



**ST. MARY'S UNIVERSITY
SCHOOL OF GRADUATE STUDENTS**

**FRESH WHOLEMILK MARKETING CHANNELS AND DETERMINANTS
OF MARKET PARTICIPATION IN DEBREZEIT TOWN**

BY

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JUNE, 2022

ADDIS ABABA, ETHIOPIA

**FRESH WHOLEMILK MARKETING CHANNELS AND DETERMINANTS
OF MARKET PARTICIPATION IN DEBREZEIT TOWN, EAST SHOWA
ZONE, OROMIA REGIONAL STATE, ETHIOPIA**

**A THESIS SUBMITTED TO ST. MARY'S UNIVERSITY SCHOOL OF
GRADUATE STUDIES IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF MASTERS OF ARTS IN
DEVELOPMENT ECONOMICS**

**BY
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**JUNE, 2022
ADDIS ABABA, ETHIOPIA**

DECLARATION

I declare that this study entitled “*Fresh Whole-milk marketing channels and determinants of market participation: the case of Debrezeit Town, East Showa Zone, Oromia Regional State, Ethiopia*” is my own work. I have undertaken the research work independently with the guidance and support of the research advisor. This study has not been submitted for any degree or diploma program in this or any other institutions and that all sources of materials used for the thesis have been duly acknowledged.

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ENDORSEMENT

This is to certify that **DAGIM GEREMEW** has done the study on the topic *“Fresh Whole-milk marketing channels and determinants of market participation: the case of Debrezeit Town, East Showa Zone, Oromia Regional State, Ethiopia”* This study is authentic and has not been done before by any other researcher.

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APPROVAL OF BOARD OF EXAMINERS

This is to certify that the thesis prepared by **DAGIM GEREMEW** entitled: *“Fresh Whole-milk marketing channels and determinants of market participation: the case of Debrezeit Town, East Showa Zone, Oromia Regional State, Ethiopia”* and submitted in partial fulfillment of the requirements for the Degree of Master of Development Economics complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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ACRONYMS AND ABBREVIATIONS

ALPAN	African Livestock Policy Analysis Network
BCR	Benefit Cost Ratio
CSA	Central Statistical Agency
IMR	Inverse Mills Ratio
IRR	Internal Rate of Return
LMA	Livestock Marketing Authority
MoFED	Ministry of Finance and Economic Development
MSU	Michigan State University
NMM	Net Marketing Margin
OLS	Ordinary List Square
ROI	Return on Investment
TGMM	Total Gross Marketing Margin
UNICEF	United Nations Children Fund

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ABSTRACT

The main objective of this paper was aimed to analyze Fresh Whole-milk marketing channels and determinants of market participation the case of Debrezeit Town, East Showa Zone Oromia National Regional State, Ethiopia. Using random sampling technique, 141 smallholder milk producer households were selected and 76 milk traders from different marketing actors were involved in the sample. The required data were collected from both secondary and primary sources of data and analyzed using descriptive and econometric method of data analysis. The fresh whole-milk marketing channel analysis found chain actors along with their roles and the core actors identified in the district were input suppliers, producers, collectors, wholesales, processors, retailers and consumers. Marketing margin among the actors was analyzed across the main milk marketing channels. The benefit share of producers ranges from 28.42% (in channel 3) to 100% (in channel 1). Regarding traders Cafes /Hotels were the highest benefited market actors for the share of GMM in channel 3(62.1%) and collectors were the lowest benefited market actors in channel 3 (9.48%). To analyze the determinants of smallholder milk producer household's milk market participation decision and their level of participation Tobit regression model was used and results of Tobit regression model showed that out of thirteen independent variables, about seven independent variables namely: education level of the household, land holding size of the household, volume of milk allocated for home consumption, access to credit, experience of household in milk production, distance from market centers and the Amount of Milk Produced affected significantly the probability and level of participation of smallholder milk producers in milk market supply.

Key words: milk, marketing channels, Marketing margin, Market supply, Tobit regression model

CHAPTER ONE

1. INTRODUCTION

1.1. Background of the Study

Dairy production is essential in Ethiopia as milk and milk products are crucial source of food and income. Despite the great potential, dairy production has not been fully exploited and promoted in the country. A number of factors such as use of old technologies, lack of input supply, lack of enough extension service, poor marketing support and market information, poor credit services, lack of producer's organizations, and degradation of natural resources have contributed to un-exploitation of dairy potential (Kuma B et al.,2013). In addition, policy decision on certainty of quality and standards, product marketing, among others is taken in the lack of vital information on how they affect the overall value chain (Taye Z et al., 2017).

Naturally endowed with various agro-ecological zones and Conducive environmental conditions, Ethiopia is a home for different livestock species and suitable for livestock production. According to CSA 2013 Ethiopia have the highest livestock inhabitant in Africa. An estimate shows that Ethiopia is a home for about 25.5 million sheep, 53.9 million cattle and 24.06 million goats (CSA, 2013). From the overall cattle inhabitants 98.95% are local breeds and the reset are exotic breed and hybrids. The subsector contributes about 35.6% of the agricultural and 16.5% of the national GDP (Metaferia et al. 2011). It also shares 30% of agricultural employment and 15% of export income (Behnke, 2010). By the year 2025 human population in Ethiopia is expected to reach 140 million and portion of population live in urban will rise to 40 million. It is, therefore, obvious that milk will be in short supply without both horizontal and vertical expansions of the dairy industry sector will take place (Azage et al. 2004). In spite of the role of cattle to the farming population in particular and to the overall national economy at large, the sector has remained unchanged and underutilized (Melaku, 2011).

The large population density of milking cows and diverse agro-ecologies makes Ethiopia to be a country with huge potential for dairy production (CSA, 2013). Despite such a huge potential, the dairy sector is underutilized. About 97% of the country's total annual milk production is produced by the traditional and backward milk production system, which is dominated by native breeds of low genetic origin potential for milk production (Felleke et al., 2010).

Debrezeit (Bishoftu) town is located in East Showa Zone of Oromia Regional State. In Debrezeit town there is great potential of milk production because of the generously sufficient availability of labor force, large number of milking cows and water but there is a market participation problem of smallholder milk producers. Many milk producer households cannot supply their product to the market due to different factors. And those suppliers can only supply a small amount of their total production of milk.

1.2. Statement of the Problem

Ethiopia did not have a clear livestock development policy until the establishment of Livestock Marketing Authority (LMA) in 1998. In Ethiopia, milk and milk products serves as a source of income, employment, health and nutrition for the smallholder producers. Increasing market participation of smallholder producers to promote wellbeing of them from growing demand of milk and milk products is a better choice of action that should be taken into consideration by policy makers since the participation of producer in milk market supply is an important strategy for poverty reduction and ensuring food security in developing countries (Shapiro et al., 2015).

In Ethiopia smallholder dairy farmers produce about 98% of milk. On the other hand, only 5% of the milk produced in the country is sold in markets while the rest of 95% is processed and consumed at home (CSA, 2012). Whereas in the year 2011, from the total production of milk, butter and cheese in rural Ethiopia, about 6.55%, 36.58% and 14.35% was sold in the commercial market, respectively (CSA, 2011).

According to, (Zelalem, et al., 2011), reported that lack of strong linkages between the different actors in the dairy value chain are some of the essential factors that contribute to the poor development of Ethiopia's dairy sector. Assessment of determinants of milk market supply and value addition is essential to alternative course of action that should be considered by policy makers. Accordingly, many studies were conducted on determinants of milk market (Woldemichael, 2008; Meryem, 2013; Berhanu, 2014; Bedilu et al., 2014) and determinants of milk value addition (Berhanu, 2012; Tadele, 2014; Kumar, 2015). In spite of that, none of these studies has been done so far in the study area to gather milk value chain information. The study conducted by (Gudeta et al., 2020) dairy value chain upgrading in bishoftu Focus on development of value addition in market chain process at large scale, small scale and medium scale producer level by using descriptive statistics and the researchers did not studied factors that affect

smallholder milk producer households milk supply participation and level of participation in addition the study didn't use econometric method of analysis.

Market distortions are common characteristics of market intermediaries in price setting. Milk is not creating time value due to its perishable nature. This gives an opportunity for market intermediaries to cut price, which moreover decrease producers bargaining power to sell their products at a price convenient for them. Under such circumstances, a study that focused on the analysis of milk market chain actors and channels can play essential role towards the improvement of the existing market problems. Even though milk is economically and socially crucial, key milk marketing actors and channel and their functions have not well been studied and analyzed for the target study area, where high potential of milk production exists and also the main factors that affect milk market participation are not well studied. Having these facts in mind the analysis of Fresh Whole-milk marketing channels and determinants of market participation of Debrezeit Town as case study will conduct to find out the following objective:

1.3. Research Questions

- Who are the fresh whole-milk marketing actors? What is their function? And what does marketing margins along the chain looks like?
- What factors determine smallholder milk producer household's milk market supply participation decision and level of participation?

1.4. Objectives

1.4.1. General Objective

The general objective of this study is to analyze Fresh Whole-milk marketing channels and determinants of market participation the case of Debrezeit Town at smallholder milk producer's level in the study area.

1.4.2. Specific Objectives

In line with the general objective, the researcher wants to address the following specific objectives:-

- to identify fresh whole-milk marketing actors, their functions and marketing margins along the chain; and

- To analyze the determinants of smallholder milk producer household's milk market supply participation decision and their level of participation.

1.5. Significance of the Study

This study analyzed the entire fresh whole-milk marketing channels from input supplier to the end users their function and marketing margin within the country. Furthermore, this study delivered information on key factor that affect smallholder farmers decision to participation in the market and level of participation in the market. Consequently, it sheds light on required efforts to raise the production and utilization of milk at larger-scale to promote economic development in the area. The information which was generated from the study also help a number of organizations including: research and development organizations, producers, traders, policy makers, government and non-governmental organizations to assess their activities and redesign their mode of operations and ultimately influence the design and implementation of policies and strategies.

1.6. Scope and Limitation of the Study

Due to financial and time constraints, the study was conducted in and restricted to Debrezeit Town So, data was collected only from this study area. This study only focused on fresh whole-milk marketing. As a result, value added milk couldn't addressed under this topic. On the other hand, three high fresh whole-milk producer kebeles were selected based on their production potential. As a result, participation decision and level of participation is inseparable process to supply milk to the market. For this reason, Tobit regression model were applied.

1.7. Organization of the Thesis

The thesis is organized into five main sections. Section one holds introduction which includes the background of the study, problem statement, research questions, objectives, significance of the study, Scope of the study and organization of the thesis. Section two contains review of literature; both theoretical and empirical evidences for the study. Section three contains research methods and materials which includes overview of the study area, types of data and their sources, data collection method, sample size and sampling techniques and method of data analysis. Section four presents results and discussions. Section five generalizes findings of the research along with its conclusion and recommendations.

CHAPTER TWO

2. LITERATURE REVIEW

2.1. Theoretical Literatures

The theoretical framework section is the starting point for this chapter. It presents the background theories, up on which the study relies.

2.1.1. Definitions of Basic Terms and Concepts

Market: can be referred to as when the products and/or services and their substituent's undergo exchanging process by one or more sellers through competition of a group of buyers for their patronage. A market can be also stated as a point where an operation of price making force and actual movement of ownership of goods takes place. Market can be viewed as a process by which the transformation of ownership of goods from sellers to buyers of a final consumers or intermediaries (Kotler and Armstong, 2003).

Marketing: According to American Marketing Association marketing is an activity, set of institutions and manners for making, collaborating, distributing and exchanging of offerings that have value for partners, customers, and society at large.

Marketing Channel: is a business structure of interdependent organizations that facilitate the transfer of ownership as products move from producer to business user or consumer (Kotler, P and Armstrong, 2003). According to Islam et al., 2001 the channel is composed of different institutions that facilitate the transaction and the physical exchange and it may be short or long depending on kind and quality of the product exchanged, availability of marketing services and existing social and physical situation.

2.1.2. Value chain and supply chain

Value chain: a value chain defines the overall range of activities needed to take along a product or service through the different phases of production, including physical transformation, the input of various producer services, and response to consumer demand which include the vertically linked interdependent processes that generate value for the consumer (Kaplinsky, and Morris 2000). Value chain mentions to a chain of actions that are related with adding value to an item through the production and distribution practices of each activity (Schmitz, 2005). An organization's competitive benefit is built on their product's value chain. The aim of the company is to bring maximum worth to the end user for the least promising total cost to the company, thus maximizing profit (Porter, 1985).

Bammann (2007) has identified three important levels of value chain:

- i) Value chain actors: The chain of actors who directly agree with the products, i.e. produce, process, trade and own them.
- ii) Value chain supporters: The services delivered by different actors who never directly agree with the product, but whose services value add to the product.
- iii) Value chain influencers: this contains the guiding framework, policies, infrastructures, etc.

Supply chain: the supply chain is the arrangement of facilities (factories, warehouses, terminals, ports, stores, and homes), vehicles (planes, trains, trucks, and ocean vessels), and logistics information systems (LIS) connected by an enterprise's supplier's suppliers and its customer's customers (Edward Frazelle, 2002). It is taken to mean that the physical flow of goods that are required for raw materials to be transformed into finished products. Supply chain management is about making the chain as efficient as possible through better flow scheduling and resource use, improving quality control throughout the chain, reducing the risk associated with food safety and contamination, and decreasing the agricultural industry's response to changes in consumer demand for food attributes (Dunne, 2001).

Milk Supply Chain: at the present time dynamic, complex and vastly organized milk production, the need for actors to work together becoming increasingly (Anandajayasekeram and Berhanu, 2009). There is a rising acknowledgement that supply chain management (SCM) propose significant occasions for organizations to make strategic advantages. The acknowledgement of supply chain management is rising from time to time since it proposes significant chances for organizations to make strategic advantages and interventions (Wen and Gu, 2014). *Milk Supply Chain* is the flow of goods and services from point of origin to point of consumption as well as the storage of raw materials, work-in-process inventory, and finished goods.

The link of a value chain can be analyzed through mapping value chain which describes the full range of activities required to bring a product or service from conception, through the altered points of production (including a mixture of physical transformation and the input of different producer services), and supply to final consumers (Kaplinsky and Morris, 2001). In these days, firms are forced by increasing of competitive pressures and market globalization to develop supply chains and thereby to quickly respond to customer needs. The companies must lessen operating costs to persist competitive and advance customer service. Communication between chain actors is

essential for the effective operation of all phases in the milk supply chain and the degree of inference is directly proportional to the time needed to take countermeasures to change the production process in early stages of required level (Rodríguez-Enríquez *et al.*, 2015). According to these authors, milk supply chain is categorized into eight stages namely:

- a) Production of cow's food: The dairy supply chain arises with rising of feed sources such as corn, alfalfa hay, grass, and soybeans, etc. to feed dairy cows.
- b) Milk production: Dairy cows are fed, housed and milked on dairy farms
- c) Milk transportation: Milk is transported from point of production or farm to the processing entity or distribution site in alter means of transportations.
- d) Processing: is spinning of milk into ice cream, yogurt, cheese, powdered milk, and etc.
- e) Packaging: is typically prepared by the dairy processor by using suitable containers such as plastic containers that are planned to keep dairy products fresh, clean and wholesome.
- f) Distribution: Distribution agents supply dairy products from the processor to retailers, consumers, and other outlets.
- g) Retail: Milk and dairy products are available at certain number of retail outlets
- h) Consumer: Milk and milk products delivered and consumed by consumers to get essential nutrients.

