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An assessment of the role of co-operatives in smallholder dairy production and marketing in Swaziland

By

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DECLARATION

I Nonjabuliso Simelane declare that the thesis/dissertation , which I hereby submit for the degree MSc in Agriculture Economics at the University of Pretoria, is my work and has not previously been submitted by me for a degree at this or any other tertiary institution.

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DATE: 15 February, 2011

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ABSTRACT

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The study investigates the role of co-operatives in smallholder dairy production and marketing in Swaziland. The study was undertaken to determine the effectiveness of co-operatives in improving production and marketing as well as in minimisation of transaction costs. Expectations were that co-operative members perform better than independent farmers in terms of production and productivity, have larger herd sizes, generate a higher income, and also incur lower transaction costs indicated by a higher quantity of milk sold.

Results of the survey indicate that co-operatives play a positive role in production and marketing activities of smallholder dairy farmers, although certain developments such as provision of support programmes need to take place in order for them to make a more significant contribution. Co-operative members produce and sell higher quantities of milk (19.3% higher and 24.5% higher respectively), which is mainly attributed to provision of technical inputs. Co-operatives also provide farmers with a reliable market, although price paid is lower (35% lower) compared to that of independent farmers in the same areas. Low income is compensated by the fact that co-operative members incur lower transaction costs indicated by the lower transportation costs per unit of output, adequate access to market information through frequent visits of extension officers and regular training, as well as a lower percentage of losses incurred compared to independent farmers. Results of the study confirm the hypothesis that co-operative members perform better and incur

lower transaction costs than independent farmers. Results of the regression model indicate that distance, access to market information, milk output and co-operative participation significantly influence the quantity of marketable milk, and hence contribute to lower transaction costs incurred. The results show that co-operative farmers incur lower transaction costs although they sell their milk at a lower price. Nevertheless, the fixed price effect renders co-operative farmers not susceptible to price fluctuation risks that independent farmers are faced with because of their volatile prices.

The study suggests that there is a need for support programmes that will help motivate individual farmers and strengthen co-operatives, as their contribution to smallholder production and marketing is still marginal. Support programmes include provision of a supportive policy environment, infrastructure development, access to financial and credit facilities and improvement of training and extension to provide more extensive dynamic opportunities to farmers. In terms of further research, the study recommends that a similar study be undertaken in other areas of Swaziland so that the study is representative of the whole country. In addition, further research is needed on performance of dairy co-operatives to enable replication of successful co-operatives in the country which will go a long way in improvement of the dairy industry as a whole.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

The livestock sector in developing countries plays an important role in contributing to rural livelihoods, particularly those of the poor. The sector is estimated to constitute approximately a third of agricultural GDP in developing countries and this share is rising (World Bank, 2009:16). The rapid increase in livestock production in these countries is attributed to a fast-growing demand for livestock products, resulting especially from an increasing urban population as well as a rising consumer income. Dairy production forms part of the livestock sector and is regarded as an important farming activity, especially in the developing world, providing supplementary income, employment and nutrition to a number of people, particularly in rural areas (International Fund for Agriculture Development, 2001:20).

Dairy production is also an important activity in Swaziland. It is a source of income and employment generation for small and marginal farmers. In addition, it is a source of food for Swazis who traditionally consume a lot of milk in the form of sour milk and this provides a vibrant milk market. A great potential exists for dairy development in the smallholder sector (Swaziland Dairy Board, 2004:5) due to the favourable climate for improved, high-yielding breeds, and the relatively disease-free environment with potential for improved animal feeding. Despite the potential that the dairy sector has, it is still largely underdeveloped. Milk production has not increased significantly in recent years although the population has continued to grow at an unprecedented rate. The low performance and underdevelopment of the dairy sector is attributed to the fact that smallholder farmers, who constitute a large percentage of the dairy subsector, are still faced with serious limitations in accessing essential inputs and selling their output (MOAC, 2004:20). They are also constrained by shortage and fluctuation in quality and quantity of feed, poor genetic resource base, poor management practices, poor market infrastructure, poor service delivery, policy and institutional arrangements.

To improve development and remove some of the important constraints, efforts have been made in various aspects to help develop the industry and help particularly smallholder farmers to improve their production and marketing capabilities. These efforts include the provision of input and services, such as animal health, breed improvement, feed resources development, research, extension services and development, finance and marketing (SDB, 2004:10). However, such efforts have not made an impact on improving the situation of milk shortage. In addition, policies and strategies put into place to promote milk production have not yet addressed the key concerns of smallholder milk collection and processing. This has been another limiting factor in the success of many development projects in the dairy sector.

The problems encountered by smallholder dairy farmers in the country indicate the general problems smallholder farmers encounter in most developing countries. These farmers have limited access to physical and financial resources which restricts their opportunities to increase scale of production due to high transaction costs (Kruijssen, Keizer & Giuliani, 2006:2). In addition, farmers have limited technical skills, lack access to training on production and processing, information on market requirements, and lack bargaining power. This presents a number of challenges for the farmers, especially those involved in seasonal and perishable agricultural products.

Experiences gained particularly in East Asia and East Africa indicate that co-operatives are among the institutional arrangements that can help smallholder farmers to overcome the numerous constraints they are faced with. Co-operatives have the potential to improve productivity in the smallholder sector as well as enhance market participation by farmers (Birthal, Joshi & Gulati, 2005:2). In this regard, the Government of Swaziland has recognised farmer-controlled co-operatives as an instrument of change that can effectively reduce transaction costs, increase farmer productivity as well as enhance market participation by smallholder farmers, especially in the dairy sector. Consequently, policies have been drafted for co-operative development to encourage more producer organisations, especially in the smallholder dairy sector.

Encouraging farmers to act collectively is therefore seen as one viable strategy for addressing constraints, especially in the smallholder sector (Shiferaw, Obare & Muricho, 2006:3; Sinja, Njoroge, Mbaya, Magara, Mwangi, Baltenweck, Romney & Omore, 2006:3). Although co-operatives have had an unhappy history, especially in Africa, evidence indicates that they have the potential of linking farmers to markets (Develtere, Pollet & Wanyama, 2008:366) by reducing transaction costs. Improving smallholders' access to markets is considered essential to enhance their income and increase the number of marketing options available to them (Markelova, Meinzen-Dick, Hellin & Dorhn, 2009:1). Difficulties in market access limit income-generating opportunities by farmers which can result in subsistence rather than market-oriented dairy production systems.

Organising farmers through dairy co-operatives has many advantages over individual farming. It improves or facilitates access to market information, reduces costs of marketing, increases producers' access to technology, extension and related services, thereby enhancing efficiency in production and marketing of milk as well as dairy products (Lapar, Trong Binh, Tuan Son, Tiongco, Jabbar, & Staal, 2006:2). Hence, development interventions should be aimed at improving production and marketing activities of smallholder farmers by addressing constraints in the smallholder sector. This can be achieved through collective organisations such as farmer associations and co-operatives. Similarly, Government has a role to play in development of infrastructure and provision of technical services as co-operatives are unable to do so due to their limited access particularly to financial resources.

1.2 PROBLEM STATEMENT

Swaziland has set forth development goals to promote smallholder production and marketing in order to meet or at least partially meet local demand for milk and dairy products. Local demand for milk continues to increase, which is mainly attributed to low production resulting from a number of challenges faced by smallholder dairy farmers as well as the prevailing marketing system in the country. In addition, the increase in the cost of beef and poultry which milk competes with as a source of protein in recent years has increased the demand for milk tremendously. Approximately 30 million litres of milk are produced in the country and this accounts for less than half of the estimated milk

consumption of 69 million litres (LMEs) per annum (SDB, 2009:3). The balance is met through imports, especially from South Africa. Efforts have been made in various aspects to help develop the local industry and to especially help smallholder farmers to improve their production and marketing capabilities. However, these efforts have been unsuccessful in meeting the increasing demand for milk.

Previous studies conducted by the Ministry of Agriculture and Co-operatives in collaboration with the SDB in Swaziland as well as in other countries conclude that the small-holder dairy sector has the greatest potential to increase national dairy production. Despite this and decades of developments, small-holder dairy farmers still lack essential inputs, have limited access to guaranteed markets and credit for their produce and are faced with high transaction costs. Milk production and marketing are very costly ventures when farmers face high transaction costs (Somda, Tollens & Kamuanga, 2005:190), which makes it impossible for them to achieve higher production and hence, lowers profits on their part. Farmers end up leaving the industry which negatively impacts on milk availability in the country and contributes to the excessive demand Swaziland is experiencing.

As stated in the background, evidence from countries in East Asia and East Africa, such as India and Kenya, suggests that co-operatives are a viable strategy in which challenges in the smallholder dairy sector can be addressed. Co-operatives play a major role in improving productivity, minimising transaction costs, and improving marketing capabilities of farmers. As a result, a number of producer co-operatives have been established in the dairy sector and formation of these organisations is being encouraged by the Government. This has been done with the certainty that dairy co-operatives will yield the same results as countries that have been successful in their development of the smallholder dairy sub-sector and positively influencing production. For farmers to improve their productivity and access markets, they need to overcome the constraints they are faced with.

Considering the fact that dairy farmer co-operatives can benefit the smallholder sector, the focus of the study therefore is to generate information on whether co-operatives in the context of Swaziland are able to promote smallholder production and marketing by minimising the numerous constraints and the high transaction costs that characterise this

sector. The study will further explore which policies can be put in place to help boost performance of dairy farmers as well as co-operatives in the process of improving smallholder production and marketing in the country.

1.3 RESEARCH OBJECTIVES

The main purpose of the study is to assess the role that co-operatives play in the development of smallholder dairy farmers with respect to production and marketing in Swaziland. The study has been guided by the following specific objectives:

- To examine the performance indicators of dairy farmers participating in co-operatives and compare them to farmers not participating in co-operatives.
- To identify the types of transaction costs smallholder dairy farmers face and to determine whether co-operative participation has any positive effect in minimising these costs.
- To identify key dairy co-operative constraints and opportunities, and make possible policy recommendations that could help in promoting the smallholder dairy sub-sector through dairy co-operatives.

1.4 STATEMENT OF HYPOTHESIS

The hypotheses to be tested in the study are:

- **Hypothesis 1:** Dairy co-operatives play a significant role in smallholder dairy production and marketing, resulting in a better level of performance in terms of yield/cow, productivity, marketing, income levels and better management practices to co-operative members.
- **Hypothesis 2:** Co-operative farmers incur lower transaction costs per unit of output sold indicated by a higher quantity of marketable surplus of milk.

1.5 IMPORTANCE AND BENEFITS OF THE PROPOSED STUDY

Dairy production is an important activity in Swaziland. It provides income-generating opportunities for the rural and urban population and contributes to the nation's nutrition. As noted in the background, the study will provide useful information on whether co-operatives benefit smallholder dairy farmers in dealing with challenges they are faced with. Assessing the role played by co-operatives, especially in the smallholder sector, is cardinal for the improvement of milk production and marketing in the country. Therefore, the study sheds light on whether dairy co-operatives do indeed contribute to smallholder dairy development with respect to production and marketing.

Producer co-operatives are identified as being essential for dairy development and dairy farmers need to organise themselves to overcome the problems of accessing essential inputs, transport, processing and marketing of milk (Ortmann & King, 2007b:225) through reduction of transaction costs. This information is vital for policy makers to take appropriate action towards facilitating the establishment and development of more dairy co-operatives. Addressing constraints in the smallholder sector will enable more participation of farmers in markets and thereby satisfy the high demand for milk in the country.

The dairy enterprise in the country has been seen to be profitable, especially for farmers who sell their produce via the informal marketing channel because of higher prices offered in such markets (MOAC, 2008:20). A litre of milk in the informal markets ranges between E3.50¹ and E8.00 (depending on current exchange rate) compared to the formal channel where the maximum attainable price per litre is E3.80. However, smallholder farmers are unable to fully exploit this profitability because of challenges in the smallholder sector. For them to realise the profitability of the dairy enterprise, they need considerable support from Government and other development agencies, such as NGOs. Development and implementation of policies as well as programs in the dairy industry to support the establishment, development and sustainability of co-operatives is imperative. This will help in increasing incomes because of guaranteed markets and access to adequate inputs.

¹ At the time of the study the official exchange rate was \$1 = E6.97

Therefore, minimisation of constraints will help farmers to be more productive and will result in an increase in milk production which will in turn help to curb the severe milk shortage in the country.

