk sold was high between cross breed dairy farms mainly due to their larger production base and more market-oriented production objectives. The share of local breed dairy farms in milk market participation was found to be small in terms of quantity which was due to limited per capita milk production. The mean milk production per day per dairy farms in the milk shed during the survey period was found to be the highest (27.12 litters) in cross medium and lowest (6.9 litters) in local small dairy farms. The survey result indicated that 63%, 42%, 66% and 75% of sampled local small, local medium, cross small and cross medium dairy owners were, respectively found to participate in milk market during the survey period (Table 7). The F-test statistics revealed that the mean difference in milk produced and sold per day among the dairy farms of the milk shed was estimated to be statistically significant at less than 1% probability level.

Table 7. Mean milk yield per day and market share of dairy household by dairy farm size

Items	Dairy Farm types				F-value
	Local small	Local medium	Cross small	Cross medium	
Mean milk yield (litter)	6.9 (7.66)	4.54(2.79)	14.84(10.07)	27.12(20.5)	15.32*
Mean milk sold (litters)	4.4(6.6)	1.91(3.2)	9.87(9.17)	20.25(17.26)	18.352*
Percentage (%)share of milk marketed	63	42.07	66.5	75	

Source: survey result, 2007

Figures in the parenthesis represent standard deviation.

Contribution to the improvement of producers' income: Table 8 shows that dairying was found to hold 79.7%, 43.6% and 64% of gross annual income value of Hawassa, Shashemane and Yergalem sampled dairy household, respectively. The average value of annual gross income from dairy source in the milk shed was 62.4% of the total annual income of sampled dairy households during the survey period. This result confirms that dairying is of paramount importance to the milk shed dairy producers.

Table 8. Composition of annual income of the sample household (in Birr)

Sources of income	Hawassa (N=99)	Shashemane (N=42)	Yergalem (N=39)
Annual income from dairy	8,496.3	4,429.8	3,447.2
Annual income from crop	864.3	1039	1583
Annual income from other sources	1302.08	4696.565	359
Total annual income	10,662.68	10,165.4	5,389.2
% share of dairy income	79.7	43.6	64

Source: own computation, 2007

4.2. Socio-economic Characteristics of the Sampled Dairy Households

4.2.1. Milk market participants and non-participants

From 180 dairy producing sampled households, 85% were market participants as they were found to sell raw milk at the time of the survey, while the rest (15%) did not sell at the time of survey. The mean family size of milk market participating household was larger than the non-participating households. Table 9 shows that the t-test statistics for the family size of the market participants and non-participants was found to be significant at less than 1% probability level. As expected, farm households with larger family size in adult equivalent had higher marketable milk surplus than dairy household with smaller family size. This indicates that family size in adult equivalent can directly influence dairy household milk market participation. The mean experience years in dairy production of milk market participants and non-participants was 14.2 and 20.75, respectively and the mean difference was estimated to be significant at 5% probability level.

With regard to milking cow ownership, the mean numbers of cross breed milking cows owned by participating and non-participating sampled dairy household were 1.19 and 0.03, respectively and were found to be significant at less than 1% probability level. Where as, the mean number of local breed milking cow owned by participating and non participating dairy household was estimated to be 0.3 and 1.33 milking cow per dairy household, respectively and the their mean difference was estimated to be statistically significant at less than 1% significance level. This result is consistent with the finding of Gizachew (2005). The reason for mean number of local milking cow owned by non-participating dairy household was larger than participating household seems to be that dairy households with larger number of local cow reside at periphery of the town in need of more land for their larger number of cattle and as a result they were less accessed to milk market. Further, the informal survey revealed that dairy household with larger local dairy cow give more attention for social value (prestige) of their animal rather than income generation objectives. With regard to milk yield, mean milk yield per day per participating and non-participating sampled dairy household was 14.6 and 2.85 litters, respectively and was found to be significantly different at less than 1% probability level. The mean value of milk produced per day per participating household

was more than 5 times higher than that of non-participating households (Table 9). This result suggests that production volume was found to be the most important variable in determining the level of milk market participation.

Table 9. Socio-economic characteristics of milk market participants and non-participants

Variables	Mean value of variables for		t-value
	Participants	No participants	
Age	50.89	49.40	-0.520
Family size	6.31	5.40	-1.922*
Experience in dairy production	14.20	20.73	2.952**
Number of cross breed milking cow owned	1.19	0.03	-12.37*
Number of local breed milking cow owned	0.31	1.33	7.945*
Quantity of milk produced per day	14.6	2.85	-7.638*
Income from non dairy source per annum	6, 978.3	3, 977	2.329**

The independent sample t- test also revealed that there is statistically significant difference in mean value of financial income from non-dairy source between participating and non-participating sampled dairy households and was estimated to be significant at less than 1% significance level. Participating sampled dairy households had 1.75 times higher than non-dairy financial income than non-participating sampled dairy household (Table 9). The data in Table 9 shows that mean annual income of milk market participants and no participant dairy household were 6978.3 ETB and 3977 ETB, respectively.

The survey result in Table 10 depicts that there was statistically significant difference between milk market participants and non-participant sampled dairy household's religion. The chi-square test revealed that religion of participating and non-participating sampled dairy household was found to be statistically different at 1% significance level. The majority of sampled milk market participant household were found to belong to Orthodox Christianity (42.5% of sampled household), where as the majority of the non-participant sampled dairy household was found to

belong to Protestant Christianity (13.3% of sampled dairy household). This has a direct implication with level of milk market participation. The informal survey conformed that Orthodox Christianity followers usually do not consume diet of animal origin for more than 208 days annum. During fasting days and periods, they were found to sale most of their dairy produces which rise the level of milk market participation. However, the survey result highlighted that other religion had no direct impact on milk market participation level.

The market participating households as prior expectation had higher educational level than non-participating sampled dairy households and statistically significant at less than 1% significance level.

Table 10. Socio-economic characteristics of milk market participants and non-participants (%)

Variables		Participants (%)	Non-participants (%)	Chi-square Value
Sex	Male	83	77	0.668
	Female	17	23	10.02*
Religion	Protestant	22.5	51	
	Orthodox	42.5	22.8	
	Catholic	15	9.8	
	Muslim	20	13	
Marital status	Single	30	0	0.34
	Married	70	100	
Education level	Illiterate	2.5	10	16.78*
	Read and write	5	31.4	
	1-6 grade	27.5	24.9	
	7-12 grade	47.5	33.7	
	>12 grade	17.5	0	

Table 10 depicts that about 61.6% and 13.26% of market participating and non-participating sampled dairy households, respectively had different level of educational background. The

chi-square test revealed that the difference in education level of market participating and non-participating was estimated to be significant at less than 1% significance level.

4.2.2. Socio-economic and demographic characteristics of the sampled households by location

The mean value of family size, dairy production experience, distance from milk market, number of cross and local bred dairy cows owned, quantity of milk produced per day per household and annual income from non dairy income source were found to be different across the locations and were significant at less than 1% significance level (Table 11). Mean value of family size in Hawassa, Shashemane and Yergalem was estimated to be 7, 6 and 5, respectively. The survey result indicates that Yergalem dairy producers (20.35 years) had more dairy farming experience than Hawassa and Shashemane sampled dairy producers. The proportion of literate in Hawassa, Shashemane and Yergalem was respectively, 70%, 77.5% and 77.5%. Medium level (7-12 years of schooling) and higher level of education (>12years of schooling) were largely higher at Hawassa than anywhere else in the study area (Table 12).

Table 11. Socio-economic and demographic characteristics of sampled household (mean)

Variables	Sample Locations (mean)			F -value
	Hawassa	Shasheman	Yergalem	
Age	46.43	51.95	53.18	2.91***
Family size	7.2	6.1	4.95	11.58*
Experience in dairy production	13.35	13.8	20.35	5.64*
Number of cross bred dairy cow	1.25	1.30	1.05	0.7
Number of local dairy cow	0.6	0.33	0.78	3.8**
Quantity of milk produced	15.72	10.54	8.75	3.074**
Annual income from non dairy source(ETB)	2166.4	5752	1942	6.243*

The chi-square test indicates that there was a significant difference in the educational level of sampled dairy households among the study locations at less than 10% significance level. The

survey result also shows that there was a significant difference in religion among sample location. Table 12 indicates that the mean value of non-dairy income was 101, 512 ETB, 5, 752 ETB and 2, 779 ETB in Hawassa, Shashemane and Yergalem, respectively and this difference across the sample locations was found to be significant at 1% significance level.

Table 12. Socio-economic characteristics of sample household by location (%)

Variables	Sampled dairy households (%)				
		Hawassa	Shashemane	Yergalem	Ch-square value
Sex	Male	77.5	80	87.5	1.44
	Female	22.5	20	12.5	
Education level	Illiterate	30	22.5	22.5	18.136***
	Read and write	7.5	12.5	7.5	
	1-6 grade	10	27.5	17.5	
	7-12th grade	37.5	37.5	35	
	>12th grade	15	0	18	
Religion	Protestant	45	17.5	45	18.4**
	Orthodox	32.5	57.5	50.05	
	Catholic	10	10	0	
	Muslim	12.5	15	4.95	
Marital status	Single	2.5	10	2.5	3.158
	Married	97.5	90	97.5	

*, ** and *** represents 1%, 5% and 10 % significance level

4.3. Access to Services

Table 13 depicts that access to credit, extension and market information which are the most important factors that promote agricultural production and productivities thereby increasing marketable surplus and ultimately farm income.

4.3.1. Access to credit

According to the survey results, 21%, 11.5% and 33% of sampled dairy households in Hawassa, Shashemane and Yergalem, respectively had access to credit. The difference in access to dairy production credit across the sampled location was found to be significant at 1% probability level. Table 13 shows that 79%, 88.5% and 67% of sampled dairy households in Hawassa, Shashemane and Yergalem were in need of credit, although their experience with credit use is low. The survey result depicts that average of 21.83% of sampled dairy household in the milk shed had access to dairy production credit.

4.3.2. Access to extension

Regardless of the country's huge and extensive investment in promoting extension services, the study results revealed that only 40% of the sampled dairy producers received dairy production extension services with large variability among the sample locations. With respect to locations, 70%, 32.5% and 17.5% of Hawassa, Shashemane and Yergalem sampled dairy households, respectively had access to dairy production extension services (Table 13). The difference in access to extension service across the sample location was found to be significant at less than 1% significance level.

4.3.3. Access to market information

The survey result revealed that dairy producers had access to a variety of market information sources (Table 13). On average of 82.1% of the total sampled dairy households had access to current milk market price information. Awareness on milk price information was found to be 88.8%, 82.5% and 80% in Hawassa, Shashemane and Yergalem, respectively. The Chi-square test statistics revealed that there was no statistical difference in access to milk market information among sampled dairy households across the sample locations. This was mainly due to the strong demand for milk in the immediate neighborhood in Hawassa followed by Shashemane where good network of dairy cooperative societies are operational.

Table 13. Sampled dairy household access to services

Variables		Hawassa (%)	Shashemane (%)	Yergalem (%)	Chi-square value
Access to credit	Yes	21	11.5	33	6.4*
	No	79	88.5	67	
Access to extension	Yes	70	32.5	17.5	11.5*
	No	30	67.5	82.5	
Access to market information	Yes	80	82.5	80	7
	No	20	16.2	17.5	
Source of market information	Friend/other traders	40	22.5	25	1.75
	Personal observation	40	55	37.5	
	Consumers	13.5	22.5	37.5	
	Extension agents	0	0	0	

Source: own computation, 2007

4.3.4. Access to market

Performance of dairy household also depends on access to infrastructure. Milk being a perishable commodity, good access to market is of paramount importance. The information on average distance to milk market centers was analyzed as an indicator of access to market (Table 14). The survey result revealed that about 61.2% of sampled dairy households in the milk shed had easy access to milk market centers. The proportion of sampled dairy household with easy access to milk market in Hawassa was estimated to be the highest (67% of the respondent) among the study locations followed by Shashemane (66.7%). Table 14 depicts that dairy producers at Yergalem were relatively at farther distance from average milk market center. The F-test statistics confirmed that the difference in access to milk market center among the sampled locations was found to be significant at less than 1% significance level.

Table 14. Sample dairy households with average distance to dairy product market

Distance	Sample locations			F-value
	Hawassa (%)	Shashemane (%)	Yergalem (%)	
<1 km	67	66.7	50	3.19*
1-2 km	19	25.6	35.6	
> 2 km	14	7.7	14.4	

Source: survey result, 2007

4. 4. Socio-economic and Demographic Characteristics of Milk and Butters Traders

Milk traders: Table 15 and 16 depicts that education, religion and age of the sampled milk traders were comparable across the sample locations.

Table 15. Socio-economic characteristics of milk traders (%)

Variables		Sample Locations			Chi-square value
		Hawasaa	Shashemane	Yergalem	
Sex	Male	81.25	81.25	73	5.33
	Female	18.75	18.75	27	
Marital status	Single	35.8	29	13.3	2.44
	Married	64.2	71	86.7	
Education	Illiterate	3.2	6	0	27.75**
	Read and write	22.6	12.9	6.6	
	1-6 grade	67.75	22.6	6.6	
	7-12 grade	6.45	48.38	40	
	> 12^{th} grade	0	0	46.8	
Religion	Protestant	9.67	3.13	6.6	32.6*
	Catholic	0	0	33.3	
	Orthodox	38.7	12.5	33.3	
	Muslim	52	84.4	26.6	

The chi-square test statistics shows that education and religion were found to be different across the sample locations and were statistically significant at 5% and 1% significance level, respectively. The F-test statistics also revealed that the mean age of milk traders was found to be statistically different at 1% significance level.

