

**ANALYSIS OF LOCAL DAIRY VALUE CHAIN FOR
SMALLHOLDER PASTORALISTS IN SIMANJIRO DISTRICT,
TANZANIA**

By

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**A Dissertation Submitted in Partial/Fulfillment of the Requirements for the
Master's Degree of Science in Procurement and Supply Chain Management of**

Mzumbe University

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CERTIFICATION

We, the undersigned, certify that we have read and hereby recommend for acceptance by the Mzumbe University, a dissertation entitled: Analysis of local diary value chain for smallholder pastoralists in Simanjiro district, Tanzania, in partial/fulfillment of the requirements for award of Master's degree of Science in Procurement and Supply chain Management of Mzumbe University.

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DEDICATION

Special dedications to **Laanyuni Sumuni** and **Susanne Rasmussen** for their sincere love and commitment to my studies. To my love **Sinyati Paulo** and my beloved son **Losim**. It was a sacrifice on their part but I hope the quality of their lives will improve in the years to come.

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ABBREVIATIONS

ADCE – African Dairy Conference and Exhibition

CBPP – Contiguous Bovine Pleural Pneumonia

DOSI – Dutch Orkonerei Social Investment

FAO – Food Association Organization

FMD – Foot and Mouth Disease

GDP – Gross Domestic Product

ILO – International Labor Organization

ILRI – International Livestock Research Institute

IOPA – Institute of Orkonerei Pastoralist Advancement

Ltd – Limited

MCPC – Milk collection and processing Centre

MLFD – Ministry of Livestock and Fisheries Development

MMA – Match Makers Association

MPU – Milk Processing Unit

NBS – National Bureau of Statistics

NGO – Non Governmental Organization

OMASI – Orkonerei Maasai Association Social Initiative

OMG – OMASI Marketing Group

SHGW – Stichting Het Groene Woudt

SME's – Small and Medium Enterprises

TAMPA – Tanzania Milk Processors association

TAMPRODA – Tanzania Milk Producers Association

TDB – Tanzania Dairy Board

UHT – Ultra High Temperature milk

USD – United States Dollar

VC – Value Chain

VCA – Value Chain Analysis

WHO – World Health Organization

ABSTRACT

The study aimed at analysis of local dairy value chain for smallholder pastoralists. The first objective was to identify the structure of local dairy value chain and key actors' roles. This study found that, the local dairy value chain in Simanjiro consist five (5) distinct stages, namely; input supply, milk production, trading, processing and consumption. The main actors in the dairy value chain were input suppliers, milk producers, milk traders, milk processors and milk consumers.

The second objective was to explore chain strategies developed by chain actors in market milking. Results showed that; actors' chain-strategies developed were; contractual agreement between pastoralists and milk buyers, actors often attending trainings on milk marketing, and pastoralists' collective actions whereby benefits are accrued by being member of milk marketing groups.

Third objective was to identify business challenges facing local dairy value chain actors in the study area. Findings revealed that, challenges identified to exist were; Seasonal fluctuations in milk availability, Livestock diseases, lack/few market channels for milk and milk products, poor cold chain infrastructures, facility breakdowns, quality aspects and low capacity of existing processing units. The conclusions attained through findings discussion recommended the following; Sensitize value chain concept as an economic tool to develop milk and milk products value chain, Improving efforts of milk producers on milk production and livestock management, and improvement of existing small scale milk processing units.

TABLE OF CONTENTS

CERTIFICATION	ii
COPYRIGHT	iv
DEDICATION	v
ACKNOWLEDGEMENT	vi
ABBREVIATIONS	vii
ABSTRACT	ix
TABLE OF CONTENTS	x
LIST OF TABLES	xiii
LIST OF FIGURES	xv
CHAPTER ONE	1
INTRODUCTION.....	1
1.0 Overview.....	1
1.1 Background of the study	1
1.2 Statement of the problem	4
1.3 Research questions.....	5
1.4 Study Objectives	5
1.4.1 General Objective	5
1.4.2 Specific Objectives	5
1.5 Scope of the study	6

1.6 Significance of the study.....	6
1.7 Limitations of the study	6
1.8 Rationale/Justification of the study.....	7
1.9 Organization of the dissertation	7
CHAPTER TWO	9
LITERATURE REVIEW.....	9
2.0 Overview.....	9
2.1 Theoretical Literature review.....	9
2.1.1 Meaning of terms	9
2.1.1.1 Supply chain	9
2.1.1.2 Value chain	10
2.1.1.3 Value chain mapping	12
2.1.1.4 Value Chain Analysis (VCA)	14
2.1.2 Dairy sector in Tanzania	16
2.1.3 Milk production in Tanzania.....	17
2.1.4 Milk processing.....	19
2.1.5 Milk marketing	21
2.2 Empirical Literature review	22
2.3 Research gap	25
CHAPTER THREE	26
RESEARCH METHODOLOGY	26
3.0 Overview.....	26

3.1 Research design	26
3.2 Area of the study	26
3.3 Target population	28
3.4 Sampling Techniques and sample size.....	28
3.5 Data collections methods	29
3.6 Types of data collected	30
3.7 Data Analysis.....	30
3.8 Validity of research instruments	31
3.9 Reliability of the Study Instruments	32
CHAPTER FOUR.....	33
PRESENTATION AND DISCUSSION OF FINDINGS	33
4.0 Overview.....	33
4.1 Structure of the local dairy value chain and key actors' roles	33
4.1.1 Inputs Supply	34
4.1.2 Milk Producers.....	36
4.1.3 Milk marketing systems (Bulking)	38
4.1.4 Milk Trading	40
4.1.5 Milk Processors.....	41
4.2 Chain strategies developed by actors in milk marketing in the study area	44
4.2.1 Contracts in milk marketing.....	44
4.2.2 Trainings to pastoralists	45
4.2.3 Pastoralist's Collective actions	47

4.3 Business challenges facing chain actors	48
4.3.2 Milk producers	49
4.3.2 Milk trading	52
4.3.3 Processors level.....	53
4.3.4 Consumption.....	56
CHAPTER FIVE.....	58
SUMMARY, CONCLUSIONS AND POLICY IMPLICATIONS.....	58
5.0 Overview.....	58
5.1 Summary	58
5.2 Conclusions.....	60
5.3 Policy Recommendations.....	62
5.4 Areas for further studies.....	66
REFERENCES.....	67
APPENDIX I	70
APPENDIX II.....	72
APPENDIX III	73
VITA.....	74

LIST OF TABLES

Table 4.1 Inputs Supply to pastoralists.....	35
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Table 4.2 Amount of milk produced by pastoralists daily.....	37
Table 4.3 Distribution of pastoralists into milk marketing channels.....	39
Table 4.4 Types of contractual arrangements used by pastoralists supplying MPU....	45
Table 4.5 Proportions of pastoralists trained by different facilitators.....	46
Table 4.6 Benefits accrued by group membership by pastoralists.....	47
Table 4.7 Challenges facing milk producers.....	49
Table 4.8 Challenges facing milk traders.....	52

LIST OF FIGURES

Figure 2.1 Generic value chain map	13
Figure 3.1 Map of Simanjiro district.....	28
Figure 4.1 Structure of local dairy value chain in Simanjiro district.....	34
Figure 4.2 Milk marketing channels by pastoralists.....	39
Figure 4.3 Milk trading channels by traders.....	41

CHAPTER ONE

INTRODUCTION

1.0 Overview

This chapter depicts background of the research problem, the statement of the problem, research objectives and research questions. It also describes the scope, significance, limitations of this study and give out Justification/Rationale of the study. Organization of the entire dissertation was indicated at the end of this chapter.

1.1 Background of the study

Tanzania ranks third in Africa after Ethiopia and Sudan in livestock keeping. Livestock is among the major agricultural sub-sectors in Tanzania. Livestock resources for Tanzania include 21.3 Millions cattles. More than 90% of livestock population in the country is of indigenous type, kept in traditional sector, known for their ability to survive and produce in even harsh environment with poor feed resources (MLDF, 2012). The livestock sector contributes 3.8% of GDP. The contribution of livestock is not limited to its share in the total GDP but also play other important roles such as contribution to national food supply (meat, milk and eggs), and food security; acts as a source of cash income, employment and an inflation free store of value. It also provides manure and draught animal power thus contributing to sustainable agriculture. In addition, livestock play an import substitution role in the consumption of livestock products in the country (Njombe, 2012). Similarly, the dairy industry is among the important components of the livestock sector. The sector has a great potential for

improving the living standards of the people and contributing towards reduction of poverty through improved nutrition, arising from consumption of milk and incomes raised from sale of milk and milk products. Milk is a source of animal protein, income and employment (ILRI, 2012)

However, pastoralists are not economically benefited out of huge milk production in the extent at which ought to be. Consequently, their livelihood is vulnerable to different natural and artificial shocks. Among others is that the lack of coordination between milk value chain activities i.e milk production, milk processing and milk consumption is less or not functioning (ILRI, 2012). A lot of raw milk goes to waste due to the lack of adequate cooling, transportation and processing facilities, especially during the high season of milk production (TAMPA, 2009).

Studies show that; the focus among donor organizations has been to increase the participation of smallholder farmers in high-value global value chains. According to Lie, (2011) a particular emphasis has been on the promotion of exports, often of organic and fair trade products, with support from either the private sector or public sector, and facilitated through NGO's and other international development agencies.

However, in such high-value global dairy value chains, smallholder pastoralists have limited control. Such value chains may thus be less appropriate for many smallholder actors, who may lack the ability to handle dynamic markets and comply with the increasing amount of regulations and standards (Lie, 2011). It is known phenomenon

that, agri-food products is based on consumer assurance, high standards for food quality and safety, low prices, and reliability of supply, lead actors in retail or export often coordinate the value chain. The ability of smallholder pastoralists to take the lead is limited; Power is often concentrated among one or a few chain participants that coordinate market activity (Shepherd, 2007)

On the other hand, local value chains that meet growing local demand might be more within the reach of smallholders. According to Herr (2007) an in-depth analysis of successful smallholder initiatives in local value chains could give valuable insights on how to develop value chains based on local resources and context.

This study describes a local dairy value chain in Simanjiro district, using DOSI – Engiteng’s, a social business organization in Simanjiro, which aims on improving living conditions for pastoralists communities in Tanzania through commercialization of milk from pastoralists and milk products. The major concern of this study was identifying and/or maps the structure of the milk value chain for smallholder pastoralists in Simanjiro through an in-depth assessment of the supply chain of milk and milk products marketing through identifying actors, value adding activities and relationships. The analysis makes use of a value chain approach that provides a framework to map and describe local value chain in which smallholder pastoralists can participate. In particular this study highlights the benefits of establishing local value chains to smallholders in the area with realization of value addition and benefits distribution. The study also

highlights ways used by actors in developing strategies in milk marketing and challenges cum facing chain actors.

1.2 Statement of the problem

As stated earlier, there is huge livestock resource in the pastoral communities of Tanzania in general and pastoralists in Simanjiro in particular, they are not economically benefited out of it to the extent at which ought to be. Consequently, their livelihood is vulnerable to different natural and artificial shocks. Among others lack of coordination of local value chain, appropriate marketing channel and limited degree of response that resulting weak market integration is the impediments which affect their marketing activities.

Studies have been focusing to increase the participation of smallholder farmers in high-value global value chains. Such value chains may thus be less appropriate for many smallholder actors, who may lack the ability to handle dynamic markets and comply with the increasing amount of regulations and standards. Supporting the pastoralists to commercialize milk and milk products adds value to their locally available resources and this could be a means to build their resilience against the shock they are facing. To this end, this study analyzed the local dairy value chain for smallholder pastoralists in Simanjiro district.