2.1.3. Methods of Evaluating Marketing Marginality

2.1.3.1. Marketing performance Analysis

The evaluation of market performance can be done via analysis of costs and margins of marketing agents in different channels. The system of marketing performance usually measured in marketing margin or price spread.

Marketing margin: It is referred to as a common way of evaluating the performance of marketing system (Abbot and Makeham, 1981). Margin can be a useful descriptive statistics when it is used to show how consumer's prices of products distributed among market participants at different levels of marketing system (Mendoza, 1995). Total marketing margin (TMM) is the difference among what a consumer willing to pay and what a producer actually receives for the product. The total marketing margin contains two components: the costs of marketing services and the profit

margins or net returns. It can be concluded that a wide margin means usually high prices to consumers and low prices to producers. The total marketing margin is expected to be higher in an imperfect market than in a competitive market for the aim of seeking an abnormal profit level. It is also expected to be high, even in competitive market because of high real marketing cost (Wolday, 1994).

Marketing costs: refers to those costs, which are incurred to accomplish different activities of marketing in the transportation of goods from point of production to the end consumers. Marketing costs includes storage costs, handling costs (packing and unpacking, costs of searching for exchange, screening potential trading partners to ascertain their trustworthiness, bargaining with potential trading partners and representatives to reach an agreement, moving the product, checking the agreement to see that its state of affairs are satisfied, and implementing the exchange agreement etc. (Holloway and Ehui, 2002).

2.1.3.2. Gross margin of milk marketing

The major way to assure milk traders get sufficient earnings is the level of profit from their invested capital (Karuga, 2009). The normal profit is the minimum payment a trader or the enterprise owner would be willing to perform the entrepreneurial functions. Thus, receiving normal profit is important in order to keep the trader from withdrawing the capital and managerial effort and putting it into another alternative business (Kotler and Armstrong, 2006).

There are different ways of enterprises profitability measurements that includes Gross Margin (GM), Benefit-Cost Ratio (BCR), Return on Investment (ROI), internal rate of Return (IRR), and Marketing Margin (MM) (Turuka, 2000). The GM is an important measure of resource efficiency in Small and Medium Enterprises. It is useful to identify returns (profit) of traders at each stage along the value chain of milk marketing. The GM calculation for different enterprises in various segments along the value chain of milk marketing involves analysis of the accounts of enterprises, noting precisely the cost incurred and the value added at every stage alongside the value chain (Debertin, 1993). The size of GM in a competitive market is the effect of supply and demand for marketing functions, and it should therefore be equal to the minimum cost of product/service provided and normal profit (Scarborough and Kydd, 1992). The GM is a gross return minus the total variable expenses, which can be expressed in normal value, ratios or as a percentage of return (Debertin, 1993).

In order to compare the profitability of enterprises at different stages along the milk market, GM can be employed and expressed as a ratio or percentages (Mendoza, 1995). When the GM expressed as ratio is given by;

$$\text{Ratio of GM} = \frac{\text{Total Revenue (TR)} - \text{Total Variable Cost (TVC)}}{\text{Total Revenue (TR)}} \dots\dots\dots (1)$$

On the other hand, the above expression cannot be used to indicate the normal value of enterprise earnings and profitability measure of non-production enterprises; rather it is useful for comparing profit across different enterprises and segments along the value chain (Mendoza, 1995). Debertin (1993) indicated that there are some problems of using GM for the measure of profitability, such as failure to deduct the opportunity costs for the money invested in the enterprises. Ponte (2002) showed that the use of GM has several disadvantages which include failure to consider the variation of fixed costs, and it also fails to incorporate the allowances of costs for depreciation and obsolescence of fixed assets. On the other hand, Phiri (1991) explained that GM is still the best acceptable measure of resource efficiency in Small and Medium Enterprises. Despite the weaknesses of GM as a measurement of profitability, it remains the most satisfactory measure of resource efficiency. GM gives a good indication of the managerial effectiveness and the efficient utilization of the financial resource of an enterprise and deep insight into traders' management efficiency of the enterprises (Hammod, 2001).

2.1.4. Market Supply Participation

The study of market supply is important to fill the gaps of understanding the success of commercialization and to identify determinants of market supply. Market supply refers to the amount of goods that is actually taken to the markets irrespective of the need for home consumption and other purposes (Wolday, 1994).

Marketable excess is the volume of produce that is left over subsequent to meeting the producer's consumption and necessities of utilization for kind disbursements and other duties such as gifts, charity, etc. The marketable excess can be defined as the quantity exist for sale in the market. The marketed surplus is the amount which is actually sold after deducting the losses and hold by the farmers, if any and accumulate the left out of precede stock for sale (Thakur *et al.*, 1997). The supply of surplus product stands for what amount the producer takes to the market, but does not necessarily imply an excess of the producer subsistence requirement. It includes portion of the

product required for consumption by household and supplied to the market when the farmer is forced to sell to pay rents and debts, buy inputs and other staples foods, to come across socio-cultural responsibilities, and to cover other instant expenses. Hence, marketed surplus stands for the amount of actual surplus and the quantity sold in the form of enforced selling (ARS-BOARD, 2003). The success of agricultural commercialization includes two options namely: by increasing production of marketable excess of staple food over what is essential for self-consumption and production of cash crops beside staples or exclusively (Neway, 2006). At the level of household farm, commercialization is simply measured by the value of proportion of sales to the total value of output. However, there would always be some amount of output that a subsistence farmer would sale in the market to buy basic essential goods and services. Due to this reason, the ratio of marketed output up to a certain minimum level cannot be considered as a measure of commercialization. Marketed surplus may be equal to marketable surplus, it may be less if the whole marketable excess is not traded out and the farmers hold some stock and if damages are happened at the farm or through transport (Thakur *et al.*, 1997). In the case of crops that are generally marketed, the output and marketed excess are the similar (Reddy *et al.*, 1995).

Observed studies of market supply of farm products indicate that changes in prices cause small proportion of variation in output. The weather and pest effect short run variations in output, while improvement in technology effect long run changes and thereby results change in market supply. The most essential reasons of shifts in market supply are the variations of input prices and returns from commodities that contend for the identical resources. The improvements of technology can influence yields and costs of production as well as the level of price and risk of yield faced by producer (Tomek and Robinson, 1990).

The reactions of marketed surplus to variations in prices and non-price aspects such as landholding size, irrigation and productivity are important. The core factors which rises significantly the marketed excess are the raise of production followed by payments in kind and intensity of consumption (Thakur *et al.*, 1997).

The decision of bringing agricultural products to the market rest on different aspects like availability of farm resource, household characteristics, land, access to market, labor supply, experience and extension service. Besides, a farm gate business deal commonly takes place when products are limited in their supply and highly demanded by traders or when the produce is bulk

quantity and tough for farmers to hold and transport to the markets without reducing product quality (Moti, 2007).

2.2. The Role of Milk in Ethiopian Economy

MOFED estimated the gross value of ruminant livestock production in 2008/09 at Birr 32.64 billion; of this, Birr 19.471 billion (59.65%) obtained from milk and milk products (Behnke & Fitaweke, 2011). After one year, the recalculation of values by these authors showed the livestock contributions to the economy is at Birr 48.07 billion, (an increase of 47% from MOFED estimates) during the same year. This statistics doesn't take into account the animal traction value. Out of this 48.07 billion, milk and milk products contributes 63.49% to gross value of ruminant livestock production. This indicates that the government of Ethiopia has been underestimating the contribution of livestock especially the share of milk to the agricultural gross domestic product of the country.

2.3. Milk Production Systems in Ethiopia

According to Land O'Lakes (2010), Ethiopia's milk production systems can be divided into four main systems as described in detail below.

2.3.1. Commercial production system

This production system mainly keeps pure or cross bred cattle with a better usage of artificial insemination of improved semen and record keeping. In this system, a majority of the pure or cross bred animals are owned by commercial farms. The output per cow can range from 1120 – 2500 liters of milk per lactation. These producers would be willing to pay for the more expensive imported breeds (SNV, 2008).

2.3.2. Pre-urban and urban production system

In pre-urban, farmers use milk as cash generating commodity by directly selling milk. In most urban centers especially smaller towns, residents tend to own a few cows for milk production for home consumption and sales. Buttermilk, a byproduct of butter making is usually used for cottage cheese making for home consumption. In the lowland Milk is mainly used for home feeding then the remaining is sold to urban centers. However, even if market for selling fluid milk is available, decision making for processing depends on economic factors and meeting family needs for the products.

2.3.3. Rural smallholder production system

The Ethiopian highland smallholder farmers owned about 75% of the country livestock population using their cattle as a main source of milk production, traction power and manure as a fertilizer on crop land or for household fuel. In the rural highland areas of Ethiopia, producers keep mostly zebu cattle which have lower milk production performance but better suited to resist disease and poor management conditions. The sources of feed are communal grazing pastures and crop residues. The possibility of in-breeding is more expected since producers do not practice breeding record keepings. The rural small-holder production system produces the largest share of total milk produced in the country, contributing about 98% of the milk production (CSA, 2015). Small-holder producers' sell their milk and milk products to urban areas when they get market access and affordable transportation. Producers process their milk to butter or yogurt (fermented milk) and consume in their home or sell to their neighbors or in the market.

2.3.4. Pastoral and agro-pastoral production system

This type of production system is mainly depends on natural pasture located on non-arable rain-fed lands for their livestock keeping and milk production. The seasonal movements by the majority of animal stock in seek of water and feed resource is their main character. When animals are close to home, crop residues (sorghum and maize thinning and Stover) are important feed resources for livestock especially for those of agro pastoral (Land O'Lakes, 2010).

2.4. Policies in Milk Value Chain

According to ALPAN 1985 in many African countries, lack of livestock policy was the main factors for poor performance of dairy production. Lack of well-proportioned policies and supplementary measures are partially due to knowledge gap of the structure of farming systems and aspects that governing farmer's actions. Ethiopia did not have a clear livestock and livestock products marketing policy for many years up until the establishment of LMA in 1998. Livestock projects were formulated on the basis of government's agricultural policy. Because of this, most livestock product marketing policy decisions have been taken in the deficiency of vigorous information. As a result better sympathetic of these elements contributes on the way to knowledgeable policy making and technology improvement efforts (de Haan et al., 1997). Despite all constraints mentioned above at national level, studies aimed at identifying specific restraints dairy farmers, processing enterprise, cooperative and other actors are not quite studied and identified (Gryseels, 1988).

2.5. Empirical Literatures

2.5.1. Status of Milk production and marketing system in Ethiopia

The production and market system of milk in Ethiopia face severe constraints along with complex milk value chain both in formal and informal market channels. Only 5% of the milk produced in Ethiopia is sold in commercial markets while the rest of 95% is consumed and processed at home (CSA, 2012). Dairy producers and the downstream actors in the milk value chains face many challenges in getting milk to market. For the most part, milk collection, chilling and transport are not well organized and there are few economies of scale. Transaction costs are high and up to 35% of milk is spoiled or otherwise lost. Poor genetic makeup, insufficient access to proper animal feed and poor management practices all contribute to the low productivity levels (Felleke *et al.*, 2010).

On the other hand, the survey result conducted on consumers and Cafes/Hotels by AGP (2013) stated that very high price of milk and milk products as a major challenge; hence, it becomes increasingly difficult for many middle and low-income consumers to purchase. According to the same source, the major marketable milk products include: fresh milk, is the main product available in the market, sour milk (“ergo” in Amharic, which is useful either for further processing or storing milk during fasting days), cheese, ghee, butter, pasteurized milk and skimmed milk.

2.5.2. Marketing margin

Different studies have been carried out by different scholars on marketing of different agricultural commodities using market concentration ratios, marketing costs and margins and profit analysis. The result indicates that profit and margin received by marketing actors and level of market efficiency varies with respect to location and size of marketing channel. The study of Gizachew (2005) found that the total gross marketing margin to be 44.6% and 10% for milk processor and milk market cooperatives, respectively. The survey result of Woldemichael (2008) revealed that average producer’s share of milk marketing margin estimated to be 56.53% while the average total gross marketing margin (TGMM) and retailers net marketing margin of milk in Hawassa, Shashemane and Yergalem found to be 37.2%, 40.9%, 52.3% and 6%, 7.35% , 6.98%, respectively. The study conducted by Ali T. (2017) on milk value chain analysis of milk reveal that The benefit share of producers high 100% when they sell directly to end users and. Low when different market intermediaries participate in the market. Accordingly the most benefited marketing actors in milk marketing chain from traders in the study area were retailers and their

benefit share from the market were 63.3% The study of Meryem (2013) on analysis of cow milk market chain revealed that processors obtained the highest gross marketing margin in channel IV which was 43.5% of consumers' price, followed by retailers in channel I that accounted for 42.5% of consumers' price. Her study also showed that retailers and processors obtained the highest NMM of consumers' price which accounted for 32.3% and 31%, respectively and she generalized that semi-whole sellers and dairy cooperative union obtained the least NMM.

2.5.3. Determinants of milk market supply participation and level of participation

According to Meryem (2013) on analysis of milk market supply decision using Heckman first stage model show that sex of the household head, access to market information and access to credit positively and significantly affected milk producers' decision to sell milk. On the other hand, number of local and cross breed milking cows owned positively affected milk market participation decision and level of participation of milk producers whereas the number of children less than five years of age affected negatively and significantly producers' decision to sell milk and volume of milk sale.

According to Berhanu (2012) by using probit model the result show that the, presence of at least a child in a house, family size, land holding size and distance from nearest urban market center showed an inverse relationship whereas milk yield per day in liter showed a direct relationship with the probability of milk sales decision by milk producers. Another study conducted by Berhanu (2014) using Heckman first stage model also indicated that milking cow owned positively influenced the probability of milk sales decision of milk producers whereas age of the household and dairying experience affected negatively the probability of milk sales decision.

A study conducted by Woldemichael (2008) on determinants of milk market supply by using Heckman model the result revealed that family size, education level and number of cross breed milking cows owned positively affected both milk sale volume and milk market participation decision of milk producers. According to Gizachew (2005) using logit model the result revealed that the effect of education level of the household head and extension visits showed direct relationship with milk market entry decision of milk producers. However, the study refuse to take the contribution of access to milk market information and availability of credit to market participation of milk producers. A study conducted by Asfaw (2009) show that membership of smallholder dairy producers in milk producers' cooperative is a key factor in determining their

decision to participate in milk and butter markets and levels of market participation. Quantities of milk and butter that were produced, marketed and consumed by the members of cooperatives are significantly larger than those of non-members.

The study conducted by Ali T. (2017) on determining status and intensity of participation of smallholder milk producers in milk market supply was analyzed using Tobit model and the results showed that land holding size, amount of income from sale of livestock and livestock products, local and cross breed milking cows owned, access to market information and service contact frequency of extension affected significantly the participation decision and level of participation of households in milk market supply.