Literature indicates that effective co-operatives are those where external linkages play a major role. Satgar and Williams (2008:129) verify that farmer organisations require ongoing training and capacity building for them to be effective in playing their role. Therefore, by working together, Government, the private sector, NGOs and all stakeholders can provide services that co-operatives cannot provide through the provision of a supportive environment for effective operation and management of co-operatives. Development of both physical and economic infrastructure is some of the services that can be provided to co-operatives in order to deal with challenges in the sector. This will facilitate improvement of dairy production and marketing through co-operative activity.

1.6 STUDY AREA

The Kingdom of Swaziland is comprised of four topographical and climatic areas varying from 400 to 1800 metres above sea level, each with its own unique characteristics (IFAD, 2001:1). These are the Hhohho, Manzini, Lubombo and Shiselweni regions. The areas chosen for the study are the Manzini and Hhohho regions and were purposively selected because a higher percentage of smallholder dairy farmers and well-functioning co-operatives are situated in these areas compared to the other regions.

The Manzini region is the central part of Swaziland and is divided into wet and dry areas. It is suitable for most agricultural activities, including dairy farming. The general infrastructure of the area is highly developed, particularly the transportation network. Farming in this area is characterised by a mixture of crop and livestock production. Major crops grown include maize, vegetables, sweet potatoes, sugarcane and beans. Maize is currently the most important crop regarding cultivated area and use. However, sugarcane will soon become the most important crop grown in the area because farmers have moved from maize production to sugarcane production because of the availability of credit and higher income in sugarcane production. This region represents a more important

agricultural zone because of its high crop yields and the high percentage of the crop-growing land located in this region (MOAC, 2004:1).

The Hhohho region is situated in the northern part of Swaziland. It is characterised by a temperate climate and received more rain compared to the other regions. The general infrastructure of the area is developed. Approximately 80 % of this area is under Swazi Nation Land, held in trust by chiefs for the king. The main agricultural activities include forestry, crop and livestock production. Farming practice is also characterised by a mixture of crop and livestock production.

1.7 METHODOLOGY

This section presents the research methodology used to answer key study questions.

1.7.1 Sampling Procedure

A stratified random sampling procedure was applied using farmers from the central and northern parts of Swaziland. As mentioned, these parts of the country were purposively selected because they have a higher percentage of smallholder farmers. Moreover, these areas were selected because of the existence of co-operatives with good potential, thus members from these co-operatives were used for the study. There are 386 registered smallholder farmers from both the Manzini and the Hhohho regions (Table 1.1). This comprises of both independent and co-operative farmers; however this number is not a true reflection of smallholder dairy farmers in the country because most farmers are unregistered.

Table 1.1: Profile of dairy farmers in Manzini and Hhohho regions

Region	Number of independent farmers	cooperative farmers	
		Name of cooperative	Number of members
Manzini	128	Mkhiweni dairy coop	22
		Lamgabhi dairy coop	21
		Luyengo dairy coop	25
Hhohho	140	Phumelela dairy coop	20
		Sengani dairy coop	30
Total	268		118

Source: Ministry of Agriculture and Cooperatives, 2008

The target population (smallholder farmers) was divided into two strata: co-operative members and non co-operative members. Farmers were then randomly selected from two lists obtained from SDB to make up a sample size of 120 farmers. The co-operative farmer list used in the sampling process included farmers from all 5 co-operatives listed in the table above. The sample size is representative of the total population of smallholder dairy farmers in Manzini and Hhohho regions.

It is evident from Table 1.1 that there are more independent farmers compared to co-operative farmers in the study areas as well as in the whole of Swaziland which can be attributed to the fact that most farmers prefer working alone rather than being part of a co-operative. However, for ease of analysis the same numbers of co-operative and independent farmers were used in the study. Hence, 60 independent and 60 co-operative member farmers made up the sample size of 120. The number of farmers interviewed in each area is given in table 1.2.

Table 2.2: Selected areas and sampled respondents

Study areas	Sampled co-op members	Sampled non co-op members
Hhohho:		
Buhleni	9	5
Mayiwane	8	6
Mkhuzweni	7	3
Ndlalambi	-	8
Manzini:		
Mafutseni	-	7
Malkerns	3	4
Mankayane	8	7
Mbikwakhe	-	8
Luyengo	25	8
Ludzeludze	-	4
Total	60	60

Source: Survey data, 2010

1.7.2 Data collection

Relevant data were collected from both primary and secondary sources. Primary field surveys of sampled smallholder farmers who are co-operative and non co-operative members were conducted to gather information on their production and marketing activities through the use of a questionnaire. Data from secondary sources that include both published and unpublished documents were obtained from the Ministry of Agriculture, SDB, FAO, Fincorp as well as the Internet.

Questionnaire development

The study made use of primary data collected by means of an appropriately structured questionnaire (Appendix A). Both open-ended and close-ended questions were used in the questionnaire because of the nature of the data that had to be collected from smallholder farmers. Data that were collected through the questionnaire comprised of farmers' socio-economic characteristics, dairy production and marketing, input and output levels of milk, farm management practices, as well as income received from dairy activity.

Once prepared, the questionnaire was discussed with extension officers and relevant personnel; it was then pre-tested to ensure validity and reliability of data collected. Five farmers were selected for pre-testing of the questionnaire. After approval of the questionnaire, face-to-face interviews were conducted by the researcher to generate all the required data from farmers.

1.7.3 Data analysis

Upon completion of data collection, two methods of analyses, namely descriptive and econometric analysis, were used for analysing the data collected from dairy producers. Prior to this, data were first recorded in Microsoft Excel for ease of analysis and then imported to a statistical package, known as STATA 10, for analysis. Descriptive statistics were used to describe the general characteristics of sampled households, their production as well as their marketing systems in order to depict differences in performance between co-operative and non co-operative farmers. Econometric analysis was used to determine whether co-operatives have a positive influence on minimising transaction costs.

Descriptive analysis

A descriptive analysis was used to compare characteristics of the different sampled households whereby frequencies, percentages, means and standard deviations were used to describe the socio-economic characteristics of smallholder farmers, dairy production and marketing, input and output levels, milk handling and farm management practices, as well as income received from dairy activity. Tables and figures were created to illustrate trends, especially in performance indicators, such as herd size, milk production and income levels among co-operative participants and non participants. This provides a general insight into how co-operative and non co-operative members differ in terms of their production and marketing behaviour. In addition, the descriptive analysis of the effect of co-operative participation on transaction costs was done. This was made possible by analysing problems and constraints, differences in location of farmers as well as differences in their marketing systems.

Econometric analysis

An econometric analysis was carried out to determine whether being a co-operative farmer has any positive influence on minimising transaction costs incurred by smallholder dairy farmers. This was captured through the amount of milk farmers sell; whereby milk marketed by co-operative farmers is hypothesised to be higher than milk sold by independent farmers, hence co-operative farmers are perceived to incur lower transaction costs. A better understanding on the effect of co-operatives on transaction costs minimisation will help in designing programs that will enable co-operatives to be more effective in improving smallholder dairy farmers' marketing activities. This is because transaction costs are said to be the main inhibitor for smallholder farmers' marketing activities in particular. A more detailed account of the econometric analysis is provided in Chapter 6.

1.8 LIMITATIONS OF THE STUDY

The study was constrained by finances and time. The money allocated for data collection was insufficient which was further worsened by the fact that data had to be collected within a given period of time. In addition, some of the respondents were reluctant to give out information about their production and marketing activities. Furthermore, the study found that the majority of farmers do not keep records. Hence, some of the collected information was based on recollection of recent events, such as procurement rates. The inputs provided by the farmers therefore could not be checked for authenticity. Although two out of the four regions of Swaziland were selected for the study, results cannot be generalised for the whole population of smallholder farmers in Swaziland because of differences among the four regions.

1.9 OUTLINE OF THE STUDY

The study is organised into six chapters. The first chapter gives a brief background of the study, the problem statement, objectives, the hypothesis, the justification of the study and the methodology that was used in the study. The second chapter contains literature

reviewed on the role of co-operatives in agricultural development and dairy production. The third chapter gives an overview of transaction costs, particularly in dairy farming. The results and discussions on household characteristics, dairy production and marketing in Swaziland are presented in Chapter four. Chapter five contains descriptive as well as econometric results on the effect of co-operatives on transaction costs. Finally, Chapter six gives a summary of the findings, conclusions as well as policy recommendations aimed at solving the current problems in the dairy industry in Swaziland.

CHAPTER 2

ROLE OF CO-OPERATIVES IN AGRICULTURAL DEVELOPMENT AND DAIRY PRODUCTION

2.1 INTRODUCTION

The main objective of this study is to assess the role of co-operatives in dairy production and marketing activities in Swaziland. In order to analyse this role, the international experience with co-operative development and the role of these forms of horizontal co-ordination in assisting farmers' access to input and output markets as well as credit markets have to be studied. The purpose of this chapter therefore is to present a review of the international experience on the role played by co-operatives in dairy production and in the broader context of agricultural development as documented in secondary literature. Empirical studies on the role of co-operatives and their challenges are also presented in this chapter.

2.2 OVERVIEW OF ISSUES CONCERNING CO-OPERATIVES

2.2.1 Defining co-operatives

The International Co-operative Association (1995) defines a co-operative as an autonomous association of people united voluntarily to meet their common economic, social and cultural needs as well as aspirations through a jointly-owned and democratically-controlled enterprise. The definition of co-operatives implies that firstly, they are formed by groups of people who have a specified common need or problem. Secondly, the organisation is formed freely by members after contributing to its assets. Thirdly, the organisation is formed and governed democratically so as to achieve desired objectives. Fourthly and lastly, the organisation is an independent enterprise promoted, owned and controlled by its members to meet their needs.

According to Galor (2003:1), co-operatives are economic enterprises that are initiated by

their members and belong entirely to their members. These enterprises are formed with the intention of providing the best possible services at the lowest possible cost to their members when markets fail to provide required goods and services at affordable prices and acceptable quality.

Co-operatives can be formed in any sector of the economy and they vary greatly in terms of size and scale with regard to the functions they perform (Rondot & Collion, 2001:2). They can operate at village level, regional and even national levels. Like all forms of businesses, co-operatives are also guided by a set of principles that were first set out by the Rochdale Society of Equitable pioneers in 1844 (Ortmann & King, 2007a:41; Rheingold 2008:2). These principles are universally applicable to all co-operatives.

Co-operatives differ from other organisations in the sense that profit is returned as benefits, depending on the type and structure of the co-operative (Suber, 2005:5). Member benefits are relative to the amount that a member utilises the co-operative services. Generally, benefits include quality supplies at discount rates, increased market power; a share of the earnings relative to the percent of business performed with the co-operative as well as increased economic activity within the local community.

2.2.2 History of co-operatives

According to Shiferaw *et al.* (2006:5), farmer co-operatives were historically introduced in Sub-Saharan Africa (SSA) during the colonial period for promoting the production of cash crops by peasant farmers. After independence, a number of governments, including donors, promoted co-operatives and other rural organisations as a potential source of decentralised grassroots participation in agricultural credit, input and commodity markets (Ortmann & King, 2007a:44). Their performances were mixed and this was attributed to technological problems and poor management. Generally, co-operatives were controlled by government hence being considered as an extended arm of government and not as institutions that can help farmers in accessing markets as well as required inputs (Satgar & Williams, 2008:5).

The political interference by governments also contributed to co-operatives' poor performance. However, in the 1980s, the situation changed in the sense that economic liberalisation opened up new opportunities for producers to be actively involved in organisations that they owned (World Bank, 2008:154). This led to reconsideration of the role of co-operatives in development despite past failures and bitter experiences (Kodama, 2007:87).

2.3 RATIONALE FOR THE ESTABLISHMENT OF CO-OPERATIVES

Improvement in the ability of poor smallholder farmers to participate in markets is a serious challenge in most developing countries. This problem is especially acute in the SSA region, given the dominance of smallholders in the agricultural sector (Onumah, Davis, Kleih & Proctor, 2007:3). Evidence suggests that the proportion of farmers engaged in subsistence agriculture in this region is still high because of high transaction costs that inhibit them from participating in markets (Bernard, Gabre-Madhin & Taffesse, 2007:1). They lack essential inputs and improved technologies preventing them from improving their production as well as participating in markets. Development programs designed in developing countries to develop smallholder farmers are unable to do so especially at the initial stages.

The difficulties farmers face in accessing markets where they can acquire agricultural inputs as well as sell their produce are major inhibiting factors in improving their livelihoods and levels of production (Sinja, *et al.*, 2006:2-3). Farmers who can produce a surplus are also unable to sell their produce because of a lack of access to profitable markets which then forces farmers to sell at the farm gate or to sell to convenient buyers and at any price that the buyer offers. Markets supporting institutional arrangements, such as farmer organisations, have been proposed as having the potential to bridge market imperfections and promote co-ordination in markets for enhancement of opportunities for the poor in markets.