Table 16. Socio-economic characteristics of milk traders

Variable	Sample location			F-value
	Hawassa	Shashemane	Yergalem	
Age (mean)	29.87	36.25	40.87	6.61*
Family size (mean)	3.29	3.91	5.3	2.09
Experience in milk marketing (Yrs)	2.91	1.62	1.47	0.021**

Source: survey result, 2007

*, ** and *** represents to 1%, 5% and 10% significance level, respectively

The survey result in Table 16 shows that the difference in business experience of the milk traders across the sampled locations was found to be significant.

Butters traders: On average, 74.86%, 12.76% and 11.8% of sampled butter traders had 1-5, 6-10 and 11-15 years of business experience, respectively. With regard to religion, 6.3%, 29%, 12% and 52.7% of sampled butter traders belonged to protestant, Orthodox, Catholic and Muslim religions, respectively. The majority (44% of respondents) of butter traders had secondary level of education where as only 9.7% of traders were found to be illiterate. According to the survey result, literacy was found to be vital for both butter and milk business activities (Table 17). This was because of the fact that traders had to communicate with vast and various number of consumers having different languages and attitude.

Table 17. Socio-economic characteristics of butters traders (%)

Variables		Sampled butter traders by locations		
		Hawassa (%)	Shashemane(%)	Yergalem(%)
Business experience	1-5 years	68.8	68.8	17.6
	6-10 years	31.3	31.3	58.8
	11-15 years	0	0	11.8
	>16 years	0	0	11.8
Religion	Protestant	9	34	64
	Orthodox	71	31	29
	Catholic	15	9.4	0
	Muslim	5	25	5.9
Sex	Male	43	22	59
	Female	57	78	41
Marital status	Single	21	34	6
	Married	79	66	94
Educational	Illiterate	11	34	17.8
	Read and write	18	16	17.6
	1-6 grade	21	25	17.6
	7-12 grade	50	22	47
	>12 grade	0	3	0

Table 18 shows that average age, family size in adult equivalent and business experience of sampled butter traders was respectively found to be 37 years and 5 members and 5.79 yrs.

Table 18. Socio-economic characteristics of butter traders

Variables	Mean values of the variables		
	Hawassa	Shashemane	Yergalem
Age (years)	36	36	40
Family size (number)	4	4	6
Business experience (years)	3.8	4.6	8.97

Financial capital of sampled butter and milk traders: Table 19 indicates that average initial and current working capital of butter traders during 2006/2007 was 1, 445.3 ETB and 2, 088.3 ETB, respectively where as of the milk traders was 2, 399.7 and 6, 046.6 ETB, respectively. More over, as it was indicated in Table 19 that the initial working capital for milk traders was estimated to be 1.7 times higher than that of initial working capital for butter while the 2006/07 current working capital for milk business activities was estimated to be nearly 3 times higher than initial working capital for butter.

Table 19. Financial capital of sampled butter and milk traders

Variables		Butter trader			Milk trader		
		Hawassa	Shashemane	Yergalem	Hawassa	Shashemane	Yergalem
Initial working capital (ETB)	Mean	3408.00	516.00	421.30	3618.00	1346.00	2235.00
	Minimum	30.00	30.00	5.00	100.00	20.00	250.00
	Maximum	2000.00	1500.00	2500.00	1000	500.00	4545.00
Current working capital (ETB) (2006/07)	Mean	2136.00	1882.00	2247.00	10131	3335.90	4672.00
	Minimum	100.00	70.00	200.00	300	350.00	1000.00
	Maximum	4000.00	7000.00	5000.00	8000	1, 200	15,454.00

Sources of traders' working capital and access to credit: 75%, 84.4% and 82.4% of butter traders and 43.8%, 87% and 42.9% of milk traders in Hawassa, Shashemane and Yergalem, respectively had used their own source of capital for their respective trading activities (Table 20). Next to own source of capital, Bank/loan for milk traders and relatives for butter traders were found to be important sources of capital. Table 20 also depicts that 15.6%, 6.4% and 17.6% of butter traders and 25%, 12.5% and 7.1% of milk traders in Hawassa, Shashemane and Yergalem, respectively had used informal credit sources (friend/relatives) as their major source of initial working capital for their business.

Table 20. Sample households source of working capital and access to credit (% of respondents)

Variables		Butter traders			Milk traders		
Source of Financial capital for traders		Hawassa	Shasheman	Yergalem	Hawassa	Shashemane	Yergalem
	Own	75	84.4	82.4	43.8	87.5	42.9
	Friend	15.6	6.4	17.6	25	12.5	7.1
	Bank/loan	9.4	9.4	0	31	0	50
Access to credit	Yes	25	15.6	23.5	46.9	18.8	57.1
	No	75	84.4	76.5	53.1	81.2	42.9

Source: survey result, 2007

This indicates that own source of initial working capital for butter traders was more important than that of milk traders which is perhaps due to fear of running into debt because of highly fluctuating demand for butter and lack of collateral. The survey result in Table 20 revealed that 25%, 15.6% and 23.5% of butter traders and 46.9%, 18.8% and 57.1% of milk traders in Hawassa, Shashemane and Yergalem, respectively had access to credit. This result confirms that own source of capital for butter trading activity was more important than milk trading activities.

4.5. Milk and Butter Marketing Participants, their Roles and Linkages

In this study, different butter and milk market participants were identified in the exchange functions between producer and the final consumer. These were: producer, producer traders, producer cooperative, semi-whole sellers and consumers for milk market; and producers, semi-whole sellers, retailers, itinerate traders/hawkers and consumers for butter market.

The major milk and butter market participants and their respective role:

Dairy producer: The first link in the milk and butter marketing chains. Producers are predominantly smallholders and have always supplied milk and butter for consumption to neighbors as the most efficient way to dispose of surpluses quickly and cost effectively for payment or other form of value exchange. Producers do supply more distant consumers directly depending on individual circumstances such as the amount of surplus, the cost of transport and the availability of sales in the immediate locality. There are obvious economic trade-offs for dairy in both extra costs and time incurred, limiting how far and how much effort producers will make. Prices paid by consumers depend on the region (milk-surplus/deficit area), but even more so the micro-locality of milk available in the immediate neighborhood. The directness of the channel with no intermediaries or transport/processing costs results in considerable cost savings to both parties. The less availability of pasteurized milk and the high cost of long-life milk/imported dairy products in the milk-shed mean that there is little real competition for raw milk in the area.

Dairy Cooperatives: Theoretically, a common form of collective action to address access problem to market is assumed to be participatory, producer-led cooperative that handles input purchasing and distribution and out put marketing usually after some of bulking or processing. Producers gain benefit of assured supplies of the right inputs at the right time, frequently, credit against out put deliveries, and assured market for the out put at a price that is not always known in advance, but applied equally to all producers in a given locations and time period**.** The dairy cooperatives of the milk shed accounts for about 17.2% of total milk marketed in the milk shed per day. Dairy producers' cooperative societies operational during the survey period in the milk shed were:

Yetigilfire milk producers cooperative: The cooperative is located at the center of Hawassa town (the capital of SNNRG) 275 km away from Addis Ababa. It was informally established in January 1998 having 17 members with sole aim of feed supply for the cooperative members at reasonable price. After solid two years, it was formally established in July 2000 with founding members of 68 male and 18 females totaling 86 members. The amount of

initial establishment capital was 1, 2900 ETB with individual share of 150 ETB. Their aim at the time of formally establishment comprised forming reliable milk sale out let, supply of animal feed at reasonable prices, facilitating AI services and necessary medicament for the members' dairy farm owners. During the early period of establishment, the cooperative had increased its sale outlets to three. The informal discussion made with chairperson of the cooperative revealed that soon after its establishment, it was purchasing and selling 200 litters of milk per day or 6000 litters of milk per month. However, during the survey period, the cooperative was found to purchase only 47 litters per day or 1, 410 litters per month. The purchasing and selling price of the cooperative was revealed to be 3.00 Birr and 4.00 Birr, respectively during the survey period. The cooperative was found to accounts for 0.56% of total milk marketed in the milk shed per day. The number of cooperative members was dramatically decreased from 86 members during its establishment to 67 members during the survey period.

According to the cooperative vice-chairman, the reason for decrease in the number of cooperative members and sale volume per day was due to availability of a number of alternative milk marketing channels/out lets for the milk producers in the town, lack of technical support through intensive training and advisory services; and the cut off purchase volume of milk from the members during fasting period due to considerable decrease in milk demand/consumption level in the area. However, information obtained from the members revealed that the reason for decreasing the work dimension of the cooperative was mainly due to ill-defined rule and regulation of the cooperative. Further, informal discussion conformed that the cooperative seems to collapse in its near future if it is to continue in its current pace.

The informal discussion made with chairperson of the cooperative also revealed that the cooperative was performing its entire function with one chairperson, one vise chairperson and one casual sale person. All were non-paid workers except the sale person. Further more, the informal discussion made with chair person and vice chairperson identified that the cooperative had 6000 Birr deposited at bank.

Biftu milk and feed supply service dairy producers cooperative: The cooperative is located at Shashemane town 250 km south of Addis Ababa. The association although informally established in 2003, got its license from cooperative office of Oromiya Regional State in August 2004. It had founding members of 34 male and 26 female totaling 60 members with a single share of 250.00 ETB. Over the last few years, the association has grown significantly, and by May 2007, full membership had increased to 161 members, composed of 84 male and 77 female dairy producer households. The amount of milk collected from the founding members was estimated to be 1, 300 litters per day or 39, 000 litters per month, which accounts for 58.3% of total milk marketed (2, 330 litters) per day through various channels in Shashemane town during the survey period. The cooperative also accounts for about 16% of total milk marketed in the milk shed per day.

According to the informal discussion made with the chairperson of the Biftu cooperative, raw milk processing into butter and cheese, which was more occasionally done during intense fasting period, was found to be unprofitable. The cooperative was found to purchase raw milk from the members only at 2.40 ETB per litter and sale it for 2.50 ETB per litter on wholesale and retail basis to catering shops, hotels and restaurants, kiosks, individual consumers in the town, and rarely sale to semi-whole sellers residing in Hawassa. The cooperative was also selling skim milk (milk after removing milk fat), which is mainly produced during the big fasting period when raw milk is in excess of demand. However, selling of skim milk was not the routine undertaking of the cooperative but except fasting period. The informal discussion made with members of the cooperative and milk retailers displayed that selling skim milk was found to be more profitable in order to capture economies of scale. However, selling of skim milk was not the continual under takings for the cooperative due to lack of knowledge in line with business and technique. In relative terms, the cooperative seems to be progressively competing with local informal traders.

Provision of input services at reasonable price kept the members' loyalty, maintain milk yield, and gave the cooperative economies of scale. In addition, lump-sum monthly payment allowed producers to budget and thus is prepared to accept lower milk prices from the cooperative than elsewhere. The members felt the sense of ownership and consider the

cooperative as their own and it was reliable year round out lets for their produce. The informal discussion made with chairperson and vice person of the cooperatives revealed that there was no cut off purchase volume of milk from the members during the intense fasting period as it was commonly done in Hawassa dairy cooperative. Nevertheless, the informal discussion highlighted that some producers were found to be not trustful to deliver the milk volume that they were committed to bring into cooperative as they could have alternative milk sale out lets with better price particularly during peak demand period.

During the survey period, the financial capital of the cooperative was 350,000 ETB deposited at bank. The daily purchase volume of milk was 1, 350 litters, which figures 40, 500 litters per month. The purchase and sale activities were found to be undertaken through five distinct milk sales out lets in Shashemane town. More over, the chairperson of the cooperative revealed that the association has been planning to open additional milk sale out lets in Hawassa town in the immediate future. Currently, the cooperative has been undertaking its overall activities by one chairperson, one vice person and seven sale persons. All were full time paid workers and the cooperative was likely business oriented.

Magara dairy producers' cooperative: The cooperative was first founded in Yergalem (Abosto) town 325 km from Addis Ababa on the main high way to Moyale (the Kenyan border). It was informally established in November 2, 000 with sole aim of creating sustainable milk sale out lets for the members with out any additional services for the cooperative members and was non-business oriented cooperative during its establishment. The cooperative was non-profit making. The founding member was 26, composed of 2 females and 24 males with a single share of 150 ETB. The informal discussion made with chairperson of the cooperative in February 2007 revealed that the current capital in their account was about 6, 000 ETB. The cooperative was found to collect milk at Abosto and sale it to semi-whole seller whose residence is Hawassa. The cooperative was found to be non-profit making and accounts for 1.03% of total milk marketed in the milk shed. The cooperative was found to sale a litter of milk for the semi-whole seller for 2.33 ETB with out making any profit for the cooperative members. During the survey period, the amount of milk being collected from founding members was 86 litters per day or 2,580 litters per month.

Itinerate /Mobile traders: These market actors stand for only butter business activities. It refers to those butter traders that are characterized by lack of fixed premises and the proprietors predominantly run the business personally. They purchase butter from neighbor areas and sale at business site or residences. Their mode of transport is mainly public transport and some times on foot. They involve casual workers in transporting, loading and unloading activities. The majority of them were found to sale butter more often, but sale cheese less frequently. Almost all the butter being traded in the area was found to be imported from other areas. This butter in turn was delivered to the customers in urban market places, kiosks, bars, hotels, restaurants and individual government and non-government employees in their residence. This delivery at residence activities was usually done by itinerate butter traders.

Semi-whole seller: Is an important butter and milk market intermediaries who perform the function of both retailing and wholesaling depending up on market conditions. The informal survey revealed that the existence of semi-wholesalers in both butter and milk marketing channels; however, semi-wholesaling function is non-operational in Yergalem and Shashemane and Shashemane for butter and milk business undertakings. The census for the survey revealed that there were three milk semi-whole sellers whose residence are Hawassa and one butter semi-whole seller whose residence is also in Hawassa.