According to Bedilu et al. (2014) on determinants of camel and cow milk marketed surplus using Heckman model the result indicated that number of milking cow and access to milk market information affected positively both milk sale volume and milk market participation decision of milk producers. According to these authors, number of milking cow, access to extension service, access to market information and market price of cow milk affected positively the volume of milk supplied to the market by milk producer households.

2.6. Conceptual Framework of the Study

The conceptual framework in (Figure 2.1) illustrates the interrelationships in the study was developed based on a literature review of existing studies and theories. Accordingly, demographic factors, Institutional factor and Socio-Economic factors had an influence on fresh whole-milk market supply participation. The market participation in turn increased the household income generated from fresh whole-milk sales. On the other hand, primary and supporting actors influence on actor's role, marketing margin and benefit share of market participants these in turn affect fresh whole-milk marketing channels.

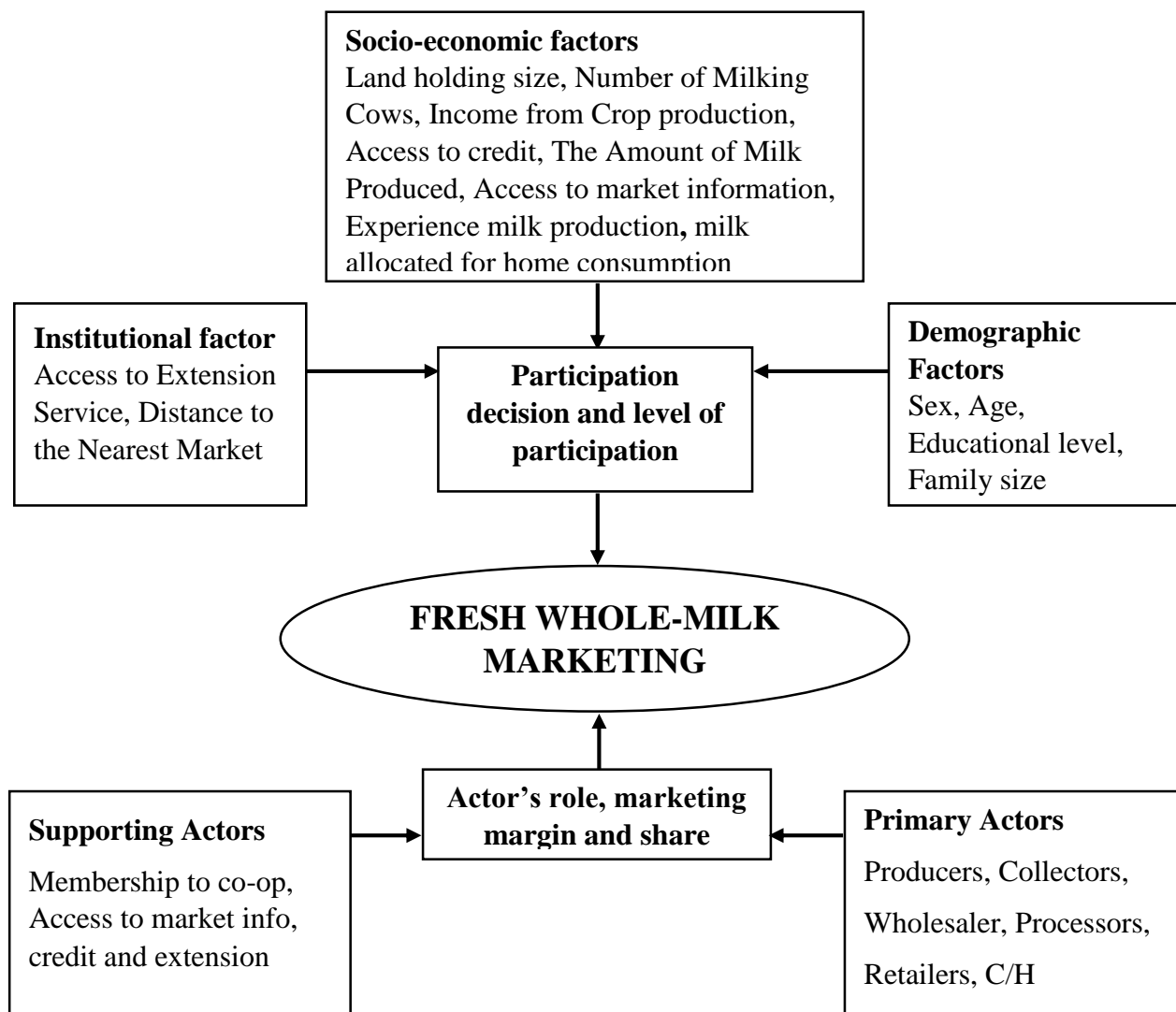


Figure 2.1: Conceptual frame work of fresh whole-milk marketing channels and determinants of market participation.

Source: own divination (2022)

CHAPTER THREE

3. RESEARCH METHODOLOGY

3.1. Description of the Study Area

The study was conducted in the central highlands of Ethiopia that fall in the administrative territory of Oromia Regional State, Ethiopia. Data were collected from Debrezeit town. These areas were selected based on the production potential, availability of dairy farming and marketing practices of milk. The brief description of the study area is presented below.

Debrezeit (Bishoftu) Town: is located at the distance of 45 km South East of Addis Ababa and is very close to the other major urban centers like Adama and Mojo. The town is located in East Showa Zone of Oromia Regional State and it lies between longitudes 38°51' to 39°04' East and latitudes 8°46' to 8°59' North covering a land area of 1750 km². Most of the land (90 %) is plain highland. It has an annual rainfall of 866 mm of which 84% is in the long rainy season (June to September) and the remaining in the short rainy season extending from March to May. The dry season extends from October to February. The mean annual maximum and minimum temperatures of the area are 26°C and 14°C, respectively, with mean relative humidity of 61.3%. Mixed farming system is practiced in the area. These agro-ecological conditions provide a favorable environment for dairy production and it is also well known for high agricultural potential, with good access to market for quality agricultural products, including milk products. In the areas there is fast growing dairy production and many households are engaged in dairy production for their income and consumption. Availability of feed processing plants, veterinary services and also accesses to market help them to expand their dairy production.

3.2. Sample size and sampling technique

The primary data for this study was collected from the actors in Debrezeit Town. Those actors are producers, wholesales, processors, local collectors, retailers Hotel/Cafe and Restaurant and consumers.

From the Nine kebeles of Debrezeit town, the researcher selected three kebeles. Based on their current milk production level and market accessibility using the list provided by Administrative Offices of Agriculture. According to the list provided by Administrative Offices of Agriculture from the total volume of fresh whole-milk produced by smallholder producers, about 52.1% per annum was produced by those three kebeles. The three kebeles are 01, Dembi and Babogaya

kebeles. From those three high milk producer kebeles 141 small holder milk producers were randomly selected. The total population size where samples were drawn was 1,427. The sample size of milk producers selected from the total population for this study was calculated by using the formula of Yamane (1967) given as:

$$n = \frac{N}{1 + N(e)^2} \dots\dots\dots (2)$$

Where: n = sample size,

N =Population size e =sampling error/ level of precision = 8% level of precision were used in order to reduce sample size because the households in the area have relatively homogeneous characteristics.

Finally, probability proportional to size method of calculation was used to distribute the total sample size for each of those three kebeles in Debrezeit Town.

Table 3.1: Sample summary of fresh whole-milk producer households for study area

No.	Kebeles	Total milk producer households	Sample size of households
1	01	402	40
2	Dembi	497	49
3	Babogaya	528	52
Total		P=1,427	S=141

To collect data from Milk traders, sample frame were taken from the records kept by tax and revenue collection and administration offices of Debrezeit (Bishoftu) Town. Out of the total 19 registered milk traders (4 Wholesalers, 7 milk retailers, 4 collectors and 6 processors) all of them were selected since their number is small. The sample size of Hotels/Cafe & Restaurants 54 were selected by using the same formula as used in milk producer’s selection: Yamane (1967). All of the legal milk traders were included in the probability of sample selection process to have an equal chance of being selected.

Table 3.2: Sample summary of fresh whole-milk traders

No.	Name of milk market intermediary	Total number of population	Sample size
1	Collectors	4	4
2	Hotels/Cafe & Restaurants	83	54
3	Milk Retailers	7	7
4	Wholesalers	5	5
5	Processors	6	6
Total		P=105	S=76

Determining the number of consumers is difficult to identify, so a total of 15 households were randomly selected from the study area. Generally, the total sample size of 232 was used for this study including producers, traders and consumers.

3.3. Data type and methods of data collection

Both primary and secondary data types were used in the study under investigation. Primary data were collected using two types of structured questionnaire, one for milk producer farmers and the other for milk traders. Primary data collected from households were focused on factors affecting milk market participation decisions and level of participation and general behavior of different fresh whole-milk marketing channel actors. Secondary data will also collected from journals, books, CSA, Zonal Agricultural Office and other organizations.

3.4. Methods of data analysis

3.4.1. Descriptive analysis

Descriptive statistics such as means, ratios, percentages, standard deviations are used to analyze demographic and socio-economic characteristics of smallholder milk producers.

Value chain map

Mapping of value chain enables to visualize the flow of the product from input suppliers up to consumer through various actors. It help to identify the different actors involved in the milk value chain and to know their functions and linkages (McCormick and Schmitz, 2002). Thus, the map of fresh whole-milk marketing channels was carried out through presenting the various actors of the chain, their linkages and all operations of the chain from inputs supply up to end user.

Market performance analysis

Describes market performance as to how well the market accomplishes certain private and social objectives. This contains price stability and price levels in short and long term, level of profit, cost,

efficiency and food commodities quality and quantities. For the reason that exact costs are frequently challenging to determine in various agricultural marketing chains because costs are frequently cash and imputed, the (TGMM) Total Gross Marketing Margin is required to be calculated (Scott, 1995). It is expressed as a percentage of the difference between end buyer and first seller prices (Mendoza, 1991).

$$TGMM = \frac{\text{End buyer price} - \text{First seller price}}{\text{End buyer price}} \times 100 \dots\dots\dots (3)$$

Where, TGMM=Total Gross Marketing Margin.

The producer’s margin is calculated as a difference:

$$GMP = \frac{\text{End buyer price} - \text{Gross marketing margin}}{\text{End buyer price}} \times 100 \dots\dots\dots (4)$$

Where GMP = the producer’s share in consumer price or

$$NMM = \frac{\text{Gross margin} - \text{Marketing cost}}{\text{Consumer price}} \times 100 \dots\dots\dots (5)$$

Where NMM = Net Marketing Margin

3.4.2. Econometric analysis

Depending on the objectives set to be achieved and the hypotheses to be verified, Tobit regression model were selected to analyze hypothesized variables of this study. Tobit regression model were used to analyze the determinants of smallholder milk producer household’s milk market participation decision and their level of participation.

Tobit regression model: is an econometric model which was used in this study to analyze determinants of probability of participation and level of participation of smallholder milk producers in milk market supply. Many smallholder milk producers in the study area participated in milk market supply; however, the level of participation within the participants differs. On the other hand, some of the producers participate in milk value addition and some are not participate. In Tobit model, the participation decision and level of participation of milk producers in milk market supply can be determined concurrently by the same variables as the variable which affect the probability of participation also affect the intensity of participation or total marketed volume. For those non-participants, Tobit model considers all the zero observations as corner solutions

where the respondent is assumed to be a milk supplier with zero marketed volume of milk supply by them.

The Ordinary Least Square regression model can be chosen if and only if the entire observed households participate in the market, but in this situation; most households participate in milk market supply while some others do not due to they may choose not participate in milk market supply in search of other options while other milk producer households may be totally excluded from participation due to asset limitations or marketing situations. On the other hand, participants are not also supplying in the same intensity. If the OLS regression model is applied rejecting the non-participants from the analysis, a sample selectivity bias is introduced into the model and then the output produced will be biased.

Additionally, for this study double hurdle model was also inapplicable since the two decisions are not independent as well as the two groups are not comparable in size. As a result, in a situation when the two groups of participants and non-participants differ with large gap in their size and interdependence among the two decisions is assumed, Tobit model is a desired model. The dependent variable in Tobit model is censored; this means that Tobit models set parameters around it. Tobit models also address problems of data due to measurement or dataset and that are not taking all the information (i.e. ceiling effects or censored data).

The variable y_i^* is assumed to be as a variable that captures the outcome variable of interest for all observations in the sample, even for those where one wasn't observed in reality (for example Milk producers who did not sell milk). Tobit model is also applicable to mutually determine factors determine probability and intensity of participation (Sindi, 2008) and also, Tobit model deals with the identification of disparities between the participants intensity of supplying. As a result, Tobit regression model was selected for the data analysis of determinants of smallholder milk producer's probability and intensity of participation in milk market supply for its advantage that the latent outcome variable y_i^* which is related to the observed and censored outcomes in the following way and the model assumes normal distribution with constant variance (Greene, 2003) and specified as:

$$y_i = x_i \beta + \varepsilon_i, \quad \varepsilon_i \sim N(0, \delta^2) \dots\dots\dots (6)$$

$$y_i = \begin{cases} y_i^*, & \text{if } y_i^* > 0 \\ 0, & \text{if } y_i^* \leq 0 \end{cases}$$

Where: y_i = is the volume of marketed milk supply taking continuous value between 0 and 1

y_i^* = latent outcome variable that captures the outcome variable of interest for all observations in the sample

x_i = vectors of explanatory variables

β = parameters specifying relationship between x and y

ε_i = error term (with assumption of being normally distributed)

To estimate the possible effects of changes in explanatory variables x_i on y_i the derivatives of the estimated Tobit model outcome should be computed since interpreting the coefficients of a Tobit outcome as in OLS method of interpretation in linear model is not a suitable way (Johnston and Dinardo, 1997). In Tobit model, explanatory variables x_i , affect the conditional mean of y_i^* , when $y_i^* > 0$ in the distribution and the marginal effect of an independent variable on predictable value of the dependent variable can be specified as:

$$\frac{\partial E(y_i)}{\partial x_i} = F(Z) \beta_i \text{ where } \frac{\beta_i x_i}{\sigma} \text{ is denoted by } Z \text{ as Maddala (1997)} \dots\dots\dots (7)$$

And the explanatory variables x_i , also affect the probability that the observed value to fall within $y_i^* > 0$ category of distribution per change in x_i (independent variables) and specified as:

$$\frac{\partial E(Z)}{\partial x_i} = f(Z) \frac{\beta_i}{\sigma} \dots\dots\dots (8)$$

The change in level of participation in market supply among participants with respect to a change in an explanatory variables x_i , y can be denoted as:

$$\frac{\partial E(y_i / y_i > 0)}{\partial x_i} = \beta_i \left[1 - Z \frac{f(z)}{F(z)} - \left(\frac{f(z)}{F(z)} \right)^2 \right] \dots\dots\dots (9)$$

Where:

β = a vector of maximum likelihood estimates

Z = the z-score for the area under normal curve

$f(z)$ = the value of the derivative of the normal curve at a given point (that is, unit normal density)

$F(z)$ = the cumulative normal distribution of Z

$\hat{\delta}$ = the standard error of the error term

3.4.3. Variables Description, Measurements and Expected Sign (Hypothesis)

Dependent variables

Probability and level of participation in milk market supply (MSupply): is continuous dependent variable measured in liters indicating the actual volume of milk supplied to the market per household per day and regressed using Tobit model and that represented the probability of milk market participation (either to participate or not to participate) and intensity of participation of milk producers in milk market supply. This variable is a relevant substitute for level of market participation by representing the observed and actually marketed amount of milk y_i^* in the market.