Over the past decade, donors and governments have revived interest in collective action mechanisms to overcome smallholder marketing constraints as well as ensuring that they realise the perceived benefits (Bernard & Spielman, 2008:60; Collion & Rondot, 2001:1).

This interest is due to the fact that governments and donors have realised the usefulness of these organisations, especially as a medium for sustainable development. Moreover, the renewed interest is to a certain extent in response to changes that have occurred in the global agricultural economy that have presented rural producers with both new challenges and opportunities (Hellin, Lundy, & Meijer, 2007:2-3). This is of significant importance, especially for high-value product farmers who are constrained by high transaction costs.

Because of these challenges, co-operatives and other farmer organisations have been suggested as institutional innovations that can contribute to the development of production and marketing activities in the smallholder sector (Abdulai & Birachi, 2008:119; Shiferaw, *et al.*, 2006:3) by enhancing market participation through collective action. They have been viewed as appropriate in reaching the poor smallholder farmers because of being owned and controlled by smallholder farmers when other development programs have failed to do so. They present significant institutional change believed to change economic opportunities available to smallholder farmers by production improvement through better access to necessary inputs, better technologies and access markets (Negassa, 2009:3).

2.4 CONTRIBUTION OF CO-OPERATIVES TO AGRICULTURAL DEVELOPMENT

Agriculture is considered to be one of the important vehicles for realising Millenium Development Goals (MDGs), which are intended to halve the number of people suffering from intense poverty and hunger (World Bank, 2008:1). Statistics indicate that three out of four poor people in developing countries live in rural areas and depend directly or indirectly on agriculture for their livelihood (Rondot & Collion, 2001:1). Thus, in much of SSA, agriculture is a strong option for encouraging growth, overcoming poverty and enhancing food security. However, considerable development that has taken place especially in agriculture has not offered a lot of benefits to rural poor people and has not made a significant impact on alleviating rural poverty (Pinto, 2009:3). These people constitute the smallholder sector in developing countries which in most cases is left without any effective support that offers rural people new opportunities to move out of poverty.

Dorward, Chirwa Kachule, Kumwenda, Kydd, Poole, Poulton, Stockbridge (2005:1) acknowledge that recent years have indeed seen extensive interest in farmer organisations, which includes co-operatives and other collective marketing associations, as instruments for supporting agricultural development. A number of countries have called for more comprehensive measures to overcome problems hindering smallholder market access. Such measures include increased investment in infrastructure, in market institutions and in agricultural research and extension services, together with a greater role for producer groups (World Bank, 2002:18). Hence, most countries' policies and development strategies now reveal a strong emphasis on promotion of farmer associations in order to facilitate farmer access to inputs, credit, output markets, market research, technical training and to improve co-ordination within the smallholder sector.

The role played by co-operatives is evident and more significant in the agricultural sector than any other sector. This is because, as an area of productive activity, the agricultural sector has some sector-specific attributes that distinguish it from other sectors (Valentinov, 2007:57). Agriculture is an asset-specific sector and agricultural production is also dependent on nature, including biological and climatic factors. The high reliance on nature implies that farmers have relatively low control over production processes which puts them at a disadvantage (Valentinov, 2007:57-59). Because of their advantages, co-operatives help farmers to compensate for the problems encountered in this sector and have appeared to generate systematic incentives for farmers to form co-operatives. Consequently, the co-operative sector is now a widespread phenomenon in both developed and developing countries, especially in the agricultural sector. They are viewed as instruments that can help achieve the productivity revolution in the smallholder sector.

Similarly, the importance of the role played by co-operatives in agricultural development is demonstrated by the fact that the co-operative sector in most developing countries has been viewed as a potential significant contributor towards the realisation of MDGs (Francesconi, 2006:2). Co-operatives in the agricultural sector are considered to be the most important organisations that pay attention and try to support rural development in general as well as agricultural development, especially through activities and services intended for farmers. They have mainly contributed to the agricultural sector by raising productivity, linking farmers to markets, reducing risk and vulnerability, facilitating

agricultural entry and exit as well as increasing farm income and enhancing environmental stability. Pur, Gwary and Gaya (2003:2) reveal that a review of co-operatives' role at an international level indicates that they play a vital role in all aspects of agricultural production which can range from the land clearing to the consumption stage.

2.4.1 Raising agricultural productivity

Co-operatives play a major role in raising agricultural productivity through the various activities they undertake. One way in which they raise agricultural production is through the provision of necessary inputs and services to smallholder farmers. This places farmers at a better position to operate efficiently because they can organise more resources than they would otherwise be able to achieve in an individual capacity and are thus able to improve their productivity. Pur *et al.*, (2003:2) describe co-operatives as a medium through which services, such as the provision of farm inputs, farm implements, farm mechanisation, agricultural loans, agricultural extension, members' education, marketing of members' farm produce and other economic activities and services, are rendered to members.

Through timely delivery of agricultural inputs and services required, farmers are able to improve their productivity and produce good quality products, increase farm income and become more competitive (Pur, *et al.*, 2003:2). Inputs are usually not easily accessible and transport costs are high, and co-operatives have made it possible for collective buying of inputs and lowering transportation costs. In other words, co-operatives form a link between farmers and input dealers, enabling easy access of inputs. This accelerates transformation of agriculture and rural economic development because it brings about productivity improvement in the agricultural sector through improved access to inputs as well as service delivery.

On the other hand, co-operatives have also played a major role in agricultural development through the improvement of access to credit by farmers. This has been made possible by enabling the poor to access reasonably priced credit at terms and conditions favourable to them (Hovhannisyanyan, Urutyanyan & Dunn, 2004:5). As a result, production has increased in the smallholder sector, when considering that a large number

of farmers without land titles or any form of security usually find it difficult to access credit. Thus co-operatives offer smallholder farmers the opportunity to access credit affordable to them which is vital for the development of the rural economy as well as helping the rural poor build assets (World Bank, 2009:23). Improved access to finance facilitates the use of purchased inputs, including mechanisation, which is thus an improvement in agricultural production.

Co-operatives provide education and support to farmers, improving their managerial capacity as well as enhancing the competitiveness of the agricultural sector. They promote capacity building and human capital investment through member training and education programmes in a variety of topics depending on members' needs (Satgar & Williams, 2008:23). As a result of globalisation, farmers are forced to become more competitive and this is through education and training. Education and training provided by co-operatives help to facilitate dissemination and adoption of new technologies by farmers (Kariuki & Place, 2005:4). This positively improves agricultural production.

2.4.2 Linking farmers to markets

Farmers come together for the main purpose of marketing their product and co-operatives have always been an important vehicle for collective marketing and thereby strengthening farmers' links to markets. Provision of an assured marketing outlet sufficient to producers is an essential condition of increased production which, in most cases, acts as an incentive for farmers to participate in co-operatives (Ayenew, Wurzinger, Tegegne & Zollitsch, 2009:2). This implies that farmers can avoid market imperfections through co-operatives that help co-ordinate markets. For instance, experience in Uganda and Kenya has pointed to marketing outlets being a key initiator of milk production by smallholders.

As far as development is concerned, co-operatives have expanded modern markets in rural areas by providing a ready market for farmers' produce and absorbing transaction costs that hinder smallholder farmers from market participation (Holloway, Nicholson & Delgado, 1999:10). This has generated a high income for farmers through the marketing of their produce in markets that they previously had no access to (Ortmann & King 2007a:44). This is particularly the case for traditional commodities that still play a major

role in many developing country economies and offer substantial opportunities for future growth (World Bank, 2009:22).

The co-operative sector also makes a contribution to infrastructure development which enables the linking of farmers to markets (Bienabe & Sautier, 2005:4; Kariuki & Place, 2005:4; Negassa, 2009:3). The smallholder sector is characterised by poor roads, poor communication facilities, unavailability of storage facilities and poor market infrastructure leading to post harvest losses. Market failures caused by asymmetric information and high transaction costs are more pronounced in areas with underdeveloped road and communication networks and other market infrastructure (Shiferaw, *et al.*, 2006:6). Cooperatives have assisted in development of rural markets that provide farmers with a ready market for their produce hence enable farmers minimize costs associated with travelling to distant markets. They have also contributed in investment of primary processing facilities through pooling of resources to allow for value addition.

In addition, the worldwide food and financial crisis poses many challenges for the agri food sector especially in developing countries (Prakash, 2000:2). The demand for high value products is rapidly increasing, driven by rising incomes and faster urbanisation. This has presented a number of expanding opportunities as well as challenges for smallholder farmers because they are encouraged to venture into high value markets yet their produce has to meet certain qualities, standards and timeliness in delivery (World Bank, 2009:22). Because of poor infrastructure, inadequate support services and weak institutions, farmers are unable to participate in the high value markets. Applying grades and standards require investments in training, equipment, infrastructure and monitoring systems, which can be afforded by larger organisations. Co-operatives therefore have made it possible for farmers to integrate into such markets through the provision of necessary inputs and equipment, technical knowledge as well as market information necessary for accessing high value product markets. Shiferaw *et al.* (2006:10) acknowledge that the ability of smallholder farmers to participate and compete in high value markets is a determining factor for agricultural growth, especially in developing countries because of better economic opportunities offered to them.

However, in order for co-operatives to promote the participation of smallholder farmers to markets, it is critical to ensure effective horizontal co-ordination. According to Poulton and Lyne (2005:126), horizontal co-ordination can range from informal arrangements between farmers to co-ordinate procurement of inputs and sales, to groups formally constituted for facilitation of collective action (e.g. farmer associations and organisations, co-operatives). Therefore, through collective action facilitated by horizontal co-ordination, co-operatives place farmers in a better position to improve their market access as well as strengthen their market power.

2.4.3 Improvement of market information

The availability of market information is limited in developing countries. This is due to the fact that the acquisition, collection and processing of required information is costly leading to asymmetric information, especially in the smallholder sector (Shiferaw, *et al.*, 2006:5). As a result of their limited resources to access market information, smallholder farmers are placed at a disadvantage because they are inhibited from having access to markets. Co-operatives are able to bridge the information gap by obtaining, interpreting and disseminating information about both inputs and output markets, thereby enabling productivity increase, which is a positive contribution to agricultural development. Timely access to market information can dramatically improve the price discovery process of farmers, reducing local market instability as well as post harvest losses (Lapar, *et al.*, 2006:4). This has a positive effect on improving market access by farmers and enables them to make better and informed decisions.

2.4.4 Improvement of bargaining power

Co-operatives also have a positive influence in strengthening the bargaining power of farmers (Ortmann & King, 2007a:43). They make farmers' voices heard in decision-making processes in policies that affect the context in which they produce, transform and market their products. In larger numbers, farmers have a more effective input in decision-making processes that affect their lives, rather than in operating as individuals. In developed countries, such as the United States of America, co-operatives have developed to become a significant force in agriculture and play an important role in influencing

national agricultural policies (Cropp & Graff, 2001:11). Improving the bargaining power of farmers has a positive influence in the development of the smallholder sector as well as the agricultural sector as a whole.

2.4.5 Employment creation

The agricultural sector absorbs a great deal of labour in developing countries and statistics indicate that 35 % of the population is employed either directly or indirectly in the agricultural sector (Pinto, 2009:3). Co-operatives contribute to employment creation in the agricultural sector as well as to other sectors of the economy. They employ a large number of people; generate and enhance income, improve viability of business activities; and thus have significant potential in eradicating poverty, enhancing empowerment and creating jobs. Where there is a well functioning co-operative organisation, at least two people are employed directly and many others are indirectly employed. The United Nations (UN) in 1994 estimated that the livelihood of nearly three billion people was made secure by co-operative enterprises. For instance in Kenya, the co-operative sector employs over 250 000 people (Satgar & Williams, 2008:16), which is very significant in contributing to development.

It is thus evident that co-operatives play an important role in agricultural development and the next section reviews literature on the role of co-operatives in dairy development.

2.5 THE ROLE OF DAIRY CO-OPERATIVES

Dairy farming plays a key role in the socio economic status of the large percentage of rural people especially in developing countries through provision of employment opportunities as well as supplementary income to the rural poor. However, evidence indicates that the proportion of dairy farmers engaged in subsistence agriculture in the developing world is still high despite the rapid increase in demand of livestock products (Bernard, *et al.*, 2007:1). As a result, many countries are attempting to increase milk production by assisting small-scale farmers to integrate in markets since they are the most numerous and poorest of the farmer population as a whole (Negassa, 2009:3). This has an impact on the provision of rural employment, increase in income and diversification away from

traditional production to modern systems of production. Therefore, the co-operative system has proved to be an effective vehicle for dairy development, particularly in rural areas (Sinja, *et al.*, 2006:2; Lapar, *et al.*, 2006:3). It has featured prominently in dairy development worldwide because of the range of skills involved in milk production and marketing that require a number of activities that can best be provided through collective action, thus through co-operatives.