Retailers: These include dairy marketing intermediaries such as supper markets and other small and large–scale retailers who trade dairy as part of other retail activity mainly involving sale of other household consumer item in like shops and kiosks. The retailers divide large amount of produce and sell it to consumers in small units. Many of the retailers in the study areas were not licensed to sale/handle butter and milk. Some had refrigeration particularly in Hawassa because of relatively hot weather conditions that can easily perish raw milk with in less than half a day. Many of milk traders in Shashemane and Yergalem did not have refrigeration perhaps due to two reasons: due to lack of investment capital and awareness about the benefit of the refrigerator. Moreover, all milk traders but cooperative society in Shashemane did not have milk-testing equipment such as hydrometer and alcohol, testing kits

for water adulteration and bacterial development during their purchase. However, some of the traders found to use regular supplier in order to develop their own supplier quality.

Consumer: This is the last link in the dairy marketing chain. From the consumer point of view, the shorter the marketing chain, the more likely is the retail price going to be low and affordable. Consumers' consumption patterns/demand structure, purchasing power and traditions/norms are assumed to largely affect the potential market for agricultural commodities in general and dairy commodities in particular.

4.6. Dairy Marketing chains

A marketing chain may link both formal and informal market agents. The survey results depicts that milk in the study area was found to be marketed through both formal and informal marketing channels. Further, the survey result revealed that dairy marketing chains prevailing in the milk shed was found to be comprised of various milk and butter marketing channels and a number of the respective market player

4.6.1. Milk marketing channels

The number of intermediaries in a given marketing channel will have a bearing effect on both producer and consumer milk prices. The shorter the channel the more likely that the consumer prices will be low and the producer will get a higher return. The survey result identified that there were different types of milk marketing channels in the study area during the survey period. Milk was found to be supplied to Hawassa from Yergalem and Shashemane (Arsi-Negele), as the area was deficit in milk supply. However, only locally produced milk was found to be marketed in Shashemane and Yergalem as the areas have surplus production.

Number and type of milk market out lets: Milk price in the areas was found to considerably vary depending upon distance from milk market, type of milk sale out let, consumer preferences, level of surplus production per household and seasons**.** Table 21 shows number of marketing out let used by sampled dairy producers during the survey period. On

average, 75 % of total sampled dairy household had one milk sale out let. The proportion of sampled households that had two milk sales out lets in Hawassa and Shashemane were nearly equal. Further more, the survey result indicates that none of the sampled dairy household except in Hawassa had three milk sales out lets. This result points out the extent of demand for milk in the respective survey locations.

Table 21. Number of milk sale out lets for sample dairy producers

Number of market out lets	Hawassa (%)	Shashemane (%)	Yergalem (%)
One	65	74	85
Two	28	26	15
Three	6	0	0

Table 22 depicts the type of milk sale out lets that were used by sampled dairy producers in the milk shed during the survey period. The Table shows that 10% and 6% of sampled dairy households in Hawassa and Yergalem respectively sold their milk through their own shops. This implies that there were producers retailing their own milk through their own milk selling out let. Although dairy producers have multiple out lets for their milk, selling at farm gate was found to be the most important milk marketing channel for Hawassa sampled dairy producers and accounts for about 69% of the total sale volume of milk per day, where as delivery to buyer in the immediate neighborhood is predominate and accounts for 69 % of total sale volume of milk per day in Yergalem followed by Shashemane.

Table 22. Type of milk market out lets for sample dairy producer households

Type of milk marketing sale out let	Sample locations		
	Hawassa (%)	Shashemane (%)	Yergalem (%)
Farm gate	69	11.5	22
Delivery to buyer	17	65.4	69
Own shop	10	0	4
Cooperative	4	23.1	5

Source: Survey result, 2007

Table 22 also highlights that 23.1%, 4 % and 5% of sampled milk producers in Shashemane, Hawassa and Yergalem, respectively sold milk through cooperative societies.

Milk marketing channels depicted in figure 3 was constructed based on the data collected from Hawassa, Shashemane and Yergalem during the survey period. The survey result identified that there were four, three and two major milk marketing channels in Hawassa, Shashemane and Yergalem, respectively.

The major milk marketing channels:

Producer → Consumer: This channel accounts for 21%, 4.7% and 23.7% of total milk marketed per day in Hawassa, Shashemane and Yergalem, respectively (Table 23). The channel was found to be the shortest of all milk channels identified during the survey period in the milk shed.

Producer → Semi-whole seller → Retailer → Consumer: This channel was identified to be operational only in Hawassa where milk semi-whole sellers undertake both retailing and wholesaling activities. Milk semi-whole sellers link producers and retailers in one way when they undertake bulk selling to retailers, and in other way, they link producers and consumers when they under take retailing functions. This channel represents 60% of total milk marketed per day in Hawassa. In terms of volume of milk marketed in the milk shed per day, the channel was found to be the largest of all the milk-marketing channels identified during the survey period. This was the case because this channel was the most reliable and best alternative source of milk supply for retailers in Hawassa where demand for milk exceeds supply of milk. This milk was transported from other areas out of Hawassa such as Shashemane and Yergalem.

Producer → Cooperative → Retailer → Consumer: The channel account for 2.2% and 46.9% of total milk marketed per day in Hawassa and Shashemane, respectively. It seems to be less important as compared to other marketing channels in Hawassa. This seems the case

because of limited volume of milk sold through cooperative Hawassa. However, this channel was identified to be the most important milk sale out let for milk producers and the most reliable milk supply source for milk retailers in Shashemane where surplus milk production triumph. The fundamental reason among others why producers and retailers prefer to purchase from this source seems to be to avoid risks associated with fluctuating demand for milk. If producers are to sale for retailers and retailers are to buy from producer, the amount/volume should be fixed for both parties regardless of demand level which may lead them unnecessary loss.

Producer → Retailer → Consumer: The channel represents average of 43% of milk marketed per day in the milk shed where as this channel represents for 16%, 38% and 76.6% of total milk marketed per day in Hawassa, Shashemane and Yergalem, respectively during the survey period. This channel was identified to be the most important alternative milk sale out let for milk producers and the most important supply source for retailers in Yergalem.

Table 23. The major milk marketing channels of the study area by location

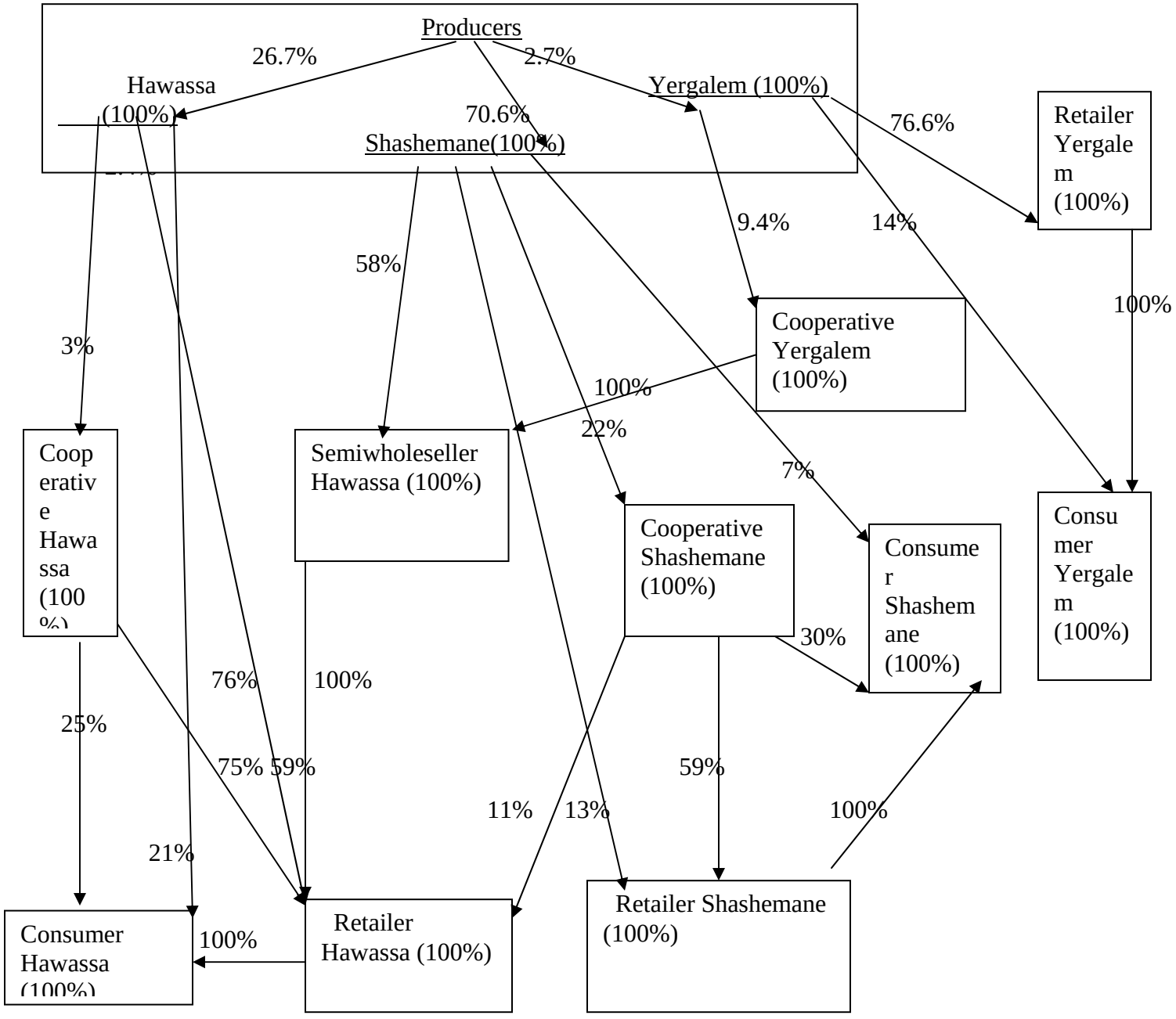
The major milk marketing channels	Sample locations		
	Hawassa (%)	Shashsemane (%)	Yergalem (%)
I. Producer → Consumer	21	4.7	23.4
II. Producer → Semi-wholesaler → Retailer-Consumer	60	-	-
III.Producer → Cooperative → Retailer → Consumer	2.2	46.9	-
IV. Producer → Retailer → Consumer	16	38	76.6
V. Producer → Cooperative → Consumer	0.81	10.4	-
Total	100	100	100

Producer → Cooperative → Consumer: The channel was exceptional for Shashemane and Hawassa where dairy cooperative are found (Table 23) and accounts for 0.81% and 10.67% of total milk marketed per day in Hawassa and Shashemane, respectively during the survey period. This channel was identified to be the least important milk sale out let for Hawassa

producers as they have relatively larger number of milk sale out lets which can fetch them better price.

Figure 3 shows explains the direction of milk flow from areas of major milk production to major market/demand. The figure further explains the relative importance of the milk-marketing participants in terms of volume across the sample locations and their linkage.

Figure 2. Milk supply flow for Shashemane, Hawassa and Yergalem towns



4.6.2. Butter marketing channels

The survey results revealed that there were three, four and three major butter marketing channels in Hawassa, Shashemane and Yergalem, respectively (Table 24). The Rapid Marketing Appraisal made prior to formal survey highlighted that the study area was deficient in butter and cheese. This was because of the fact that dairy producers were not producing marketable surplus of butter and cheese. Furthermore, the informal survey highlighted that the wide demand gap prevailing in the milk shed was found to be met through supply from external part of the milk shed such as Wolyita (Kucha, Areka, Gasuba and Waka), Sidama (Arbegona), Kofole in western Oromiya and Addis Ababa (Gojam Berenda butter). The location of butter supplying areas vary from 30 km for the nearest (Sidama) to 315 km for the furthest (Addis Ababa and Wolyita).

The informal survey revealed that very small quantities of fresh butter produced by local dairy producers in the study areas was found to be mostly used for cooking as well as cosmetics purpose at the household level. According to the informal discussion made with key informants, local dairy producers were found to process milk into butter and other milk derivatives only for household level consumption. This was because of the fact they had excess demand for their milk and thus, found processing of milk into milk derivatives was lobour intensive and less economical. Further, the discussion elaborated that the fat content of exotic breed cow milk is very low that results less butter extraction per volume of milk. Urban consumers who are concerned with quality and food safety prefer consuming cooking butter and cheese at household level rather than selling. As a result, mobile butter traders were involved in accumulating supplies for consumers in rural and urban markets. In the areas, the butter in market places was seen to be sold mainly in terms of volume using hand weighting. In this line, the weight as well as the quality of butter was seen to vary considerably depending on personal experience in butter purchasing and selling. However, butter in kiosks and some market places was found to be sold in terms of weight using standard measurement apparatus (kilogram).

The informal discussion made with key informants highlighted that butter that comes from very rural areas of Sidama (Dale district) part some times be transported to Addis Ababa by Semi-whole sellers and retailers especially during the National festivals. As it was undertaken very rarely and non availability of live data, the butter chains of Addis Ababa destination was not considered in the market chains analysis part of the study.

The major butter marketing channels identified during the survey period

Producer → Consumer: This channel is found to involve the direct sale of butter to consumer in the immediate neighborhood and local market places. The channel was the shortest in terms of intermediaries and smallest in terms of volume of butter and value. The channel represents 5%, 11% and 6% of total butter marketed per week in Hawassa, Shashemane and Yergalem, respectively. The channel is used mostly for cosmetics butter rather than cooking butter.