Independent variables

The explanatory variables that were hypothesized to influence the smallholder milk producer household's milk market participation decision and extent of participation were the following.

Age of the household (Age): is a continuous variable, will be taken as one of the Independent variables measured in year and The expected sign will be positive relationship with the probability and intensity of milk producers' participation in milk market supply as a result of age is one of the parameters of human capital. As an individual stays long, he will have better knowledge and will decide to produce more and supply more. According to Tadele et al. (2014) age of the household positively affect the smallholder milk producer households' decision of participation and level of participation in milk market supply practices. In addition a study conducted by Berhanu (2012) indicate that age variable positively and significantly affect consumption of milk. For that reason, in this study, age of the household was expected to affect positively the participation decision and level of participation of smallholder milk producer households in milk market supply.

Sex of the household head (Sex): is a dummy variable that will take a value of one if a household is male and zero if a household is female and assumed to affect the households probability of decision to participate in milk market supply and magnitude of supply. Male households have been observed to have a better tendency than female household in milk production, supply and more favored to get input for milk production. For this reason, in this study, being male household was expected to affect positively the smallholder milk producer households' probability and intensity of participation in milk market supply. According to Tadele et al. (2014) being male head of a household was found to influence positively the likelihood of participation in milk market supply.

Family size (Fs): is a continuous variable measured in measured in man-equivalent, i.e., the availability of active labor force in the household, which affects smallholder milk producer household probability and intensity of participation in milk market supply. Since production is the function of labor, availability of labor is expected to have positive relation with volume of supply. According to Kumar (2015) family size is associated negatively with the level of milk market supply participation. However, family size is hypothesized to have positive impact on market volume of sales, but larger family size requires larger amounts for consumption, reducing marketable surplus. In this context family size will be hypothesized to have positive or negative impact on market participation and volume of sale.

Educational level household head (Edu): It is a continuous variable measured in number of years of formal schooling and expected to have a positive relationship with probability and magnitude of milk market supply. Those household heads who will have formal education determines the readiness to accept new ideas and innovations, and easy to get market information and this enhances farmers willingness to produce more and increase volume of sales. According to Woldemichael (2008) education level of a household head positively affected the probability and magnitude of participation of smallholder milk producer households in milk market supply. For this reason, formal education was hypothesized to positively influence market participation and marketable surplus.

Land holding size (Lanhs): is continuous variable measured in hectare and proposed to influence negatively the decision of participation and volume of milk market supply. According to Berhanu (2012), landholding size showed an inverse relationship with the probability of milk sales decision by milk producers. On the other hand, study conducted by Azeb L et al. (2020) as the farmer use more land for crop production more output is obtained and the residue also used for the feed of animals.

Income from Crop production (Incpro): is a continuous variable measured in number and hypothesized to affect negatively the smallholder milk producer's probability and magnitude of participation in milk market supply. According to Azeb L et al. (2020) if income from crop production of households is adequate for their consumption and economically enough, household do not sell their milk and milk products to the market.

Experience of household in milk production (Exp): is a continuous variable measured in number years and assumed that a household with better experience in milk production is expected to produce more amounts of milk than the one with only less experience. Therefore, experience of household in milk production is positively affect the probability and level of participation of milk producer households in milk market supply. The study conducted by Ali T. (2017) milk market supply showing that dairying experience affected significantly milk producer's participation in milk market supply.

Access to market information (Ainfo): It is a dummy variable taking a value of zero if the households have not dairy market information access and one if the household have access of dairy market information. It is supposed that milk market information is positively associated with the probability and intensity of milk market participation of households. Study conducted by Anwar M. (2019) there is a significant relationship between dairy market participation and access to information. Dairy producers who have market information were better to decide how to produce and supply dairy products to the market. Therefore, this variable was hypothesized to influence positively the smallholder milk producer households' probability and intensity of participation in milk market supply.

Distance to the Nearest Market (Dismar): It is a continuous variable measured in kilometer. Expected to influence negatively probability and intensity of participation in milk market supply. According to Berhanu (2012) distance from market center showed inverse relationship with participation of milk producer households in milk market supply. On the other hand Study conducted by Anwar M. (2019) as the distance of a household from the milk market is higher, the higher would be the transportation charges, increase transaction costs, walking time and loss due to damage, and also increase other marketing costs, low access to market information and facilities.

Access to credit (Acc): This is a dummy variable, which assumes a value of one if the farmers have credit access and zero otherwise. Study conducted by Anwar M. (2019) Access to credit would enhance the financial capacity of the farmer to purchase the necessary inputs and increases output. For that reason, it is hypothesized that access to credit would influence the probability and intensity of milk market participation of milk producer households positively.

The Amount of Milk Produced (Amntp): is a continuous variable measured in liters. When the amount of milk production was increased, the surplus amount of milk in the household also

increases. So, the amount of supply also increases. The variable is expected to have a positive relation with the probability and intensity of milk market participation. Study conducted by Anwar M. (2019) result suggests that the marketable milk surplus of the households in the study area is more responsive to the volume of milk produced. Furthermore, this result explains that the rate of market participation increase in response to the increase in the amount of milk produced.

Number of Milking Cows (Nummco): This variable is continuous and is measured in number of milking cows owned. As the number of milking cow increases, production of milk also raise and proportion of consumption declines and milk sales raise. The probability and rate of milk market participation of milk producers were supposed to be positively influence by the number of milking cows owned. A study conducted by Berhanu (2012) also found that the number of milking cows kept positively and significantly affects the milk market participation of households.

Access to Extension Service (Acexsn): The objective of the extension service is introducing farmers to improved agricultural inputs and to better methods of production. In this regard, extension is hypothesized to have a positive relationship with probability and intensity of milk market supply. It is a dummy variable with value of one if a household head has access to extension and zero otherwise. According to Meryem (2013) there is direct relationship between extension visit and milk market participation.

Volume of milk allocated for home consumption (Hconsump): is a continuous variable measured in liter and expected to affect negatively the milk producer households' probability and intensity of participation in milk market supply. The study conducted by Ali.T (2017) in line with this result show that increase in allocation of milk for home consumption negatively affect decision of participation in milk market supply.

Membership to milk producers' cooperative (Mmbcoop): is dummy variable taking the value of one if a household is member to milk producers cooperative and zero otherwise and hypothesized to have a positive relationship with probability and intensity of milk market supply participation. Members have better opportunity to bargain and get fair price for their milk products which encourages them to participate in milk market supply. According to the study of Asfaw (2009), milk marketing cooperative members produced, consumed and sold more milk than non-members milk producers.

CHAPTER FOUR

4. RESULTS AND DISCUSSION

This chapter presents the results of descriptive and econometric data analysis of the study. Descriptive analysis was used to describe demographic characteristics of respondent households with regard to identify milk fresh whole-milk marketing channel actors, their functions and marketing margins along the chain and their performance analysis. The econometric analysis was used to analyze determinants of participation decision and level of participation in milk market supply.

4.1. The Results of Descriptive Analysis

4.1.1. Socioeconomic and demographic characteristics of the sample households

Table 4.1: Socioeconomic and Demographic characteristic of the sample households by categorical variables.

Variables	Participation in milk market supply					
	Total (N=141)		Participants (N=121)		Non participants (N=20)	
	Number	%	Number	%	Number	%
Sex						
Female	29	20.57	26	21.49	3	15
Male	112	79.43	95	78.51	17	85
Total	141	100	121	100	20	100
Marital status						
Single	14	9.92	9	7.44	5	25
Married	107	75.89	96	79.34	11	55
Divorced	12	8.5	10	8.26	2	10
Widower	8	5.68	6	4.96	2	10
Total	141	100	121	100	20	100
Income source from:						
Crops	94	66.67	81	66.94	13	65
Sales of livestock and livestock products	36	25.53	32	26.45	4	20
Off farm activities	11	7.8	8	6.61	3	15
Total	141	100	121	100	20	100

Source: own divination (2022)

From the total 141 sample smallholder milk producer about 121 (86%) sample households were found to be fresh whole-milk market supply participants and the rest 20 (14%) were not participate in fresh whole-milk market supply. The reason presented by sample respondent household were as a result of their participation in value added dairy market.

Out of 141 and 79 sampled smallholder milk producer and traders, 79.43% and 20.57% and 67% and 33% were male and female household respondents, respectively. On the other hand, of the 121 (86%) milk market supply participants, about 95 (78.51%) and 26 (21.49%) were milk market supply participants of male and female households. This result implies that the majority of milk producer and traders in the study area was male household head.

Based on the survey result, the marital status of sample households were 9.92% single, 75.89% married, 8.5% divorced and 5.68% widower. Regarding the major annual income source, about 66.67%, 25.53% and 7.8% respondents said that their major income was from crops, sales of livestock and livestock products and off farm activities, respectively.

Table 4.2: Socio-demographic depiction of sample households by continuous variables

Variables	Participation in milk market supply					
	Total (N=141)		Participants (N=121)		Non participants (N=20)	
	M	SD	M	SD	M	SD
Age (year)	49.18	13.55	49.23	13.79	47.2	12.23
Family size (No.)	6.08	2.09	6.05	1.99	6.26	2.68
Edu Level(year)	5.31	5.67	5.51	5.66	4.09	5.67
Distance to market center (km)	6.83	3.23	6.35	3.22	9.77	2.08
Experience in milk (year)	13.14	10.52	13.41	10.87	11.45	8.05
Frequency of extension contact/month	3.89	3.76	4.1	3.83	2.58	2.06

Source: own divination (2022)

The average age and family size of sample household heads was 49.18 years and 5.68, respectively. Bigger family size has supported to boost volume of supply in the study areas to impact for better participation in markets. Thus existence of larger family size has positively affected the supply of marketable surplus mainly due to lower dependency ratio and reduced cost of input especially for labor. The mean educational level of sample household was 5.31 years. The mean distance from the home of sample milk market participant and nonparticipant households to milk market center was 6.35, 9.77 km. The average value of milk production experience of sample households was about 12.54 years. Whereas the service contact frequency of extension per month provided for sample households by development agent (extension worker) was 3.89 times.

4.1.2. The mean values of production and income source per sample households

Table 4.3: The mean values of annual crop production and income per sample households

Variables	Participation in milk market supply					
	Total (N=141)		Participants (N=121)		Non participants (N=20)	
	M	SD	M	SD	M	SD
Crop production/ year/hh (quintal)	5.18	3.13	5.27	3	4.64	4.08
Annual income per hh from:						
Agro forestry	4,677.00	6,596.66	4,664.00	6,322.00	4,753.00	8,378.00
Trade	600.00	3,129.64	648.00	3,294.00	0.00	0.00
Livestock sales (offtake)	4,828.00	5,515.68	4,936.00	5,516.00	4,160.00	5,615.00

Source: own divination (2022)

The average annual crop production per sample household of smallholder farmers are 5.18 quintals. The average annual income of sample households from agro forestry, trade and livestock sale in the study area were 4,677, 600 and 4,828 birr, respectively.

4.1.3. Resources owned, cow productivity and milk allocation of sample household

Table 4.4: Resource owned, Cow productivity and milk use for different purpose

Variables	Participation in milk market supply					
	Total (N=141)		Participants (N=120)		Non participants (N=20)	
	M	SD	M	SD	M	SD
Landholding size/hh	0.87	0.47	0.87	0.46	0.85	0.85
Milk allocation per week /household for:						
Consumption	10.78	8.7	9.3	6.96	19.9	13.17
Market supply	26.74	58.2	31.27	61.73	0	0
Milking cows/hh	1.37	1.05	1.41	1.11	1.1	0.47
Milk yield/cow/day	4.35	2.42	4.6	2.43	2.8	1.83

Source: own divination (2022)

The average value of landholding size per household in the study area was 0.87 hectare. The average total milking cows per household and milk yield per cow per day were 1.37 and 4.35 liters, respectively. From the total per household weekly produced milk (44.76 liters), the average volume of milk allocated for market supply and home consumption was 10.78 liter (24%) and 26.74 liter (59.74%) respectively. Besides, about 16.26% per household per week was processed into different milk products.

4.1.4. Access to different support services

Table 4.5: Access to different support services/enabling factors

Variables	Participation in milk market supply					
	Total access level (%) (N=141)		Participants (%) (N=121)		Nonparticipants (%) (N=20)	
	Yes	No	Yes	No	Yes	No
Marketing information (Yes or No)	22	78	25.62	74.38	0.00	100
Access to credit (Yes or No)	19	81	17.44	82.56	28.57	71.43
Memb to milk prod coop(Yes or No)	3	97	3.49	96.51	0.00	100

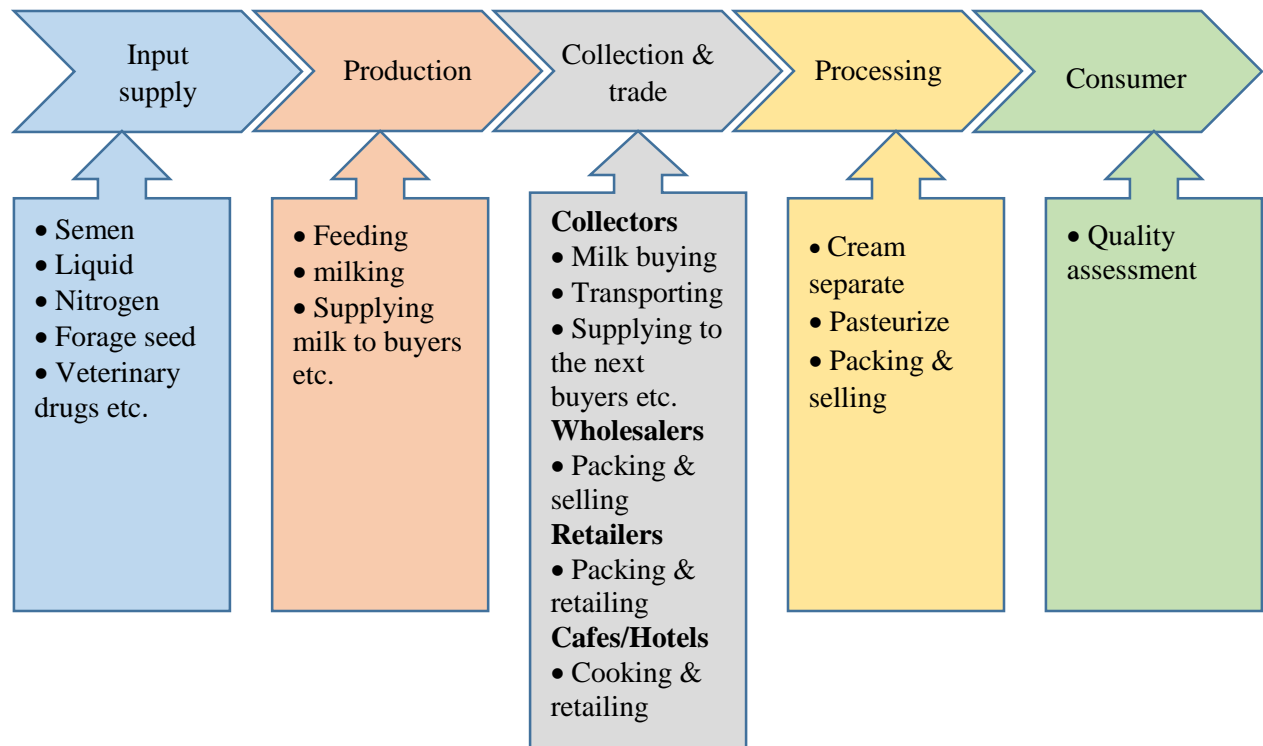
Source: own divination (2022)

According to the survey results indicated in the above Table, 22% of sample households have got access to market information while 78% have not got. Out of 22% of sample households who accessed market information, all of them were milk market supply participants and none of non-participants were accessed market information. On the other hand, the findings indicated that 17.44% of milk market supply participants and 28.57% of nonparticipants have got access to credit. In case of membership to milk producer's cooperative, the result of this study show that 3.49% of milk market supply participant households were member to milk producers cooperative.