The role of co-operatives in dairy production is evident in the following ways:

2.5.1 Improvement in milk production

Co-operatives have played a vital role in fostering dairy development in a number of countries in the developing world, particularly by providing a stable market environment and delivering necessary farmer services for smallholder dairy farmers (Sulastri & Marhajan, 2002:18). This has been made possible through the development of informal or traditional marketing channels which co-operatives have contributed to, and these markets are dominated by smallholder farmers. They control approximately 80 % of marketed milk in many countries in SSA, South Asia and Latin America (FAO, 2001:146). Examples include Kenya (86 %), Tanzania (98 %) and India (83 %).

Dairy development through co-operatives is considered to be the most effective strategy for supporting smallholder dairy farmers, which is made possible by providing a guaranteed market for milk; supplying feed at reasonable prices as well as provision of other services such as milk collection, provision of credit, veterinary aid, and artificial insemination (Holloway, *et al.*, 1999:10). Access to necessary inputs and services is a major contributor to increase and sustain milk production. An increase in milk production has a positive influence in income generation which encourages farmers to invest in better dairy technology, such as improved dairy breeds and better feed, resulting in milk production being more profitable. Farmers produce better feeds and improve housing and care for their animals, which contribute to dairy development and hence an increase in milk production.

In addition, many smallholder farmers still practise or use low levels of technology. They are unable to adopt new production technologies that demand higher investment, given their limited financial resources and skills. Although the adoption of improved production technologies has a positive effect on milk production, it does require high investment. Co-operatives have played a pioneering role in introducing modern technologies to help farmers increase production and maximise their returns (Lapar, *et al.*, 2006:2). They have facilitated in the dissemination and adoption of new technologies through education and training provided to farmers. The adoption of modern technologies for milk conservation, transportation and processing has benefited smallholder farmers through the maximisation of their returns from increased milk productivity.

2.5.2 Improvement in milk marketing

The marketing of milk presents serious challenges for smallholder dairy farmers because of its unique features that require special co-ordination in markets as compared to other agricultural products. According to Wolf and Hamm (2001:3) and Hovhannisyan *et al.* (2004:3), milk has three special attributes that distinguish its marketing from other agricultural products. Firstly, milk is a perishable product and, unlike other agricultural products, it can only be stored for a few days in its liquid state. Secondly, most agricultural products are harvested once a year and can be stored for later sales whereas milk is normally harvested twice a day. Thirdly, the supply and demand of milk is counter-cyclical over the year. These attributes are evidence that milk requires a secure market and co-operatives have proven to be a provider of such an assured milk market, as observed in countries like India, Kenya and Uganda (Staal, Thorpe, Muriuki, Omere, & Owango, 2000:5).

Moreover, these special attributes of milk contribute to high transaction costs in dairy production and marketing because of the high marketing costs for fluid milk, scattered nature of fluid milk markets and the risk attached to marketing milk as a perishable product (Holloway, *et al.*, 1999:5). Because of its perishable nature, milk requires rapid transportation to the market in order to avoid losses arising from spoilages. Farmers lack post harvest infrastructure such as chilling facilities to keep milk in good condition hence the need for rapid transportation of milk to the market (Kariuki & Place, 2005:9). This

results in high transaction costs which negatively affect farmers' decision to participate in markets, thus limiting them from accessing markets (Abdulai & Birachi, 2008:104; Staal, Delgado & Nicholson, 1997:780). In this regard, co-operatives play a central role in minimising transaction costs in dairy production because they improve market participation by overcoming barriers to assets, information, necessary services and, most importantly, by overcoming barriers to markets within which smallholders wish to sell their milk (Lapar, *et al.*, 2006:6).

Co-operatives therefore improve the marketing of milk through the minimisation of transaction costs associated with marketing milk as a perishable product. Co-operatives provide a reliable market outlet to dairy farmers and they have the advantage in the collective marketing of milk which significantly lowers transaction costs among smallholder farmers (Hovhannisyan, *et al.*, 2004:5). The provision of a reliable market outlet that is sufficiently rewarding for farmers acts as a stimulator for milk production and co-operatives provide more marketing options to farmers. This in turn brings about major improvements in the production and marketing of milk as well as changes in consumption behaviour of smallholder households since they consume a higher percentage of their produce (Ayenewu, *et al.*, 2009:2). Co-operatives also enable value addition through the processing of milk into less perishable products which assists farmers in selling directly to final consumers, thereby earning more profit.

Improvement in market access encourages more intensive dairy production in the form of improved dairy breeds and improved feed technologies that enable smallholder farmers to increase their income and employment, which in turn leads to improvement in the welfares of families, including those of women and children (Staal, *et al.*, 2000:9). An example of successful co-operatives in the dairy industry is found in India. More than 70% of India's milk is produced by households owning only one or two dairy animals and these producers form part of a nationwide network of dairy co-operatives (FAO, 2004:24). Transaction costs in milk production will be discussed in detail in the next chapter.

2.5.3 Improving food safety and standards

Increasing food safety concerns over the effects on health and recent global concerns have led to a growing interest among consumers in food safety assurances and traceability of products offered by farmers (Francesconi & Ruben, 2007:12). As one of their advantages, co-operatives have made it possible for dairy farmers to produce good quality milk and dairy products as independent farmers are often unable to meet food safety and quality control requirements because of poor milk handling techniques and technology used. Smallholders do not usually have chilling or processing facilities because of extreme poverty, low asset base and no access to finance. Co-operatives can thus provide farmers with such facilities. To ensure good quality products and safety, milk from farmers is tested on a daily basis, which forces farmers to use appropriate milk handling techniques for which they are given appropriate training.

In addition, co-operatives have played a role in undertaking more farmer-oriented research which has expanded dairy education and extension services, and enhanced government role in integrated dairy development (Sulastri & Marhajan, 2002:17). They have played an important role in providing a base for farmer service delivery and for generally stable agricultural knowledge systems. In short, co-operatives play a major role as a source of market information for dairy farmers.

Access to market information improves decision making by farmers and enhances market participation. Access to such information improves production practices to prevent, eliminate or reduce food safety hazards on the farm. According to Valeeve (2005:620), these practices include particularly husbandry and management practices such as feed production, cattle movement and traceability, health and treatment, milking procedures, maintenance of milking equipment, dairy cattle housing, water management, hygiene level on the farm, as well as transport of raw milk to selling points. Evidence suggests that farmers with limited access to this information are less likely to adopt standards.

2.6 CO-OPERATIVES IN SWAZILAND

As a third world country, development of the smallholder sector in Swaziland can be a significant contributor to poverty alleviation. This has recently resulted in the promotion of the use of co-operatives by the Swazi government as organisations that can help to enhance the development of small-scale farmers in the country. Co-operatives are not a new concept in Swaziland and date back to 1931, when the first co-operative proclamation was introduced (MOAC, 2004:9). Only a few co-operatives were registered then, particularly in the farming sector. The posts of Registrar for Co-operatives and for the Department for Co-operative Development were created in 1963 to enable proper registration of co-operatives; hence the Co-operative Societies Proclamation in 1964. This later changed to the Co-operative Societies Act of 2003 and was completed by Co-operative Societies Regulations in January 2006.

Although co-operatives were originally formed mainly in the agricultural sector, they are now in various sectors of the economy. They include farmers' co-operatives in poultry, livestock breeders, fruit and vegetables, consumer, savings and credit co-operatives as well as multipurpose co-operatives. The savings and credit co-operative sector has the largest membership. In addition, a higher percentage of agriculture co-operatives are rural based, comparatively small in size due to a small membership base and are based around a single product. The co-operative movement in Swaziland has formed three apex organisations for multi-purpose farmer co-operatives, savings and credit co-operatives and for poultry co-operatives. Currently, there are 190 registered co-operatives with a membership of 43,528 members and approximately 70% of them are women (MOAC, 2004:6).

2.6.1 Dairy co-operatives and their role in Swaziland

It has been estimated by Staal, Pratt & Jabbar (2005:13) that milk demand in developing countries will more than double by 2020 due to population growth and urbanisation. This is evident in Swaziland because the country is and has been experiencing an excessive demand of milk and dairy products which presents a serious challenge for all stakeholders in the industry. Suitable domestic dairy development efforts are therefore being made to

improve milk availability in the country. This is possible through the improvement of production and marketing activities, especially in the smallholder sector that forms the basis for dairy development. Co-operatives form part of the efforts being made to help develop the dairy industry in Swaziland.

The need to satisfy local demand and improve the marketing system as well as to improve the welfare of smallholder dairy farmers led to the establishment and development of milk co-operatives in the country. Dairy co-operatives in Swaziland were introduced as part of the dairy development programme to improve milk production, collection from smallholder farmers, marketing and to serve as a source of essential inputs (Mavuso, 2004:12). However, a number of the co-operatives have been unsuccessful because of lack of support from all necessary stakeholders including the government. The emphasis of milk co-operatives is to support smallholders to stimulate economic growth and reduce poverty in rural areas, thereby contributing to income and employment generation in the smallholder sector. This is because large-scale farmers are not faced with the same problems smallholder farmers are faced with in the industry and even if they are, are better equipped to withstand risks. Further, smallholder farmers are considered to be the basis of dairy development and hence the focus of development is on them.

The ever-increasing demand for milk and the dependence on imports have stimulated a renewed interest to promote more dairy co-operatives as mechanisms that will improve milk production and marketing in the country (Mapako, 2007:5). Such inspiration is derived from countries like Kenya and India where dairy exports have materialised within the frame of co-operative organisations. Dairy co-operatives are meant to provide milk collection, necessary inputs, credit, extension and training, to promote technological innovation in terms of dairy breeds and the use of Artificial Insemination (AI) for breeding purposes as well as to assist in the marketing of milk from the smallholder sector. However, more needs to be done to enable co-operatives to fulfil their objectives.

Currently, there are only five fully operational dairy co-operatives in Swaziland (SDB, 2008:23). A number of most dairy co-operatives closed down because of numerous constraints (such as a lack of support from government and development agencies, lack of finance, poor management, lack of member commitment and participation, and poor

governance) and some are not yet operational. However, the extent to which co-operatives are fulfilling the various roles indicated above and the problems they are facing are not well documented in the country. Detailed information and assessment of the role co-operatives play in the industry would assist in designing development programs to improve their performance. Currently, plans for the establishment of more dairy co-operatives country-wide are underway. This is expected to make a contribution to the government's development strategy of improving agricultural development as well as to the availability of milk in the country.

The formation of these organisational innovations will increase marketing options available to smallholder farmers as well as improve the prevailing marketing system which favours large-scale farmers compared to small-scale farmers. For the same reason, financial institutions are also encouraging group lending in the dairy sector as a way of promoting the development of co-operatives. Adequate support from government and other stakeholders should be extended to enable effective performance of co-operatives.

2.7 COMMON CHALLENGES FACED BY CO-OPERATIVES

There are a number of challenges that have contributed to co-operatives' lack of success, especially in developing countries, despite the fact that they play a significant role in development. Most co-operatives have failed to improve their performance because they do not have enough resources to make a difference (Pur, *et al.*, 2003:5; Chambo, 2009:10). For instance, they lack access to financial resources to help them expand their business which inhibits their investment opportunities in better technologies. Often, credit awarded to them is insufficient to meet the financial needs of the organisation.

In addition to this, co-operatives are constrained by limited economic benefits for their members yet the entire business revolves around economic benefits that members expect from the co-operatives, especially for agriculture co-operatives (Prakash, 2000:8). This discourages member participation and erodes confidence in leadership of the co-operative. The incentive structure for attracting membership remains marginal because of the limited economic benefits (Chambo, 2009:11). This has led to co-operatives being

unable to attract the right leadership and management due to a lack of incentives, and thus poor management is another challenge faced by co-operatives.

Furthermore, member education and training has not been effective in giving members the right skills and knowledge of bringing about significant change to their lives through their co-operatives (Bienabe & Sautier, 2005:8). The implementation of programs such as good governance, transparency, accountability as well as member participation is put under strain, leading to poor performance of co-operatives. Further, co-operatives cannot fully achieve their set goals because of a lack of support required from government and development agencies. Other co-operative challenges include poor management, lack of member commitment and participation, restrictive government policies, as well as poor governance resulting in corruption. For them to be effective, co-operatives need to be managed with minimal government involvement and be provided with all the support they require, such as a favourable policy environment, infrastructure development and capacity building.