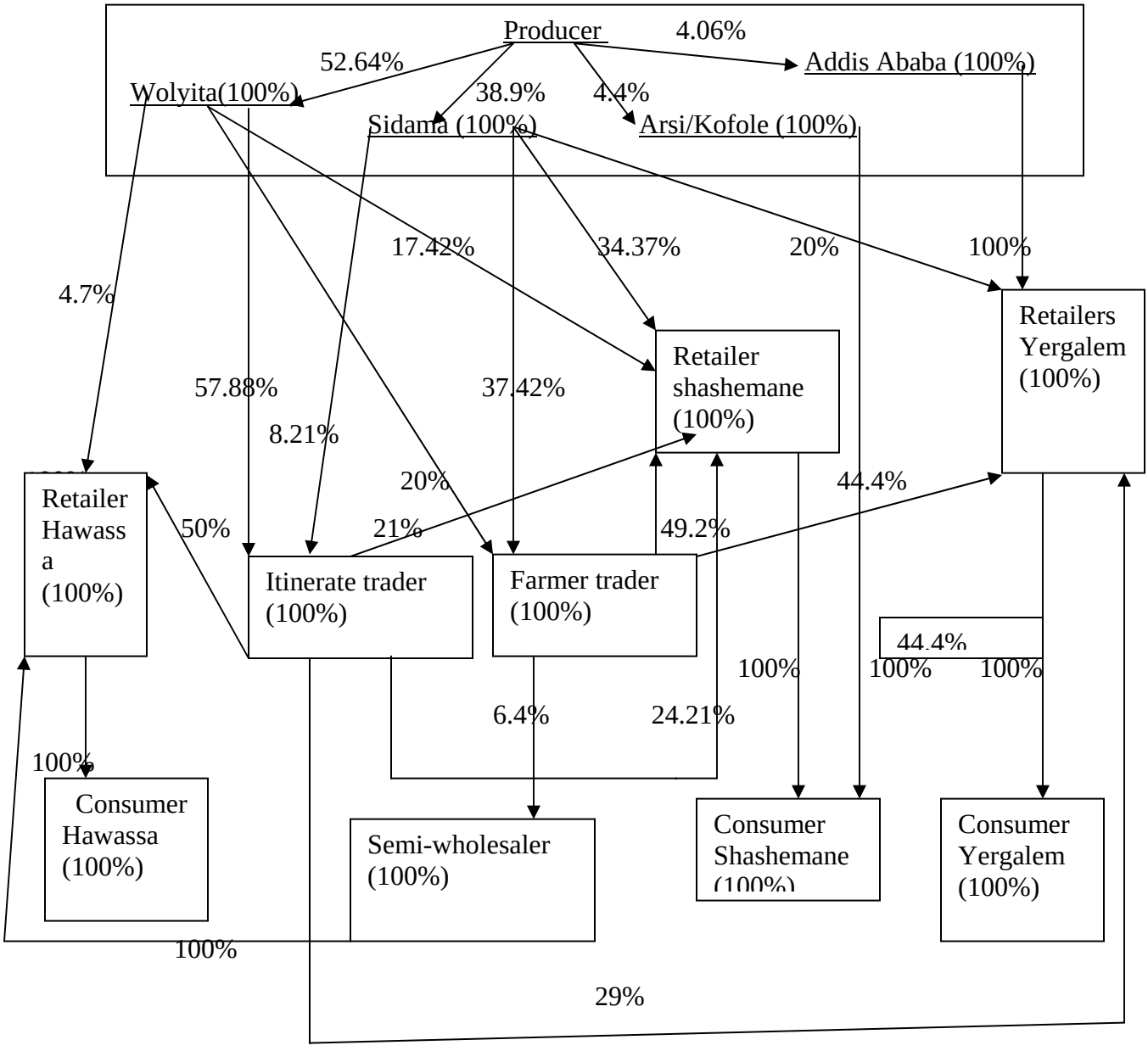
Table 24. The major butter marketing channels of the study area by location

Butter marketing channels	Sample locations		
	Hawassa (%)	Shashemane (%	Yergalem (%
I. Producer → Retailer → Consumer	16.4	11.5	10.24
II.Producer → Farmer-trader → Semi-whole seller → Retailer → Consumer	6	-	-
III.Producer → Itinerate traders → Retailers → Consumer	72.6	31.1	42
IV. Producer → Farmer trader → Retailer → Consumer	-	46.2	41.7
V. Producer → Consumer	5	11	6
Total	100	100	100

Producer → Retailer → Consumer: The channel accounts for 16.4%, 11.5% and 10.24% of total butter marketed per week in Hawassa, Shashemane and Yergalem, respectively (Table 24).

The major butter source of the study areas were Wolyita (52.64%) and Sidama (39.9%) (Figure 4).

Figure 3. Butter supply flow for Sahshemane, Hawassa and Yergalem towns



Source: Survey result, 2007

Producer → Farmer-trader → Semi-wholesaler → Retailer → Consumer: This channel account for 6% of total butter marketed per week in Hawassa (Table 24). Both Shashemane and Yergalem were lacking the channel because there were no farmer butter traders and semi-wholesalers to link retailers and consumers.

Producer → Itinerate traders → Retailers → Consumer: The channel was estimated to be the largest of all the butter-marketing channels identified during the survey period. The channel accounts for 72.6%, 31.1% and 42% of total butter marketed per week in Hawassa, Shashemane and Yergalem, respectively during the survey period. The channel was found to be the most important channel in Hawassa because itinerate traders were linking retailers and producers. This was the case because of the fact that these are the areas among the sampled locations where relatively better price for butter prevail.

Producer → Farmer trader → Retailer → Consumer: The channel accounts for 46.2% of total butter marketed in Shashemane during the survey period. This channel was identified to be the most important butter-marketing channel in Shashemane in terms of volume.

4.7. Structure, Conduct and Performance (S-C-P) of Milk and Butter Market (Organizational Approach)

This study employed S-C-P model from the theory of industrial organization in order to examine the competitiveness of milk and butter market, behavior of the marketing actors and success in meeting their respective goals in the study areas.

4.7.1. Market structure

The dairy market structure of the study area was found to involve marketing agents like dairy producers, dairy producers cooperatives, semi-whole sellers, retailers, milk bars, restaurants, kiosks for milk market and producer, farmer trader, itinerate trader, semi-whole seller and retailer for butter market.

4.7.1.1. Size distribution and market concentration

Market concentration refers to the number and relative size distribution of buyers and sellers in a market. For an efficient market, there should be sufficient number of firms (buyers and sellers). Firms of appropriate size are needed to fully capture economies of size; there should be no barriers to entry into, exit from markets, and should have full market information.

Size Distribution: The total milk volume marketed per day per total sampled milk market traders in the milk shed through both formal and informal marketing channels was estimated to be 8, 338.9 litters. From this, 57.16% (4766.5 litters) and 42.83% (3572.4 litters) of total milk marketed in the milk shed was estimated to be marketed through formal and informal milk marketing channels, respectively. In terms of volume of milk marketed per day, milk whole sellers were found to dominate the formal milk market of the area and were playing the role of balancing supply of and demand for milk by transporting milk from surplus production areas (Shashemane/Arsi-Negale and Yergalem) to milk deficient areas (Hawassa). From the total milk marketed through the formal milk marketing channels of the milk shed, 70% (3, 336.55 litters) and 30% (1, 433 litters) of milk was estimated to be marketed by milk semi-whole sellers and dairy producers' cooperatives societies, respectively. The survey result also showed that from the total of 3, 572.4 litters of milk marketed per day in the milk shed through informal milk marketing channels, 26.6 % (950.26 litters), 70.63% (2523.04 litters) and 2.77% (99 litters) of milk was estimated to be marketed in Hawassa, Shashemane, and Yergalem, respectively. It was noticed that out of milk marketed by semi-wholesaler in Hawassa per day, 97.5% (3, 419.8 litters) and 2.5% (86 litters) of milk respectively was supplied from Shashemane town/Arsi-Negale town and Yergalem town.

With regard to butter purchase and sale volume, about 2298 kg of butter per sampled butter traders per week was estimated to be marketed in milk shed per week. The survey result also showed that out of total butter marketed per week in the study areas, 29% (668 kg), 39% (898 kg) and 32% (732 kg) of butter was marketed in Hawassa, Shashemane and Yergalem, respectively per week through different butter marketing channels.

Market Concentration: The analysis of the degree of market concentration was carried out for all sampled traders; namely, milk and butter traders of study areas. It was measured by the percentage of milk and butter handled by the largest four traders (Kohl and Uhl, 1985). Here, concentration ratio for four traders was meant for all type of milk and butter traders with largest upper volume of the respectively marketed commodity in general. This was because of the fact that both milk and butter marketing actors were found to purchase from different sources in different marketing channels and sale to different agents in different channels, too (Table 23 and 24). The concentration index of the butter market of the milk shed was estimated to be 39.93% indicating weakly oligopolstic market type. Further, the survey result highlighted that butter market in Hawassa (37.9%) and Yergalem (44%) were estimated to be weakly oligopolistic, where as the market type for butter in Shashemane (31.9%) was likely competitive (Table 25). Nevertheless, the collusive price setting conditions was not common except in Yergalem.

With regard to fluid milk market, the concentration ratio in Hawassa and Yergalem was estimated to be 62.2%, 53.6%, respectively indicating strongly oligopolstic market type. In Shashemane, the milk market was estimated to be 39.7% indicating weakly oligopolistic market type. Market for milk in the milk shed was characterized by strongly oligopolsitc type for which the concentration ratio was estimated to be 51.83% (Table 25). However, these oligopolistic characteristics of milk market in terms of volume had nothing to do with milk price setting in the milk shed except Yergalem. As there were no large number of dairy households owning cross breed cows and relatively few milk traders in Yergalem, there were producers groups owning cross breed dairy farms and selling their own milk at retail base to consumers and were found to decide milk price on collusion and influence milk market price at large. However, in Hawassa and Shashemane, there were large number of cross breed dairy owners who were mainly engaged in market oriented dairy production and supplying milk at large and large number of milk and butter traders. Thus, milk and butter prices in Hawassa and Shashemane were found not to vary noticeably.

More over, the informal survey revealed that there was ill competition among smaller and larger butter and milk retailers. Small retailers were found to purchase poor quality of butter

and milk at relatively cheaper price and sale it at lower price. This was the case because of the fact that the small-scale retailers did so in order to reduce risk associated with perishable nature of milk and loss of butter weight. Where as large retailers purchase and sale of better quality milk and butter at higher price in order to attract consumers with better income and better quality preference. Further, smaller retailers adulterate butter and milk in order to obtain abnormal profit in the short run as they are in most cases opportunistic traders. From this, it can concluded that since markets for both milk and butter were found to be characterized by oligopolstic type of market, the dairy markets in the milk shed were assumed to be imperfect and inefficient.

Table 25. Concentration Ratio for sampled traders

Sample traders	Concentration index for Four Firms (%)	
	Butter	Fluid milk
Hawassa	37.9	62.2
Shashemane	31.9	39.7
Yergalem	44	53.6

4.7.1.2. Degree of market transparency

The degree of market transparency refers to the adequacy, timeless and reliability of market information that the traders have for their marketing decision. The existence of a large number of buyers and sellers does not guarantee competition and efficiency of the market unless the traders and producers have a proper knowledge of the functioning of the market. In a transparent market, participants have adequate information about their competitors regarding their source of supply and buying prices for better decisions. The survey result in Table 26 depicts that traders in the study areas had varieties of butter and milk market information sources such as direct observation to market/sale places, friends, other traders through telephone and personal contact, consumers/ buyers, or a combination of two or more information sources.

Table 26. Access to milk and butter market information

Number of market information sources	Butter traders			Milk traders		
	Hawassa (%)	Shashemane (%)	Yergalem (%)	Hawassa (%)	Shashemane (%)	Yergalem (%)
One	31.3	53.1	50	44.4	40	60
Two	62.5	43.8	70	50	53.6	33.7
Three	6.3	3.1	20	5.4	6.4	6.3

However, as there was difference in source of market information among the respondents, the market for butter and milk seemed to be non-transparent and thus confirms the inefficiency of the market. The survey result in Table 26 illustrates that 44.8%, 58.8%, and 9.8% of sampled butter traders, and 48.1%, 45.8% and 6% of sampled milk traders, respectively had market information from one, two and three sources. Moreover, friend/other traders, personal visit to market places and consumers were found to be the most important market information sources of milk and butter traders of the milk shed during the survey period (Table 27).

Table 27. Major source of information for butter and milk trader (% of traders)

Type of market information sources	Butter trader			Milk traders		
	Hawassa	Shashemane	Yergalem	Hawassa	Shashemane	Yergalem
Personal visit	18.7	68.8	76.5	43.8	50	78.6
Friend/other traders	81.3	21.9	23.5	12.5	15.6	14.3
Consumers	0	9.4	0	43.8	34.4	7.1

Source: Survey result (January-May, 2007)

4.7.1.3. Barriers to entry and exit

Market liberalization should ideally enhance the chances for development of rural business. Yet, entry barriers in poor areas are still high and local resources like land and labour remain underutilized (Kristiansen, 2007). Main explanations for the lack of entry by small-scale

entrepreneurs are limited information and knowledge; uncertainties due to the concentration and market dominance by powerful business groups and problem of transportation and perishable nature of products. The gap is wide between those who know and control and those who do not. Lowering entry barriers into dairy production and marketing is mainly a matter of increasing competence at the household level, but institutional changes are also required (Kristiansen, 2007).

In line with this particular study, managerial know-how, working capital, nature of commodity and demand and supply conditions, and legal and policy constraints were used in analyzing barriers to milk and butter market entry and exit.

i) Managerial Know-How*:* Managerial know how refers to the ability and knowledge of dairy product traders and it was examined by level of traders' formal education and their trade experiences.

A) Formal Education: The result of traders' survey in Table 15 and 17 points out that 20.9% and 3.09% of butter and milk traders, respectively were found to be illiterate while 79.1% of sampled butter traders and 90.4% of sampled milk traders were found to be literate. About 40% of butter traders and 44.3% of milk traders had joined junior secondary and high school, respectively. This result portrays that formal education seemed to create entry barrier into butter and milk market. The survey result confirms that traders' educational background was found to be more important in milk market entry than butter market as milk traders were found to be more educated than butter traders were during the survey period.