1.3 Research questions

- a) What is the structure of local dairy value chain and key actors' roles for smallholder pastoralists in Simanjiro?
- b) How chain actors developed chain-strategy in marketing of milk?
- c) What are businesses challenges facing actors of the local dairy value chain?

1.4 Study Objectives

The study comprises general and specific objectives

1.4.1 General Objective

The general objective of the study was to analyze local dairy value chain for smallholder pastoralists in Simanjiro District, Tanzania

1.4.2 Specific Objectives

The study addressed the following specific objectives

1. To identify the structure of the local dairy value chain and key actors' roles in the study area.
2. To explore how chain actors developed chain-strategy in milk marketing in the study area.
3. To identify business challenges facing actors of local dairy value chain in the study area.

1.5 Scope of the study

The study was confined to pastoralists at Terrat, Naberera and Orkesumet divisions of Simanjiro district and DOSI-Engiteng's, milk processing units in Simanjiro District; located in the study area. Also it has involved pastoralists (milk producers), milk collectors, milk processors and local milk-buyers at community auctions (markets) in the study area.

1.6 Significance of the study

The findings of this study have the following significances as described below:

Add to the existing body of knowledge about the local dairy value chain in Simanjiro District. Findings and recommendations of the study can be used by DOSI-Engiteng's to adjust their operations to ensure benefits distributions among value chain actors with the aim of improving living conditions for pastoralists communities in Simanjiro. Support the pastoralists to commercialize milk and milk products for betterment of their economy. Academically, the final report of this study was submitted by the researcher to the school of Business as the requirements for partial fulfillment for the award of Master's degree of science in Procurement and Supply Chain Management of Mzumbe University.

1.7 Limitations of the study

Funding: The research is academic, no funds allocated by the university. The researcher supports himself for the study expenses to cover stationeries, field visits and accommodations. Simanjiro district is a Pastoral area; therefore it was difficult to find

pastoralists at homes in day times because of pastoral activities. Difficulty in estimation of profits margins of actors due to their poor financial records keeping. These limitations had moderate effects to the completion of this study but the researcher developed some mitigation to overcome them. Among the mitigations was making appointments to meet with respondents in the VEO offices in day time and also visits community markets to identify milk prices, buyers and other financial records pertaining milk business.

1.8 Rationale/Justification of the study

Smallholder pastoralists are important component of the Tanzanian dairy sub-sector. This is because it constitutes 80% of the total dairy sub sector (ILRI, 2012). The profits and value flow of the smallholder dairy pastoralists remain to be variable and dismal in many of the farms, therefore the mapping and analysis of local value chain together with exploring marketing strategies and challenges are worth noting. Apart from the known global dairy value chains, developing local dairy value chain and exploring marketing strategies are important to understand. Most studies on dairy value chains have been focusing on analyses of complex global value chains. In such global chains smallholder pastoralists has limited control. Thus this study depicts structure of local dairy value chain and chain strategies developed by actors in marketing of milk, not left-aside business challenges facing chain actors.

1.9 Organization of the dissertation

The dissertation has been organized under five chapters. Chapter One pinpoints background, statement of the problem, research questions, objectives, significance of the

study, scope and limitations of the study and justification and organization of the dissertation. Chapter Two presents review of theoretical and empirical literatures to the study. Chapter Three discusses research methodology (research design, area of the study, target population, sampling and sample size, methods of data collection, types of data collected and data analysis) of the study. Chapter Four presents results and discussions of the findings and finally Chapter Five gives conclusion, recommendations and policy implication of the study.

CHAPTER TWO

LITERATURE REVIEW

2.0 Overview

This chapter reviews theoretical and empirical literature, and depicts a conceptual framework.. Section 2.1 starts with the theoretical part. This section includes meaning of terms; supply chain, value chain, value chain mapping, value chain analysis, and discussion of dairy sector, milk production, processing and marketing in Tanzania. Empirical literature review is explained in section 2.2; this chapter ends with research gaps in section 2.3.

2.1 Theoretical Literature review

2.1.1 Meaning of terms

2.1.1.1 Supply chain

The terms production chain, supply chain, market chain and value chain are often used interchangeably, but in fact there are some important differences. In its simplest definition, the terms production chain, supply chain, market chain are synonyms used to describe all participants involved in an economic activity which uses inputs and services to enable a product to be made and delivered to a final consumer.

According to Harrison, (2008) a supply chain is a network of partners who collectively convert a basic commodity (upstream) into a finished product (downstream) that is valued by end-customers, and who manage returns at each stage.

Lysons, (2006) defines supply chain as the network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that produce values in the form of products and services in the hands of the ultimate customer or consumer.

According to Baily *et. Al* (2008) supply chain is concerned with the co-ordinated flow of materials and services from origins through suppliers into and through the organisation and on to the ultimate consumer in such a way as to maximise value added and minimise cost.

Milk Supply chain takes the similar orientation as meanings given by authors. In order to get from raw milk to milk products, several actors are involved. The main actors in the supply chain include: the farmers who produce the milk, the hawkers who sell the milk to the informal market, the traders who transport the milk from the farmer to the Traders (collectors), and processors who process the milk.

2.1.1.2 Value chain

The value chain is a concept which can be simply described as the entire range of activities required to bring a product from the initial input-supply stage, through various phases of production, to its final market destination. The production stages entail a combination of physical transformation and the participation of various producers and services, and the chain includes the product's disposal after use. As opposed to the traditional exclusive focus on production, the concept stresses the importance of value

addition at each stage, thereby treating production as just one of several value-adding components of the chain.

According to Kaplinsky and Morris (2001), value chain is the full range of activities that are required to create and add value to a finished product or service. This refers to the different phases of production from raw material, processing, distribution, and marketing until the product or service reaches the consumer and is disposed of after use.

The term 'Value Chain' was used by Michael Porter in his book "Competitive Advantage: Creating and Sustaining superior Performance" (1985). The value chain describes the activities the organization performs and links them to the organizations competitive position.

The value chain describes the full range of activities which are required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumers, and final disposal after use (ILO, 2009).

According to Van den Berg et al. (2008) there are three main concepts of value chain; the "filière concept", the "Porter concept" and the "global concept" of value chain analysis. Within the filière concept of value chain analysis, emphasis is placed on the physical flow of goods from producers to consumers represented in flow charts (Essang, Woin and Badeboga, 2003). The Porter concept of value chain emphasizes competitive advantage of businesses which may not be tied to any actual physical transformation of

product (Porter, 1985). The global concept of value chain centers on analyzing the way in which firms and countries are integrated with the advance of globalization (Keane 2008).

From the foregoing, it can be said that value chain analysis may have very diverse application (Miehlbradt, 2007), thus, different approaches in value chain analysis are useful depending on the goal of the analysis.

According to Roduner (2007) value chain concept in dairy sector is very important as increasingly dairy products are hardly consumed in the place where they are produced but are transformed, combined with other products, and transported from one actor (owner) to the other with value addition to the product, packaged and displayed until it gets to the final consumer. The final consumer in turn, must be able and, willing to pay for the value addition and services involved in the transformation of the product.

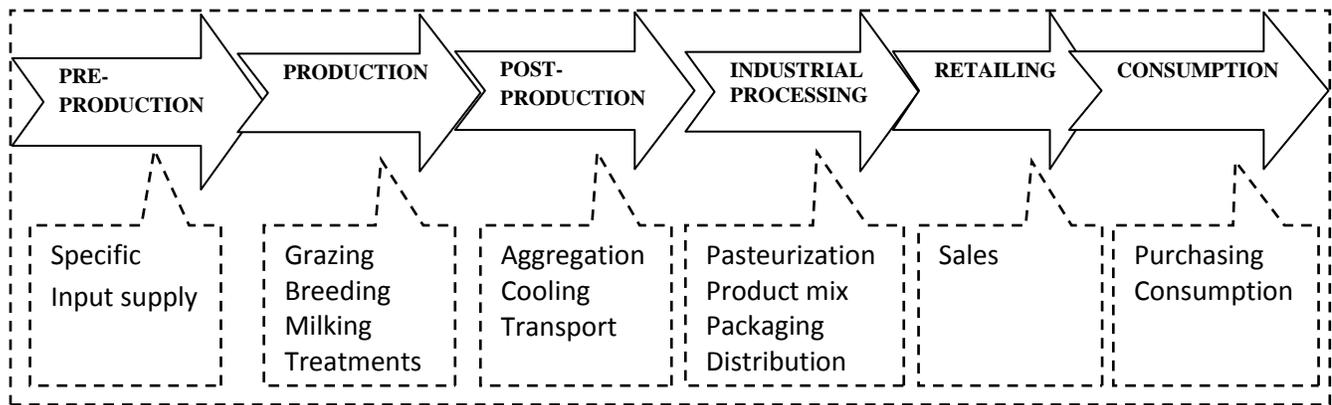
2.1.1.3 Value chain mapping

Mapping a chain means creating a visual representation of the connections between businesses in value chains as well as other market players (ILO, 2009). In its simplest form it is merely a flow diagram (i.e. illustrating the core transactions of value chains). More sophisticated versions show that some enterprises differ in size and that some connections are more important than others; and they help to identify bottlenecks and leverage points (ILO, 2009). Value chain maps help to get a quick grasp of complicated

realities, also illustrating, for example, how core transactions in value chains are connected with the market players in the immediate and wider business environment.

Constructing a map is not a quick job and how long it takes, depends on how much you already know about the enterprises and workers whose situation in the (global) market system you are trying to capture (ILO, 2009). There are of course many different ways of constructing value chain maps, but there is no one-size-fits-all template for value chain maps and most importantly is to experiment; to adapt the value chain map to the local context and needs of the value chain initiative. According to (Van de berg, 2001) the generic value chain map is as shown below on figure 2.1.

Figure 2.1: A Generic dairy value chain map



Source: Adopted from (Van de Berg, et al, 2001)

A value chain map can serve as a way of identifying and categorizing key market players. Such value chain maps (or inventories) have been used in projects to invite market players to various workshops and events, arrange interview appointments with them or form steering groups comprising key market players. If a value chain initiative

intends to explore market opportunities, value chain maps can show up different market channels through which products and services reach the final customer. These maps can also provide additional information on the relevance of individual market channels and the nature of relationships (e.g. number of competitors, size of market, number of workers, value chain governance, etc.)

2.1.1.4 Value Chain Analysis (VCA)

Value chain analysis is an analytical tool that helps to understand the way in which firms (large and small) are integrated and linked in the value chain. VCA examines all the actors involved in the chain, the linkages between them, and the activities within each link. It also takes into account market demand, buyer requirements, quality standards, and local, regional, national and global influences on the chain (Kaplinsky and Morris 2001,).

In doing so, the value chain approach goes beyond firm- or activity-specific analysis as it looks at all the actors and institutions that play a part of a product or service's life cycle, rather than single enterprises (Gereffi, Humphrey and Sturgeon 2005).

VCA describes the activities within and around an organization, and relates them to an analysis of the competitive strength of the organization. Therefore, it evaluates which value each particular activity adds to the organizations products or services (Porter, 1985).

Again, VCA is the process of breaking a chain into its constituent parts in order to better understand its structure and functioning. The analysis consists of identifying chain actors at each stage and discerning their functions and relationships; determining the chain governance, or leadership, to facilitate chain formation and strengthening; and identifying value adding activities in the chain and assigning costs and added value to each of those activities (ILO, 2009). The flows of goods, information and finance through the various stages of the chain are evaluated in order to detect problems or identify opportunities to improve the contribution of specific actors and the overall performance of the chain.