2.8 EMPIRICAL STUDIES ON THE ROLE OF CO-OPERATIVES AND THEIR CHALLENGES

There is little empirical evidence available in Swaziland to support the role of co-operatives in smallholder dairy production and in agricultural development as a whole. However, international experience on the role co-operatives can play, especially in the smallholder subsector, will be used. The role of co-operatives as well as their performance has always been of considerable interest in agriculture economics, mainly because of the importance of co-operatives in both developed and developing countries.

2.8.1 Production and marketing

Ghosh and Maharjan (2004), in their study on the role of co-operatives and their impact on milk production and household income, discovered that co-operatives play a role in significantly improving milk produced by member farmers as well as the price received by smallholder farmers, made possible by access to necessary inputs and improved husbandry practices. This has contributed to a higher income by co-operative farmers

because of improved milk sales which has stimulated the building of household assets. The study is in line with a study conducted by Sulastri and Marhajan (2002), where it was found that co-operatives improve income generation by farmer members, made possible by the improvement of investment opportunities. The results further revealed that through collective purchasing of inputs, farmers purchase inputs at lower prices. The study recommended that the government needs to be actively involved in cow insurance programs in order to attain sustainable dairy development that will be used as an effective instrument for rural employment and rural development as a whole. In addition, the study recommended that fair pricing of milk is needed in order to create a balance between the interest of the consumer and that of the dairy farmer.

In addition, Kariuki and Place (2005) also discovered in their study that co-operatives play an important role in sharing new ideas, building the confidence of farmers and establishing networks based on trust. Co-operatives also facilitate access to credit because farmers can jointly raise collateral to secure a required loan from financial institutions, which is almost impossible when farmers operate individually.

Hovhannisyan *et al.* (2004) analysed the role of co-operatives in milk marketing and, in their study, they discovered that co-operatives play a positive role in herd size and milk produced and marketed by Armenian smallholder farmers. This was attributed to improved training regarding feeding, artificial insemination sanitation programs as well as the support in feed procurement by the co-operative. In addition, the study concluded that co-operatives increase sale opportunities of farmers because they have the potential to sell to distant and more lucrative markets which in turn results in higher farmers' incomes. Hence, training of both members and leaders is of paramount importance to improve the performance of co-operatives. The study also recommended that there is a need for vertical integration in milk processing among co-operatives for the purpose of capturing a greater share of consumers' food expenditures.

On another note, Shiferaw *et al.* (2006) discovered that co-operatives and other producer organisations have the potential to simplify and shorten marketing channels by directly linking smallholder farmers to secondary and tertiary markets, to better co-ordinate production and marketing and to facilitate access of smallholder farmers to essential

inputs at reasonable prices. They also discovered that the effectiveness of co-operatives in performing their role is dependent on improved participation in decision-making by members, improved governance as well as improved external support.

The study on the impact of co-operatives on the commercialisation of smallholder dairy farmers conducted by Bernard *et al.* (2007) in Kenya concluded that co-operatives do serve their expected role in the commercialisation of smallholder farmers. This is made possible through higher prices offered to farmers for their produce, improved bargaining power and better market opportunities provided by co-operatives. However, the study revealed that the impact of co-operative membership is heterogeneous, in the sense that households benefit differently from co-operative participation. The results particularly indicate that smaller farmers tend to sell less of their marketable surplus as a result of higher prices, while larger farmers sell more. This is mainly because poorer farm households typically face food shortages. Consequently, when facing a price increase which allows them to cover their liquidity needs with a lower quantity of output, these farmers will reduce the portion of marketed output and increase their consumption levels. An increase in price for larger farmers who are already able to fully cover their consumption needs results in an increase in marketed surplus.

On the other hand, the study indicates that co-operatives are not adequate in effectively supporting smallholder commercialisation hence corresponding institutions are a necessity to address specific needs of smallholder farmers. The study is also supported by a study conducted by Francesconi and Ruben (2007) on the impacts of collective action on smallholder commercialisation. Francesconi and Ruben evaluated seven indicators, namely co-operative size, market access, herd size and productivity, nutritive value and hygiene at farm level. Empirical findings suggested that co-operatives do indeed play a role in the improvement of members' market access and herd size, differentiated by high productivity.

Negassa (2009) studied the improvement of smallholder farmers' marketed supply and market access for dairy products and established that co-operative participation by smallholder dairy farmers play a significant role in their decision to participate in markets as well as determine the level of their participation in those markets. This was shown by

the significant increase in milk produced and sold by co-operative farmers compared to non co-operative members. However, a shortage of milk supply was found to be a major inhibitor of co-operative performance because it limits the marketing activities of co-operatives. Consequently, the scaling up of marketing activities was recommended through an increase in membership and collection centres.

2.8.2 Innovation

The role of dairy marketing co-operatives in the Ethiopian dairy innovation system was studied by Tefera (2008). Results of the study indicated that co-operatives can play a significant role in promoting technological, organisational and institutional innovations, promoting linkages for access to services and marketing as well as in knowledge and information sharing. However, Tefera discovered that the performance of co-operatives was inhibited by mismanagement on the part of co-operative leadership. Co-operatives on their own are not sufficient in effectively promoting smallholder production and marketing activities; however complementary organisations are necessary to assist in specifically addressing needs of smallholder farmers. The study recommended that governments and development agents should focus on helping co-operatives to organise their own resources in order to enhance their ability to obtain information on improved practices and not to see their role as simply transferring technology and information to farmers.

2.8.3 Transaction costs

A study on the role of collective action in overcoming market access barriers by smallholder farmers was undertaken by Lapar *et al.* (2006). The findings indicated that institutional arrangements such as co-operatives can facilitate a reduction in transaction costs in smallholder production and marketing to enhance market participation. Specifically, the study discovered that co-operatives can reduce information asymmetries, reduce transport and communication costs, as well as address non-economic barriers. Nevertheless, co-operatives need to be supported by governments through the creation of a favourable policy environment to help smallholder farmers to overcome barriers to market participation.

Ginder, Hueth and Marcoul (2005) conducted a qualitative study on co-operatives and contracting in agriculture. The study revealed that being in a co-operative; farmers are able to secure contracts with large buyers which result in higher net returns. By combining vertical and horizontal co-ordination, co-operatives play an important role in connecting farmers to high quality market chains; in the process overcoming barriers to market participation, such as a high level of transaction costs experienced by smallholder farmers. However, they discovered that this role is mainly dependent on organisational efficient information and efficient decision making.

2.8.4 Co-operative constraints

A paper by Rajendran and Mohanty (2004) identified possible constraints that hinder dairy co-operatives' effective performance and development. The constraints identified were a lack of adequate financing for co-operatives because of a low asset base; a low education level of co-operatives members and illiteracy rate that inhibits adoption of new technologies; and the inability of co-operatives to solve problems that farmers face, such as a lack of providing inputs and marketing the farmer produce, because of co-operatives' low asset base and limited resources. In addition, farmer members do not attend meetings because of their negative attitude towards the co-operative, and development policies and laws as well as programs inhibit the emergence of proper leadership and skilled management. The study recommended that governments should provide a suitable environment and conditions for the development and growth of co-operatives as well as organising specialised training courses for staff and board members.

Moreover, Mohamed (2004) discovered that the major constraints of co-operatives involve a lack of finance, lack of trust that results in poor quality of services provided, lack of professional management, misappropriation of funds, low commitment and participation by members, lack of timely market information and a high price of agricultural inputs. However, a lack of finance was found to be the major constraint that inhibits co-operatives in achieving their functions and activities effectively and prevents farmers' needs being met. The study recommended that smaller village co-operatives should be integrated to form larger co-operatives with greater economic entities which can provide and mobilize required resources to enable them to play their role effectively in agricultural development.

2.9 SUMMARY

Although co-operatives have an unhappy history in Africa and are faced with a number of challenges, they have a great potential for development in both the agricultural sector and the dairy sub-sector, particularly by developing the smallholder sector. Co-operatives also bring about commercialisation in the smallholder sector by ensuring higher productivity and higher incomes. They play a key role in the development of rural areas in developing countries, poverty alleviation and serve as an important market outlet for smallholder farmers, and co-operatives should therefore be given adequate technical and financial support. Further, there is a need for governments and development agents to provide complementary public goods that would facilitate the empowerment of farmers to participate in markets as well as for co-operatives to work as development instruments. This includes the provision of a favourable policy environment, development of infrastructure, technological development and investment in human capital as well as making credit markets accessible to the poor.

CHAPTER 3

A REVIEW OF TRANSACTION COSTS IN DAIRY MARKETING AND IN CO-OPERATIVES

3.1 INTRODUCTION

In developing countries, smallholder farmers find it difficult to participate in markets and a large proportion of these farmers are still engaged in subsistence agriculture. This is because of poor infrastructure and a lack of market institutions (Dorward, *et al.*, 2005:3; World Bank, 2002:6) in the smallholder subsector, resulting in high transaction costs, co-ordination failure and market imperfections. Smallholder farmers are limited from increasing their production and market growth is retarded because of high transaction costs which make agricultural production and marketing expensive (Lapar, *et al.*, 2006:2; World Bank, 2002:8). As a result, farmers focus on subsistence production because in the absence of mechanisms to cope with these constraints, smallholders are less likely to participate in markets. These challenges are an indication of why agricultural growth is slow, particularly in SSA.

Transaction costs affect smallholder agriculture that has the potential to improve agricultural production in Africa. They feature prominently in the agricultural sector and result in a lack of access to assets, production technology, information, input supplies and lucrative markets, which inhibit production by smallholder farmers (Lapar, *et al.*, 2006:4). In order to improve productivity and market access for smallholder farmers, transaction costs have to be minimised; and this does not require a single innovation or intervention but a variety of institutional arrangements. Extensive research that has been conducted recognises farmer-led organisations, co-operatives and contract farming as instruments that can help reduce transaction costs and enhance market participation as well as bring about agricultural transformation in developing countries (Birthal, *et al.*, 2005:2). This is made possible through horizontal and vertical co-ordination of production, marketing and processing activities in markets.

The purpose of this chapter therefore is to present a review of the influence of transaction costs on agricultural production, as well as on dairy production and marketing. Transaction costs in co-operatives as an institutional mechanism for an organisation are also considered.

3.2 DEFINING TRANSACTION COSTS

The issue of transaction costs has always been a major concern in agricultural markets. The term transaction cost is broadly interpreted as costs associated with market exchange. However, it is defined by Williamson (1996), cited in Pingali, Khwaja & Meijer (2005:9-10); Abdulai & Birachi (2008:106) as a “trade-off between the costs of co-ordination within an organisation and the costs of transacting and forming contracts in the market”. This trade-off depends on the degree of the transaction costs. On the other hand, Eggertson (1990:15) defines transaction costs as “the costs that arise when individuals exchange ownership rights for economic assets and enforce their exclusive rights”.

In addition, Hobbs (1997:1083) classified transaction costs into information, negotiation, monitoring and enforcement costs. Information costs arise before an exchange and comprise the costs of obtaining price and product information as well as the cost of identifying an appropriate buyer. Negotiation costs are related to the costs of physically carrying out a transaction and comprise the commission costs, costs of negotiating the terms of an exchange and the costs of formally drawing up contracts. Monitoring and enforcement costs are the costs of ensuring that the terms of the transaction are adhered to by the parties involved in the transaction and occur after a transaction has taken place.

Staal *et al.* (1997:782) categorised transaction costs into observable and unobservable costs, and this has been a widely-used definition because of its simplicity. This definition also builds on work done by Coase and incorporates a number of definitions that other authors have come up with. Observable costs are tangible and visible when an economic exchange takes place. According to these authors, observable costs include the costs of transport, handling, packaging, storage, spoilage (variable transaction costs). Unobservable costs (fixed transaction costs), on the other hand, include the costs of information search, bargaining and enforcement of contracts. Because of the presence of

transaction costs associated with information, negotiation, monitoring, co-ordination, and enforcement of contracts, it has been contemplated that intermediary firms will surface to economise on these costs.

3.3 SOURCES OF TRANSACTION COSTS

Transaction costs originate from a number of sources; however, a major element of transaction costs relates to market information. Lapar *et al.* (2006:4) confirm that the availability of market information is limited, especially in developing countries, and this negatively influences market participation by smallholder farmers. Smallholder farmers lack reliable market information as well as information on potential exchange partners. Farmers without access to market information are unable to exchange their products in markets because conducting transactions tend to be costly for them. Information about prices, products, as well as buyers that farmers can exchange products with will enable their greater participation.