B) Business Experience: Business or trade experience refers to the number of years that dairy product traders stayed in the dairy product trading activity. The traders' survey results in Table 16 and 17 showed that most of the traders had been in butter and fluid milk trading business for more than 5 years. Out of the sampled butter traders, 52%, 41%, 4% and 4% had business experiences of 1-5, 6-10, 11-15 and >16 years, respectively. With regard to milk traders, 75%, 15%, 7.6% and 2.4% had business experience of 1-5, 6-10, 11-15 and >16 years, respectively. On average, fluid milk traders had larger business experiences than butter traders. However, in both trading activities, the majority of traders were in between 1 and 5

years of business experience and therefore, business experience did not create a barrier to both butter and milk market entry.

ii) Lack of Working Capital*:* Working capital refers to the amount of money required by butter and milk traders to enter into business activities. The result of traders' survey showed that 35.4%, 33%, 22% and 9.2% of sampled butter traders were able to purchase 1-20, 21-40, 41-60 and > 60 kg of butter per week, respectively, while 26.3%, 43.9%, 12.8%, 9.6% 7.3% of sampled milk traders were able to purchase 1-5, 6-10, 11-20, 21-40 and >40 litters of milk per day. More over, the survey result in Table 19 revealed that about 81% of butter traders and 51% of milk trader had their own sources of working capital. From the survey result, since the majority of butter and milk traders had their own source of capital for the respective trading activities and were able to purchase 1-20 kg of butter per week and 1-10 litters of fluid milk per day, lack of capital seemed not to be constraint for butter and milk market entry.

iii) Nature of commodity and seasonality of demand for butter and milk: As the survey result highlighted that about 47.2% of the respondents claimed that their major milk and butter marketing problem was seasonality of demand associated with highly perishable nature of milk. The informal survey further confirmed that there were milk and butter traders run out of their business activities because of the fact that they had incurred lose/run into debt due to highly fluctuating demand associated with perishable nature of dairy products in general and milk in particular. This indicates that highly fluctuating demand associated with perishable biological nature of dairy product was found to create strong milk and butter market entry and exit barriers.

iv) Legal and Policy Constraints

Licensing of butter and milk traders: Marketed commodities may pass from producers to consumers directly or it may pass through two or more market agents who are characterized by no licensing/ or licensing requirements to generate the business and no regulation/ or regulation of operation. Licensing is a major barrier in many business activities. In line with dairy products business activities of the milk shed, according to Sidama Zone, Hawassa

Transitional Administrative town in southern Ethiopia and Western Shewa Zone Trade, Transport and Tourism, and Finance and Economic Department, "butter and milk trading in the municipality, like any other business, needs trade license, and traders involved in this business need to be licensed". In practice, however, this was not the case, as most of the traders operating in the study area had no butter and milk trade license. It is suggested that, the enforcement of the law was weak.

Table 28. Legality of milk and butter traders in the study area (% of traders)

Traders	Butter traders			Milk traders		
	Hawassa	Shashemane	Yergalem	Hawassa	Shashemane	Yergalem
Licensed	3.12	3	5.6	37.5	6.3	21.4
None licensed	96.88	97	94.4	62.5	81.3	78.6
No response	0	0	0	0	12.4	0
Total	100	100	100	100	100	100

According to the sampled traders' survey result, average of 96.5% and 74.13% of sampled traders did not have butter and milk trade license, respectively (Table 28). This indicates that the sector was receiving no due attention from government side or any body else. The survey result further revealed that only 2.9% of butter-sampled traders and 21.73% of milk-sampled traders during the survey period reported that they had trade license. Since the majority of traders lacked trading license in both butter and milk trading activities, it seemed that trade license did not create market entry and exit barriers.

V) Reputation and relationship with experienced traders and clients: This was the most credible functional parameter to determine whether milk and butter business firm to be successful or not. The experienced traders convincingly share the direction of major supply and major demand for their respective commodities. Moreover, their personal character play pivotal role in attracting the clients.

4.7.2. Milk and butter market conduct

4.7.2.1. Producer's behavior

Milk production, consumption and disposal pattern: Dairy producers retain part of the milk for home consumption and sell the rest in the market to get cash income. The milk production, consumption and disposal pattern is given in Table 29. The average milk production per household was found to have a direct relation with dairy farm size. In Hawassa, dairy producers were found to sell about 72% of total milk produced per day, which is higher than average of the milk shed (65.48%).

The share of milk sold in Hawassa, Shashemane and Yergalem, respectively was found to be 72%, 63% and 61.4% of the total milk produced per day per household. These figures are more consistent with results obtained from study conducted by Felleke and Geda (2001) on dairy production system in Ethiopia in Addis Ababa and regional towns found that of the total urban milk production, 73 percent is sold, 10 percent is left for household consumption, 9.4 percent goes to calves and 7.6 percent is processed into butter and ayib (cottage cheese).

With regard to per capita consumption of milk by sampled dairy households, the highest figure was obtained in Shashemane (11.6%), where as the lowest in Hawassa (8.6 %). The volume of milk processed into other dairy products (butter, cheese, ergo, soured butter and/ skim milk) was found to be the highest in Yergalem (22.31%) and the lowest in Hawassa (11.2%). Majority of dairy products marketing intermediaries of the study areas identified during the survey period were found not to use milk cooling tank and other milk preservation technologies that could enable continuous procurement of milk and contribute to increase in quality and quantity of raw milk. The prices received by producers appeared to vary considerably among the sample locations depending on the size of sale, cost of production, bargaining power of the producers, breed type (local cow milk costing higher price due to its higher fat content) access to milk market information and availability of alterative milk sale out lets.

Table 29. Milk production, consumption, and disposal pattern in the study area

Variables	Sample locations		
	Hawassa (%)	Shashemane (%)	Yergalem (%)
Home consumption	8.2	11.6	10.84
Milk Consumed by calves	8.6	18	5.42
Milk Processed into other products	11.2	7.3	22.31
Milk sold	72	63	61.43
Average price received by producer	3.18	2.43	2.46

Factors considered by dairy producers in making decision to whom to sell: The most important factors considered by sampled dairy producers in decision to whom to sell are shown in Table 30. Price had greatest influence (59.2% of the respondent) on the producer's decision to whom to sell followed by closeness to demand center for milk (24.16% of the respondent). Secured demand (16.4% of the respondent) was found to be the third important factors considered by the sampled milk traders. With regard to sample locations, milk selling price was the most important factor in Yergalem (87.7% of the respondent) followed by Shashemane (54% of the respondent) considered in deciding to whom to sell. However, selling price was found to be the least important factor considered by dairy producers in Hawassa. In Hawassa, the most important factor considered by sampled dairy household was found to be closeness to milk market center. This implies that producers in Hawassa had a number of alternative milk selling out lets and they do not worry about milk price as the price for milk is not varying considerably. Secured demand followed by price was identified to be important factor for Shashemane milk producers in deciding to whom to sell.

Table 30. Factors considered by milk producers in deciding to whom to sell

Variables	Hawassa (%)	Shashemane (%)	Yergalem (%)	Over all
Price	34.3	54	89.7	59.2
Closeness	51.4	13.5	7.6	24.2
Secured demand	14.3	32.4	2.6	16.6
Total	100	100	100	100

4.7.2.2. Traders behavior

Traders' buying and selling strategies: In the study area, the informal survey revealed that the supply of milk and milk products to end consumers was found to emanate from two main sources: Industrial dairies supplying milk and milk products, and dairy producers, dairy traders and dairy cooperatives raw milk. The informal marketing system for butter and milk was in most cases characterized by no licensing requirement to generate the operation, low cost of operation, high producer price compared to formal market and no regulation of operation.

The survey result identified that the bulk of milk was marketed through traditional channels and transactions found to take place with direct contact between seller and buyer. There were no observed operational brokers in both milk and butter market during the survey period. The organized dairy cooperatives were estimated to represent only about 17.2% of the total milk off take of the milk shed. With regard to contractual agreement between market actors, only verbal agreement based on personal relation, which has no legal implication, seemed to prevail for quality and supply assurance of butter and milk. The milk semi-wholesaler were found to purchase milk from producers, however, the amount and the pattern of milk purchase by semi-whole sellers from dairy cooperatives was not substantial; more over, it was not continuous.

The survey result revealed that itinerate butter traders, semi-whole sellers and farmer traders purchase fresh and rancid butter from different butter sources and agents depending on amount of working capital and proximity to butter sources/local markets. For instance, the butter retailers were found to purchase butter either directly from producer at local market and/or urban semi-whole seller, rural butter itinerate traders, or from farmer traders in their environs and sale it in markets place, kiosks and/or hawks at bars, restaurants and individual residences. No standardization and grading system in purchasing and selling of butter and milk. Both butter and milk were found to be purchased and sold at non-standardized weight and volume basis.

Traders pricing behavior: The survey result revealed that three major factors; namely, season (Kiremnt and Bega), social festivals and fasting periods were found to exert considerable impact on butter and milk pricing behaviors. The price of butter and milk was identified to reach its peak during the big social festivals, non-fasting periods and summer (Bega) season when the economic activities become high and its lean during fasting period and winter (kiremnt) season when economic activities become low.

The rate of price fluctuation in butter market was higher than price fluctuation in milk market due to availability of close substitute for butter at affordable price for majority of lower income classes. Purchased and sold quantity fluctuation for butter was observed to be highly significant than price fluctuation. However, price fall in case of milk was barely observed except for quantity. Fluctuation is meant only with a year time. In general, prices for butter and milk were observed to rise dramatically due to urbanization, increasing population, transaction cost, decreasing production and increasing purchasing power of consumers. The general pricing structure of milk and butter was found to be based on with little or no consideration of quality but quantity of butter and milk across the sample locations. The informal discussion made with key butter market informants during the survey period highlighted that the change in butter price in Addis Ababa (Merkato Gebaya) had direct impact on price of particularly Wolyita and Sidama butter market price especially during big national festivals.

Traders purchasing and selling price setting strategies: The survey result in Table 31 showed that negotiation was found to be the most important butter-purchasing price setting strategy. However, informal discussion made during the Rapid Marketing Appraisal with key informants showed that the price of milk per litter highly differs from village to village which was based on cost of feed, level of demand for milk, access to milk market information, and bargaining power of producers and season of demand for milk. Because of the presence of many imported close substitutes for butter and its relatively higher price which cannot be afforded by majority of lower income group except during the national festivals and especial social occasions, and serious suspension by consumers about its purity due to adulteration with dirt, over all demand for butter in the areas was found to be very low. The purchasing as

well as selling price of butter usually differs based on source of butter (Wolyita, Sidama, Kofole Gojam and others), level of quality (level of purity) and degree of rancidity based on consumer's preference. On average, 20.6% of butter and milk 27% of milk traders reported that the respective commodity price was set by market where as 77% of butter and 30.2% of milk traders reported that market price was set by negotiation.

Table 31. Butter and milk traders purchasing and selling strategies in the study area

Purchasing and selling price setting strategies	Butter traders			Milk traders		
	Hawassa (%)	Shashemane (%)	Yergalem (%)	Hawassa (%)	Shashemane (%)	Yergalem (%)
Negotiation	78.1	65.6	88.2	37.5	40.6	12.6
Market	15.6	34.4	11.8	18.7	25	37.4
Producer	6.3	0	0	43.8	34.4	50
Buyer	0	0	0	0	0	5.8
Total	100	100	100	100	100	100

Source: survey result (January-May, 2007)

Factors considered in price setting: Average of 33.3%, 29.5% and 24.4% of the sampled milk traders, respectively reported that season of supply and demand, distance from milk market and price of milk were their primary criteria in milk price setting.

Table 32. Factors considered by sample milk traders in selling price setting

Items	Hawassa (%)	Shashemane (%))	Yergalem (%))	Overall (%)
Distance from milk market	21.8	31.13	42.8	29.5
Quality of milk	12.5	9.47	11.3	11.1
Price of milk	35.7	19.4	15.7	24.4
Season of demand and supply	30	40	30	33.3
Total	100	100	100	100

Table 32 showed that distance followed by season of supply and demand from milk market was found to be the most important factors considered by sampled dairy household during the survey period. In relative terms, quality of milk was given less attention in milk price setting.

With regard to butter traders, the survey result highlighted that 39.54%, 24.16%, 16.3% and 20% of the sampled butter traders, respectively reported that the primary criteria considered by butter price setting process were found to be season of demand and supply, quality of butter, consumer preference and butter price (Table 33).

Table 33. Factors considered in butter price setting

Items	Hawassa (%)	Shashemane (%)	Yergalem (%)	Overall (%)
Season of demand and supply	35.04	43.6	40	39.54
Quality of butter	29.44	19.36	23.68	24.16
Consumer preference	17.52	15.04	16.32	16.3
Price	18	22	20	20
Total	100	100	100	100

Butter price was found to be the least important factor considered in butter price setting. This was because of the fact that price of butter by it self is determined by source/origin-based quality of butter and consumer preference.

The most important factors considered in butter price setting was supply and demand (39.54%) followed by quality (24.16%) of butter. Informal discussion made during the Rapid Marketing Appraisal revealed that traditionally, butter price was mainly set by source (butter of Wolyita, butter of Gojam, butter of Kofole, butter of Sidama and so on) of butter with out giving due attention to its quality/purity. With respect to sample locations, quality of butter was found to be more important in Hawassa than anywhere else. This highlights that Hawassa consumers were more conscious of quality of butter.

4.7.3. Milk and butter market performance

4.7.3.1. Marketing Costs and Margins

Price per litter for milk and price per kilogram for butter was used for the marketing margin calculations. Results of analysis of marketing costs and margins were used to determine whether there were excess profits and serious inefficiencies or whether wide margins are due to technical constraints (such as transportation bottleneck). Margin and cost calculation was carried only for key butter and milk marketing channels.