By going beyond the traditional narrow focus on production, value chain analysis scrutinizes interactions and synergies among actors and between them and the business and policy environment. Thus, it overcomes several important limitations of traditional sector assessments which tend to ignore the dynamic linkages with and among productive activities that occur outside the particular sector under assessment or involve informal operations.

Value chain analysis also reveals the dynamic flow of economic, organizational and coercive activities involving actors within different sectors. It shows that power relations are crucial to understanding how entry barriers are created, and how gain and risks are distributed.

VCA helps to illustrate and understand the process by which a product goes through several stages until it reaches the final customer (i.e. the core transactions). Knowing about the different levels in a value chain is also a precondition for identifying bottlenecks that are preventing the achievement of certain targets.

According to Kaplinsky and Morris (2001) framework model, the value chain analysis has four main components; first it maps the activities in the chain and characterizes the actors participating in it, Second, assess governance structures in value chain to understand the relationships and coordination mechanisms that exist between actors in the chain and how these may need to be restructured to improve the chain. Third, VCA highlights upgrading strategies based on constraints and opportunities in the chain. And finally evaluates who benefits from participation in the chain, and assesses how the distribution of benefits will be influenced by restructuring the chain through different upgrading strategies.

2.1.2 Dairy sector in Tanzania

Tanzania is primarily an agro-based economy. The agricultural sector employs more than 80 percent of the population. Out of the 4.9 million agricultural households, about 36% depend on livestock as a source of livelihood. In Tanzania there are 18.5 million cattle (ranking third in Africa after Ethiopia and Sudan), 13.1 million goats (ranking fifth in Africa) and 3.6 million sheep. The livestock sector contributes to 30 % of the agricultural GDP in 2006 and of that the dairy sector contributes 30 % (FAO 2009; Njombe and Msanga 2009).

The livestock sector in Tanzania makes an important contribution to national food supply, food security and to the livelihood of smallholders by providing a source of cash income, employment and an inflation-free store of capital (MMA 2008; Njombe & Msanga 2009). Milk is one of the products which provide farmers with income throughout the year. To realize market exchange several actors are involved: the farmers that produce the milk, the processors and the consumers.

Development of the dairy industry is limited by several threats. One of the main stumbling blocks for the dairy industry development in Tanzania is inadequate milk production and next to it is the development of the market for processed dairy products. Production of milk is seasonal and so is the consumption pattern albeit at a lesser extent current flows of milk for processing purposes are not meeting the installed capacity for processing. Other threats include inadequate financial credit and processing facilities, poorly organized marketing system, low consumption of milk and animal diseases, inadequate nutrition, support services and insufficient supply of dairy stocks. (MMA, 2012)

2.1.3 Milk production in Tanzania

In Tanzania milk production is mainly from cattle. Of the 18.8 million cattle found in the country about 560,000 are dairy cattle which consist of Friesian, Jersey, Ayrshire breeds and their crosses to the East African Zebu. The rest are indigenous cattle raised as dual purpose animals that are for milk and meat production. Dairy goats are also gaining

popularity as a source of milk particularly to the poor and their milk is normally consumed at household level.

About 70% of the annually produced milk comes from traditional sector (indigenous cows), whereas the commercial sector (dairy cows) produce about 30%. Milk supply has increased 130% over the last decade to about 1.6 billion litres (NBS 2009), implying a per-capita milk consumption/availability of approximately 39 litres per annum. The increase in milk production from both indigenous and improved dairy cattle is mainly due to increase in herd size rather than in productivity per head (milking cow). Arusha and Kilimanjaro regions supply about two-thirds of the milk. Other significant producing regions are Tanga, Mwanza, Kagera, and Dar es Salaam (NBS, 2009).

Most of the farmers in Tanzania are pastoralists. They send their wife or children out with their cows to find grazing land and water. This is a traditional farming principle and most farmers still adhere to it. Only in the mountainous regions the zero-grazing principle is more frequently applied. In these regions there are more cross breeds with a higher milk production if they are maintained well. There is no space for free grazing because the land in the mountain is too forested. Therefore, people prefer to keep a limited number of cows in these areas.

However the performance of the sector has been dismal in absolute context, the output of milk per cow is such low that in 2008 Tanzania produced 1,664 million litres of milk. A study in 2009 that covered Dodoma, Manyara, Morogoro, Shinyanga, Singida and

Tabora indicated that output per traditional cattle is as low as 0.5 litres per lactating day/cow (Ijumba, 2011).

2.1.4 Milk processing

According to MLDF Budget speech - August 2012, indicated that Tanzania has 63 processing companies with an installed processing capacity of 417,000 Litres / day out of which only 130,400 Litres (33.3%) of the capacity is utilized. This is huge challenge for viability and competitiveness.

Presently most of the processing plants are working at less than 12% of the installed capacity, resulting in only 60,000 litres being processed per day. The low performance in milk processing makes the dairy industry uncompetitive in the region as shown by the rise in milk imports from 3,459 MT in 1997 to 7,111 MT in 2004 worth about US\$ 10 million. This level of imports shows that the demand for processed milk is grossly undersupplied.

Reasons for this low performance include inadequate raw milk production (due to seasonality, milk being produced in small quantities and small scale milk producers being widely spread in remote areas) which increases milk collection and transportation costs , high cost of milk processing due to high cost of equipment, machinery, packaging materials and utilities. In addition to the poor infrastructure, high cost of doing business and low milk consumption levels also constrain milk processing.

Recently, the government, private and donor agencies are actively discussing ways of reviving the sector's contribution to the national economy. Dairy processors seem to have organized themselves quite well under umbrella of Tanzania Association of Milk Processors (TAMPA). Most of the processors in Tanzania are a member of TAMPA (Tanzania Milk Processors Association), which was established in 2001. TAMPA aims "to create a better business environment for milk processing in the country". It serves as a platform for the local milk processors to meet and discuss the developments in the Tanzanian dairy sector. TAMPA also enables dairy processors to submit collective proposals to the central and local governments and non-governmental institutions. As such, TAMPA brings the dairy processors together to speak with one, strong voice.

Milk producers (essentially small scale based) are not yet so well organized. The Tanzania Milk Producers Association (TAMPRODA) is at its formative stages. The government has responded well to the need for dialogue with private sector and support organizations by establishing the Tanzania Dairy Board which has overseen a number of regulatory and policy issues been re examined and streamlined. There are still a number of unresolved issues particularly on enforcement of regulations and enabling environment that render the industry uncompetitive.

2.1.5 Milk marketing

The dairy industry is also heavily influenced by the informal sector operations. Although recent data for milk production shows that there has been an increase from 1.74 billion Litres in 2010/11 to 1, 85 billion Litres in 2011/12, most of it (over 99%) is traded informally without processing. Out of the annual national production a huge share of 72 % of the milk produced is consumed on farm and not marketed while the remaining 28% are marketed. Over 90.5 % of the marketed milk is traded through traditional informal markets; only approx. 9.5% is processed and sold through formal markets (ADCE, 2011).

Remoteness and poor infrastructure constitute the largest bottlenecks to collection and marketing of milk. Thus the milk produced is mostly consumed locally and quite often a significant amount is left for the calves. However, some producers who depend on milk for their cash income are willing to exploit the available opportunity in marketing their produce, for example, Maasai herders who transport milk by bicycles over long distances, for sale at collection centres located along the Dar es Salaam – Chalinze – Segera and Dar es Salaam – Chalinze – Morogoro – Dodoma highways.

Official figures indicate that milk consumption in Tanzania has been increasing from 20.4 litres in 1995 to 39 litres to date. However, the levels are still low compared to other countries and the 200 litres recommended by FAO. The cause for such a low consumption rate in Tanzania, among others, is attributed to low production, cultural beliefs and traditional taboos making people refrain from consuming milk. This has

greatly limited expansion of the domestic milk market and development of the dairy industry in general. Since consumption of milk has a catalytic effect in improving levels of milk production and processing, it calls for concerted efforts in cultivating a habit of taking milk as food/ drink to people especially children hence the continued efforts in promoting milk consumption through annual milk consumption events such as annual milk week.

Imported products command 44% of sales in Tanzania (NIRAS Study 2010). These imported products are mainly UHT, Ghee, Butter and Cream. The competition with imported packaged milk inhibits production and sales by local dairy processors. Imported products from e.g. Middle East, New Zealand, Kenya, Zimbabwe and Southern Africa can be found on retail shelves at competitive prices despite high import duties, which indicate that appropriate taxes and duties are not levied yet; resulting in unfair competition with locally produced packed milk.

2.2 Empirical Literature review

YONAD Business Promotion and Consultancy Service (Ethiopia) conducted a study in (2009), to analyze the milk and milk products value chain in Borana pastoral community, primarily undertaking an in-depth assessment of the milk and milk products marketing through identifying actors' factors and relationships. This study identified that; there are opportunities which the competitiveness of milk subsector can be built up on, there was untapped high milk production potential, small portion of the total marketable milk reaches the terminal market, addressing the constraints needs a value

chain approach, there were organizational and business management and development gaps among the small-scale milk processing units, any interventions in the milk and milk value chain should address the poor and women pastoralists. It is anticipated all the interventions will be implemented by the stakeholders operating in the area and engaged directly or indirectly on milk and milk products subsectors.

According to TAMPA (2009), most of milk processors face a number of problems including; unstable milk supply. Farmers are often not very dedicated in delivering their milk to the milk collection centers they are very opportunistic in their behavior and are easily tempted to sell their milk to another processor or to the informal market when offered a better deal. Seasonality in the dry season the production is very low and the competition for milk between the hawkers and the processors intensifies. In contrast, in the wet season the milk is abundant and not even all the milk can be sold and processed. Weak institutional support, the government's involvement in the sector is not very strong.

Survey on Dairy Products Market in Tanzania conducted by NIRAS/RLDC, 2010 in the subsistence farming system, milk is produced on the farm and entirely consumed by the farming community, this part of the dairy sector accounts for 29.5 % of total milk consumed in the country. Sixty seven percent of milk consumed in the country enters the market but it is marketed by hawkers through traditional channels. Considering the size of this sector, as well as its regional coverage it seems to be logical that the majority of

interventions with the task of improvement of the dairy value chain were focusing their activities on this sector in the past two decades.

Lie (2011), conducted a study in Tanzania, aimed to assess the potential for local dairy value chains as an approach for smallholder farmers to improve their livelihood, using goat milk yoghurt for smallholders farmers in Mgeta. Findings confirm that local dairy value chains are beneficial for both the smallholder farmers' directly involved in the chain and to others in the community. The commercialization of goat milk yoghurt has given smallholders in Mgeta a stable and increased income. Other positive impacts are an increased asset base for the farmers involved, job creation, and other ancillary effects like improved household nutrition. The chain has potential for further development and positively benefitting more smallholder farmers in Mgeta. However, there are challenges related to lack of critical assets such as electricity, proper packaging, and lack of access to information and finance that complicates the development of becoming an increasingly competitive chain.

The study by MMA, (2012) on the product diversification, market opportunities and business viability analysis for Engiteng dairy products in Tanzania concluded that, the main problems affecting the feasibility of the Engitengs includes; Insufficient milk supply to individual Engitengs, ideal practices in dairy processing require at minimum that milk supply be guaranteed throughout the year in order to retain viability; poorly developed milk collection system. There are limits to the quantity, cost and distance to be covered in collecting milk, especially when operating in pastoralist's areas, to

optimize cost effectiveness and efficiency, lack of proper infrastructure (Power and road), Community and social involvement at the expense of viability, adverse community and political interventions based on the social context of the project, lack of profitability orientation among staff members, educational and social background of staff providing challenges with regard to obtaining and maintaining basic production parameters.