Prior to marketing their product or choosing a buyer, farmers need to determine the price of their product which in turn affects their buying and selling decisions (Birtal, *et al.*, 2005:10). These decisions are made based on the difference between the market price and the actual cost of production, yet information on market price can be costly and difficult to obtain. This results in a lack of access to information as farmers have to search for information to be in a better position to sell their product. Basically, transaction costs affect the output price which in turn affects traded output in markets (Somda, *et al.*, 2005:190). In other words, transaction costs influence the production and marketing behaviour of farmers in markets in the sense that farmers will not participate in markets when the costs of undertaking a transaction exceeds the value of participating in the market. High transaction costs result in low prices experienced by farmers which discourage them from selling their produce.

Transport and communication costs are also the most important source of transaction costs among smallholder farmers (Makhura, 2001:40). High transportation and communication costs limit access to markets by farmers because of poor infrastructure. The majority of small-scale farmers are located in remote areas that are far away from

service providers and the main consumers of their produce. The long distances arising from factors such as poor roads that farmers use to get to markets, lead to high transportation costs. Poor communication infrastructure, such as telephone service, limits farmers from accessing market information and results in high transaction costs particularly search and monitoring costs.

Again, the nature of a product determines the prevalence of transaction costs, rendering variation in production and marketing (Pingali, *et al.*, 2005:66). Smallholder farmers in the agricultural sector face high transaction costs in the marketing of their products. However, farmers of perishable products incur higher transaction costs than farmers of any other agricultural products. Perishable products require rapid transportation to avoid losses arising from spoilages. This results in high transportation costs and limits the marketing options available to small and remote farmers. Furthermore, transaction costs arise when an asset-specific investment has been made (Van Der Hallen, 2009:6). This means that the investment in that asset is to some extent non recoverable when the need to divert resources arises, resulting in opportunistic behaviour from buyers transacting with the owner of the asset.

Opportunism is a fundamental concept in the study of transaction costs. It results in transaction costs which cannot be directly observed. Opportunism specifies that individuals are guided by self-interest and behave in a manner deceiving to the other party during the exchange process (Williamson cited in Makhura, 2001:27). This gives rise to transaction costs in the form of monitoring and ensuring that the other party does not engage in opportunistic behaviour. Moreover, transaction costs occur due to the fact that farmers have to search for buyers, determine the terms of contracts, and then conduct the negotiations leading to a bargain. There is also a need to draw up contracts and ensure that the terms of the contract are adhered to (Hobbs, 1997:1088). All these procedures are sufficiently costly to smallholder farmers and prevent many transactions from taking place.

Household characteristics are also a source of transaction costs. Age, gender and education have an effect on transaction costs in different ways. They influence the cost of information search, negotiation, monitoring and enforcement. Age can signify farming

experience. This implies that a higher level of experience makes certain information and search costs cheaper to obtain. On another note, education facilitates minimisation of costs associated with searching for information, for example a higher education level reduces cost of searching for information as well as the time taken to process and act on that information (Pingali, *et al.*, 2005:66-67).

For farmers to actively engage in markets, they need to search for buyers, determine the terms of a transaction, and conduct negotiations resulting in bargaining and drawing up of contracts. Again, farmers also need to ensure that the terms of contracts are adhered to. These are costly activities that prevent a number of transactions from taking place. Therefore, there is a need to have institutions in place that will help minimise the high costs of conducting transactions in order to improve market participation by smallholder farmers. Institutional innovations such as co-operatives have been suggested as potential vehicles that can link farmers to markets by reducing transaction costs; which will be addressed in the next section on co-operatives and transaction costs.

3.4 TRANSACTION COSTS IN DAIRY PRODUCTION AND MARKETING

According to Staal *et al.* (1997:780) and Somda *et al.* (2005:190), transaction costs play a major role in dairy production and marketing because of the risks attached to marketing a perishable product. This makes it difficult for smallholder farmers to gain access to required assets and markets. Literature indicates that transaction costs in the marketing of milk arise from a number of uncertainties, such as price and behavioural uncertainties, as well as information asymmetries. The purpose of this section is to unpack the various transaction costs in dairy production and marketing in terms of the sources as well as the role that co-operatives play in minimising transaction costs in dairy production.

3.4.1 Sources of transaction costs in dairy production

As a perishable product and prone to post harvest losses, milk has to be quickly transported to consumption centres or processed within a couple of hours after production into less perishable forms. It can be stored for two to three days before processing only when kept at a low temperature. However, in most cases, farmers do not possess post

harvest infrastructure or chilling facilities to keep milk in a good condition and this implies greater losses to them.

In addition, milk requires rapid transportation to consumption places or to processing centres (Holloway, *et al.*, 1999:6; Staal, *et al.*, 1997:782). Accessible markets are usually distant from places of production, which limits marketing options available to smallholder farmers and increases transportation costs. Because of the high transportation costs which make it expensive for farmers to transport their milk; farmers resort to selling their produce at the farm gate or other market outlets with lower transaction costs but also lower prices. These market outlets offer lower prices for farmers' produce hence low returns.

Moreover, the bulky nature of milk contributes to high transportation costs incurred by farmers. In general, raw milk is more than 80 % water, resulting in high transportation costs per unit. Consequently, the quantity that can be sold at a time is limited, especially for farmers without vehicles to transport milk (Holloway, *et al.*, 1999:7). High transportation costs therefore limit farmers from selling their produce in remunerative markets. Furthermore, dairy production is a year-round activity and requires a guaranteed market that has to be maintained. This means that the frequency of transactions is high (Ngigi, Delgado, Staal & Mbogoh, 2000:3; Staal, *et al.*, 1997:783) and producers have to search for stable buyers or outlets for their product which results in high transaction costs. Again, because of its perishability as well as natural variation, the composition and quality of milk vary and are difficult to determine. Monitoring costs therefore arise because milk quality has to be monitored and controlled, hence resulting in high transaction costs.

Similarly, the nature of milk can result in opportunistic behaviour on the part of market agents purchasing milk from farmers. As argued by Abdulai and Birachi (2008:106), buyers of milk may take advantage of the lack of simple measurable quality standards by rejecting milk when they have already made an agreement with farmers to buy certain amounts of milk higher than what they can profitably sell. This also contributes to high transaction costs in the smallholder dairy sector. When farmers sell directly to consumers through direct transactions, they are able to retain much of the price paid by consumers.

However, the costs of searching for buyers and the delivery of milk can be very high, leading to a lot of uncertainties involved in milk marketing.

Moreover, dairy production is asset specific, which also contributes to high transaction costs in dairy farming. For instance, farmers in dairy production have to invest in assets such as a milking parlour, dairy cattle, processing equipment and milk coolers, which are specific to dairy production and would not be easily transferred to other enterprises. Thus these result in transaction costs, particularly in the presence of opportunistic behaviour or unsecure market outlets.

The uncertainty principle states that the greater the uncertainty surrounding a transaction, the less likely a transaction is to be efficiently mediated by independent market contracting (Staatz, 1987:94). Dairy production is a risky venture and is surrounded by a lot of uncertainties emanating from price, nature of milk and behaviour of buyers. When uncertainty increases, farmers have to move from spot markets to contracts which increase the costs of negotiating for these contracts. Co-operatives therefore offer more ways of dealing with uncertainties through horizontal and vertical integration in markets by farmers.

3.4.2 Can co-operatives reduce transaction costs in dairy production and marketing?

If transaction costs in dairy production and marketing are as high as described above, the question then is: how can co-operatives help in reducing these transaction costs? In the first instance, co-operatives enhance milk production and productivity, which is made possible by having more reliable access to production inputs, capital, technology and information (Lapar, *et al.*, 2006:14). As far as rural households are concerned, developing a greater surplus of milk for marketing is not simply a question of improving production technologies or increasing milk prices in order to increase supplies; there are other factors governing the post-production decision at the farm level which co-operatives have the potential to contribute to.

Through co-operatives, farmers are provided with a guaranteed market that is otherwise not possible on a regular basis for milk producers. In so doing, farmers' transaction costs are absorbed (Sinja, *et al.*, 2006:3) that would otherwise hinder small farmers from market integration. They reduce milk marketing costs of raw milk, such as the information costs, costs of searching for markets and drawing up contracts, negotiating costs as well as monitoring and enforcement costs. To individuals these markets are closed but are opened to members of a producer organisation. Linking farmers to markets has a positive effect in improving their competence and viability through horizontal integration. Subsequently, milk produced and sold by farmers increases which implies higher incomes in the smallholder sector.

Again, dairy production is a risky business characterised by a lot of uncertainties arising from the nature of milk and price fluctuations. Greater access to markets through co-operatives improves farmers' capacity to withstand risks that arise from production and price fluctuations. Co-operatives enable farmers to share these risks and result in a reduction of transaction costs which make co-operative members better off compared to independent producers (BIRTHAL, *et al.*, 2005:2). Through co-operatives, the variability of farmers' income is reduced because of a reliable market that offers a regular income to farmers. Therefore, any fluctuations in prices are offset by the regular income and the fact that co-operatives buy milk from farmers at fixed prices.

As producers of a perishable product, dairy farmers are required to ensure milk is of good quality by adhering to safety standards. In reality, smallholder farmers are unable to meet these stringent food safety and quality control requirements indicated by their inefficiency to provide standardised products on a continuous basis as demanded by buyers (Valeeva, 2005:60). This can be attributed to a lack of information and quality control measures which are very costly for smallholder milk farmers considering that buyers at times do not pay the highest price for the highest quality product. Subsequently, farmers are not motivated to invest in ensuring quality due to lower market revenues. Co-operatives therefore enable the assurance of milk quality through the provision of chilling facilities as well as value addition, which can establish a collective reputation for quality that generates better output prices which may not otherwise be possible under individual farmer conditions.

In addition, co-operatives compensate for the problem of required big investments in marketing infrastructure and services, given that the fixed costs of such investments can be shared between group members (Lapar, *et al.*, 2006:6). Because of its perishability, milk needs to be processed within two to three days if not sold immediately after production. Farmers on their own cannot afford to buy post harvest equipment, such as milk coolers and processing equipment. Co-operatives therefore overcome smallholder farmers' barriers to assets by collectively sharing the cost of these investments; especially to improve product quality and enable value addition, in the process improving the amount of milk sold by farmers.

Access to market information is one of the major problems farmers are faced with (Lapar, *et al.*, 2006:6). Incomplete and asymmetric information gives room for opportunistic behaviour among market agents buying milk from farmers. As a result, mutually advantageous transactions may fail to occur. Co-operatives reduce the need to search for reliable and current price information. However, member farmers still have to follow the market evolution to ensure that prices offered by the co-operatives are fair. Co-operatives therefore lower transaction costs for farmers by obtaining, interpreting and disseminating information about production and markets. Due to the fact that farmers do not have to actively search for current and reliable market information, they incur lower information costs in comparison to farmers in normal dairy chains (Cordes, Richerson, McElreath & Strimling, 2006:12).

Farmers in co-operatives do not have to negotiate with potential buyers or input providers for a transaction to take place. This is because co-operatives can provide market power to their members through collective negotiations with suppliers or buyers of milk, by controlling member supply into the market (Valentinov, 2007:58). A co-operative can negotiate for better prices paid by buyers and better terms for the purchase of inputs by their members, which reduces production costs. Lower production costs imply more milk produced and sold because of lower negotiation costs, which simultaneously lower transaction costs. Farmers only have to reach an agreement with the co-operative on quality and price of milk so long as the price received by farmers is fair.

In cases where dairy farmers are highly dependent on local milk traders and processors for carrying out regular and timely purchases of produced milk, farmers receive less income than when they sell directly to individuals. This dependence creates the possibility for these market agents to opportunistically seize farmers' profits (Sinja, *et al.*, 2006:3). Dairy co-operatives therefore help farmers to avoid such a situation by allowing them to sell their milk directly to the co-operative as well as by internalising milk processing which results in higher profits for the farmers. Co-operative members do not have to search for potential buyers willing to pay a good price for their produce since they have a guaranteed market available to them in the form of a co-operative. In the process, farmers incur lower search costs that in turn result in lower transaction costs.

Lastly, as a result of milk perishability and its bulky nature requiring rapid transportation, dairy farmers incur high transportation costs, which can also be attributed to poor road infrastructure. Poor road infrastructure increases transportation time and costs associated with accessing markets and information. Co-operatives therefore minimise transportation and communication costs through the collective transportation of milk to the market as well as the improvement in infrastructure (Pingali, *et al.*, 2005:21).

Although co-operatives have the potential to reduce transaction costs for smallholder farmers, they are also susceptible to transaction costs by way of the design of the organisation itself and the influence of human behaviour. Hence, the next section discusses transaction costs problems associated with co-operatives and their institutional design.