Marketing cost and margin for milk traders: Table 35 revealed that the average total milk-marketing margin (TGMM) in Hawassa, Shashemane and Yergalem was found to be 37.2%, 40.9% and 52.3%, respectively. The highest (52.3%) and the lowest (25%) total gross marketing margin (TGMM) was respectively found in Yergalem channel IV and in Hawassa channel V. In line with producer's share of milk retail price, the survey result revealed that average producer' share of the milk marketing channels was estimated to be 56.53%. With respect to sample locations, the average milk producer share in Hawassa, Shashemane and Yergalem, respectively was calculated to be 63%, 59% and 47.7%. The cooperative society in Hawassa and Shashemane had gross marketing margin of 25% and 2.5% of the milk retail price, respectively. This large difference between the two cooperatives' gross marketing margins (GMM) was due to large difference in purchasing and selling prices between the two cooperatives. The reason why milk-marketing margin for Yergalem cooperative was not calculated was that Yergalem dairy cooperative was found to sale directly to semi-whole seller in Hawassa at the same price as that of producers in Yergalem. Thus, the members had been receiving the same proportion as the non-member producers and there fore GMMcop was not calculated.

Net marketing margin (NMM) of the milk market for cooperative society was calculated to be 5% and 0.5% in Hawassa and Shashemane, respectively. Table 35 depicts that calculated average net milk marketing margin for milk retailers in Hawassa, Shashemane and Yergalem was estimated to be 6%, 7.35% and 6.98% of milk retail price, respectively.

Table 34. Average price and marketing costs/litter of milk in the study area

Items	Marketing channels						
	Hawassa				Shashemane		Yergalem
	II	III	IV	V	III	IV	IV
Producer price	2.50	2.88	3.00	3.00	2.40	2.33	2.83
Cooperative price	-	-	-	4.00	2.50	-	2.83
Semi-whole seller price	3.25	-	-	-	-	-	-
Retailer price	4.70	4.69	4.85	4.00	4.00	4.00	6.00
Total marketing cost	0.11	0.04	0.07	0.05	0.0053	0.012	0.058

Table 35. Marketing margin of milk traders

Marketing margins (Birr)	Marketing channels						
	Hawassa (%)				Shashemane (%)		Yergalem (%)
	II	III	IV	V	III	IV	IV
TGMM	46.8	38.6	38.14	25	40	41.75	52.3
GMMsws	16	-	-	-	-	-	-
GMMcop	-	-	-	25	2.5	-	-
GMMrt	30.8	38.6	38.14	-	37.5	41.75	52.3
GMMp	53.2	61.4	61.86	75	60	58.25	47.7
NMMsws	1.01	3.32	-	-	4.56	-	-
NMMcop	-	-	-	5	0.5	-	-
NMMrt	4.2	7.38	6.42	-	9.24	10.14	6.98

Butter marketing cost and margins: Average total gross butter marketing margin (TGMM) was respectively found to be 23.31%, 15.24 % and 24.3% of consumer's price in Hawassa, Shashemane and Yergalem. The survey result revealed that the highest (31.8%) total gross

butter marketing margin (TGMM) was obtained by Yergalem butter marketing channel III followed by Hawassa (25.5%) butter marketing channel III because of larger variability in purchasing and selling price. Where as the lowest total gross butter marketing margin (TGMM) was obtained by Shashemane (5.72%) butter marketing channel I. Table 37 indicates that the highest (41.75%) butter gross marketing margin (GMM) was obtained by Shashemane butter retailer in channel IV followed by Hawassa (38.6%) butter retailer in channel III. Regarding producers' portion, which is the portion of the price paid by the end consumer that goes to the producers, the highest percentage (94.28%) was obtained in Shashemane channel I followed by Yergalem (83.8%) channel I.

Among butter market actors, butter retailers in Hawassa channel I had relatively the highest net butter marketing margin (NMM) (1.12%), where as farmer traders and itinerate butter traders in Yergalem channel IV and channel III had respectively incurred negative net marketing margin. The reason why farmer traders and itinerate traders in butter marketing incurred loss was perhaps due to the fact that the traders lacked skill to inspect butter during purchasing and they are seemingly lack better education to generate price, supply and demand related information.

Table 36. Average prices and marketing costs per kg of butter

Price/marketing cost (Birr/kg)	Butter marketing channels									
	Hawassa			Shashemane				Yergalem		
	I.	II.	III.	I.	II.	III.	IV.	I.	II	I
Producer price	32	30	31.5	36.57	30.6	33.2	30	31	30	26
Farmer trader price	-	33	-	-	-	-	33	-	32	33
Semi-wholesaler price	-	35.5	-	-	-	-	36	-	36	-
Itinerate traders	-	-	34.0	-	-	36	-	-	-	35
Retailers	41	38.7	42.3	38.79	36.4	39.1	40	37	40	38
Total marketing cost/kg	0.68	0.04	0.05	0.02	0.01	0.02	0.01	0.0583	0.08	0.5

Table 37. Marketing margin for butter traders

Marketing margins (Birr)	Butter marketing channels								
	Hawassa (%)			Shashemane (%)			Yergalem (%)		
	I.	II.	III	I.	III	IV	I.	III	IV
TGMM	22	22.5	25.5	5.72	15	25	25	31.8	25
GMMsws	-	7.75	-	-	-	-	10	-	-
GMMit	-	-	5.91	-	7.16	-	-	4.72	-
GMMft	-	6.45	-	-	-	7.5	5	18.9	5
GMMrt	22	8.27	19.6	5.72	7.83	10	10	8.14	20
GMMp	78	77.42	74.5	94.28	85	75	85.1	68.2	75
NMMsws	-	0.084		-	-	-	0.06	0.02	-
NMMit	-	-	0.02	-	0.13	-	0.08	-0.01	-
NMMft	-	0.063	-	-	-	0.16	-0.06	0.36	-0.075
NMMrt	1.12	0.11	0.34	0.096	0.14	0.22	0.06	0.08	0.3

Source: Survey result, 2007

The reason why farmer traders and itinerate traders in butter marketing incurred loss was perhaps due to the fact that the traders lacked skill to inspect butter during purchasing and non-consideration of transport cost when they transport butter on foot. On average, net marketing margin (NMM) for butter marketing channels was found to be 0.084%, 0.1%, 0.13% and 0.29% for semi-whole sellers, itinerate butter trader, farmer traders and retailers, respectively (Table 37).

4.7.3.2. Marketing profit for milk and butter traders

Marketing profit for milk traders: Marketing profit for milk traders is summarized in Table 38. Average return for dairy producer in the study area was found to be 2.3 ETB per litter of milk, which was the highest among the milk marketing intermediaries. As far as the locations of dairy producers are considered, 2.40 ETB, 2.24 ETB and 2.25 ETB return per litter was

obtained in Hawassa, Shashemane and Yergalem, respectively. The reasons for difference in producers' return/litter of milk seemed to be due to different level of milk demand/selling price and cost of milk production. The semi-whole seller in Hawassa channel II had 0.43 ETB profit per litter. With regard to cooperative profit, 0.97 ETB and 0.07 ETB profits per litter of milk, respectively was obtained in Yetigilefire and Biftu dairy producer cooperatives.

Table 38. Production cost/litter of milk for dairy producers by sample locations

Cost items (Birr)	Sample locations		
	Hawassa	Shashemane	Yergalem
Feed cost	0.25	0.175	0.2
Medicament	0.1	0.11	0.12
Labour	0.15	0.07	0.08
Total cost	0.5	0.35	0.401

Table 39. Mean milk marketing cost/litter (Birr)

Cost items	Milk marketing actors								
	Hawassa				Shashemane			Yergalem	
	Producer	Retailers	Cooperative	Semiwholesaler	Producer	Retailer	Cooperative	Producer	Retailer
Transport cost	-	0.09	-	0.16	-	0.04	-	-	0.137
Labour cost	-	0.3	0.012	0.086	-	0.03	0.028	-	0.14
Tax paid	0.001	0.06	0.008	0.048	-	0.02	0.006	-	0.017
Spoilage	0.013	0.15	0.01	0.026	0.001	0.01	-	0.01	0.016
Total cost	0.014	0.24	0.03	0.32	0.01	0.1	0.03	0.01	0.31

Source: Survey result, 2007

The reasons for difference in profit/litter of milk between the two cooperatives seems to be difference in purchasing and selling price per litter of milk and running cost.

Table 40 indicates that Yergalem milk retailers had the highest average profit (2.86 ETB) per litter of milk followed by Shashemane milk retailers (2.49 ETB ETB). However, Hawassa retailers (1.39 ETB) obtained the least average profit per litter of milk. On average, milk retailers, cooperatives and milk semi-whole sellers, respectively had 2.25 ETB, 0.52 ETB and 0.43 ETB. According to the survey result, milk retailers had the highest profit where as milk semi-whole seller had the least profit per litter. This was because of the following reasons: retailers sell relatively at higher price since they are in most cases opportunist. During the survey period, some milk retailers and semi-wholesalers were found to form oral contractual agreement with milk producers retailers in order secure milk supply at reasonable price.

Table 40. Milk marketing profit/litter

	Marketing channels									
Milk marketing actors	Marketing cost and profit	Hawassa					Shashemane			Yergalem	
		I	II	III	IV	V	I	III	IV	I	IV
Milk producer	Selling price	3.09	2.50	2.88	3.00	3.00	2.61	2.75	2.40	2.47	2.83
	Production cost	0.5	0.5	0.5	0.5	0.5	0.35	0.35	0.35	0.4	0.4
	Marketing cost	0.014	0.014	0.014	0.014	0.014	0.0104	0.0104	0.0104	0.0141	0.0141
	Profit	2.6	2.00	2.38	2.5	2.5	2.26	2.4	2.05	2.07	2.43
Semi-whole seller	Purchasing price	-	2.50	-	-	-	-	-	-	-	-
	Selling price	-	3.25	-	-	-	-	-	-	-	
	Marketing cost	-	0.32	-	-	-	-	-	-	-	-
	Profit	-	0.43	-			-	-	-	-	-
Cooperatives	Purchasing price	-	-	-	-	3.00	-	2.40	-	-	-
	Selling price	-	-	-	-	4.00	-	2.50	-	-	-
	Marketing cost	-	-	-	-	0.03	-	0.03	-	-	-
	Profit	-	-	-	-	0.97	-	0.07	-	-	-
Retailers	Purchasing price	-	3.25	2.88	2.88	-	-	2.50	2.50	2.83	2.83
	Selling price	-	4.70	5.00	5.00	-	-	5.00	5.00	6.00	6.00
	Marketing cost	-	0.06	0.33	0.33	-	-	0.01	0.01	-	0.31
	Profit	-	1.39	2.05	2.05	-	-	2.49	2.49	-	2.86

Marketing Profit for Butter Trader: Marketing profit for butter traders are summarized in Table 43. Average of 3.76 ETB, 3.12 ETB, 2.93 ETB and 5.84 ETB profit/kg of butter was respectively obtained by farmer trader, semi-whole seller, itinerate trader and retailer. The average profit obtained by Hawassa butter retailer was found to be the highest among the butter market actors. The reason why butter retailers had the highest profit was that the majority of butter retailers were found to purchase butter either directly from farmer traders at local market with cheaper price and were found to incur relatively less cost or even butter could be delivered by itinerate butter traders at their business site with no transport cost. Among the butter retailers, profit obtained in Hawassa channel II was found to be the highest of all the channels in the milk shed during the survey period. Generally, all the butter channels in the study areas were found to be profitable; however, the profit seems to be subsistence for those who were undertaking the business activities with lower capital. As the milk shed was deficient in marketable butter, dairy producers in line with butter were not considered this study and thus, the production cost for butter was not calculated.

From the concept of marketing margin and producer's share, the butter and milk markets were convincingly efficient as producer's share and marketing margins were fair. Furthermore, it can be concluded that with respect to producer' share and marketing margins, butter market seemed to be more efficient than milk market as producer's share was higher and marketing margin was lower than milk market.

Table 41 . Mean marketing cost/kg of butter for butter traders

Cost items	Sample locations										
	Hawassa				Shashemane			Yergalem			
	Retailers	Farmer trader	Semi wholesale	Itinerate Traders	Semi wholesaler	Retailers	Itinerate traders	Retailers	Farmer traders	Itinerate traders	Semi-wholesaler
Transport cost	0.159	0.028	0.0175	0.0125	0.005	0.0075	0.001	0.181	0.20	0.546	0.057
Labour cost	0.077	0.003	0.0105	0.0275	0.003	0.0045	0.006	0.081	0.18	0.081	0.008
Tax paid	0.022	-	0.007	-	0.002	0.003	0.013	0.027	-	0.06	0.016
Total cost	0.258	0.031	0.035	0.04	0.01	0.015	0.02	0.289	0.38	0.68	0.08

Source: Survey result, 2007

Table 42. Average prices and marketing costs /kg of butter by channels

Price/marketing cost (Birr/kg)	Butter marketing channels								
	Hawassa			Shashemane			Yergalem		
	I.	II.	III.	I.	III	IV	I.	III	IV
Producer price	32	30	31.5	36.57	33.200	30	31.0	26	30
Farmer trader price	-	33	-	-	-	33	-	33	32
Semi-whole sellers price	-	35.5		-	-	36	-	-	36
Itinerate traders	-	-	34.0	-	36	-	-	35	-
Retailers	41	38.7	42.3	38.79	39.06	40	37.0	38.	40
Total marketing cost/kg	0.68	0.04	0.05	0.02	0.022	0.01	0.06	0.5	0.08

Source: survey result, 2007

Table 43. Marketing profit (ETB/kg of butter) for butter marketing agents

	Marketing channels									
Butter marketing intermediary	Marketing cost and profit	Hawassa			Shashemane			Yergalem		
		I.	II.	III.	I.	III	IV	I.	III	IV
Farmer trader	Purchasing price	-	30	-	-	-	-	-	-	30
	Marketing cost	-	0.031	-	-	-	-	-	-	0.08
	Selling price	-	33	-	-	-	-	-	-	32
	Profit	-	3.031	-	-	-	-	-	-	1.92
Semi-whole seller	Purchasing price	-	33	-	-	-	-	-		-
	Marketing cost	-	0.035	-	-	-	-	-	-	-
	Selling price	-	35.5	-	-	-	-	-	-	-
	Profit	-	2.47				-	-		-
Itinerate trader	Purchasing price	-	32	31.5	-	33	-	-	33	-
	Marketing cost	-	-	0.034	-	0.022	-	-	0.68	-
	Selling price	-	-	34	-	36	-	-	36	-
	Profit		-	2.47	-	2.98	-	-	2.32	-

Table 43 (Continued)

Retailer	Purchasing price	32	33	34.0	36.57	30.6	36	33	31.00	32	33	32
	Marketing cost	0.68	0.044	0.05	0.02	0.01	0.022	0.01	0.058	0.08	0.68	0.08
	Selling price	41	38.7	42.3	38.79	36.4	39.06	40	37.0	40	38.	40
	Profit	8.74	5.44	8.04	2.205	5.65	3.05	6.99	5.73	7.73	4.73	7.92

4.8. Factors Affecting Milk Market Supply

Milk is produced for both market and household consumption in the milk shed. Various variables are assumed to determine the sale volume of milk and of milk market participation by sampled dairy households.