2.3 Research gap

There exists a large body of literature dealing with global value chains. Contemporary value chain research has generally been biased towards global value chains and local value chains have received little attention in the context of developing countries. In high-value global dairy value chains, smallholder pastoralists have limited control. Such value chains may thus be less appropriate for many smallholder actors, who may lack the ability to handle dynamic markets and comply with the increasing amount of regulations and standards. Much less work has been focused on local value chains that might provide viable market opportunities, especially for smallholder farmers. Furthermore, improper marketing channel is one of the major constraints of dairy sector in Tanzania. Milk production and marketing in Tanzania is dominated mainly by the informal private sector. Thus, a stronger focus on developing and understanding local value chains in Tanzania is needed.. The researcher adhere to this view in analyzing the local diary value chain for smallholder pastoralists in Simanjiro District, Arusha

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Overview

This chapter depicts methods and techniques that a researcher applied during his study. It provides a plan of action used by the researcher, clearly defining research design, area of the study, target population, sampling techniques, sample size, data collection methods, Data analysis and presentation.

3.1 Research design

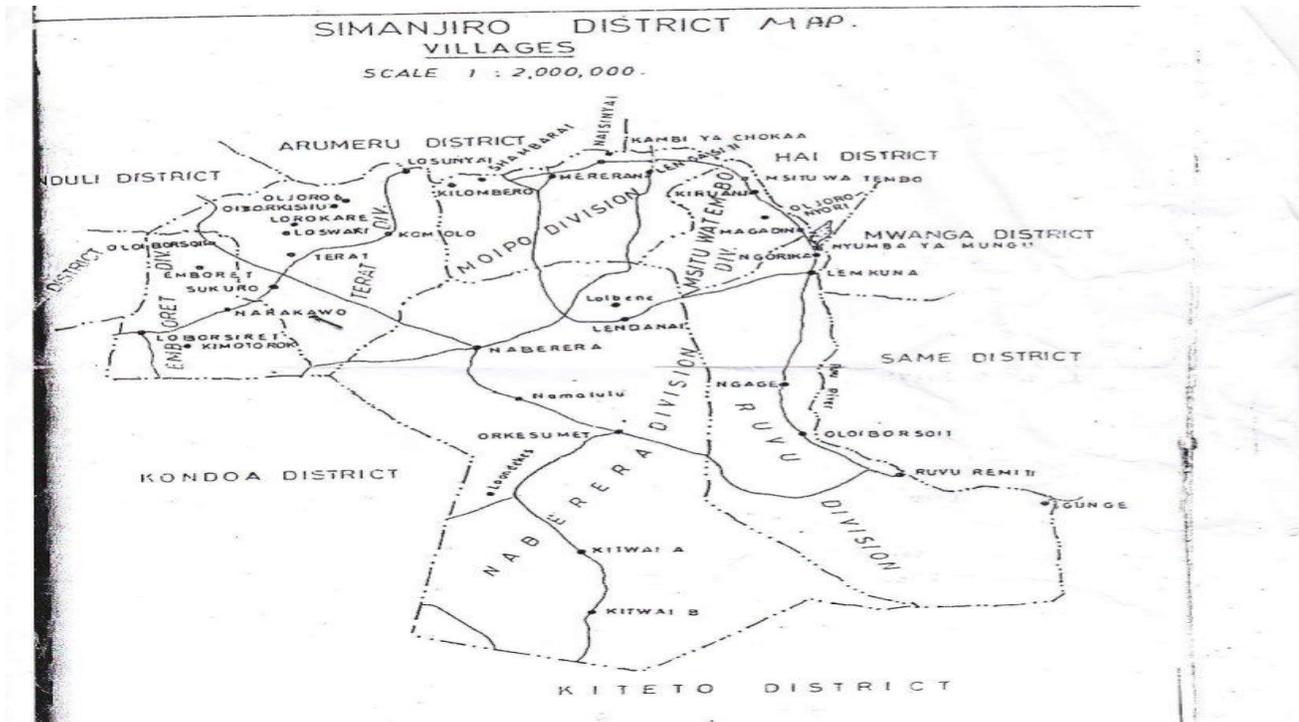
The researcher used a survey design, to allow extensive investigation of the unit based on time and financial resources allocated to this research project. This method of research involves collection of data directly from a population or a sample thereof at particular time. It is a field study always conducted in a natural setting. Also survey allows flexibility on using various methods of collecting data like; questionnaire, interview and observation (Kothari, 2009).

3.2 Area of the study

The study was confined to Simanjiro District, specifically at Terrat, Orkesumet and Naberera divisions and DOSI-Engiteng; MPU owned by DOSI present in the area. Simanjiro District was chosen because of its pastoral nature, consisting of prominent Milk processing Units, who buys milk directly from nearest household and processing to varieties of products.

Simanjiro is one of the 5 districts of the Manyara region of Tanzania. It is bordered to the north by Arusha Region; to the north east by Kilimanjaro Region; to the south east by Tanga Region; to the south by Kiteto District to the south west by Dodoma Region and to the west by Babati District. Simanjiro district is a Semi – Arid with an average annual rainfall of 500mm. It has dual periods of unreliable rainfall comprising of short rains in November – December and long rains on March – April. The cold months are May – July, while the hot months includes August- February. Temperature ranges from 13° - 30° centigrade. The total land coverage and utilization also varies significantly in each ward. However, out of the total land coverage most portions are exclusively allocated for grazing. The other portions are shared among cultivated, forest, bush and non-utilizable land according to the priority sets. The land use pattern in area is communal rangeland utilization managed by effective traditional management system. Pastoralists or agro-pastoralists use their land primarily for pasturing their animals with few practice of agriculture in some arid and semi arid areas. Other economic activities are Tanzanite Mining (Mererani), honey production and charcoal making (Rotiana farm).

Figure 3.1: Map of Simanjiro district



Source: Field survey, 2013

3.3 Target population

The target population was pastoralists in Terrat, Naberera and Orkesumet wards, Workers in DOSI – Engitengs (Simanjiro) and Omasi Marketing Group at Sakina-Arusha.

3.4 Sampling Techniques and sample size

The first stage involved selection of one district from Manyara region. At this stage Simanjiro district was purposively selected from five districts in the region on the basis

of presence of milk processing units, near the pastoralists (milk producers). In the second stage, three divisions; Terrat, Naberera and Orkesumet were selected purposively for the same reason of presence of milk processing units in these divisions.

The third stage involved selection of sample villages from the three divisions. The selection criteria of the study villages were; presence of nearby MPU, reachability and population of livestock. Terrat mjini, Naberera and Orkesumet villages were selected on the basis of those criteria. The fourth stage involved selection of milk producing households. The target population included all participants involved in milk production and marketing in the sampled villages. With the assistance of the village executive officers (VEO) a simple random sampling technique was employed to select the milk producing households in Terrat mjini, Naberera and Orkesumet villages.

At each village, 15 pastoralists were selected randomly making a total of 45 pastoralists. However during field survey, a researcher interviewed five milk traders involving 3 collectors and 2 retailers in shops and restaurants. Also, one general manager of DOSI – Engitengs was interviewed during this study. Thus the total sample makes 51 respondents. Kothari, (2004) suggested a minimum of 30 items to be included in a sample when statistical analysis has to be adopted.

3.5 Data collections methods

The researcher collected data using observation, structured questionnaires and interviews. The researcher collected data at the level of the farmers, middlemen and milk

processors. During the visits a standardized questionnaires were used that enabled cross-case analysis. At each interview similar questions was asked to increase the reliability of the data.

3.6 Types of data collected

Both primary and secondary data were collected. Structured questionnaires were used to collect data from the pastoralists who supply milk to the MPU and those who sell fresh milk to local buyers. Standardized questionnaires, open-ended in “Swahili version” were personally administered to 45 pastoralists during field visits. The researcher administered personally to 36 pastoralists at the MPU, and 9 pastoralists were filled the questionnaires at the community market place was interviewed. General Manager of DOSI – Ltd was interviewed at the MPU focusing on challenges facing MPU business operations. Also, five milk traders were interviewed face to face, 3 collectors found at the MPU and 2 retailers at shops and restaurants. Data collected through questionnaires and interviews were supplemented by researchers’ observations on activities of different actors of local diary value chain. Secondary data were collected from various documents of related surveys of milk analyses found in Measurement and Evaluation department of OMASI Ltd.

3.7 Data Analysis

The researcher analyzed data using both quantitatively and qualitatively methods. Quantitatively data was analyzed by using descriptive statistics such as percentages and frequencies obtained through simple computations using Microsoft excel. While

qualitatively, data involved logical and factual interpretation of data. The first objective was to identify the structure of local dairy value chain for smallholder pastoralists in the study area. The structure of the value chain was analyzed using VCA. VCA examines all the actors involved in the chain, the linkages between them, and the activities in each link (Gereffi, Humphrey and Sturgeon 2005). In the present study the VCA examined three key actors-farmers, collectors and processors who were involved in milk production and marketing and processing, the linkages between them and the activities within each link. Distribution of milk was traced from pastoralists to the final consumers. The flow chart was used to trace the value chain used by pastoralists to market their produce. The structure of the value chain helped to determine the relationships between the key actors in the market. The percentage of milk sold to different chain actors was analyzed using frequency counts and percentages. Chain strategy on milk marketing were analyzed using descriptive statistics; percentages, tables, pie charts and frequencies. Challenges facing chain actors were analyzed using frequency counts and percentages.

3.8 Validity of research instruments

Validity refers to the degree to which the instruments used actually test or measure what it purports to measure (Punch, 2004). To ensure validity of research instruments, this study was validated through initial field work to be carried out based on research instrument designed to answer the research questions. May (1993) maintains that piloting aims to see how the survey works and whether changes of the instruments are

necessary before the start of the full-scale study. Community market (auction) at Loiborsiret was selected for pilot study where by the researcher pre-tested the research questionnaires to some pastoralists who were selling milk. Pilot study provided the means of catching and solving unforeseen problems when designing and administering questionnaires, such as the phrasing and sequence of questions or its length. This helped the researcher to design the valid questions to meet objectives and considering time to spend in responding.

3.9 Reliability of the Study Instruments

In order to ensure reliability of instruments the main focus of the study is to ensure that measurement devices or procedures consistently assigns the same score to individuals or objects with equal values. In the field, the researcher increases the reliability of data by clearly clarifying the objective of the study to the respondents and clearing some doubts raised by respondents. Also, the researcher was aware on information provided during interview and from filled structured questionnaires as means to ensure triangulation and clarity of information given from one respondent to another.