4.2. Chain actors, functions and relationships

4.2.1. Fresh whole-milk value chain map

The milk and milk products pass through different marketing agents before reaching the end users. To tackle constraints and access available opportunities by fresh whole-milk marketing actors, it is necessary to identify the main fresh whole-milk marketing actors and functions involved in the entire value chain. The main functions in fresh whole-milk marketing channel are input supply, production, collection, wholesaling, processing, retailing and consumption whereas the major actors in fresh whole-milk marketing channels are input suppliers, producers, processors, traders (collectors, wholesalers, retailers and Cafe/Hotel owners), and consumers. Based on the roles and functions, the major fresh whole-milk marketing channel actors and their relationship in Debre zeit Town is shown below by using value chain mapping (Figure 4.1). Value chain mapping is important to easily understand the movement of the product from beginning to end consumer via various actors (McCormick and Schmitz, 2002).



Supporting Actors

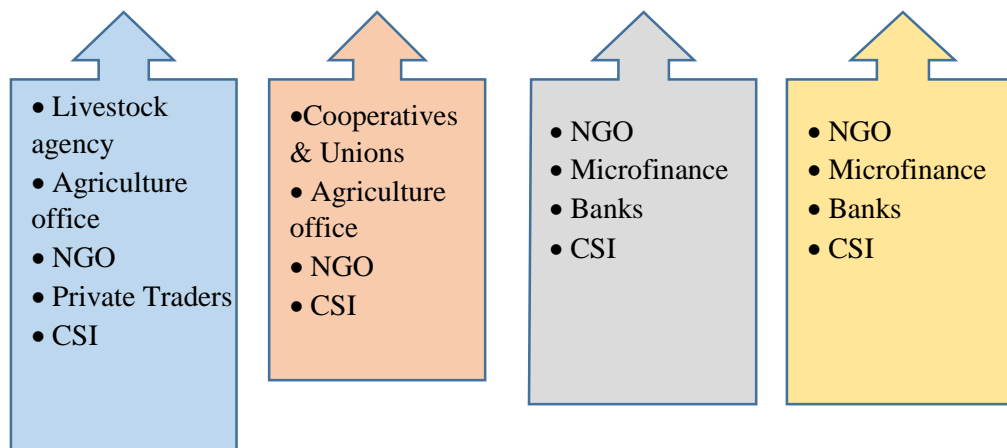


Figure 4.1: Fresh whole-milk value chain map

Source: own divination (2022)

Based on the value chain map indicated above, the major direct and indirect actors, their role and functions are discussed below.

4.2.2. Fresh whole-milk marketing chain actors

4.2.2.1. Primary actors

The primary actors of fresh whole-milk marketing chain identified in the study area were input suppliers, milk producers, milk processors, milk market intermediaries and consumers.

Input Suppliers

Value chain function starts from inputs use to produce milk products. The main inputs used by milk producers in the study area include semen (including sexed semen), and estrus synchronizing hormone, heifers, bulls, forage seeds, veterinary drugs, water, land and house (shelter). Currently, the main agricultural input suppliers that were directly or indirectly involved in the study area were Office of Agriculture (at different levels), traders, NGO (LIVES project, FAO, etc.) and farmer's own source. The inputs; house, water and land are provided by the farmers themselves. In the study area, the house/shelter/ was constructed together with human shelter without separating it and was not well designed by feeding troughs and canals for waste disposal. The source of water for cattle was local watering points from the springs and ponds found in the area and it was managed by the cattle owners. Of the inputs supplied, forage seeds are provided by all actors of suppliers mentioned above. The heifers, bulls and estrus synchronizing hormone were also supplied by NGO (EAAP and LIVES project) and heifers and bulls supplied by farmers own source whereas veterinary drugs and semen were supplied by the government via agricultural offices.

Producers

Producers perform plenty of activities within production stage. Among these functions milking and selling, feeding of cows, harvesting, housing and taking of cows to veterinary medicine when medication considered to be important. Hygienic care of milk during and after milking was practiced by the milk producers to keep the neatness of the milk. But, as the respondents said, there was storage problem to store fresh milk safely and to minimize the loss of milk due to its perishable nature especially when there was no market access during fasting time. Instead, producers process their milk using traditional method into different milk products since there was no innovated technology of milk processing at smallholder milk producers level. Out of the total milk produced weekly (44.76 liters), about 16.26% per household per week was processed into different milk products. The milk producer households who were participated in milk market were used human labor to transport their milk to the market.

The growing demand for milk and milk products created an opportunity for milk producers to exploit the available market access and increase their income level. However, producers were not encouraged in getting better benefit due to unfair consumer price share for their milk they produce and because of the perishability nature of milk mainly during fasting time. As indicated in (Table 4.8), the highest share of gross marketing margin was obtained by the Cafes/Hotels owners in channel 3 (62.1%). Furthermore, all milk market participant respondents emphasized and said that inaccessible milk market during Orthodox fasting period was the major problem of milk market in the study area. Since the smallholder milk producers were not well organized, they were not able to bargain and govern the value chain. Thus, milk producers were price takers and could not bargain for their milk price due to low demand during Orthodox fasting time. According to the survey result, the Cafes/Hotels owners were the key value chain governors in the study area and milk producers had no bargaining power and agreed to sell their milk at the price set by Cafes/Hotels owners. However, consumers and collectors blame on the milk quality provided by milk producers as it was adulterated and not-fresh milk.

Collectors

They collect surplus of milk from smallholder milk producer household of rural area to resell it in the nearby urban milk market center for the wholesaler, processors and retailers. They use their traditional and practical knowledge to differentiate the milk quality whether it is fresh or not before they buy. They consciously prioritize the areas where there was sufficient supply to assemble enough volume of milk they require and the number of processors found in the study area were four. On average they collect 5,955 liters of milk from smallholder producers and reselling to their respective wholesalers, processors, Cafes/ Hotels or retailers in the study area. Collectors packed the milk they bought using plastic vessel (Jerry can) and used horse cart and Bajaj for transportation to nearby market centers (Debrezeit town) to resell the milk for their respective buyers.

Wholesalers

Wholesalers are those actors who purchase large volume of fresh row milk directly from producers or through local milk collector and finally sell it mainly to milk retailing shops/kiosks and very rarely to milk processing enterprise, organizational consumers like hospitals, Cafeterias/Hotels and. Depending on the demand and supply, by using refrigerators they also store milk that they purchase usually for about three days. There are about four wholesalers in the study area and all

wholesalers are located in Debrezeit town and hence, they had better storage facility, access of transport and communication than any other traders except processors.

Processors

These are actors who are using processing technology and mostly produce skimmed milk, pasteurized packed milk (prepared for selling in different volume of containers), butter and cheese. The number of processors found in the study area were six and all of them have their own processing technology (such as cream separator, churner, refrigerator, etc.) and processing houses and thereby process different volumes of milk per day and they pack processed milk into different volume for reselling mainly to retailing shops and very rarely to Cafes/Hotels owners, supermarkets and wholesalers and consumers.

Retailers

Retailers are those which include milk retailing shops/kiosks, Cafes/Hotels, and supermarkets. Most of the time, the retailers buy milk from collectors, processors, wholesalers or directly from producers and they sell mostly to urban consumers. The number of legal retailing shops/kiosks in the study area were seven and their main activities done by them include buying of processed (from processors) or unprocessed milk (from producers or collectors), testing of milk quality using their traditional knowledge, lactometer, and transport to their retailing shops and selling to consumers. The retailers also prepare large amount of milk into retailing volume and provide it for selling to consumers in small pack containers. They retail either unprocessed (raw milk) or processed (skimmed and pasteurized milk) which is packed in different volumes by different processing center. These actors are the end intermediary connector of consumers with other intermediaries when the marketing chain goes via retailers.

Brokers

Brokers are middlemen who acted in intermediating between the sellers and buyers to negotiate each other for successful agreement among them in relation to selling and buying the milk. Brokers are more important especially when the supply is greater than demand such as in fasting time and in this case they play an important role in linking the milk producers with the potential buyer. But brokers sometimes were not important when supply is very low in the study area. However, the brokers facilitate transaction and sometimes involved in price fixing and gain more benefit by persuading the milk producers to sell their milk to Cafe/Hotels, wholesaler, processors or retailers

by the price they set. They mostly involved between Cafe /Hotels owners and milk producers in search of potential sellers and buyers. Generally, their influence in the study area was limited.

Consumers

In the study area, consumers are those actors who purchase milk and milk products for their consumption purpose only. Consumers could consume milk in their home and Cafes/Hotels. According to consumers’ response, they on average, consume 0.25 liters of milk per day per household. The trend of milk buying of consumers indicated that they were buying directly from producers or Cafes/Hotels and from retailing shops.

Consumers refer the quality of milk using their own methods such as making yogurt from fresh raw milk and if the milk forms good and semi-solid yogurt, consumers perceive that the milk is non-adulterated and good quality. However, consumers and collectors blame on the quality of milk provided by producers which was considered by consumers and collectors as adulterated and non-fresh milk. On the other hand producers strongly complained on consumers and Cafes/Hotel owners especially during Orthodox fasting time for their low milk demand and price.

Table 4.6: Sources of fresh whole-milk for consumers purchasing

Consumers	Sources of milk for consumers purchase			
	Producers	Retailers	Cafes/hotels	Total
Numbers	1	9	5	15
Percentages	6.67	60	33.33	100

Source: own divination (2022)

4.2.2.2. Supporting actors

Supporting actors are those actors that provide support services extension, information, financial, research and development services, etc. Access to support services like information, technology and finance determines the success of value chain actors (Martin et al., 2007). Office of Agriculture, Micro Finance, Research Centers, Office of Cooperatives Society Promotion and NGO were main supporting actors in the study area that provide such important services.

Extension Services

The survey results indicated that about 66% of the respondents obtained four times and above service contact frequency of extension from development agent of Livestock sector whereas about 44% of respondents obtained 3 times and below contact, of which 26% have no received contact of extension service. Furthermore, the survey results showed that the monthly average value of service contact frequency of extension of sample households with developments agents was 3.67

times. However, the value of this variable for milk market participants and non-participants was 3.88 and 2.36 times per month, respectively (Table 4.2). The structure of office of agriculture is stretched up to the kebele level and gave training and extension service by appropriate technocrat staffs.

Financial services

Bank and Credit and Saving Institution, Office of Cooperatives Society Promotion, relatives and individual lenders were found to be major source of credit for sample households. The survey findings showed that of the total sample households, about 19% said that they do have access to credit from financial institution and of these institutions, credit and saving institution was found to be the potential creditor than others for all actors while the rest 81% of respondents said that they did not have access to credit service. Among those 19 respondents with access to credit, 15 (79%) and 4 (21%) of them were milk market participants and non-participants (Table 4.5).

4.3. Fresh whole-milk market channels and marketing margins

4.3.1. Fresh Whole-milk marketing channels

According to the survey findings, six alternative main fresh whole-milk marketing channels were identified with an average supply of 9,629 liters of raw milk per month by sample respondent households. Based on the channel comparison made, volume of milk passed via channels indicated that the main purchaser of fresh raw milk from producers were collectors, retailers and consumers with the estimated percentage share of volume of milk to be 61.85%, 19.63% and 18.52%, respectively.

The channel that conveys the highest volume of raw milk was channel 3 (producer, local collector, Cafes/Hotels, consumers) followed by channel 2: (producer, Retailers, consumer) and channel 1(producer, consumer) with an average percentage volume of milk estimated in each to be 20%, 19.63% and 18.52% of milk, respectively.

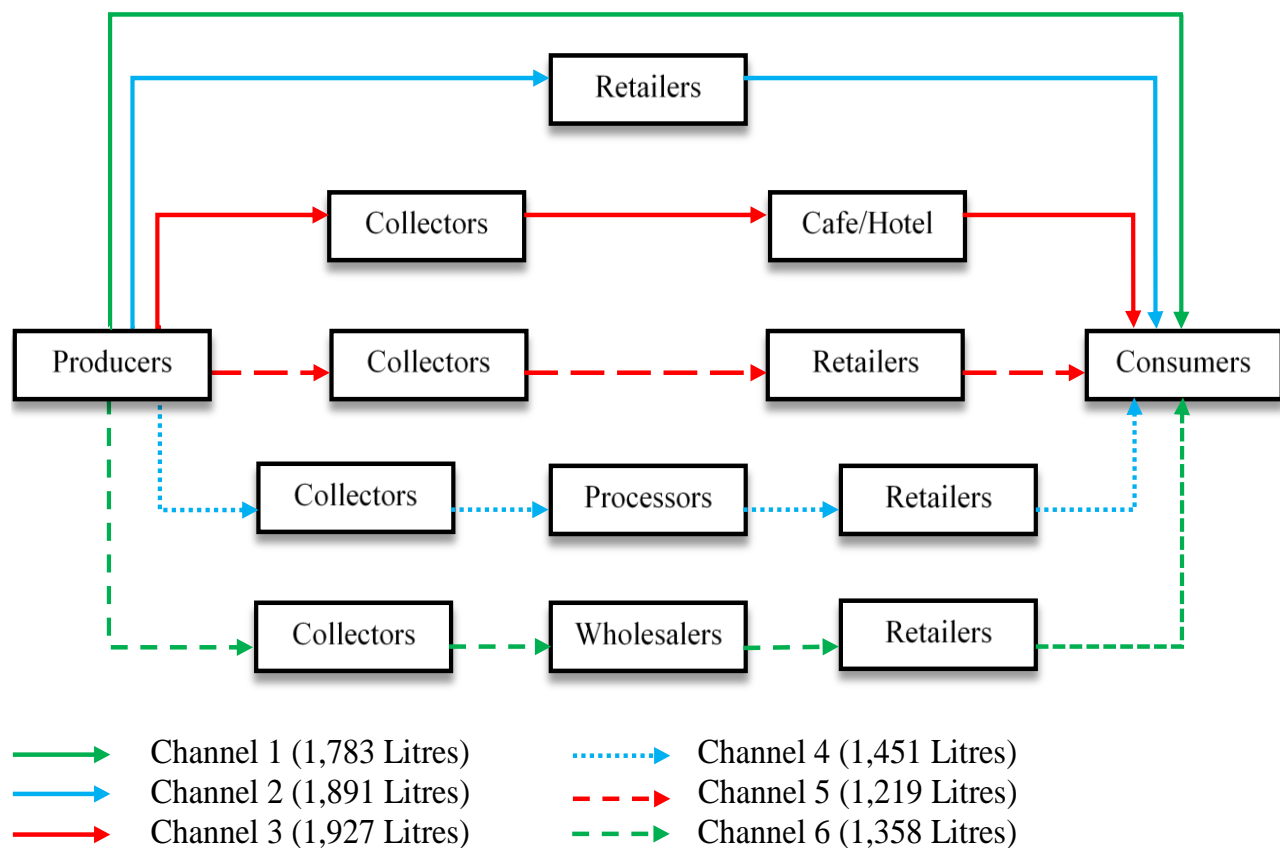


Figure 4.2: Fresh whole-milk marketing channels

Source: Own divination (2022)

4.3.2. Performance of fresh whole-milk market

Costs and marketing margins were used to assess the performance analysis of milk market. Due to perishable nature of milk, it requires serious care at the time of storing which needs refrigerator shortly after milking until the time of consumption. Computation of marketing margin was employed to show the distribution of benefit share obtained from final selling price captured when milk transferred from producers to final consumers through different intermediaries of fresh whole-milk market channel along the marketing channels. The size of gross margin of milk market participants within the market channel indicates that where and what amount of value is added and profit is made in each marketing agent. The average buying and selling prices of milk was used for each marketing agent to calculate the gross marketing margin of actors in the value chain.