The study used the variance inflation factor to check multicollinearity among continuous variables and contingency coefficient to check multicollinearity among discrete variables. According to the test results, multicollinearity was not a serious problem both among the continuous and discrete variables except between size of daily milk out put and number of milking cows (appendix I). As a result, the volume of daily milk production per household variable was not considered for the model analysis.

Regression output of the Heckman two stage analyses

The econometric analysis for the Heckman two-step estimation procedures was performed using LIMDEP version 7. The Heckman two-step procedure was employed in order to control the selectivity bias and endogenity problem and obtain consistent and unbiased parameter estimates. The model in the first stage predicts the probability of participating in the milk market of each household; in the second stage, it analyses the determinants of volume of milk supply to market. Maddala (1983; cited in Daniel, 2001) suggested using selection variable that is assumed to affect the participation decision largely, but not level of participation in the selection equation which enables the inverse Millis' ratio to predict correctly. Accordingly, this study used distance to milk market center as selection variable in probit model/participation equation which was found to affect the milk market participation decision by dairy household, but has no significant impact on level of milk market participation in order to predict inverse Mill's ration correctly.

The binary probit equation/participation Equation: The model out put reports result of estimation of variables that are expected to determine milk market participation of an individual household. From all sampled dairy households, 86.66% were correctly predicted

into market participant and non participant categories by the model. The correctly predicted participants and correctly predicted non participants of the model were 90% and 76.66%, respectively.

Out of 12 explanatory variables, six variables were found to determine the probability of milk market participation. These are age (AGE), education level (ELHH), family size in adult equivalent (FSHH), experience in dairy production (EXHH), access to milk market (DNMM) and number of crossbreed milking cow (CB) (Table 44).

Age of the household head (**AGE):** The model result depicts that age of the household head as expected had a positive and significant impact on market participation decision of the sampled dairy households. The positive and significant relationship between the two variables indicates that older dairy household head could have more milking cows increasing the probability of the household milk market entry decision. The marginal effect also confirms that when the household age increases by one year, the probability of participating in the milk market increases by 16.4%.

Family size of the dairy household (FSHH): The variable is statistically significant at less than 5% significance level. As expected, the variable has a positive effect on probability of dairy household milk market participation decision. The positive and significant relationship indicates that as dairying is labour intensive activity, larger family size provides higher labour to undertake dairy production and management activities easily which in turn increases daily marketable milk volume leading to increased capacity of dairy household milk market participation. The marginal effect of the variable also emphasizes that for every increase in adult equivalent increases the probability of milk market participation decision of the household by 10.1%.

Table 44. Estimation result of the Binary probit model

Variables	Coefficient	t-ratio	Marginal effect
Constant	-0.64	-1.83	
AGE	0.20749	1.72***	0.164
AGESQ	0.34939	0.97	0.147
FSHH	0.16	1.65**	0.101
ELHH	0.11	2.019**	0.059
EXHH	-0.042	-2.14**	-0.069
DNMM	-0.0168	0.069*	0.027
CB	0.6	2.41*	0.102
LB	-0.105	-0.478	-0.007
ACEXT	0.055	0.786	0.13
SEX	-0.29	-0.613	-0.02
ACCR	0.27	0.344	0.0025
ACMINFOE	0.59	1.51	0.055
INFNDS	-0.156	-0.702	-0.009

Dependent variable=household market participation (MMP), number of observation (N) = 180, Log likelihood function=-29.74, Restricted log likelihood=-67.480, Chi -squared=75.44, Degree of freedom=139, significance level=0.0000000, *, ** and *** represents significance level at 1%, 5% and 10% probability level, respectively, positive prediction value=90.000%

Education level of the household head (ELHH): Education has positive effect on probability of dairy household milk market participation decision and is significant at less than 5% probability level. The positive and significant relationship indicates that education improves the dairy household capacity to process production related and market related information, which in turn improves bargaining position. The marginal effect indicates that addition of one-year formal schooling leads the probability of dairy household milk market participation to rise by about 6%.

Experience in dairy production (**EXHH):** Contrary to prior expectation, the variable has negative impact on dairy household milk market participation decision and was significant at 5% probability level. The result of the informal survey confirms that those of dairy households having larger experience in dairy production were with larger number of local breed and were found to live at very edge of the town where demand for milk is very less. Further, the survey result also elaborated the issue of negative relation ship between experience and milk market participation that local breed dairy cow owners had larger experience in dairy production because they had been integrating livestock with crop for long period rather than specializing in dairy production. Because of being further from milk market center and limited marketable milk volume from local zebu cattle, dairy households with larger experience in dairy production seems to be more engaged in marketing milk derivatives rather than milk. The marginal effect of the variable also confirms that every one-year experience rise in dairy production causes milk market participation decision to fall by 6.9%.

Number of cross breed milking cows (CB). As it was expected, this variable has positive relationship with household milk market participation decision and was statistically significant at 1% probability level. The positive and significant relation between the variables indicates that as the number of milking cow increases, milk production per dairy household also increases which in turn increases percentage share of sale volume of milk per day per household. The marginal effect of the variable also confirms that a unit increase in cross breed dairy milking cow leads the probability of dairy household milk market participation to rise by 10.2%. More over, this result designate that increasing number of quality crossbred dairy cows is an important policy relevant variable in stimulating the smallholder to market entry and benefit from economic transaction.

Distance to nearest milk market (DNMM): This variable has negative effect on milk market participation and found to be statistically significant at less than 1% significance level. The negative relationship indicates that the farther is a household from the milk market, the more difficult and costly it would be to get involved in the milk market. The marginal effect also confirms that a one-kilometer increase in milk market distance from the dairy farm owner reduces the probability of participation in milk market by 2.7%. In other words, as the dairy

households become closer to milk market center by one kilometer, the probability of his/her participation in milk market rises by 2.7%. Similarly, study conducted by Holloway et.al. (2002) and Gizachew (2005) found the negative relationship between distance to market and the probability of participation in milk market.

Estimation Results of the Selection Equation: In the selection equation of the model, five variables are found to be significant determinants of level of milk market participation. These are family size (FSHH), number of crossbreed milking cows (CB), education level of the dairy household head (ELHH), age squared of the dairy household head (AGESQ) and income from non dairy source (INFDS).

Family size of the household (FSHH): This variable has positive effect on marketable surplus of milk per day per dairy household and statistically significant at less than 10% probability level. The positive and significant coefficient of family size pictures that the lager the family size, the more volume of milk is supplied to market per day. The coefficient of the variable confirms that as the dairy household family size increases by one adult equivalent, volume of marketable milk surplus rises by 0.5 litters per day. This is because of the fact that household members represent labour resources for better management of dairy cows and, hence, are posited to be directly related to engagement in production and marketing activities.

Age squared of the dairy household head (AGESQ): As it was hypothesized, the variable is found to have non linear (parabolic) relationship with milk sale volume per day. More over, the negative sign of the variable indicates that at some stage of earlier period of the dairy household age, the relation was positive as it was shown by positive sign of the coefficient of age variable, but latter on, as the dairy household gets older, the milk sale volume declines as dairying is the function of active labour (Table 45).

Education level of the dairy household head (ELHH): Education has positive effect on milk sale volume per household per day is statistically significant at less than 5% probability level. The model out confirms that one formal year education leads the dairy household to rise daily milk sale volume by 0.401 litter.

Table 45. Supply equation model

Variables	Coefficients	St.error	t-ratio	Marginal effect
Constant	-2.93	4.05	-.722	
AGE	0.73	0.22	0.033	0.73
AGESQ	-0.13247	0.676	-1.958***	-0.13
FSHH	0.509	0.27	1.85***	0.509
ELHH	0.401	0.5	0.802*	0.401
EXHH	0.0613	0.069	0.884	0.0613
CB	4.16	0.456	9.12*	4.16
LB	0.61	0.77	0.799	0.61
ACEXT	0.33	0.23	1.41	0.33
SEX	-1.48	1.59	-0.932	-1.48
ACCR	-.184	2.01	-.091	-.184
ACMINFOE	1.04	1.51	0.69	1.04
INFNDS	0.0001	0.66	1.93***	0.0001
LMDA	1.43	1.039	1.381	0.1701

Dependent variable=total milk supplied to market, Mean=7.37, number of observation (N) =180), standard deviation=10.29, Model size parameter=13, R-squared=.755966, Adjusted R-squared=73 (prob) =.0000, Log likelihood=-368.1751, Restricted (b=0) =-453.535, correlation of disturbance in regression and selection criteria (Rho) = 0.029, significance level=0.0000, * and *** represents significance level at 1% and 10% probability level, respectively.

Income from non-dairy source (INFDS): Financial income from non-dairy sources has positive effect on sale volume and found to be significant at 10% probability level. The positive relation between the variables indicates that any additional financial income enables the dairy household to purchase more number of improved dairy cows which can contribute to

increased milk production per household per day and then contribute to increased milk market participation decision by dairy household.

Number of crossbred cows (CB): As hypothesized**,** this variable is significant at 1% probability level and has positive effect on marketable milk volume. The model out put predicts that the addition of one crossbreed milking cow causes the marketable milk surplus of the dairy household to rise by 4.16 litters per day per dairy household. This result is plausible and suggests that marketable milk surplus of the household in the study areas are more responsive to number of cross breed milk cow. Furthermore, this result elaborates that marketable milk surplus per day increases in response to the increase in milking cow number. Holloway et.al. (2002), found that household with larger dairy cows was positively associated with value of sale of dairy products.

LAMDA: According to the model output, the Lambda (Inverse Mills Ratio) or selectivity bias correction factor has positive, but statistically insignificant impact on dairy household marketable milk surplus. This result suggests that there appears to be no unobserved factors that might affect both probability of dairy household market entry decision and marketable milk volume. However, the positive sign of the inverse mill's ratio shows that there are unobserved factors that are positively affecting both participation decision and marketed milk volume.

4.9. Major Constraints of Dairy Production and Marketing

Dairy production and marketing in the milk shed was found to be constrained by a number of factors related to production and marketing.

4.9.1. Dairy production constraints

Problems related to access to services: Access to credit for financing investment and farm operations is crucial to the commercialization of smallholder agriculture. However, the survey

result highlighted that producers' knowledge of issue related to dairy production credit was found to be limited in the milk shed.

In the discussion part, it was indicated that only 12.5% of the sampled dairy producers were accessed to various credit sources. This highlights that shortage of finance was found to be one of the critical problems in dairy production for sampled dairy producers. More over, the credit system was not well developed in the study areas. Private Banks were not interested to finance agriculture in general and dairy production in particular due to the risks associated with dairy production and marketing activities. Micro credit is typically short-term loan that can help in financing working capital, but not investment capital required to improve market participation. Informal credit from conventional lenders was often quick and less difficult to obtain, but because of the risk involved, it was very limited in amount, and involve restrictive conditions in terms of repayment and interest.

With regard to dairy production extension services**,** the contact of development agents with dairy producers was not frequent and regular. More over, the services rendered were very limited, untimely, and irregular. The model output confirms the issue related to extension that the impact of extension visit was insignificant on both milk market participation and sale value of milk during the survey period.

Problems related to seasonality of milk production and consumption: The increased milk production was found to coincide with periods of weak seasonal demand in the study areas. This combination put strong downward pressure on farm milk prices in the low demand seasons in the milk shed in general and Shashemane and Yergalem in particular.

Feed and dairy breed genetic constraints: Inadequate supply of quality feed and the low productivity of the endogenous cattle breeds were major factors limiting dairy productivity in the study areas. Feed, usually based on fodder and grass, were either not available in sufficient quantities due to fluctuating weather conditions or when available were of poor nutritional quality. These constraints result in low milk, high mortality of young stock, longer parturition intervals, and low animal weights. Limited and unsafe medical and Artificial

Insemination services and poor dairy cattle management system were vital problems that were exhibiting negative impact on dairy production system of the areas.

4.9.2. Butter and milk marketing constraints

There are a number of highlighted constraints that hamper further development of dairy sector in the milk shed. Given the current production level, there appears that the producers have had market problems. However, the less possibilities of improved dairy production technology, under developed dairy market and absolute absence of dairy processing plants in the area might have contributed to problems currently prevailing in the milk shed.