CHAPTER FOUR

PRESENTATION AND DISCUSSION OF FINDINGS

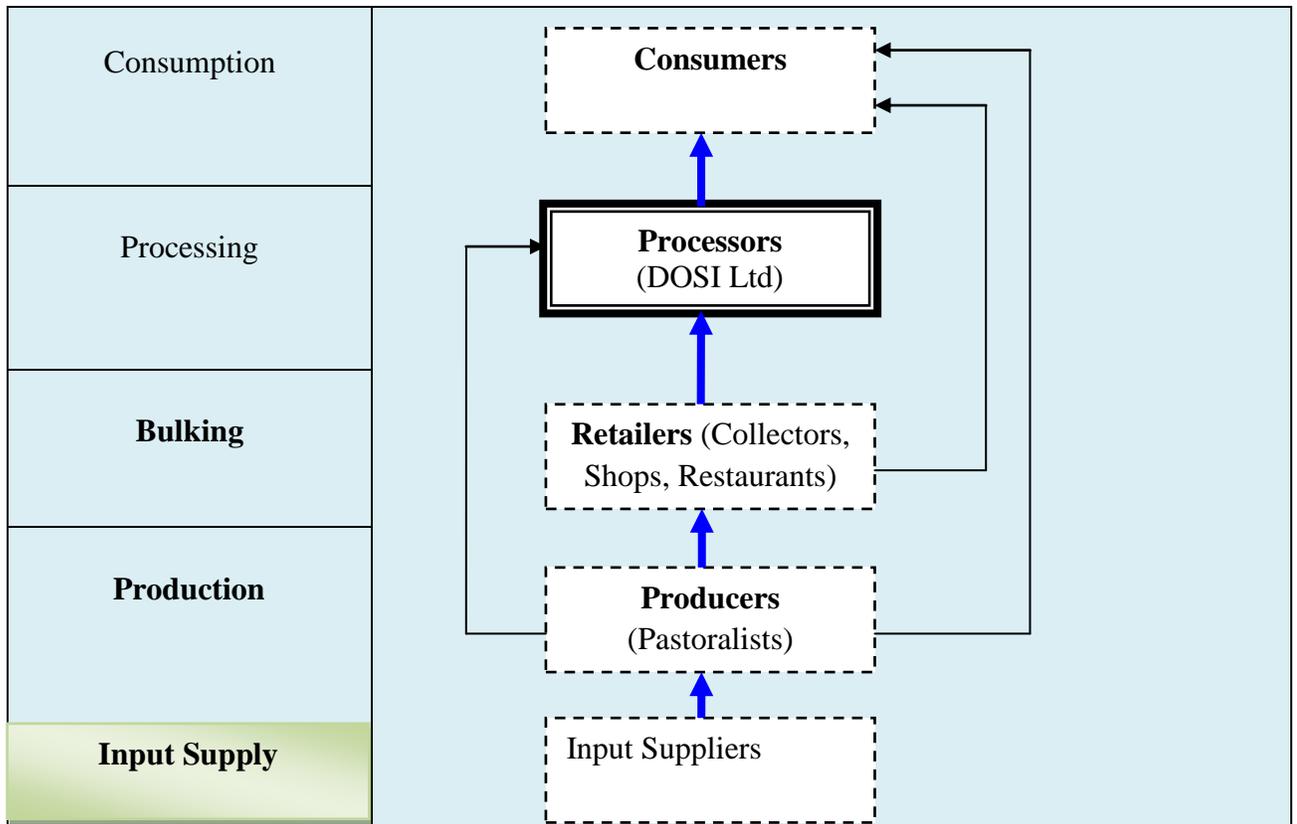
4.0 Overview

This chapter presents and discusses the research findings. Section 4.1 presents the structure of the local dairy value chain and actors characteristics. Section 4.2 describes how actors developed chain-strategy in milk marketing. Section 4.3 describes business challenges facing actors.

4.1 Structure of the local dairy value chain and key actors' roles

The first objective of this study was to identify the structure of the local dairy value chain and describes roles of key actors in the chain. This study revealed that, the dairy value chain in Simanjiro district involves five distinct stages, namely; Input supply, milk production, bulking, processing and consumption. Figure 4.1 indicates levels of local fresh milk value chain, key players of the chain and milk distribution through various channels. The key actors' roles have been discussed in subsequent sections below.

Figure 4:1 Structure of local dairy value chain in Simanjiro District.



Source; Field Survey 2013.

4.1.1 Inputs Supply

The input suppliers in the dairy subsector are the starting point for every long dairy value chain as they play important roles in sustaining the viability of value chain. These include the supply of veterinary services, equipments and drugs for livestock treatments and produce' handling.

This study found that, pastoralists in the study area use traditional and modern veterinary drugs for their livestock. In particular, pastoralists purchase veterinary drugs often tetracycline, sulphadimidines and penicillin-streptomycin from livestock services retails outlets at Arusha town and Simanjiro district. Extension services, research and development are facilitated by NGO's and the Government. Table 4.1 indicates the responses of pastoralists towards the types of input suppliers in the study area, DOSI Ltd and Government being common suppliers.

Table 4.1 Input suppliers to pastoralists.

Input suppliers(extension services and drugs)	Frequency	Percentage
NGO's (DOSI Ltd)	36	80
Government	9	20

Source: Field survey, 2013.

On other hand, milk cans are important inputs in the dairy industry. Because milk needs to be transported in hygienic conditions, milk cans are important. The quality of milk is related to the handling and storage of milk that farmers use in the transportation of milk to the milk collection centres. Aluminium containers provided on loans by DOSI Ltd to pastoralists are used for the transportation of milk by the small scale farmers. The Milk cans are major inputs for the dairy farmers at levels thus small holder, emergent and commercial farmers. Livestock Services is a major supplier of milk cans.

4.1.2 Milk Producers

Production is the basic segment for any value chain analysis and it is the pivotal point where makes the value chain to develop and attain competitiveness. Producers of milk in Simanjiro district are mainly pastoralists of Maasai society, who are experienced in livestock management for their livelihood. In Maasai community, men own cows while women own milk. In doing so, men are responsible in livestock management in aspects of herding, veterinary services and defense; meanwhile women are responsible in milking and milk management. Lactating cows are milked twice a day during early in the morning before grazing time and evening after grazing. Previously, their production is not market oriented and a minor portion of the locally produced milk enters the commercial sector owing to the marketing constraints and lack of processing techniques suitable for smallholder dairying. Establishment of DOSI-Engiteng increased the demand for raw milk from smallholder farmers to sustain its processing capacity. Volumes of milk production by pastoralists in the study area were shown in table 4.2 below.

Table 4.2 Amount of milk produced by pastoralists daily.

Volume of milk produced daily	frequency	Percentage %
≤ 5 litres	12	26.67
6 – 10 litres	28	62.22
11 – 15 litres	5	11.11
≥ 16 litres	0	0.00

Source: Field survey, 2013.

Findings in table 4.2 show that, milk production among pastoralists varies accordingly. Majority (62.22%) of pastoralists produced between 6-10 litres a day. Some pastoralists (26.67%) produced as little as ≤ 5 litres and others (11.11%) produced as high as 15 litres a day. The production had large deviation which showed that the production was very variable and not evenly distributed depending on the number of milking cows they have. This variation in production in the households may be attributed to the difference in breeds kept, seasonality and number of cattle kept.

In essence, pastoralists women used milk mainly for household consumption for family daily food, supplied to the market and in turn purchasing of grains, clothes, salt, sugar, tea etc and given to relatives and neighbors who do not have or have less milking animals. Insignificant amount of milk is also given to guests and travelers who asked the pastoralists water to drink. In general the proportion of household milk utilization is largely depends on different variables. Among others accessibility of pastoralists to

market, the numbers of milking cows, the volume of milk produced and the number of neighbors and relatives that have less milking animals. It is also learnt that seasonal and yearly climate fluctuations also influence the proportion of household milk utilizations.

However, the level of milk production is not stable for the whole year round. Seasonal variability of milk production in pastoral areas is basically managed by amount and distribution of rainfall, and availability of forager and water. Milk production in Simanjiro is relatively highest during the wet season (February to May), medium in (June to August) season, and very low in (September to January). Pastoralists in the study area have no supplementary feeding to livestock, thus, during drought seasons, majority of herds is moved away from homes to areas with pasture and water availability, leaving few milking cows at homes which can only sustains household consumptions.

Thus, the improvement made in this level of the chain could have a significant implication in enhancing competitiveness in all other levels of the chain. It holds true particularly for agricultural value chains in general and milk and milk products in particular.

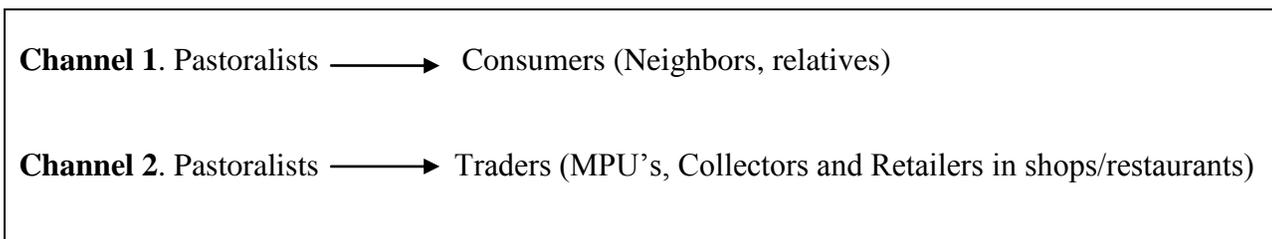
4.1.3 Milk marketing systems (Bulking)

Fresh Milk from pastoralists is channeled through formal and informal marketing systems. The informal market involves direct delivery of milk by farmers to individual consumers in immediate neighborhood. In informal market, milk may pass from

producers to consumers directly or it may pass through two or more market agents. It is characterized by no licensing requirement to operate, low cost of operations, high farmer price and no regulation of operations.

On the other hand, formal marketing system involves selling fresh milk to different traders including, the nearby MPUs, itinerant traders in shops and restaurants, and milk collectors. The resulting marketing channels used by pastoralists to sell their fresh milk were indicated in figure 4.2 below.

Figure 4.2 Milk marketing channels by pastoralists.



Source: Field survey, 2013.

The proportions of pastoralists in each marketing channel were presented in table 4.3 below.

Table 4.3 Distribution of pastoralists into milk marketing channels.

Fresh milk market channels	Frequency	Percentage (%)
Channel 1	9	20
Channel 2	36	80
Total	45	100

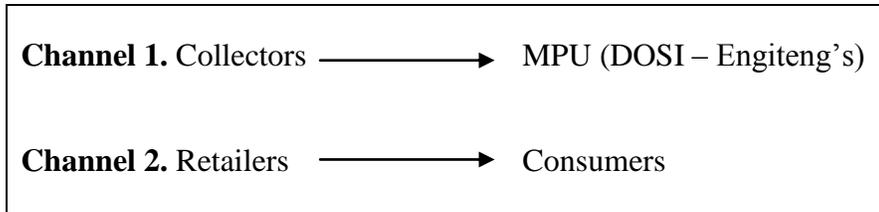
Source: Field survey, 2013.

Findings in table 4.3 show that 80% of pastoralists channeled their fresh milk to traders who may be MPU, milk collectors or retailers in nearby shops and restaurants. However, majority of his channel' pastoralists sold milk to DOSI – Engiteng MPU, followed by those who sold to retailers in shops and restaurants. The least are those who sold to milk collectors who buy milk in relatively lower prices from the pastoralists residing very far from roads and markets. However, the decision of a pastoralist to sell milk in a particular channel is influenced by trust on payment system, proximity and consistency of the buyer as indicated by majority selling to DOSI – Engitengs for same reasons. On the other hand, 20% of pastoralists channeled their fresh milk to immediate consumers including relatives and friends.

4.1.4 Milk Trading

Traders buy fresh milk at relatively low prices and resell at high prices to processors and consumers. Milk traders have got two main roles; bulking and transport of fresh milk. These two activities require hygiene and proper handling equipments to ensure milk quality on transit to next buyer. In well designed dairy value chains are often consists of interconnected cold-supply chains but in Simanjiro, this was not yet established. There were two main milk traders in the study area; collectors and retailers. These traders markets their products through two main channels indicated in figure 4.3 below.

Figure 4.3 Milk trading channels



Source: Field survey, 2013

The response of five milk traders interviewed about their respective trading channels indicated that 3(60%) traded through channel 1, while 2(40%) traded through channel 2. Majority being at channel 1 for the reasons their trust to the price offered at MPU and its consistency in buying. Few retailers on shops and restaurants sold milk to consumers in their surroundings, but the buying behavior of the consumers was low because most of them are pastoralists who own cows.