Milk marketing costs: the cost incurred from production stage of a commodity up to it reaches to the end user referred us marketing cost. As indicated in (Table 4.7) costs are incurred by each marketing actors such as producers, collectors, wholesalers, processors and retailers for different activities of milk trading. Producers incur costs for fulfilling production inputs such as feed, medicaments, housing, labour etc. The costs belonging to the milk traders contain costs that are used for processing, transportation, information access though telephone, tax, material cost, labour and cost of loss from perishability. The Table below indicated the estimated marketing cost of milk market actors per liter of milk in the study area.

Table 4.7: Marketing cost of fresh whole-milk actors (birr/liter)

Items	Actors					
	Producers	Collectors	Retailers	Cafes/hotels	wholesaler	processors
Production cost	12.00					
Marketing cost						
Labour cost	0.45	0.20	0.2	5.90	0.95	0.10
Transport cost		0.90			0.75	0.10
Loss due to perishable	0.40	0.25	0.60	0.50	0.13	0.25
Info cost/telephone	0.05	0.07	0.10	0.10	0.05	0.05
Processing cost				7.00		1.3
Container/Jerikan cost	0.05	0.05	0.04	0.75	0.05	0.27
Overhead/Other costs			0.35	2.00	0.60	0.35
Tax		0.02	0.02	0.15	0.05	0.05
Total cost	12.95	1.49	2.31	16.40	2.58	2.47

Source: own divination (2022)

Milk marketing margin: as indicated in (Table 4.8), the producers share of consumers price (GMMp) and net marketing margin (NMM) in milk market channel 1 and 3 were 62.62%, 100% and 12.68%, 28%, respectively which indicate that the net marketing margin and share of end buyer price by producers was very high in channel 1 than other channels since producers contacted directly with the end consumers whereas lower in other channels such as in channel 3 when other marketing actors involved between producers and end consumers. According to the result of survey findings indicated in (Table 4.8), the total gross marketing margin (TGMM) and producers share (GMMp) of consumers price in channel 1, 2, 3, 4, 5 and 6 was 0%, 28.89% 71.58%, 40.00%, 41.3%, 40% and 100%, 71.12%, 28.42%, 60.00%, 58.7%, 60.00%, respectively. Accordingly, it is possible to say that producers have got the highest share of consumers price in channel 1

followed by channel 2 and lowest share in channel 3. Regarding GMM, the highest share of consumers' price by milk traders was captured by Cafes/Hotels in channel 3 (62.1%), retailers in channel 2 (28.88%) and 4 (21.11%), collectors in channel 6 and 5 (18.22% and 17.83%) respectively. whereas the lowest GMM was obtained by collectors in channel 3 (9.48%) followed by retailers in channel 5 and 6 (10.87% and 10 %) respectively.

Concerning NMM, the highest profit share of consumers' price in channel 1 (62.62%) and channel 2 (37.89%) was captured by producers whereas Cafes/Hotels obtained about 44.48% in channel 3 and retailers have got 23.75% and 15.97% in channel 2 and channel 4, respectively. On the other hand, the lowest share of profit margin from consumers price was obtained by retailers in channel 5 (5.84%) and channel 6 (4.86%) followed by processors in channel 6 (6.04%) and wholesalers in channel 5 (7.23%).

As fresh whole-milk exchanges from one actor to the other, all marketing channel actors added values to the milk by refining the grade in terms of change the form to skimmed and boiled milk via processing, packing and creating place and time utility.

Table 4.8: Performance of fresh whole-milk marketing in different channels

Marketing actors	Particulars	Fresh whole-milk marketing channels					
		Channe 1 1	Channe 1 2	Channe 1 3	Channe 1 4	Channe 1 5	Channe 1 6
Producers	Production cost	12.00	12.00	12.00	12.00	12.00	12.00
	Marketing cost	2.95	2.95	2.95	2.95	2.95	2.95
	Selling price	40	32	27	27	27	27
	GMMp (%)	100	71.12	28.42	60.00	58.7	60.00
	NMMp (%)	62.62	37.89	12.68	26.78	26.19	26.79
Collectors	Buying price	-	-	27	27	27	27
	Marketing cost	-	-	1.49	1.49	1.49	1.49
	Selling price	-	-	36	35.50	35.20	35.20
	GMMc (%)	-	-	9.48	18.89	17.83	18.22
	NMMc (%)	-	-	7.09	15.78	14.58	14.91
Cafes/Hotels	Buying price	-	-	36	-	-	-
	Marketing cost	-	-	16.40	-	-	-
	Selling price	-	-	95	-	-	-
	GMMhc (%)	-	-	62.1	-	-	-
	NMMhc (%)	-	-	44.48	-	-	-
Wholesalers	Buying price	-	-	-	-	-	35.20
	Marketing cost	-	-	-	-	-	2.58
	Selling price	-	-	-	-	-	40.50
	GMMws (%)	-	-	-	-	-	11.78
	NMMws (%)	-	-	-	-	-	6.04
Processors	Buying price	-	-	-	-	35.20	-
	Marketing cost	-	-	-	-	2.47	-
	Selling price	-	-	-	-	41	-
	GMMpr (%)	-	-	-	-	12.6	-
	NMMpr (%)	-	-	-	-	7.23	-
Retailers	Buying price	-	32	-	35.50	41	40.50
	Marketing cost	-	2.31	-	2.31	2.31	2.31
	Selling price	-	45	-	45	46	45
	GMMr (%)	-	28.88	-	21.11	10.87	10
	NMMr (%)	-	23.75	-	15.97	5.84	4.86
TGMM (%)		00.00	28.89	71.58	40.00	41.3	40.00
GMMp (Producers Share) (%)		100	71.11	28.42	60.00	58.7	60.00
GMMp +TGMM		100	100	100	100	100	100

Source: own divination (2022)

4.4. Results of Econometric Analysis

This section contains the results of econometric analysis of determinants of participation decision and level of participation in milk market supply. The data was analyzed by using Tobit regression model and the results were set in (Table 4.9) indicated that about seven variables affected

significantly the decision of participation and level of participation of smallholder milk producer households in milk market supply and results are discussed as follow:

4.4.1. Factors determine market participation decision and level of participation

Table 4.9: Results of Tobit regression model for determinants of milk market supply

Variable	Marginal effect for E (y*/y>0)	Std. Err.	z	P>z	Marginal effect for Pr (y>0)	Marginal effect for E (y/y>0)
Sex	-0.3365	6.3445	-0.04	0.993	-0.0026	-0.0809
Age	0.0531	0.0159	0.57	0.252	0.0017	0.0718
Edu	0.0745	7.0846	4.73	0.000***	0.3780	0.8766
Acexsn	-0.0369	0.7386	-0.05	0.878	-0.0004	-0.0298
Incpro	-0.5823	5.8759	-0.63	0.702	-0.0403	-0.9061
Lanhs	-0.4804	5.6722	-3.82	0.008***	-0.2598	-0.8749
Hconsump	-0.0034	0.0022	-4.04	0.031**	-0.00024	-0.0027
Exp	0.3409	7.0282	7.46	0.000***	0.57372	0.7970
Acc	0.0892	7.9369	2.86	0.092*	0.2353	0.9769
Ainfo	-0.8612	9.1241	-2.34	0.541	-0.2596	-0.1327
Dismar	-0.3682	0.6294	-0.61	0.000***	-0.0042	-0.92674
Fs	0.3119	0.21291	2.11	0.527	0.0036	0.2631
Amntp	0.9803	0.8658	3.59	0.024**	0.0347	0.4673

Number of Obsn = 141, left-censored observations = 20, uncensored observations = 121, right censored observations = 0, Prob > F = 0.0000, LR chi² (13) = 146.96 with Prob > chi² = 0.0000, Log likelihood = -546.12519, Pseudo R² = 0.283, _cons = 0.062 the value ***, ** and * represents level of statistical significance at 1%, 5% and 10%, respectively.

Source: own divination (2022)

Tobit model was used to identify determinants of probability and level of participation in milk market supply. Diagnostic tests for multicollinearity and heteroscedasticity were conducted during analysis using the variance inflation factor test (VIF) and Breusch-Pagan/Cookeisberg test, respectively. Accordingly, there was no multicollinearity problem since the results of VIF for continuous variables and CC for dummy variables were less than 10 and 0.75, respectively. However, the tests of Breusch-Pagan/Cook-Weisberg test showed that there was heteroscedasticity problem in the model and therefore, the robust standard error was employed as a correction measure of the problems since robust standard error can produce the estimates with smallest possible standard errors. On the other hand, the fitness and significance of the model was tested using LR chi² (13) = 146.96, Prob > chi² = 0.0000 that shows the fitness of the model at less than 1% significance level. The log likelihood = -546.12519 reveal that the assumption of null

hypothesis of all independent variables involved in the model are collectively equal to zero to be rejected at probability level of less than 1%.

The result from this study showed that about 86% (121 in number) of sample respondents were involved in milk market supply. The results of Tobit regression model revealed that out of thirteen independent variables, about seven independent variables namely: education level of the household, land holding size of the household, volume of milk allocated for home consumption, access to credit, experience of household in milk production, distance from market centers and the Amount of Milk Produced affected significantly the probability and level of participation of smallholder milk producers in milk market supply.

The results of Tobit regression model (Table 4.9) concerning the effects of independent variables on both probability and level of participation in milk market are discussed as follow:

Education level of the household(Edu): in line with prior expectation, education level of the household affected positively and significantly the probability and intensity of milk producer's participation in milk market supply at less than 1% significance level. The marginal effect for education level of the household indicated that keeping other variables constant, as education level of a household increases by one year of formal schooling, the probability and intensity of participation of smallholder milk producer households in milk market supply increases by 37.8% and 7.45%, respectively. Similarly, the volume of marketed supply of milk conditional on decision to participate in milk market supply increases by 87.7% if the education level of a household increases by one year of formal schooling. This implies that as the education level of a household increases by one year of formal schooling, the volume of milk supplied to the market increases. This result is in line with the study of Kumar (2010 and 2015) and Tadele et al. (2014).

Land holding size of the household (lanhs): as prior expectation, land holding size of the household showed inverse relationship with smallholder milk producers' probability and intensity of participation in milk market supply and affected negatively and significantly at less 1% significance level. The relationship between these two variables indicated that land holding size of the household is a determining factor in explaining the probability of participation and level of participation of milk producer households in milk market supply. The marginal effect of land holding size of the household indicate that a hectare increase in land holding size of the household decreases the probability and intensity of participation of sample milk producer respondents in milk market supply by 25.98% and 48.04%, respectively. The actual quantity of milk supply

conditional on decision to participate in the market also decreases by 87.49% if the land holding size increases by a unit. This implies that as land holding size increases, the tendency of households in investing the resources and labour force for crop cultivation also increases which in turn decreases the resource and labour force allocation for milk development and thereby lead to decrease in quantity of milk produced and supplied to the market. This is in line with Berhanu (2012) who indicated that larger land holding size in the study area initiated households to invest on crop production instead of in milk production and market.

Volume of milk allocated for home consumption (Hconsump): in line with prior expectation, volume of milk allocated for home consumption affected negatively the probability and intensity of milk producers' participation in milk market supply at 5% probability level. The marginal effect of volume of milk allocated for home consumption indicated that keeping other variables constant, a liter increase in volume of milk allocated for home consumption decreases the probability and intensity of participation of sample milk producer respondents in milk market supply by 0.024% and 0.34%, respectively. The quantity of marketed supply of milk conditional on decision to participate in milk market supply decreases by 0.27% if the volume of milk allocated for home consumption increases by a liter. The implication is to mean that as the smallholder milk producer households' volume of milk allocated for home consumption increases, their attention to sufficiently engaged in dairy development sector decreases, as a result milk market supply also decrease. The study conducted by Ali.T (2017) in line with this result show that increase in allocation of milk for home consumption negatively affect decision of participation in milk market supply.

Access to credit (Acc): as expected, access to credit affected positively and significantly the smallholder milk producer households in their probability and intensity of milk market supply at less than 10% significance level. The marginal effect of access to credit indicated that other thing remain constant, the probability and intensity of participation of milk producer households in milk market supply with access to credit increases by 23.53% and 8.92%, respectively. Although, the intensity of marketed supply of milk conditional on decision to participate in milk market increases by 97.7% if milk producer households get access to credit. This implies that as the milk producer households get access to milk market related credit, their probability and intensity of participation in milk market supply also increases. Study conducted by Anwar M. (2019) in line with this result

and show that access to credit would enhance the financial capacity of the farmer to purchase the necessary inputs and increases output.

Experience of household in milk production (Exp): as prior hypothesis, experience of household in milk production affected positively and significantly the probability and intensity of milk producers' participation in milk market supply at less than 1% significance level. The marginal effect of Experience of household in milk production indicated that an increase of household experience in milk production increases the probability and intensity of participation of smallholder milk producer households in milk market supply by 57.4% and 34.09%, respectively. Similarly, the volume of marketed supply of milk conditional on decision to participate in milk market increases by 79.7% if the experience of household in milk production increases by a year. The study conducted by Ali T. (2017) on milk market supply in line with this result dairying experience affected significantly milk producer's participation in milk market supply.