3.5 UNPACKING INSTITUTIONAL ISSUES WITHIN CO-OPERATIVES

Co-operatives as a way of horizontal co-ordination are perceived to be a vehicle for the minimisation of transaction costs and improvement of access to more reliable markets by smallholder farmers. However, they can also introduce costs and institutional problems which can have a negative effect on the participation of smallholder farmers in group arrangements and in turn negatively affect the overall performance of the group (Gadzikwa, Lyne & Hendriks, 2007:130). Cook (1995:1156) identified five problems that result in transaction costs in co-operatives, which are discussed as follows:

3.5.1 Free riding

Free riding is one of the major problems that results in transaction costs among co-operatives. According to Cook (1995: 1156), free riding arises when members or non members utilise a resource for their own benefit. Open membership co-operatives are particularly subjected to free riding because non members cannot be excluded from negotiated terms of trade benefits even if they refuse to join the co-operative. Cook further states that free riding is exhibited when gains from a co-operative can be accessed by individuals who did not fully invest in the development of those gains. New members obtain the same support, residual rights and benefits as existing members (Gripsrud, Lenvik & Olsen, 2000:3). This discourages existing members from investing in the co-operative. Trust is one way of dealing with free riding in co-operatives in the sense that it discourages free riding by increasing the individual benefits of collective action, and hence less free riding is exhibited.

3.5.2 Influence costs

Influence costs result from activities in which members or groups in an organisation attempt to influence decisions that affect wealth distribution and other benefits (Royer, 1999:56). A co-operative that is involved in a wide range of activities and has members with diverse interests experiences high influence costs because the different groups will want to influence decisions made in the organisation. The extent of influence costs depends on the existence of a central authority that can influence the distribution of costs and benefits to members, the measures of decision making as well as the degree of homogeneity among members (Cook, 1995:1157).

3.5.3 Horizon problem

The horizon problem arises “when a member’s residual claim on the net income generated by an asset is shorter than the productive life of that asset” (Cook, 1995:1157). In this case, members are likely to underinvest in assets because the return received is less than the return generated by assets hence the benefits from an investment are limited

to the time period over which members expect to be patrons of the co-operative. Subsequently, co-operatives tend to underinvest in assets with long-term returns such as research and development or, in the case of dairy co-operatives, chilling equipment and tanks. This implies that co-operative members prefer current cash flow compared to investments, hence the horizon problem.

3.5.4 Portfolio problem

The portfolio problem occurs in conventional co-operatives because members invest on a proportional basis according to their use of a co-operative and because equity shares in the co-operative cannot be freely traded (Cook, 1995:1157). Members are therefore not in a better position to diversify their individual investment portfolios according to their risk preferences (Royer, 1999:55). As a result, risk averse co-operative members will exert influence on co-operative management to restructure the co-operative's investment portfolios to a reduced risk portfolio, even if this implies lower expected returns. Because potential investors who can diversify the risks of lower expected returns are excluded from investing in the co-operative, members have to bear these risks in an individual capacity.

3.5.5 Control problem

A control problem is caused when divergence of interests between co-operative members and representative board members (principal) and the management (agent) is being prevented (Cook, 1995:1157). A control problem occurs when ownership and control in a co-operative are separate and, according to Royer (1999:55), this can be a problem in the sense that shares in conventional co-operatives cannot be easily exchanged because of absence of equity markets and lack of equity-based management enticement schemes available to other firms. An absence of these markets implies that members are unable to monitor a co-operative's worth or assess management's performance. Lack of equity incentive mechanisms for managers puts co-operatives at a disadvantageous position because they cannot attract or retain competent managers. Iliopoulos and Cook (1999: 80) argue that although the control problem exists in majority of organisations, it is likely to be less severe in co-operatives of small sizes that have a single purpose and their members have the same interests as compared to big co-operatives.

The above-mentioned problems emanate from ill-defined property rights which result in institutional problems increasing transaction costs in the management and control of co-operatives and thereby reducing their effectiveness. In essence, these institutional problems retard growth and performance of co-operatives; and hence they have to be minimised by strengthening assignments of property rights to individual members. Among these problems, only free riding and horizon problems can be associated with co-operatives in the case of Swaziland.

In most cases, co-operative members as well as non members utilise co-operative resources to fulfil their own interests. This is due to that property rights are not well defined to guarantee that members or non-members bear the full costs of their actions or receive the full benefits from co-operative participation. Members do not participate in co-operative activities and decisions and yet want to benefit from the co-operative. They do not attend meetings, do not contribute to capital accumulation and sell part of their produce to other marketing outlets. This is an indication of a lack of commitment on the part of co-operative members.

3.6 SUMMARY

The participation of smallholder farmers in markets in developing countries remains low because of a prevalence of high transaction costs, which a number of studies have termed a key reason for smallholder farmers' failure to participate in markets. From the literature reviewed, co-operatives represent initiatives that can address this constraint by reducing transaction costs that form barriers for market participation. Dairy production is characterised by high transaction costs and from the above discussion, it is evident that co-operatives have the potential to significantly reduce transaction costs among smallholder dairy farmers. A reduction in transaction costs will improve milk marketing and contribute to smallholder dairy development. Although co-operatives represent an integrated arrangement aimed at reducing marketing costs, they are also affected by transaction costs, such as opportunism and free riding. Therefore, for co-operatives to be effective developmental instruments, these problems have to be minimised.

CHAPTER 4

HOUSEHOLD CHARACTERISTICS, DAIRY PRODUCTION AND MARKETING PATTERNS IN SWAZILAND

4.1 INTRODUCTION

This chapter presents findings of the study. It presents the descriptive analysis of the role played by co-operatives in dairy production and marketing of smallholder farmers in Swaziland. Characteristics of both co-operative and non co-operative farmers, their production systems, marketing systems as well as their performance indicators are presented and discussed in detail. All of these were used in the assessment of the role cooperatives in dairy production. This chapter also presents the benefits of being a co-operative member as well as the constraints experienced in dairy co-operatives which inhibit co-operative development.

4.2 SOCIO-ECONOMIC CHARACTERISTICS OF SAMPLED DAIRY FARMS

4.2.1 Age, gender and education level of household head

The age of the household head is very important when it comes to decision making. Older farmers are deemed more experienced than younger farmers, and younger farmers are known to be risk takers. According to Table 4.1, the average age was higher (50 years) in the case of independent farmers compared to co-operative member farmers (47.4 years). However, age did not vary significantly between co-operatives and independent farmers. The sample t test indicates that the difference in mean average age between co-operative and non co-operative farmers is statistically significant at a 10% level of significance. This indicates that co-operative farmers are slightly younger than independent farmers and this finding concurs with a number of studies conducted.

Table 4.1: Age of household heads

Age range	Non co-op members n= 60		Co-op members n= 60		t value
	Frequency	(%)	Frequency	(%)	
< 30	0	0	7	11.7	
30 -40	10	16.7	20	33.3	
41 - 50	22	36.7	12	20	
51 - 60	16	26.6	13	21.7	
>60	12	20	8	13.3	
Average age	50 (10.3)		47.4(9.97)		1.36*

Source: Survey data, 2010 (Figures in parentheses are standard deviations)

***Significant at 1%, **significant at 5%,*significant at 10%

Table 4.2 indicates that out of the 120 households interviewed, 66.7% were male headed and 33.3% of the households were female headed. However, there is a higher percentage (43.3%) of female-headed households among co-operative members as compared to non co-operative members (23.3%). This may be attributed to the fact that co-operatives encourage the participation of females who are generally excluded from more rewarding agricultural opportunities because of a lack of resources, especially land.

In addition, the education level attained by the household head is of importance, given that it plays a vital role in the adoption of new technologies that will have a positive influence in dairy farm management. Results indicate that a majority of farmers interviewed are mainly literate; however, co-op members have a higher literacy rate (82%) than independent farmers (73%). On average, they have 9.8 years of schooling while non co-op members have 8.9 years of schooling, as shown by Table 4.2. This implies that relatively educated farmers participate in co-operatives. The t-test indicates that there is no significant difference in the education level between co-operative member farmers and independent farmers.

Table 4.2: Gender and education level of household heads

	Non co-op members n=60		Co-op members n 60		t value
	Frequency	(%)	Frequency	(%)	
Male	46	76.7	34	56.7	
Female	14	23.3	26	43.3	
Education level:	8.9 (5.7)		9.8 (6)		1.11
No formal education	16	26.7	11	18.3	
Primary Education	23	38.3	11	18.3	
Secondary education	10	16.7	18	30	
Tertiary education	11	18.3	20	33.4	

Source: Survey data, 2010 (Figures in parentheses are standard deviations)

***Significant at 1%, **significant at 5%,*significant at 10%

4.2.2 Household size

The household size is an indication of the available labour in the household. Dairy production is a labour intensive activity; therefore, a large family size is an indication of the availability of more labour. In the study areas, a household consisted of 9 members on average, as indicated by Table 4.3. However, the household size for co-op members was 9.5 while that of independent farmers was 8.7. The t-test indicates that the mean difference between co-operative members and non co-operative members with respect to household size is statistically significant, at a 5% level of significance. A potential explanation for this is that households with a larger household size have more labour available for dairy production, hence more milk will be produced which will require a market that will absorb all milk produced.

Table 4.3: Household composition

	Non co-op members		Co-op members		t value
	Number	(%)	Number	(%)	
Adult members	3.8	43.7	4.3	45.3	
Children	4.9	56.3	5.2	54.7	
Average household size	8.7 (3.1)		9.5 (2.6)		2.26**

Source: survey data, 2010 (Figures in parentheses are standard deviations)

***Significant at 1%, **significant at 5%, *significant at 10%

4.2.3 Major sources of income

Households interviewed derived their livelihood from different activities apart from dairy production. The majority of households depended on agricultural activities as a source of income, indicating that farmers integrate milk production with other agricultural activities. The results confirm that approximately 60% of farmers interviewed depend on farming for their livelihood with more independent households depending on agriculture for their livelihoods. It is also estimated that 35% of co-operative members and 18.3% of independent farmers depend on off-farm employment as their major source of income, with dairy production being a secondary source. These households are expected to invest part of their earnings in the dairy enterprise to improve the farm operations as well as the asset base of the household, hence larger herd sizes.

According to Table 4.4, the mean monthly income from non dairy activities of co-op and non co-op participants was E2, 775.83 and E2, 080.83 respectively. The higher monthly income is attributed to the fact that a higher percentage of farmers depend on off-farm activities for their income as well as other agricultural activities, especially vegetable and poultry production. This implies that farmers are in a better position to expand their production and to cope with different forms of risks. Although there is a difference in the mean value of nonfarm income, the independent sample t test revealed that this difference was not significant. The average monthly income from dairy was estimated to be E2, 751.23 and E2, 469.23 for independent and co-operative members respectively. Income per cow/month was estimated to be E447.48 for independent farmers and E394.83 for co-

operative farmers. This income was estimated by using costs of inputs considered critical in dairy production. These include feed, labour, vet and drugs, dipping and transport costs. Not all expenses could be included because of data insufficiency resulting from poor record keeping. The income difference between co-operative members and non co-operative members is mainly attributed to the higher prices received from other market outlets compared to prices received when selling to co-operatives.

Table 4.4: Major sources of income

Sources of income	Non co-op members n=60		Co-op members n=60		t value
	n	(%)	n	(%)	
Dairy	9	15	10	16.7	
Dairy and other agricultural activities	32	53.3	20	33.3	
Off-farm employment	11	18.3	21	35	
Other (Remittances and pension)	8	13.3	9	15	
Average income from non dairy sources (E)	2,080.83 (2330.29)		2,775.83 (3150.46)		1.37*
Average income from dairy production (E)	2,751.23 (2900.24)		2,469.23 (2247.75)		0.37
Average income/cow (E)	447.48 (51)		394.83 (41.8)		0.8

Source: Survey data, 2010 (Figures in parentheses are standard deviations)

***Significant at 1%, **significant at 5%,*significant at 10%

4.2.4 Household endowment

Land

Land is the most important asset as the majority of the respondents derived their livelihood from farm-based activities. It was found that 95% of the farmers interviewed do not have title deeds to the land. The area surveyed falls under Swazi Nation Land (SNL), which is land owned by the king. It is either allocated to households by a chief or inherited from relatives. From the results, it can be gathered that the average land size for farmers interviewed was 1.2 hectares which presents a serious challenge to dairy farmers. It was noted that 55% of dairy producers interviewed indicated land size as one of their major constraints for expanding dairy farming activities. This limits feed resources as well as production of improved animal feeds, thus requiring farmers to intensify their production systems by practising zero grazing, which is costly for smallholder farmers.