4.1.5 Milk Processors

The Simanjiro district presently hosts three of DOSI's five Engitengs due to the concentration of the Maasai target group within this locality. The Three Engitengs are currently located in the towns of Terrat, Naberera and Orkesumet, which are 145km, 220km and 280km respectively from the DOSI headquarters in Arusha. These Milk Processing Units (MPU's) have been placed in the Simanjiro district in an attempt to satisfy OMASI's twin mandates of social development and economic empowerment. DOSI imported pre-fitted MPU's with state-of-the-art dairy processing equipment in 2007. Each of the foreign-assembled MPU's consists of two used forty-foot containers

each equipped with the following: Stainless steel Milk Cooling tanks, Water circulation Pump, Pneumatic operated cheese press, Cheese storage stand and shelves, Brining Tub, Electric separator, Electric water heater, Nylon cheese molds. In 2010 the final Engiteng was set up in Naberera using almost identical equipment that was bought second hand from Tanga Fresh Limited. Each DOSI-Engiteng' has 1,000 litres installed capacity a day. However, despite the quality of the equipment, the Engitengs have only managed to produce at a rate of less than 30% of the cumulative installed capacity of all the factories. The main reason for capacity underutilization was inadequate supply of milk.

The main suppliers of DOSI-Engitengs are the nearby pastoralists who deliver their fresh milk by simply walking and collectors who deliver milk they bought from distant pastoralists, to the MPU by bicycles or motorcycles. However OMASI has managed to establish zero grazing at their Rotiana farm located between Terrat and Naberera MPU's. Therefore, milk supplied by pastoralists and collectors was supplemented by milk from Rotiana farm (about 400Litres/day). Fresh, morning-milk is delivered at the MPU by 10:00pm, filtered, tested and poured into a processing system where converted into varieties of dairy product mix.

DOSI's premier product is its Gouda cheese. They have managed to develop a cheese platter comprising seven different Gouda variations. Other dairy products that Engitengs have introduced include yoghurt, butter and ghee. These other products are not yet commercialized. The cheese is sold mainly in Arusha, where the international community has created, according to recent surveys, the largest demand for cheese in all

of Tanzania (123 tonnes per annum, 50% of total national demand). The Gouda cheese variety however is classified as a non-cooking cheese, which is less popular than the cooking variety. This means that Gouda cheese is less demanded in the Tanzanian market compared to feta, mozzarella and cheddar cheeses.

The Engiteng' cheese is sold and distributed by DOSI Ltd at 9360Tsh/Kg to their wholesaler; OMASI Marketing Group (OMG) in Arusha. OMG brand and maturing the cheese and retailing to supermarkets and tourists hotels in Tanzania and Kenya. Recent surveys, including MMA 2013, has identified Arusha region as a favorable location with the most developed cheese market in Tanzania. Kenya market in particular is very promising with all different types of Engiteng cheese gaining acceptance and orders have increased in size every month since August 2012 and it is anticipated that by August 2013 it will be around 1 ton a month. With this positive market growth in Kenya, it is obvious that DOSI Ltd and OMG could and should strive to increase its production and supply towards this market. With an estimated 10 – 12 tons per annum, OMASI could plan its capacity expansion of Gouda cheese to 45 – 50 tons a year for both the Tanzania and Kenyan markets. The Engiteng' cheeses are targeted towards the tourism (hotels and tour companies) and expatriate and upper to middle income earners mainly buying from supermarkets. OMG has therefore priced them to reflect this median positioning.

4.2 Chain strategies developed by actors in milk marketing in the study area

The second objective of this study was to explore how chain actors developed chain strategy in milk marketing in the study area. These strategies included; contracts in milk marketing, training to pastoralists and pastoralists' collective actions as discussed in subsequent sections.

4.2.1 Contracts in milk marketing

The distribution of contracts among pastoralists is presented in Table 4.3 where findings show that, 55% of the pastoralists had spot contractual arrangements, 28% had weekly contractual arrangements, and 17% had monthly contractual agreement. In the spot contracts pastoralists sold the milk and received the money immediately. On spot contractual farmers have large constituency because, women has no other means of getting cash to sustain household daily requirements, thus requesting for on spot payment. The other types of contracts were in the form of credit arrangements where the buyers would collect the milk and pay later after a week, or a month. In some cases, farmers seem to switch from one form of contract to the other. This might be a way of reducing chances of default incase of use of only one contractual arrangement.

Table 4.4 Types of contractual arrangements used by pastoralists who supply to MPU.

Type of contract	Frequency	Percentage (%)
On spot	20	44.4
Weekly	10	22.3
Monthly	6	13.3
TOTAL	36	80

Source: Field Survey, 2013

On the other hand (9)20% pastoralists in the study was selling milk to local buyers in shops, restaurants and community auctions, and they had no contract with their buyers. Notwithstanding this, the system has to be strengthened with the introduction modern systems like transaction through mobile phone, safe money transfer and money transfer through small scale financial institutions.

4.2.2 Trainings to pastoralists

Education can be considered to be important as it makes pastoralists innovative and also easily understand concepts of marketing skills and consequently adopt new technologies with ease. In their effort to strengthen the pastoralists knowledge on milk production and supply, different NGO's has regularly conducted training among pastoralists. In particular, DOSI has been conducting trainings to pastoralists women who are their major suppliers to its MPU's . Also the workers at MPU's are maasai women selected in

the nearby villages, and given special training by DOSI management concerning skills in milk processing. These workers have been guaranteed special trainings in other largest milk processors within the country and even in the DOSI partners in Netherlands. Table 4.4 shows proportions of pastoralists in the study area who received trainings from different facilitators.

Table 4.5 Proportions of pastoralists trained by different facilitators.

Training facilitators	frequency	Percentages(%)
DOSI ltd	34	75
Other NGO's	8	18
Government	3	5
TOTAL	45	100

Source: Field survey 2013.

Finding in table 4.4 show that, 80% of farmers received training from DOSI, 15% trained by other NGO's and 5% trained in government initiatives. It can be seen from the results that many farmers acknowledged receiving training, as a result of the efforts of pastoralists capacity building by the by government and NGOs one of the most dominant in the area being DOSI Ltd. The other players in training are the government and social groups which provide trainings to pastoralists in milk production technologies in areas like breeding, feeding, disease control and quality of milk for marketing, animal health management with emphasis in the areas of deworming, disease control, and tick

management, marketing channel availability, marketing transaction costs and preservation of milk while being marketed.

4.2.3 Pastoralist's Collective actions

The study revealed that, the pastoralists' collective actions through forming dairy groups was another strategy developed in milk marketing. The dairy groups had an average of 5 women. The dairy groups had an average of 13 meetings per year, which means they met at least once a month. The pastoralists association in groups had benefits that they accrued by being members of such groups. These benefits included trainings, collective procurement of inputs, credit services and collective marketing of their milk as shown in table 4.5 below.

Table 4.6 Benefits accrued from group Membership by pastoralists

Benefits	frequency	percentage
Training	13	28.89
Marketing	15	33.33
Credit	6	13.33
Input procurement	5	11.11
Other benefits	4	8.89
No benefits	2	4.44

Source: Field Survey, 2013

Table 4.5 shows that 28.89% of the pastoralists received training from the groups, 11.11% acknowledged they had collective input procurement benefits so as to reduce costs because of economies of scale, 33.33% received marketing benefits whereby they sold their milk together with the aim of reducing transaction costs and probably have bargaining power. Furthermore 13.33% of the pastoralists received credit services as they could guarantee each other while 8.89% received other benefits other than the ones mentioned above. The results also showed that 4.44% of the pastoralists did not receive any benefits from the groups. It can be seen from the results that many pastoralists acknowledged receiving marketing benefits, as a result of the efforts of pastoralists capacity building by the by government and NGOs one of the most dominant in the area being DOSI Ltd. Moreover with sufficient numbers collective action can help dairy farmers to invest in milk handling equipment like coolers and even pasteurizers for value addition, this will consequently lead to better prices to members.

4.3 Business challenges facing chain actors

The third objective of this study was to identify business challenges facing chain actors. In the area of study, a number of business related challenges was identified. These challenges have been categorized at different levels of value chain; Inputs supply, milk production level, collection and transport level and distribution and marketing level and processing level as discussed in the proceeding sections.

4.3.2 Milk producers

In the study area, milk production is still not full commercialized. Although pastoralists keep more milk cows than non-milking cows, but the primary purpose for milk was for family consumption. Thus, introducing milk business is a new venture in Maasai community and initially was perceived by men as threat to family nutrition. Findings in table 4.6 revealed that, at milk production level, seasonality fluctuation, Livestock diseases, price setting, Lack of markets channels and poor marketing skills and financial aspects were indicated by pastoralists at this level. The constraints were ranked with 1 as the topmost problem and 5 the least problem.

Table 4.7 Challenges facing milk producers

Challenges	Sums of ranks	Ranks
Seasonality	5	1 st
Livestock diseases	8	2 nd
Price settings	9	3 rd
Lack of markets channels	12	4 th
Financial aspects	11	5 th

Source: Field survey, 2013

Findings in table 4.6 indicate challenges facing milk producers in the study area, where they prioritized their problems in the following order of importance;

Seasonality fluctuations: The research revealed that seasonal fluctuations were the topmost challenge facing milk producers. The availability of sufficient volumes of milk in Simanjiro is not for whole year round. In wet season of the year (January - May) pastoralists get surplus milk which can sustain both family consumption and milk business as well. Meanwhile, in dry seasons of the year (July- December) the pastoral areas undergoes extreme drought with no water nearby pastoralists settlement. Thus, masses of livestock migrate to areas where grazing and water are available. Therefore at homes few cows are retained to sustain family need only, hence no milk business would exist for these months.

Livestock diseases: High incidence of vector-borne and parasitic diseases, supplemented by high costs and accessibility of veterinary drugs was the second most limiting constraints to milk producers. Among the livestock diseases that are affecting milk production and productivity are ticks and tick-borne diseases like; East-cost fever, Anaplasmosis, Heart water, Babesiosis. Other eruptive diseases are FMD, Mastitis, CBPP, milk fever (hypocalcaemia), back legs etc affects milk production. Mastitis is very prominent one which affects milk in cows. During interviews of women who supply milk to MPU, the cases of milk rejected due to Mastitis were addressed. At the input level it destroys the basic livestock production process through mortality of breeding of productive animals. These diseases are very common for poorly fed cows, because of their low diseases resistance. Disease lowers the efficiency of the production process, consequently affects quality of milk produced.

Price setting was indicated as third challenge to milk producers. Milk price is set by the buyers in accordance to the place and seasons. There was no government/institutional laws governing the price setting in milk marketing. Thus the price setting was buyer-centered and pastoralists have little control over price setting. The price of milk varies accordingly; 750Tsh/Litre at MPU and 1000Tsh/Litre at local buyers (shops, restaurants, community auctions). However although MPU is relatively low, pastoralists showed trust on this market channel because it assure them to sell milk every time they get there.

Lack of market outlet for the pastoralists particularly those resides at the distant location from the road and the market and poor marketing skills by pastoralists was indicated as the fourth challenge. Results revealed that majority were strongly agreed, addressing that, inaccessibility of pastoralists to the markets left volumes of milk that might have strengthen milk business if it could have been put into the market. Also as said earlier, aspects of milk distribution in the family are the roles of women in Maasai community. Yet, these women lack skills in marketing of milk because it is a new phenomenon to them. This again imposes a great constraint to business because women are prime actors in a dairy value chain.

Financial aspects: lack of financial services such as credit and insurance was the least challenge to milk producers. In essence, sale of milk is a regular source of cash flow and the livestock owned by them constitutes an invaluable asset. Thus, pastoralists do not have ready access to financial services such as insurance and credit. In the absence of

these services they do not have a financial recourse in times of emergency such as livestock disease or mortality.