Distance from market centers (Dismar): as expected, the distance from market centers affected negatively and significantly the probability and intensity of milk producers' participation in milk market supply at less than 1% probability level. The result of marginal effect indicated that as the distance from market centers increases by a kilometer, the probability and intensity of participation of sample milk producer respondents in milk market supply decrease by 42% and 36.82%, respectively. Keeping other variables constant, the actual quantity of milk supply conditional on decision to participate in the market also decreases by 92.74% if the distance from market centers increases by one kilometer. The same result was reported by Kumar (2015) and Berhanu (2012).

The Amount of Milk Produced (Amntp): as hypothesized, the amount of milk yield per day in liter affected positively and significantly the probability and intensity of milk producer's participation in milk market supply at less than 5% significance level. The result of marginal effect indicated that *ceteris paribus*, when amount of milk yield per day increases by a liter, the probability and intensity of participation of smallholder milk producer households in milk market supply also increases by 3.47% and 98%, respectively. Although, the intensity of marketed supply of milk conditional on decision to participate in milk market supply, increases by 46.7% if amount of milk yield per day increases by a liter. This implies that as amount of milk yield per day in liter increases, the probability and intensity of milk market supply also increases. Study conducted by Anwar M. (2019) showed the same findings that the saleable milk surplus of the smallholder's producer households in the study area is more responsive to the volume of milk produced.

CHAPTER FIVE

5. CONCLUSION AND RECOMMENDATION

According to the findings of this study, the following points are summarized, concluded and their respective recommendations are drawn to enhance fair benefit share, milk market supply participation by smallholder milk producer households.

5.1. Conclusion

From this study, it was noted that the mean age, family size and educational level of the total sample household heads were 49.18 years, 6.08 and 5.31 years of formal schooling, respectively. The average distance from the home of sample milk market participant and non-participant households to milk market center was 6.35 and 9.77 km, respectively. According to respondents, about 76%, 19% and 5% sample households said that their major income source was from crops, sales of livestock and livestock products and off farm activities, respectively. Years of experience in dairying and service contact frequency of extension/month were 13.14 years and 3.89 times, respectively. On the other hand, the mean total milking cow holdings per sample household was 1.37 cows whereas average milk yield per cow per day was 4.35 liters. The average weekly milk allocation for market supply and home consumption per sample households in the study area were 26.74 and 10.78 liters, respectively.

Mapping of fresh whole-milk marketing channels showed the main milk value chain actors, their functions and support services. The main fresh whole-milk chain actors identified in the study area were input supplier, milk producers, milk processors, collectors, wholesalers, Cafes/Hotels, retailers and consumers. Accordingly, Six main fresh whole-milk market channels were identified and of which the producer-collectors-Cafes/hotels-consumers' channel (channel 3) carried the highest volume of milk transaction than other channels and Cafes/Hotels were the leading benefited market actors for the share of GMM (62.1%) followed by producers (28.42%) and collectors (9.48%) with high variation of benefit/margin share among them within this channel. From the analysis result of milk marketing margins and market channel identified, it was concluded that fresh whole-milk marketing actors were not supported well and there was disproportionate distribution of benefit or margins among actors.

To analyze factors determining milk market supply participation and level of participation Tobit regression model applied. accordingly, the result of Tobit regression model revealed that out of thirteen independent variables seven independent variables namely: education level of the household, land holding size of the household, volume of milk allocated for home consumption, access to credit, experience of household in milk production, distance from market centers and the Amount of Milk Produced affected significantly the probability and level of participation of smallholder milk producers in milk market supply.

5.2. Recommendation

Based on the conclusion of findings given, the following recommendations are drawn for future possible intervention measures.

- The cooperative structures should make a strong institutional arrangement. Cooperatives should be effective in dealing with information asymmetries and easily achieve competitive advantage. They do this through using collective action, pooling resources and lowering the unit cost of transactions. Members should widely understand the cooperative and its objectives, which is established voluntarily without any form of external imposition. Once the decision is made to implement the cooperative structure as a means of dairy development, government policies may be used to support milk supplier cooperatives.
- Office of Cooperatives Society Promotion should pay an attention in optimizing the benefit share and minimizing disproportionate margins of milk marketing among the market actors via efficient extension service by providing input, access to market information and organizing producers to have strong bargaining power and value chain linkage.
- Government sectors (more appropriately agricultural sector) should give technical support on specialization approach of dairy sector for those milk producer farmers having hope to fully engage in milk production via specialization.
- To promote positive relationship of milk market supply with access to market information, information and communication sector along with agricultural sector should mediate in revealing of the availability of the product in one way and accessibility of the market in another way via advertising the product which might also enhance the actor's linkage among each other.

- Awareness creation focused on market oriented dairying should be provided by agricultural extension workers for those milk producers who allocated greater amount of milk for home consumption.
- Extension service provision on market oriented dairying should be addressed for milk producers to aware and enable them comparing benefit cost ratio of their produce and thereby to participate in milk market supply.
- Strengthening and promoting education level of the milk producers via formal schooling should get an attention by the government sector of capacity building to enhance their participation in milk market supply and thereby increase their income level and self-sufficiency in food security.

REFERENCE

- Abbot, J. and P. Makeham, (1981). *Agricultural economics and marketing in the tropics*. Wing Tai Cheung Printing Co. Ltd, Rome. 58pp.
- Ahmed, M., S. Ehui and Yemesrach Assefa (2003). Dairy development in Ethiopia. Paper presented at the “*Successes in African agriculture*” conference In: WEnt, IFPRI, NEPAD, and CTA conference paper no. 6. 1–3 December 2003, Pretoria, South Africa.
- Alemayehu N., Hoekstra D. and Tegegne A. (2012). Smallholder dairy value chain development: The case of Ada’a woreda, Oromia Region, Ethiopia. ILRI. Nairobi
- Ali T., (2017). Value chain analysis of milk: the case of dessie zuria district, south wollo zone, northern Ethiopia.
- Amemiya T., (1985). *Advanced Econometrics*. Oxford: Basil Blackwell.
- Anandajaya sekeram, P. and Berhanu Gebremedhin (2009). Integrating Innovation Systems Perspective and Value Chain Analysis in Agricultural Research for Development: Implications and Challenges. Improving Productivity and Market Success (IPMS) of Ethiopian Farmers Project Working Paper. *International Livestock Research Institute*, Nairobi, Kenya.16: 67. Link: <https://bit.ly/2ZpVuzw>
- Anwar M., (2019). Analysis of market participation of small dairy farmers in gubre town, snpr, Ethiopia. *International journal of agricultural science and food technology*. Link: <https://dx.doi.org/10.17352/ijasft>
- Asfaw N., (2009). Improving smallholder farmers’ marketed supply and market access for dairy products in Arsi Zone, Ethiopia. Research Report 21.ILRI (*International Livestock Research Institute*), Nairobi, Kenya. 107 pp.
- Azage T. and Asfaw Y. (2004). Milk production of Ada’a Liban Woreda Dairy and dairy products marketing association, ESAP Newsletter.
- Azeb L., Kebede A. and Mohammed S. (2020). Value chain analysis of smallholder milk producer in West Hararghe Zone, Ethiopia. *International journal of agricultural science and food technology*. Link: <https://dx.doi.org/10.17352/ijasft>
- Bammann H., (2007). Participatory value chain analysis for improved farmer incomes, employment opportunities and food security. *Pacific Economic Bulletin*, 22,(3):125.

- Barry Shapiro, Getachew Gebru, Solomon Desta, Asfaw Negassa, Kidus Negussie, Gezahegn Aboset and Henok Mechal (2015). Ethiopia livestock master plan: Roadmaps for growth and transformation. A contribution to the Growth and Transformation Plan II (2015-2020) Developed for the Ministry of Agriculture, Livestock Resources Development Sector, August 2015.
- Bedilu Demissie, Hussien H. Komicha and Adem Kedir (2014). Factors affecting camel and cow milk marketed surplus: the case of eastern Ethiopia. *African Journal of Agricultural Science and Technology (AJAST)* Vol. 2, Issue 2, pp. 54-58.
- Behnke R. (2010). The Contribution of Livestock to the Economies of IGAD Member States: Study Findings, Application of the Methodology in Ethiopia and Recommendations for Further Work, IGAD LPI Working Paper 02-10. Odessa Centre, IGAD Livestock Policy Initiative, Great Wolford, UK. Available at: <http://www.springerplus.com/content>.
- Behnke, Roy and Fitaweke Metaferia (2011). The Contribution of Livestock to the Ethiopian Economy- Part II.
- Berhanu Kuma (2012). Market Access and Value Chain Analysis of Dairy Industry in Ethiopia: The Case of Wolaita Zone: A Dissertation Submitted to the School of Agricultural Economics and Agribusiness, School of Graduate Studies, Haramaya University.
- Berhanu Kuma, Derek Baker, Kindie Getnet and Belay Kassa (2014). Factors affecting milk market participation and volume of supply in Ethiopia. *Asian Journal of Rural Development*, 4(1):1-15, 2014.
- Burke, W. (2009). Fitting and Interpreting Cragg's Tobit Alternative using Stata. *The STATA Journal*, 9: 584-592.
- Cristian Aarón Rodríguez-Enríquez, Giner Alor-Hernández, Cuauhtémoc Sánchez-Ramírez and Guillermo Córtes-Robles., (2015). Supply chain knowledge management: A linked data-based approach using Simple knowledge organization system. *DYNA* 82 (194), pp. 27-35
- CSA (2011). Annual statistical abstract. Federal Democratic Republic of Ethiopia. Addis Ababa, Ethiopia
- CSA (2012). Crop and Livestock Product Utilization, Agricultural Sample Survey: Livestock and Livestock Characteristics.

- CSA (2013). Agricultural Sample Survey. Livestock, Poultry and Beehives population (private peasant holdings). Federal Democratic Republic of Ethiopia, Central Statistical Authority (CSA), Addis Ababa, Ethiopia. Available at: <http://ochaonline.un.org/ethiopia>.
- CSA (2013). Population Projection of Ethiopia for All Regions at Wereda Level from 2014 – 2017. August 2013 Addis Ababa.
- CSA (2015). Agricultural Sample Survey 2014/15 Volume II Report On Livestock And Livestock Characteristics (Private Peasant Holdings). Addis Ababa, March 2015
- Debertin, D.L., (1993).TI- An animated instructional module for teaching production economics with 3-D graphics. *American Journal of Agricultural Economics* 75: 485 – 491.
- Dunne, A., (2001). Supply chain management: fad, panacea or opportunity? Occasional paper Vol 8(2) 1–40. School of Natural and Rural Systems Management, University of Queensland, Gatton, Queensland, Australia.
- Edward, H. Frazelle, (2002). Supply Chain Strategy: The Logistics of Supply Chain Management: The McGraw-Hill Companies, Inc. pp
- Feleke G, Woldearegay M. and Haile G. (2010). Inventory of dairy policy – Ethiopia, target business consultants plc. , Netherlands development organization (SNV), Addis Ababa, Ethiopia.
- Fleming, K., (2005). Value added strategies: Taking agricultural products to the next level. Honolulu (HI): University of Hawaii. Agribusiness; AB-16. 2 p.
- Gizachew G. (2005). Dairy marketing patterns and efficiency: The Case of Ada’ Liben District, eastern Oromia. M.Sc. Thesis, Alemaya University, Ethiopia.
- Greene, W.H., 2003. Econometric Analysis. 5th Edition. Prentice Hall. Inc, London. 1026p.globalvaluechains.org
- Gryseels, G., (1988). Role of livestock in mixed smallholder farms in the Ethiopian highlands: A case study from the Baso and Worena weredas near Debre Berhan. Dissertation. Agricultural University. Wageningen, the Netherlands. 249 pp.
- Gudeta Shanko, Fikadu Mitiku and Tura Kaso (2020). Dairy value chain upgrading in bisoftu town, east shewa, oromia, Ethiopia. Link: www.iiste.org

- Haan, C., H. Steinfeld and H. Blackburb, (1997). Livestock and the environment: Finding a balance. European Commission Directorate General for development, Brussels, Belgium. 115 pp.
- Hammod, L. (2001). Post – Harvest Practices Affecting Rice Milling quality Ghana and Tanzania. Natural Resource Institute, Oxford. 20pp.
- Hobbs, J.E. (1997). “Measuring the Importance of Transaction Costs in Cattle Marketing.” American journal of Agricultural Economics, 79(4): 1089-1095.
- Holloway, G, Nicholson, C., Delgado, C., Staal, S. and Ehui, S. (2004). A Revised Tobit Procedure for Mitigating Bias in the Presence of Non-zero Censoring with an Application to Milk Market Participation in the Ethiopian Highlands. *Journal of Agricultural Economics*, 31:97-106.
- Holloway, G. and S. Ehui (2002). Expanding market participation among smallholder livestock producers: A collection of studies employing Gibbs sampling and data from the Ethiopian highlands. Socio-economic and Policy Research Working Paper 48. ILRI, Nairobi, Kenya. 85p.
- Johnston, J., and Dinardo, J., 1997. Econometric Methods. McGraw-Hill, Singapore.
- Kaplinsky, R. and M. Morris (2001). A handbook of value chain analysis. Working paper prepared for the International Development Research Centre (IDRC), p.4-6, *Institute for Development Studies*, Brighton, UK
- Kaplinsky, R. and M. Morris, (2000). A handbook for value chain research, IDRC. Ottawa, Canada.
- Karuga, S. (2009). Dairy Value Chain Analysis Timau Milk Shed for Micro Enterprises Support Programme Trust. Business Services Department, Kenya. 42pp.
- Ketema Hizkias, (2000). Dairy development in Ethiopia. In: The role of village dairy cooperatives in dairy development. SDDP proceedings, MOA, Addis Ababa, Ethiopia.
- Komarek, A. (2010). The Determinants of Banana Market Commercialization in Western Uganda. *African Journal of Agricultural Research*, 5 (9): 775-784.
- Kotler, P. and Armstrong, G. (2006). Principles of Marketing. (11th Ed.), Prentice Hall, USA. 1324pp

- Kuma B., (2013) Market access and value chain analysis of dairy industry in Ethiopia: The case of Wolaita Zone. Dissertation Thesis Submitted to, Haramaya University, Haramaya, Ethiopia. Link: <https://bit.ly/2AknWug>
- Kumar A., (2010). Milk Marketing Chains in Bihar: Implications for Dairy Farmers and Traders. *National Centre for Agricultural Economics and Policy Research*, New Delhi – 110 012. *Agric. Econ. Res. Rev.* 23: 469-477.
- Land O'Lakes, (2010). The Next Stage in Dairy Development for Ethiopia: Dairy Value Chains, End Markets and Food Security Cooperative Agreement 663-A-00-05-00431-00. Addis Ababa, Ethiopia.
- Maddala, G.S. (1983). Limited-Dependent and Quantitative Variable in Econometric. (1st edition). Cambridge University Press, Cambridge.
- Makhura, M.T. (2001). "Overcoming Transaction Costs Barriers to Market Participation of Smallholder Farmers in the Northern Province of South Africa", PhD Thesis, University of Pretoria, South Africa.
- Melaku T., (2011). Oxidization versus Tractorization: Options and Constraints for Ethiopian Framing System Ethiopia. *Int. J. Sus. Agri.*, **3**: 11-20.
- Mendoza G., (1995). A premier on marketing channel and margins. Lyme Rimer Publishers Inc., USA.
- Meryem K., (2013). Analysis of Cow Milk Market Chain: The Case of Sululta District, Oromia Special Zone Surrounding Finfinne, Ethiopia. An MSc Thesis presented to the School of Graduate Studies of Alemaya University.
- Metaferia F, Cherenet T, Gelan A, Abnet F, Tesfay A, Ali J.A, Gulilat W. (2011): A Review to Improve Estimation of Livestock Contribution to the National GDP. Ministry of Finance and Economic Development, and Ministry of Agriculture. Addis Ababa, Ethiopia.
- Moti J., (2007). Econometric analysis of horticultural production and marketing in Central and Eastern Ethiopia. PhD Dissertation. Wageningen University. The Netherlands. 101p
- Neway G., (2006). Commercialization of small holder agriculture in Ethiopia. Note and Papers Series, No 3. Ethiopian Development Research Institute. 52p