Table 21 summarizes marketing issue that has impact on dairy marketing potential of the areas. The result depicts that primarily, seasonality of dairy products due to vast fasting (more than 200 days per a year) was found to be the major bottleneck in both dairy production and marketing in the study area in general and in Yergalem in particular where the Orthodox Christianity (51%) is predominant. However, the problem seemed to be less important in Hawassa where protestant Christianity is pre- dominant and consequently, demand for milk obtained to be high. This is because of the fact that for Protestants, no regulations and rules desist of the followers from consuming animal diet through out the year. 47.17% of sampled dairy household reported that seasonality of demand for and supply of milk was one of their vital problems in dairy production and marketing.

Table 46. Marketing problems of milk producers (%)

variables	Hawassa	Shashemane	Yergalem	Average
spoilage	22	21.6	6	16.53
Seasonality of demand	25.5	43	73	47.18
No problem	26.25	18	11	18.41
Low produce price	26.25	17.4	10	17.88
Total	100	100	100	100

Source: survey result, 2007

The survey result in Table 46 depicts that average of 16.53% of the sampled dairy household reported that their major problems in marketing was spoilage/perishable nature of milk as compared to cost of milk production.

With regard to the main problems in butter and milk trading activities in the study areas, 42.7% and 36% of butter and milk sampled traders, respectively reported that non reliable and the extreme inverse relationship between the milk and butter demand and supply was their major marketing problems that were highly pressing the sector development. The survey result revealed that about 24.7% of butter traders and 24.9% of milk traders had reported that their respective problems major was shortage of initial working capital.

The absence of private or government dairy processing plant in the areas which can absorb excessive milk production during the weak demand for milk, absence of licensing and inspection of competing dairy products traders to ensure achievement of minimum hygiene and quality standards, less access to credit and lack of storage facilities were found to be the vital dairy marketing as well as production problems of the study areas. These were the cases for the study areas to partly depend on imported dairy products being sold in supper markets and small and large shops.

Part of the current problems with quality was found to occur because the dairy producers are paid on the basis of volume but not on the basis of quality or value of milk or butter components. This pricing practice gives the producers incentives to adulterate milk and devote less attention to product quality. Absence of private dairy processing industries to make efforts to improve finished product quality also hampered the standard raw product quality.

The processing and marketing of milk was a major constraint to market expansion. Market out lets in the study areas in general, in Shashemane and Yergalem in particular were relatively few, and far from the farms and some times, the milk was not disposed of quickly enough. Due to the absence of on-farm and milk collection centers cooling equipment, relatively hot

climate of the areas in general and in Hawassa in particular found to contribute to rapid deterioration in milk quality and put strong dawn ward pressure on dairy production and marketing development.

The survey result highlighted that average of 19.8% of butter traders and 14.9% of milk traders had criticized that adulteration was their critical butter and milk-marketing problem. The sampled butter traders reported that adulteration with filth is the most important and highly convincing butter-marketing problems of the area that had led the consumer to be highly chary with regard to butter quality. According to the respondents, a number of integrated problems that had contributed to adulteration were consumer preference based on source of butter rather than quality, lack of consumer skill to test butter quality, and complete absence of grading and standardization for butter and presence of large number of unlicensed local traders.

The informal survey revealed that both producers and traders were found to adulterate milk and butter at farm level and business sites, respectively. The informal survey further elaborated that existing problems with regard to adulteration in such a way that adulteration was very common in butter retailing places such as shops and market places where small scale retailers mix butter with cheap source of vegetable butter (‘Sheno-lega’), banana and ‘kocho’ (byproduct of ‘enset’).

5. SUMMARY, CONCULUSION AND POLICY IMPLICATIONS

5.1. Summery and Conclusion

The study was undertaken with the objective of dairy marketing chain analysis in the Hawassa, Shashemane and Yergalem milk shed, southern Ethiopia. Market participation decision and sale volume are found to be important elements in the study of milk marketing chains of the milk shed. The Heckman two-stage analysis was used in order to capture the selectivity bias and get the impact on market entry decision and milk sale volume per day per household. Participation in milk sale is a dichotomous dependent variable, thus in the first stage of the Heckman two stage procedures, and the maximum likelihood estimation procedure of probit model was used in the study.

The maximum likelihood probit model analysis revealed that age of the household, family size, education level, experience in dairy production, distance from milk market and number of cross breed milking cow owned were found to exert significant impact on probability of the households milk market participation. However, the selection equation procedure identified family size, number of cross breed milking cow, education level of the household, non-dairy source financial income and age squared of the dairy household head as an important factors affecting sale volume of milk. The selection equation result depicts that about 69% of the variation in sale volume is explained by the independent variables used in the analysis.

Focusing on the estimates of the models, the models predicts that the addition of one cross breed milking cow causes marketable surplus to rise by about 4.16 liters per day and causes level of household milk market participation to rise by about 0.6 standard deviation. According to the model out put, local milking cow has important, but insignificant impact on both milk sale volume and market participation decision of dairy household head.

Distance from milk market in contradictory to prior expectation, has positive impact on marketable milk volume; however, it has negative and significant impact on dairy household market entry decision. Each one-kilometer increase in distance from milk market center leads

the dairy household market entry decision to decrease by about 0.02 standard deviations. Turning to the knowledge accumulation variables of the study, education has significant impact on milk market entry decision; however, education has important but insignificant impact on sale volume.

The survey result identified that 8, 338.9 litters of milk per day per sampled milk traders and 2, 889 kg of butter per week per sampled butter traders were found to be marketed through different marketing channels that were being identified during the survey period. The most important marketing type for both butter and milk was informal marketing. Milk semi-whole sellers and dairy producers' cooperative societies were registered milk marketing agents of the milk shed. However, the dairy cooperative societies prevailing in the milk shed particularly in Hawassa and Yergalem were found to be inefficient and ineffective. They were not successful in attracting new entrants but seen fudging. More over, they developed dependency/expectation rather than business orientated performance and as result they seemed to be less proficient.

Milk market in the study area was characterized by strongly oligopolistic market type in Hawassa (62.2%) and Yergalem (53.6%), while it was found to be weakly oligopolistic market type in Shashemane (39.7%) where as butter market was characterized by competitive market type in Shashemane (31.9%), where as it was weakly oligopolistic market type in Hawassa (37.9%) and Yergalem (44%) applying the criteria of the four firm's concentration ratio (CR4). A product method of marketing margin analysis was used for different marketing actors of milk and butter market. Dairy producers in Hawassa had the highest producer's share (62.8% %) followed by Shashemane (59%) dairy producers. Milk retailers in Yergalem obtained the highest profit (2.86 ETB/ litter). The cooperative societies in Hawassa and Shashemane had 25% and 2.5% gross milk marketing margins, respectively with respective net marketing margins of 5% and 0.51%. The average milk producers' share was found to be 59.63%. With regard to butter traders, retailers had the highest profit (5.84 ETB / kg).

The survey result revealed that trade license, business experience and finical capital did not hinder milk and butter market entry. Since larger proportion of both butter and milk traders were literate and high variability in type and number of market information sources which

leads to market inefficiency, formal education and access to market information variables were found to create milk and butter market entry barrier. Regarding the market conduct, the mean average of 20.6% and 29.8% of milk and butter purchasing price respectively was set by market, where as 53% and 50% of milk and butter-selling price respectively was set by market. Vertical integration for quality and supply assurance between producers and traders was based on informal contracts.

The marketing system for butter and milk was predominantly traditional and fragmented, and characterized by no licensing requirements to generate the operation. Adulteration was a bottleneck in both milk and butter marketing. Milk and butter quality remains poor in the area; part of the problem was that producers in the areas were paid for milk by volume rather than on the basis of valuable components or measures of quality. The milk shed was lacking the dairy processing industries. Generally, dairy marketing system in the area was characterized by under developed and inefficient type of market for both milk and butter. The existing situations with regard to dairy production service sector were not encouraging. Extension service in line with improving dairy production (AI, medicament, introducing grade animal), credit and market information were very weak.

5.2. Policy Implications

On the basis of the results of this study, the following policy implications are recommended so as to be considered in the future intervention strategies which are aimed at the promotion of dairy production and marketing in the study area in particular and in the country in general.

The result of the first step of the Heckman two stage procedure (Probit) model analysis has shown that policy relevant variables having greatest impact on milk market participation decision were dairy cow number, education level of the household head and distance from milk market. More over, the second step of the Heckman two stage procedure (the selection equation) model analysis has shown that income from non dairy sources and number of cross breed cows were policy relevant variables having greatest impact on sale volume of milk in the study areas during the survey period. As it was seen from the model analysis, number of

cross breed cow has strong positive and significant impact on both milk market participation decision and sale volume of milk per day, government and other existing and potential dairy sector development partners of the study area are required to give due attention for integrating cross breed cows to the smallholders dairy sector of the study areas in particular and of the country in general. This can be achieved in two ways: (1) through promotion of large private investment, which at the end will introduce new technology in the sector such as improved genotypes, feed and processing, and (2) as smallholders will likely continue dominating the sector, government should also promote integration of crossbred cattle into the smallholder sector through improving their access to improved cattle breeds, AI service, veterinary service, and credit.

The probit model analysis also shown that distance to milk market was negatively related to milk market participation decision. This negative valued relation of the variable indicates that the closer the milk market, the lesser would be the transportation charges, reduced loss due to spoilage, and reduced other marketing costs, better access to market information and facilities which in turn increases the return to labor and capital of the dairy producer's household. Thus, the government should consider better means of coping with access problems to milk and other dairy products market through increasing dairy market out lets by forming market oriented dairy producer led-cooperative, and increasing and improving infrastructure facilities in order to reduce transaction cost associated with distance from milk market out lets.

Further, the probit model analysis result has shown that dairy household milk market participation decision was positively and significantly affected by formal education level of the dairy household head. This result confirms that education improves the readiness of the dairy household to accept new idea and innovations, and get updated demand and supply price information which in turn enhances their willingness to produce more, and thus increase milk market participation decision. Thus, government and other dairy sector development partners should emphasis on capacity building of the dairy smallholders through short and intermediate practical based training.

The selection equation of the Heckman two step procedure model analysis revealed that income from non-dairy source of dairy household was found to affect the sale volume of milk positively. The positively related value of the variable suggests that through improving liquidity, this income makes the household to improve sale volume of milk through expanding dairy production. Therefore, increasing the dimension of access to well functioning formal financial systems are critical in influencing sale volume of milk per day per dairy household.

Potentially, collective organizations like dairy cooperatives are assumed to play important role in improving the bargaining position of the dairy producers and creating employment opportunities, lowering transaction costs and reducing the level of oligopolistic market type by creating competitive market as it was seen in Shashemane dairy producers cooperatives. However, the informal survey highlighted that the dairy cooperative societies in the study areas had discontented history because of difficulties in holding management accountable to the members (Shirking), leading to financial irregularities in management, and over ambitious investment in scale and enterprises beyond management's capability. Thus, care must take before formation of the new dairy cooperatives. The members especially the cooperative management body must be aware of business oriented market tricks and self-helping, but should not display dependency syndrome. The formation of dairy producers cooperatives must be offset against its cost and their success must be evaluated relative to the alternative uses of the resources required to create them. In line with this, government actions are required to provide enabling and supporting environment such as reducing bureaucratic obstacles to effective formation and management of co-operatives and self-help groups, support of market information flows (e.g. market opportunities and prices), resources for training in management and planning and where appropriate, greater access to credit, dairy marketing policies, and greater consistency in their implementation. Abandoning the cooperative is not economical, but enabling them to diversify their operations by processing whole milk into skim milk, butter, cheese and soured buttermilk and others depending on market demand and resource availability in order to explore economies of scale is fundamental.

As seasonal fluctuation of demand for milk and butter associated with their perishable nature was vital problems of dairy marketing of the study area, development and promotion of small-scale processing technologies were critical to increasing smallholder producer's dairy production and dairy products market participations. The seasonal glut in milk production and the mismatch between seasonal production and demand in the study area identify the need for processing facilities that would produce storable dairy products such as milk powders or hard cheeses. Adding capacity to produce stored dairy products could improve the profitability of the industry and enhance food security in the milk shed in particular and in the country in general.

The survey result indicated that the over all milk and butter marketing system was found to be traditional and under developed, fragmented and inefficient. Thus, government actions are required to license and inspect competing dairy product traders to ensure achievement of minimum hygiene and quality standards in order to facilitate the dairy production and marketing process. Regardless of the country's huge and extensive investment in promoting producer extension work, the study result revealed that only 40% of the sampled dairy producers received dairy production services with large variability and irregularity among the sample locations. However, as it is latent variable to precipitate the dairy sector development in the country in general and in the study areas in particular, it has to be strengthening through either by redesigning/reforming the implementation strategies or improving and strengthening the existing policy design. Dairy market price information has to be disseminated through public sector such as extension agent or public media as the model out put identified it exerting positive impact on dairy market participation and volume of marketable surplus.

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7. APPENDEX

Table 1. Collinearity Statistics

Variables	Tolerance	VIF
AGE	0.5	1.694
FSHH	0.795	1.258
ELHH	0.654	1.529
EXHH	0.602	1.66
DNMM	0.810	1.235
CB	0.485	2.06
LB	0.540	1.851
FEXSTV	0.781	1.280

Variable	Contigency coefficient
SEX	0.055
INFNDS	0.34
ACCR	0.148
ACCINFO	0.395
ACCEXT	0.096

Source: model out put, 2007

Table 2**.** Conversion Factors for family size into adult equivalent

Labor class	Age (years)	Conversion factor
Children	<7	0
Children	7-14	0.4
Adult men	15-64	1
Adult female	15-65	0.8
Old men	≥65	0.5

Old female	≥65	0.5

Strock et.al., 1991

Table 3. Conversion of Livestock into Tropical Livestock Unit

Livestock	TLU	Livestock	TLU
Chick	0.013	Young bull	0.013
Sheep/goat (adult)	0.13	Cow and ox	1
Sheep/Goat (young)	0.06	Donkey (young)	0.35
Calf	0.2	Donkey (adult)	0.7
Heifers	0.75	Horse	1.1

Source: Strock et.al., 1991