4.3.2 Milk trading

At this level of value chain, traders face number of constraints in bulking and transportation of fresh milk to processors and consumers. The constraints were ranked with 1 as the topmost problem and 5 the least problem as indicated in table 4.7 below.

Table 4.8 Business challenges facing Milk traders

Challenge	Sums of ranks	Rank
Poor facilities	2	1 st
Poor Infrastructure	1	2 nd
Spoilage of milk on transit	1	3 rd
Limited trading channels	1	4 th

Source: Field survey 2013

Poor milk handling facilities: This constraint was ranked as the topmost at this level. In essence, milk handling requires interconnected cold chain from one actor to another. Establishing a milk cold supply chain is quite cost full for small scale traders, and alternatively traders requires proper milk handling equipments like Aluminium cans. This study revealed that, collectors and retailers used plastics cans to collect milk from pastoralists which won't guarantee the quality of milk before it reaches the customers.

Spoilage of milk on transit: This was the second constraint at this level. Due to remoteness of the area, long distances and poor handling equipments, milk traders indicated that easy spoilage of milk on trust was challenging as processors need fresh milk and consumers prefer the same. Spoilage of the milk can also be caused by poor hygiene in producers where by cases reported where batches of traders' milk were rejected at the MPU because of spoilage which might have been cause by single litre contaminated right on the hands of pastoralist.

Infrastructure: The infrastructure was ranked by milk traders as third constraint to milk marketing at this level. The main infrastructural aspects addressed were, poor rough roads, lack of collection centres and lack of electricity. These infrastructural related problems have resulted to loss of volumes of milk on transit due to spoilage of milk.

Limited marketing channels: This was ranked 4th by traders, addressing that majority of communities living in the study area were pastoralists. Therefore they need not to buy milk because they produce milk at their homes. Available milk trading channels were the MPU and few consumers who had few/no cows. In high seasons for milk, these few channels won't absorb all volumes of milk traded by collectors and retailers.

4.3.3 Processors level

At processors level of the local dairy value chain in Simanjiro was confronted by several business challenges facing actors. In the study area, there was only one formal processor; DOSI –Engiteng' who indicated a number of constraints facing them in milk

business. These include Seasonality in supply, Capacity of facility, facility breakdowns, limited market channels for the products and Political interventions. Challenges indicated by DOSI Ltd General Manager during interview were discussed in subsequent sections below as prioritized in order of their importance.

Seasonality in milk supply: The supply of milk to Engiteng's is not stable for the whole year round. These fluctuations create a challenge to processors on fulfilling varying demands of customers on milk products. Study revealed that, the capacity of each Engiteng' was 1000Litres of milk daily, to produces milk products varieties. In wet seasons (January - May) Engiteng' receives up to 1600 litres/day (surplus), meanwhile in drought seasons, Engiteng's receives as less as 300litres/day (shortage). The surplus milk during wet seasons was donated to social institutions like schools, hospitals, orphanage centres and sometimes cultured and sold in public markets. Shortage during drought was a very serious challenge affecting the operations of the processing facility and business at large.

Facility breakdowns: Most of the Engiteng's facilities were imported from Netherlands except that of Naberera which was built in the similar way as those imported. The study revealed that, there were noticeable facility breakdown caused by poor electricity supply and or technical breakdowns of the facility itself. Again, many spares parts to replace the breakdowns must be bought from Netherlands, thus creating long lead times for resuming the facility operations. Therefore, during the breakdown and maintenance of

the processing facility, the milk delivery at the MPU ceases hence affects the whole milk business in the dairy value chain.

Capacity of the processing facility: The capacity of DOSI-Engiteng's is relatively low to absorb volumes of milk available in Simanjiro district particularly in wet seasons. Each of the foreign-assembled MPU's consists of two used forty-foot containers which one container is for milk processing and for milk products storage. The other container is for power supply, containing diesel generators. Therefore, forty –feet containers are not enough to carry on processing and storage processes. Recent surveys have been addressing the establishment of milk collection centres and separate warehouses for maximizing volumes of milk collected for processing and ensure sufficient product storage before moved to the market.

Limited market channels for milk products: DOSI-Engitengs produce cheese, butter, yoghurt and ghee, where by cheese is the premier product in their product mix. Pastoralists in the study area do not buy back the milk product except few do prefer Ghee for their family consumption. The remaining products are marketed through the wholesaler, OMG at Arusha town who buy cheese, butter and yoghurt directly from Engiteng's and resells to retailers like supermarket, tourists' hotels, to individuals and sometimes Kenya. Therefore, the study revealed that, the market channels for milk products is still limited having only one wholesaler, hence this was indicated as the challenge at processors level.

Socio-Political interventions on factory operations: As the known phenomenon everywhere, socio-political has a lot to do with operations of entities. In the area of study, cases have been reported about few politicians mobilizing pastoral women to stop supplying milk to the MPU for the reasons of political interest. This impacted to social conflicts like men won't give permission to their wives going to the MPU, claiming that women left important household responsibilities since morning and come back home very late. During interviews women says that, the claims of their men are politically geared.

4.3.4 Consumption

This level comprises of ultimate customers of fresh milk and milk products who purchase and consume the product. This study did not find direct information from consumers themselves but customers' complaints at the MPU were assumed to entails consumption challenges. During interview with DOSI Ltd General Manager revealed that; challenges discussed below were observed at this level.

Poor hygienic conditions of retailers: Consumers who buys fresh milk at retail shops and restaurants have several times complained of poor hygiene in retail shops. Contaminated milk, milk with water added and dirty milk containers were reported by consumers as challenges facing milk business.

Quality inconsistency of milk products: DOSI Ltd has undergone significant branding efforts and has built a fair level of product awareness among its potential customers; however there has been several customer service related complaints mainly related to the inconsistency in quality and particularly the taste.

Monopolistic approach of collectors in prices: Milk marketing in rural areas is mainly exploited by milk traders. Consumers in semi-rural areas rely on retailers to get fresh milk for their consumption. Retailers have been rigid at high prices of milk to consumers even when prices are seasonally low in response to higher supplies, at the same time retailers exploiting pastoralists by paying low prices throughout the year.

Seasonality fluctuations: As stated earlier, the supply of milk is unstable at all levels of value chain. At consumption level, consumers indicated that, during drought where pastoralist moves their livestock away from homes, milk for consumption becomes very scarce and if available, sold at high prices.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND POLICY IMPLICATIONS

5.0 Overview

This chapter gives out summary of findings, conclusions attained from findings discussions and policy recommendations for the foregoing analysis. Also the last part of this chapter cited areas for further studies.

5.1 Summary

The aim of this study was to analyze local dairy value chain for smallholder pastoralists in Simanjiro district. Specifically the study was focusing on identifying the structure of local dairy value chain for smallholder pastoralists and key actors' role, identifying chain strategies developed by chain actors in marketing of milk and finally identifying business challenges facing actors.

The structure of local dairy value chain for smallholder pastoralists was presented in flow chart showing levels, actors and their relationships. The structure of local dairy value chain of smallholder pastoralists in Simanjiro district consists of five distinct levels; input supply, production, bulking, processing, retailing and consumption. Key actors' roles are discussed using descriptive statistics; frequency counts and percentages. Tables were used to indicate marketing channels used by actors to sell their produce; pastoralists sold to MPU and traders, traders sold to MPU and consumers and MPU sold their produce to consumers. The most popular milk marketing channel was that where

pastoralist sold to MPU, whereby the main reasons was consistency, trust on payments and proximity of MPU to pastoralists.

The second objective was to identify chain strategies developed by pastoralists in milk marketing. The results show that, chain strategies developed in the area were contracting in milk marketing, trainings to pastoralists and forming pastoralists association in which they accrued benefits by being members of such groups. These benefits included trainings, collective procurement of inputs, credit services and collective marketing of milk.

The third objective was to identify business challenges facing actors in milk marketing. Tables were used to present results of the findings of each level challenges. At each level of value chain, challenges were discussed as prioritized by respective actors in ranking of challenges. At milk producers the main challenges indicated by pastoralists included; seasonality fluctuations, livestock diseases, price settings, lack of markets channels and financial aspects. Milk traders indicated; poor facilities, spoilage of milk on transit, poor infrastructure and limited markets channels. Processors indicated; seasonality in milk supply, facility breakdowns, insufficient capacity of processing facility, limited market channels and socio-political interventions on MPU operations. At consumers the challenges indicated included; poor hygienic conditions of retailers,

quality inconsistency of milk products, monopolistic approach of collectors in prices and seasonality fluctuations.

5.2 Conclusions

The study aimed at analysis of local milk value chain for smallholder pastoralists. The analysis started at identifying the structure and key actors' roles in the local dairy value chain. The resulting structure consisted of input supply, milk production, trading, processing and consumption. The actors of this local dairy value chain include input suppliers, pastoralists, traders, processors and consumers.

Findings revealed that; pastoralists benefited with some inputs supplied by government and DOSI Ltd including extensions services, research and development, milk handling cans and trainings. 80% of pastoralists received extensions, training services and milking cans from DOSI Ltd, while 20% of pastoralists indicated to have received extensions, research and development services from the government. Also pastoralists buys veterinary services from retail outlets shops in nearby towns.

Also study revealed that, pastoralists produce milk in varying levels. The majority (62.22%) produced an average of 6 -10 litres per day. However other (26.67%) produced as little as ≤ 5 litres a day, while other (11.11%) produced as much as 15 litres per day. This variation in production in the households was found to be attributed to the differences in breeds kept, seasonality and number of cattle kept. 80% of pastoralists

market their produce to MPU while 20% of pastoralists sold their fresh milk to consumers including neighbors and relatives.

Traders buy milk from pastoralists at lowest prices and resell to MPU, consumers at shops and restaurants. 60% of traders market their fresh milk to MPU, while 40% sold fresh milk to consumers at shops and restaurants.

In the study area, three MPUs owned by DOSI Ltd are the only processor in Simanjiro. Pastoralists and some milk collectors are the main suppliers of milk to these MPUs supplemented by milk from their own zero-grazing project at Rotiana farm. Each MPU has a capacity of 1000litres per day. DOSI Ltd product mix is comprised of Cheese, yoghurt, butter and ghee, and its premier product is Gouda cheese. The Engiteng' cheeses are marketed and distributed by OMG in Arusha. Consumers of Engiteng' products are the tourists' hotels and companies, expatriate and upper to middle income earners mainly buying from supermarkets.

Pastoralists has developed several chain strategies in milk marketing including; contracting with buyers, attend trainings on milk marketing and pastoralists collective actions like forming marketing groups whereby benefits are accrued by being members of association.

Challenges facing actors were discussed according to prioritization indicated by particular actors. However, some challenges were commonly indicated at every level like seasonality fluctuation of milk, lack of market channels and infrastructural aspects.

Other challenges included livestock diseases, price settings, financial aspects, poor facilities, spoilage of milk on transit and poor hygiene.

5.3 Policy Recommendations

Based on the discussion made on structure, strategies and challenges of milk value chain and the findings of the discussion made with the pastoral community and other actors , the following intervention points are identified –that would potentially done by all the stakeholders (private sector, development organization ,the government and the pastoral community)

5.3.1 Sensitize value chain concept as an economic tool to develop the milk and milk products value chain in the area through:

- Lobby the government and other stakeholders to exert a coordinated effort to strengthen the milk value chain in the area
- Recruit business development service provider to the chain that facilitate the communication among the stakeholders, who disseminate information to all of the stakeholders and who facilitate the stakeholders’ meetings.
- Promote the value chain approach as an economic tool to tackle the problems of local dairy value chain.
- Conduct a stakeholders meeting to discuss the importance of market oriented pastoral groups in milk production and milk business.