- Omiti, J.M., Otieno, D.J., Nyanamba, T.O. and McCullough, E. (2009). Factors Influencing the Intensity of Market Participation by Smallholder Farmers; A Case Study of Rural and Peri-Urban Areas of Kenya, *African Journal of Agricultural and Resource Economics*, 3:71.
- Phiri, C.D. (1991). An Evolution of Smallholder Farming Systems in Chinguluwe Settlement Scheme in Malawi. Issue in Africa Social Network, Malawi. 104pp.
- Ponte S., (2002).The latte revolution Regulation, markets and consumption in the global coffee chain. *World Development* 30(7): 1099 – 1122.
- Porter M., (1985). Competitive advantage: creating and sustaining superior performance. The Free Press, New York
- Reddy G.P., P.G. Chengappa and L. Achotch, (1995). Marketed surplus response of millets: some policy implications. *Indian J. Agric. Economics*. L (4) 668-674
- Scarborough, V. and Kydd, J. (1992). Analysis of Agricultural Markets: A Manual of Natural Resource Institute Marketing Series No. 5. Cathan, UK. 166pp.
- Schmitz, H., (2005). Value chain analysis for policy makers and practitioners. International Labour Office and Rockefeller Foundation, Geneva, Switzerland
- Sindi, J., 2008. “Kenya’s domestic horticulture subsector: What drives commercialization decisions for rural households?” A published M. Phil. Thesis for the award of Master of Science degree, Department of Agricultural, Food, and Resource Economics: Michigan State University.
- SNV Netherlands Development Organization (2010). Report of the PSNP plus Programme, SNV Annual Report 2009-2010, Addis Ababa, Ethiopia www.ipms-ethiopia.org
- Staal S.J., (1995). Peri-urban dairying and public policies in Ethiopia and Kenya: A comparative economic and institutional analysis. PhD Dissertation, Dep’t of Food and Resource Economics, University of Florida, Gainesville, Florida.
- Tadele M., Tewodros T., and Noreen B., (2014). Factors influencing urban and periurban dairy producers’ participation in milk value addition and volume of milk value added in Welmera Woreda, West Shewa Zone of Oromia Regional State Ethiopia. *International journal of livestock production*
- Taye Z., (2017). Determinants of milk marketed supply and channel choices in Ethiopia: The case of East Wolaita Zone.M.Sc. Thesis, Haramaya University, Haramaya, Ethiopia.

- Thakur, D.S., D.R. Harbans Lal, K.D.Sharma and A.S.Saini, (1997). Market supply responses and marketing problems of farmers in the Hills. *Indian J. Agric. Economics*. 52(1): 139-150.
- Tobin J., (1958). Estimation of Relationships for Limited Dependent Variable. *Econometrica*, 46:24-36.
- Tomek, W.G. and K.L. Robinson, (1990). *Agricultural Products Prices*. Third Edition. Cornell University Press. Ithaca and London. 360p
- Turuka F. (2000). Methodology for agricultural research impact assessment. Food security and household income for smallholder's farmers in Tanzania. Applied research with emphasize on women under the project, TARP II – SUA. Proceedings of a Workshop under the Project, TARP II – SUA, 5 – 12 December, 2000, Morogoro, Tanzania.pp 14 – 22.
- Wen H., and Gu Q., (2014). *The elements of supply chain management in new environmental era*. Springer Berlin Heidelberg, City.
- Wolday A., (1994). Food grain marketing development in Ethiopia after reform 1990 A case study of Alaba Siraro district. PhD Dissertation Presented to Verlag Koster University, Berlin 293p.
- Woldemichael S., (2008). Dairy marketing chains analysis: the case of shashemane, Hawassa and dale district's milk shed, southern Ethiopia: A thesis submitted to the department of agricultural economics, School of graduate studies. Haramaya University.
- Yamane T., (1967). *Statistics, an introductory analysis*: 2nd edition. New York, Harper and Row.
Link: <https://bit.ly/31vxBtd>
- Zelalem Y., Emmanuelle G., and Ameha S., (2011). *A Review of the Ethiopian Dairy Sector*:
FAO Sub Regional Office for Eastern Africa (FAO/SFE)

APPENDIX

Survey questionnaires used for Data Collection St. Mary's University, College of Business Department of Development economics, MSc. Program. The purpose of this study is to identify fresh whole-milk marketing actors, their functions and marketing margins along the chain and to analyze the determinants of smallholder milk producer household's milk market participation decision and their level of participation in Debrezeit town.

Name of respondent _____

Name of the rural peasant kebele _____

Annex I: Survey questionnaire for smallholder milk producers' households

Section I: Demographic Characteristics

- 1) Sex: 0= female; 1= male _____
- 2) Age _____ (years)
- 3) Marital status of the household
a) Single; b) Married; c) widowed/widower; d) Divorced; e) Other specify _____
- 4) Family size _____ Male _____ Female _____
- 5) Year of schooling _____
- 6) How many years of experience do you have in milk production? _____ yrs.

Section II: Asset, Livelihoods or Income sources

- 7) Land holding size (hectare):
Arable land _____ Grazing land _____ Forest covered _____ Total _____
- 8) What is your major annual income source? a) Income from crops; b) sales of livestock and livestock products; c) off-farm income; d) others (specify) _____
- 9) Estimated Annual Income From Agricultural & Non Agricultural Activities:
9.1. Crop Production (Quintal) _____ 9.2. Forest product (Birr) _____ 9.3. Trade (Birr) _____
9.4. Other (specify) _____
9.5. Livestock Product (Annual)
(a) Livestock offtake (Birr) _____ (b) Income from milk yield (birr) _____ (c) Income from butter yield (birr) _____ (d) Income from ghee yield (birr) _____ (e) Income from butter

milk yield (birr) ____ (f) Income from cheese yield (birr) _____ (g) income from egg sales (birr) _____

10) On average how many liters of milk daily produced per liter per cow? _____

11) What are the constraints in milk production practices? **1**=no constraints; **2**=high price of milk cow; **3**=lack of credit to buy cow and other inputs; **4**=disease occurrence; **5**=low price of milk and milk products; **6**= shortage of feed **7**=Absence of milk producers cooperative and milk processing center; **8**=others (specify) _____

12) What are the opportunities to enter into milk production? (a) Better market access for milk and milk products; (b) credit access; (c) others (specify) _____

13) Do you supply milk to the market? 1= Yes; 0= No

14) If your answer is no, what are/ is the reason that hinders you?

1=the need for family consumption 2= Low milk yield per day 3= Absence/ low market information sharing 4= high distance to the nearest market 5= Influence by culture 6= other (specify) _____

15) If your answer is yes, how much, to whom or what channel and at what price do you sell your milk?

Sell to Whom?	Possible fluid milk marketing outlet choices					
	1=for Retailers	2=For Cafes or Restaurants	3=for collectors	4= for wholesalers	5=For processors	7= Other specify
Milk price per liter						

16) Number of channels used to sell your milk _____. List them _____

17) What is your reason for the choice of the channel you are using to sell your fluid milk? (Encircle the best match/matches)

1= Fair price 2= member to the cooperative 3= Well access of transport/ infrastructure 4= proximity to marketing center 5= Presence of market information 6= other (specify) _____

18) What mode of payment do you use to receive your milk sell price?

1= Immediate cash payment 2= future payment 3= Immediate in kind payment 4= other (specify) _____

19) Who decides the price to sell your milk? 1= myself; 2= Retailers; 3= bargaining; 4= collectors; 5= wholesalers; 6= processors; 7= Brokers; 8= other (specify) ____

20) Do you have information access to sell your milk to the market? 1=Yes; 0= No

21) If yes, how do you get? 1= via radio/TV, 2= via written pamphlets; 3= from brokers____ 4= retailers; 5= Cafes/Hotels; 6= processors; 7= other (specify) ____

22) Is there a possibility to get market access for your milk? 1= Yes; 0= No If your answer is No, what is the reason? 1= No credit access for traders; 2= high distance between market place and my residence; 3= no access of market information; 4= no fair price of milk

23). How many milking cow do you have? _____

24) Of the total weekly produced milk, what amounts of milk do you allocate?

(1) For home fluid milk consumption (liter) _____ (2) for market supply (liter) _____ (3) For further processing to get other milk products (liter) _____

25) Who perform more activities in milking and milk related activities? 1= women 2= men 3=boys 4= girls 5= other (specify) ____

26) Are you member of any of the cooperatives? 1=Yes; 0= No.

27) if your answer is yes, how many years are you engaged in as a cooperative member ____
Give the benefit you get from being a member 1= bargaining power; 2= better profitability, 3=able to process into different milk products; 4= other specify ____

28) If your answer is no, specify the reason: 1= not profitable and no fair price; 2=cooperative is not well established; 3 =no difference between members and non-members; 4=other specify_____

29) How many kilometer your home far from the nearest milk market place/center? _____km.

30) What type of transport do you use for your milk and milk products?

1= Public transport; 2= pickup truck; 3= horse cart; 4= Carrying by human labour; 5= other specify _____

Section III: support services

31) Are there financial institutions that provide you credit access? 1=Yes; 0= No

If yes, who is more important creditor? 1= credit and saving institute; 2=Bank; 3= relatives and friends; 4= other (specify) _____

32) Are you getting regular extension service? 1=Yes; 0= No. If yes, by whom? 1= Government organization (agriculture office); 2=LIVES project; 3=others (specify) _____

33) If your answer is yes, how frequency of contact? (Number of visits per month) _____

Thank you for your patience!

Survey questionnaires used for Data Collection St. Mary's University, College of Business and economics Department of Developmental economics, MSc. Program. The purpose of this study is to identify fresh whole-milk marketing actors, their functions and marketing margins along the chain and to analyze the determinants of smallholder milk producer household's milk market participation decision and their level of participation in Debrezeit town.

Annex II: Survey questionnaire for milk traders

Name of respondent _____

Name of the rural peasant kebele _____

Section I: Demographic Characteristics

1) Sex: 0= female; 1= male _____

2) Age _____ (years)

3) Marital status of the household

1= single; 2= Married; 3= widowed/widower; 4= Divorced; 5= other specify _____

4) Family size _____ Male _____ Female _____

5) Year of schooling _____

6) Respondent trader type _____

7) How many years of milk trade experience do you have? _____

8) From whom do you regularly buy milk for trade purpose? 1= from milk producers; 2=other (specify) _____

9) When you are buying your milk, who decides the price? 1= myself; 2= producers; 3= brokers; 4=other (specify) _____

10) At what price do you buy a liter of milk? _____.

11) To whom do you sell your milk? 1= to retailers; 2=to wholesalers; 3=other (specify) _____

12) At what price do you sell a liter of milk? _____. What is the marketing cost for a Liter of milk? _____.

13) When you are selling your milk, who decides the price? 1= myself; 2= to retailers; 3= wholesalers; 4= Brokers; 5=other (specify) _____

14) How many liters of milk do you buy per day? ____? Per month? ____? Per year? ____

- 15) Where do you take your milk after you buy? 1=I store for a while to wait good price; 2= I sell it immediately; 3=other (specify) _____
- 16) If you store your purchased milk, do you have storing facilities such as refrigerator and Room? 1= Yes; 0=No
- 17) Is there any credit access to support your milk trade? 1= Yes; 0=No
- 18) If your answer is yes, who is more important creditor? 1= Credit and saving institute; 2=Bank; 3= relatives and friends; 4=other (specify) _____
- 19) Do you have market information for your milk marketing? 1= Yes; 0=No
- 20) If your answer is yes, what means do you use to get such information? 1=Radio/TV; 2= Brokers; 3= Consumers; 4=Hotel /cafes; 5= other (specify) _____
- 21) What are the opportunities for entering milk market business? _____
- 22) What are the constraints in milk marketing and linkage along the chain? 1= No credit access for traders; 2= no access of market information; 3= weak linkage among the chain actors; 4=other (specify) _____

Only for milk processors

23) How many liters of milk do you process per day? _____

24) What costs do you incur to process a liter of milk?

25) To whom do you sell your processed milk products? 1=retailers; 2=consumers; 3=other (specify) __.

26) At what price do you sell your milk products? _____. Use the following table to give your answer.

Milk products	Milk products marketing outlet and price per unit						
	1=for retailer	2=For Cafes or Restaurants	3=for collectors	4= for wholesalers	5=For processors	6= For consumers	7= Specify if any other ...
1) Yogurt (litre)							
2) Butter (kg)							
3) Butter milk (litre)							
4) Cheese (kg)							
5) Ghee (kg)							
6) Skimmed milk(litre)							

Thank you for your patience!

Survey questionnaires used for Data Collection St. Mary's University, College of Business and economics Department of Developmental economics, MSc. Program. The purpose of this study is to identify fresh whole-milk marketing actors, their functions and marketing margins along the chain and to analyze the determinants of smallholder milk producer household's milk market participation decision and their level of participation in Debrezeit town.

Annex II: Survey questionnaire for milk consumers

Name of respondent _____

Name of the rural peasant kebele _____

Section I: Demographic Characteristics

1) Sex: 0= female; 1= male _____

2) Age _____ (years)

3) Marital status of the household

1= single; 2= Married; 3= widowed/widower; 4= Divorced; 5= other specify _____

4) Family size _____ Male _____ Female _____

5) Year of schooling _____

6) Is there milk market supply access in your locality? 1= Yes; 0=No

7) Do you consume milk? 1= Yes; 0=No

8) If yes, at what frequency do you consume? 1=daily; 2=rarely; 3=other (specify) ____

9) From whom do you regularly buy milk for consumption purpose? 1= from milk producers;

2= from retailers; 3= from Cafes and Hotels; 4=All; 5=other (specify) _____

10) At what price do you buy a liter of milk? _____.

11) How many liters of milk do you buy per day? _____? Per month? _____? Per year? ____

12) When you are buying your milk, who decides the price? 1=myself; 2= brokers;

3=producers; 4= other (specify) _____.

13) Do you have market information for milk marketing? 1= Yes; 0=No

14) If your answer is yes, from whom do you get such information? 1=Radio/TV; 2= Brokers;

3=Hotel /cafes; 4= producers; 5= other (specify) _____

Thank you for your patience!