- Support the existing village based milk collection and market supplying women groups to establish the cooperatives to strengthen milk production, collection, transportation, processing and market supply.
- Facilitating effective and efficient market information net work that can be accessible by all actors fairly benefit the actors along the milk market channel.
- Support to have legal registration and legislation in local dairy business.

5.3.2 Improving efforts of milk producers (pastoralists) on milk production and livestock management

- Pastoral and/or agro-pastoral women who are showing common needs and interests for organizing together, more likely to make responsibility and accountability in cooperative working and the necessary commitment to the center and its success has to be identified.
- Strengthen the existing organized women groups and scale up the best practices in other areas where there is no organized women groups
- Access credit to women groups who are engaged in milk and milk products production
- Building the capacity and business knowledge of milk producer pastoralists to transform the existing pastoral production system into market oriented

increased production through Continuous and regular extension services to the target pastoral groups.

- Provide market linkage and market development services for the milk and milk products produced by women groups.
- Strengthen the current efforts done by the government and development organizations to improve animal health in pastoralist.
- Promote private sector and the development organization to provide the service at affordable prices
- Establish a dry season feeding mechanism for milking cows

5.3.3 Improvement of the existing small scale milk processing units

- This study recommends that in order to optimize the Engiteng MPU's in the Simanjiro district that two of the existing MPU's be combined at one location. The possibilities for the location of the hub are the Rotiana Farm, the present Naberera location or the present Terrat location. The Rotiana farm and Naberera locations have the benefit of being in centralized positions that facilitate the collection of milk from collection centers at the other positions. Rotiana also has the possibility of tapping into the biogas unit, which can significantly reduce the present crippling cost of power, but would require some initial infrastructural investment for the establishment of the hub. The existing equipment and infrastructure at Naberera are below standard and a full overhaul will be needed if the hub is to be set up there. The Terrat location's major attraction is the fact

that the existing factory performs the best in the district. However, Terrat is not a centralized location and placement of the hub at Terrat would render raw milk collection from Orkesumet impractical.

- The Engiteng should be strategically positioned in a value chain feeding Arusha and nearby markets in the one to one products and cheese, Gouda and mozzarella. The chain leadership will be provided by OMG who will translate market signals into production targets and standards. The milk suppliers (Pastoralists, traders and Rotiana farm) organized around collection centres) would have to subscribe to the envisaged targets and commit to be reliable suppliers. Win – win proposition bidding all the key players will be spelled out through contracts, which will be reviewed from time to time.
- Collection centres should be set up and relevant investments (Cooling tank, transport means) made by OMASI (one time initial capital) based on its potential outreach. It is encouraged that collection centres grow towards becoming a business association, so that they have one voice towards the Engiteng hubs. Initially collection centres would be driven by contact persons / traders who will be organizing the collection. The Engiteng hubs would agree with them on the protocols of managing the collection centre and respective equipment. It is proposed to start with mobile tanks and only places a stationary milk-cooling tank when volumes warrant it.

- Facilitating raw milk trading modalities between milk collectors and the milk processing and marketing groups with clear and legal agreement and market trust in place.

5.4 Areas for further studies

Even if the study attempted to analysis dairy production to consumption in a value chain approach, there are a number of issues that still remain to be addressed. A number of interesting directions can be suggested here to broaden the scope of the current study. First, value chain analytical approach cannot be the only methodology to be used to enhance local dairy value chain actors' competitiveness and efficiency. Network analysis, innovation system perspective, vertical integration, modern marketing research approach and backward and forward linkage approaches could provide an alternative or complementary strategy to improve actors' competitiveness and efficiency. Second, to support dairy value chain actors' competitiveness and efficiency, the role of institutions that can complement, such as mechanisms to secure property rights, credit and saving institutions, weather-indexed insurance and institutional innovation for input markets, can and should be simultaneously explored. Third, this study only focused on few objectives of value chain analysis, the other objectives such as governance structure, cost-effectiveness, income distribution are not targeted. Fourth, production economics of value chain analysis such as resource allocation and input-output transformation are not considered. Therefore, these are some areas of value chain analysis that need further research.

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APPENDIX I

DODOSO KWA WAFUGAJI WADOGOWADOGO

Namba:.....

Mimi ni mtafiti, ambaye pia ni mwanafunzi wa shahada ya Uzamili (Masters) katika chuo kikuu Mzumbe – Morogoro kwenye fani ya Menejimenti ya Ununuzi na Mnyororo wa usambazaji. Tafadhali naomba ushirikiano wako katika kufanikisha utafiti huu wenye lengo la Uchambuzi wa mnyororo wa thamani katika maziwa, kwa wafugaji wadogowadogo katika wilaya ya Simanjiro.

Tafadhali jaza kwa kuweka alama vema (√) katika sehemu husika na toa maelezo panapohitajika.

I. TAARIFA BINAFSI

1. Jinsia
 - A. Mke
 - B. Mume
2. Kijiji unachoishi? -----
3. Elimu yako
 - A. Sijasoma
 - B. Elimu ya msingi
 - C. Elimu ya sekondari
 - D. Elimu ya ufundi
 - E. Stashahada na kuendelea

II. TAARIFA ZA UZALISHAJI MAZIWA

4. Kiasi cha maziwa upatacho kwa siku
 - A. Lita 1 hadi 5
 - B. Lita 6 hadi 10
 - C. Lita 11 hadi 15
 - D. Lita 16 na kuendelea

5. Je katika maziwa unayopata, mgawanyo wa maziwa ukoje?
- A. Matumizi ya nyumbani; Lita -----
 - B. Kuuza; Lita -----
6. Kwa kawaida maziwa unamuuzia nani?
- A. Watumiaji wa majumbani
 - B. Wakunyaji maziwa/ wauza maziwa madukani na hotelini
 - C. Wasindikaji maziwa
7. Je, wastani wa bei ya lita moja ya maziwa kwa wanunuzi hapo juu ni Tsh ngapi?
- Watumiaji majumbaniTsh
 - WakusanyajiTsh
 - WasindikajiTsh
8. Je, huwa mnapatiwa mafunzo, tafiti au madawa kwa ajili ya kuimarisha mifugo yenu?
- A. Ndiyo
 - B. Hapana
9. Kama ni ndiyo, je ni taasisi zipi hutoa huduma hizo za maendelo ya mifugo?
- A. Serikali
 - B. Binafsi; mfano DOSI Ltd
 - C. Zinginezo. Taja.....
10. Je, ni mikakati gani mmejiwekea kwa pamoja katika kuimarisha biashara ya maziwa?
-
-
11. Taja changamoto zinazowakabili wafugaji katika biashara hii ya maziwa.
-
-

-----Asante kwa ushirikiano wako!-----.

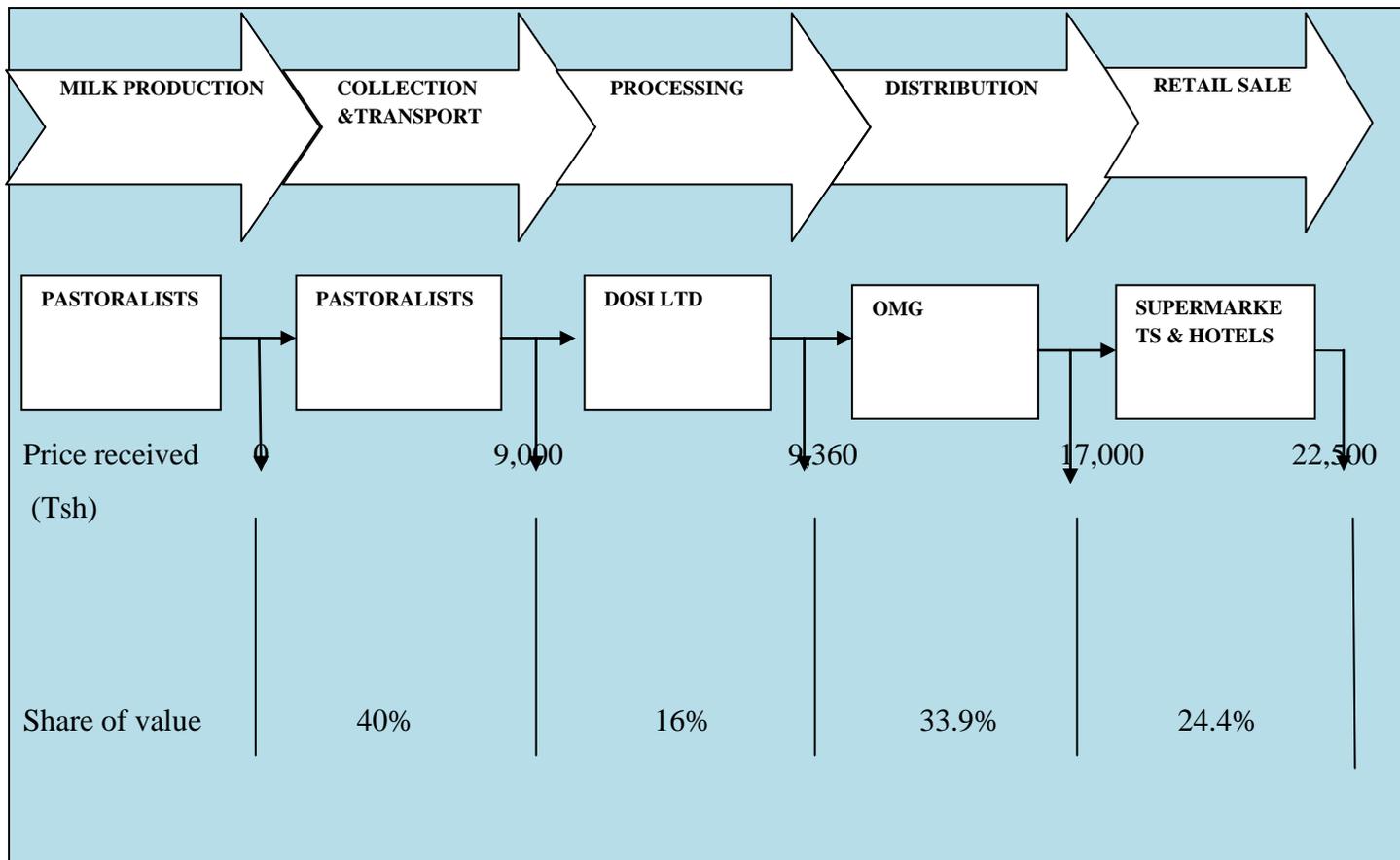
APPENDIX II
ACTIVITIES IN THE LOCAL DIARY VALUE CHAIN IN SIMANJIRO



APPENDIX III
VALUE ADDITION IN CHEESE MAKING

To make 1kg of Cheese requires 12 litres of fresh milk sold at Tsh.750 per litre

(Value-added) = (total sales value) – (value of intermediate goods)



VITA

Catholic Sumuni was born on 12th January 1985 at Mti Mmoja village of Monduli District – Arusha. He went for primary education at Mti Mmoja Primary School from 1992 to 1998 and thereafter for Secondary Education (O- Level) at Irkisongo Secondary School –Monduli, from 1999 to 2002. From there he joined Moshi Secondary School for A – Level studies, specialized in science subjects (Physics, Chemistry and Biology) from July 2003 to March 2005.

On July 2005, he joined Morogoro Teachers College for a two year Diploma course in Education, from July 2005 to February 2007, specializing in Chemistry and Biology. He appointed by the Ministry of Education and Culture to work as Assistant Educational officer II at Getanuwas Secondary School – Katesh Manyara where he used to teach Biology and Chemistry from March 2007 to September 2008.

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