Asset ownership

Table 4.5 shows the asset ownership of farmers interviewed. In general, livestock keeping forms part of the Swazi tradition and is still considered a source of social status, hence the majority of households interviewed own livestock. As shown in Table 4.5, 61.7% and 68.3% of non co-operative and co-operative farmers respectively owned livestock which comprised of cattle, sheep, goats and chickens.

In addition, results indicate that farmers own a number of assets, such as vehicles, dairy parlour, milking machines and cooling facilities, which is illustrated in Table 4.5. Asset ownership for both co-operative and independent farmers is not significantly different. However, results suggest that more of co-operative members own presented assets compared to non co-operative members.

Assets, such as milking equipment and cooling facilities, are important inputs in milk production. Milk has to be kept in good quality until it is sold. However, as indicated above, only a small percentage of both farmers had chilling facilities to keep their milk fresh, accordingly resulting in farmers incurring high losses due to spoilage. Further, a smaller

percentage of farmers interviewed owned a milking machine. This may be attributed to minimal opportunities of credit available to smallholder farmers. Apart from being faster, a milking machine positively contributes to hygiene and minimises diseases, such as Mastitis; yet farmers cannot afford to own one.

In the case of farmers interviewed, a dairy parlour is a simple structure or shed whereby a maximum of three cows can be milked at a time. For some farmers, the milking parlour serves as a storeroom for feed especially concentrates used for feeding cows during milking.

Table 4.5: Asset ownership

Variable	Non co-op members N= 60		Co-op members N=60	
	N	%	N	%
Livestock ownership (Other)	37	61.7	41	68.3
Vehicle ownership	14	23	19	31.7
Dairy parlour	50	83.3	54	90
Milking machine	3	5	7	11.7
Chilling facilities:				
Refrigerator	18	30	23	38.3
Cooler tank	2	3.3	5	8.3

Source: Survey data, 2010

4.3 DAIRY PRODUCTION SYSTEMS

It is important to understand the milk production systems and patterns within which milk production occurs. Milk production in Swaziland is mainly divided into the traditional and commercial sectors (IFAD, 2001:23). However, there are also farms that employ both production systems. Production systems of co-operative and non co-operative farmers were not significantly different from each other.

It was found that 4% of farmers interviewed were using the traditional system of production whereby dairy cows are kept mainly for consumption, and excess milk was

sold to the neighbours to increase household income. The sale of milk was not their main objective; although they did sell surplus milk when the need arose. Hence, households were not market oriented. On another note, the majority of farmers (86%) interviewed used a production system that is an intermediate between the traditional and commercial production systems. Farmers integrated dairy production with other activities, owned both dairy breeds as well as the Nguni, relied more on family labour, and the main source of feed was grazing or purchased hay and concentrates. Their main objective was to get additional income generation from the sale of milk; hence these farmers are termed market oriented.

Only 10% of the whole sample exhibited characteristics of the commercial production system. These farmers kept dairy cattle solely for profit generation through milk sales and the sale of animals. They sold most of their milk produced and there was no integration of dairy production with other enterprises. Farmers only used high producing dairy breeds for production purposes and a high level of technology was used on the farms. Farmers had their own milk cooling tanks, milking machines and they were located on TDL (Title Deed Land).

4.3.1 Variable inputs employed

The purpose of this section is to indicate whether there are any differences in expenses incurred during procurement of inputs between co-operative and non co-operative farmers. According to reviewed literature, one of the roles played by co-operatives is helping farmers in procuring inputs at cheaper prices because of the collective purchasing of inputs. Hence this section reveals whether co-operative farmers spend less on inputs than non co-operative farmers.

Non-labour inputs

Table 4.6 presents the monetary values of variable inputs that were used for both co-operative and non co-operative dairy enterprises. For the estimation of variable inputs, information of different inputs and prices was obtained from farmers and quantities used

were multiplied by their unit prices to derive the cost of inputs. Cost of input/farmer was then divided by the herd size/farm to get average cost per cow.

As indicated in Table 4.6, the highly employed inputs for both co-operative and independent farmers are feed, transport and labour. They account for 38%, 20.6% and 27.1% of the total inputs respectively in co-operative farmers; whereas for independent farmers, these inputs account for 35.6%, 30% and 17.2% of total inputs respectively. Feed is the most important factor in dairy production because for dairy animals to be more productive, they need sufficient and good quality feed. The high cost of feed is attributed to the majority of farmers' reliance on expensive purchased feed due to the scarcity of feed in the country. Some of the feed raw materials, such as hay, have to be imported from South Africa and this result in high feed costs.

Feed expenses for co-operative members are slightly higher because 75% of co-operative members relied more on purchased feed compared to 60% of independent farmers. This implies that the training received by co-operative members on feed, fodder production and conservation was not effective in motivating farmers to produce their own feed material. The high cost of transport for independent farmers is because farmers have to travel long distances (8.1 km) to sell their milk compared to 4.5 km travelled by co-operative members. In addition, input providers are situated far from where farmers are located, particularly rural farmers, hence high transportation costs. The variations among inputs are accounted for by the different herd sizes that farmers own resulting in the employment of inputs at different rates.

Labour inputs

Like most smallholder farming systems, the use of family members as a source of labour is a common tradition. The results of the survey indicate that family labour is the major source of labour in the studied areas. In this regard, 61.7% of co-operative participants relied on family labour and 38.3% relied on hired labour for routine farm activities. In comparison, 78% of non-co-operative farmers relied on family labour and 22% relied on hired labour for routine farm activities. Co-operative farmers therefore are spending more on labour because a higher percentage relies on hired labour. This is due to the fact that

the majority of co-operative members have off-farm jobs and hence spend less time on the farm and spend more on labour. Consequently, hired labour is required for daily farm activities. However, hired labour is costly for smallholder farmers because it results in higher costs of production, hence the high reliance on family labour.

Table 4.6: Variable inputs used per month

	Non co-op members		Co-op members		t value
	Cost/cow (E)	% of inputs	Cost /cow (E)	% of total inputs	
Feed	202 (96.82)	35.6	146.16 (71.60)	38	-3.56**
Dipping	52.88 (18.82)	9.6	31.22 (10.23)	7.1	-7.77**
Drugs & vet	43.49 (18.97)	7.6	31.77 (11.45)	7.2	-3.93**
Transport	203.62 (146.77)	30	97.33 (73.66)	20.6	-5.15**
Labour	46.39 (66.45)	17.2	47.88 (71.15)	27.1	0.11
Total	548.38	100	354.36	100	

Source: Survey data, 2010 (Figures in parentheses are standard deviations)

***Significant at 1%, **significant at 5%, *significant at 10%

4.3.2 Herd size, Milk production and reproductive performance of cows

Herd size and composition

Table 4.7 indicates that, on average, independent farmers and co-operative members had 5.4 and 6 dairy animals respectively. This suggests co-operative members have a slightly bigger herd size which can be attributed to an improvement in access to dairy breeds through co-operatives. However, this difference is not significant according to the independent t test, suggesting that it can be safely argued that herd sizes are very similar across the two groups. Furthermore, herd composition by breed does not differ significantly between co-operative and non co-operative members. Breeds mainly used by farmers are the Jersey and Friesian pure breeds, their crosses as well as the Nguni.

Farmers use more specialised breeds than indigenous breeds. Exotic breeds accounted for 73% and 70% of the total dairy herd for co-operative and non co-operative members respectively, whereas the Nguni breed accounted for 15% and 20% for co-operative and

non co-operative farmers respectively. The dominant breed is the Jersey breed for both co-operative and non co-operative members because of its heat tolerance and hence low feed consumption. Friesian cows are known for high milk production; however, the milk is of poor quality, with a low butter fat content. The high percentage in ownership of dairy breeds could be accounted for by the fact that SDB encourages farmers to use pure breeds for their production activities and assists farmers in procuring them from South Africa.

Table 4.7: Herd size and composition

Variable	Non co-op members		Co-op members		t value
	N	(%)	N	(%)	
Composition:					
Jersey	30	50	34	56.7	
Friesian	12	20	10	16.7	
Crosses	6	10	7	11.6	
Nguni	12	20	9	15	
Herd size	5.4 (2.81)		6.1 (2.97)		1.36

Source: Survey data, 2010 (Figures in parentheses are standard deviations)

***Significant at 1%, **significant at 5%, *significant at 10%

Milk production and reproductive performance of cows

Table 4.8 indicates that co-operative and independent farmers were milking 3.5 and 3.4 cows respectively during the study period. This accounts for 57% and 62% of the total herd for co-operative and non co-operative farmers respectively. The survey results indicate that the average lactation period for co-operative members was reported to be higher than the average lactation period for non co-operative member cows. Average lactation is significantly lower than 290- 300 days for dairy breeds and this negatively affects milk production.

Average milk production was found to be 928.77 and 1 151.23 litres per month for non-co-operative and co-operative members respectively, and it was found to be statistically significant at a 5% level of significance. Milk productivity per cow per day was 9.5 litres and 11.1 litres for non co-operative and co-operative members respectively suggesting

that co-operative members enjoy a 14.4% higher productivity above the independent farmers. High milk production may be attributed to improved management practices that have resulted from training and extension services, hence higher milk productivity. The mean difference between co-operative and non co-operative farmers was found to be statistically significant at a 5% level of significance. This implies that co-operative farmers produce higher quantities of milk compared to independent farmers.

Overall, milk production per cow across all farmers is far less than the average 15-20 and 20-25 litres per day for Jersey and Friesian cows respectively. This implies that animals are not performing to their maximum expectations, which is mainly attributed to insufficient good quality feed. Farmers are experiencing feed shortages in summer and winter; however, feed shortage is severe in the dry season, thus farmers rely on purchased feed and concentrates. In addition, the high price of concentrates pushes farmers to reduce the volume of feed ratio, resulting in low productivity. Low milk productivity is a serious constraint among smallholder farmers and there is a need for improvement of productivity in order to boost the availability of milk in the country. Changing milk practice of milking twice a day to milking three times a day can help to stimulate milk secretion to the mammary glands and thereby increase milk production per day.

Table 4.8: Milk yield and lactation

	Non co-op members	Co-op members	t value
Lactating cows	3.4	3.5	0.27
Lactation period (days)	250 (32.77)	270 (28.87)	
Average milk yield (litres/month)	928.77 (488)	1 151.23 (579.67)	2.27**
Milk yield per cow (litres/day)	9.5	11	3.6***

Source: Survey data, 2010 (Figures in parentheses are standard deviations)

***Significant at 1%, **significant at 5%, *significant at 10%

4.3.3 Husbandry and management practices

Breeding systems and disease control practices

Based on the results presented in Table 4.9, it is evident that a higher percentage of co-operative farmers employ artificial insemination (AI) compared to the use of bulls for breeding purposes. This is because farmers are trained to use the AI method for improvement of the dairy herd although this method is expensive for smallholder farmers. The AI procedure sometimes has to be performed more than once and farmers are expected to pay for all sessions. In the case of a rented bull, farmers only pay once since the bull is either rented from SDB, rented from a fellow farmer or owned by the farmer; hence this method is cheaper for most farmers. The survey found that farmers are generally not satisfied with AI and 60% using this service reported to have successful insemination after two to three trials, yet they were required to pay for every trial. In addition, farmers find the use of AI a disadvantage because only extension officers can carry out the procedure, yet they are situated far from where farmers are located, resulting in longer calving intervals. Nevertheless, the survey found that some farmers did prefer AI compared to having a bull, particularly for management efficiency, because having a bull means economising feed resources that can be used for feeding cows.

Table 4.9: Breeding practices

Breeding system	Non co-op members n=60		Co-op members n=60	
	n	%	n	%
AI	30	50	39	65
Bull	18	30	15	25
AI and bull	12	20	6	10

Source: Survey data, 2010

Livestock diseases cause economic losses in dairy farming and for this reason; dairy farmers are required to have a preventive or health program for their animals. This is highly recommended as an alternative to the treatment of sick animals. However, the results revealed that farmers did not have preventive programs and only treated animals when they were infected. The results indicated that 55% of co-operative members had preventive or vaccination programs compared to 30.8% of independent farmers. This is because although the provision of veterinary aid service was made by co-operatives, farmers are required to buy their own veterinary drugs. A veterinarian visits farmers once every week to examine animals and offer advice to farmers. Farmers pointed out that they

find vaccination programs to be expensive compared to treatment of sick animals. This has contributed to the high mortality rates of animals among farmers. Farmers vaccinate against major diseases, such as black leg, anthrax, brucellosis and lump skin diseases. Deworming is also part of farmers' preventive programs.

Feeding systems and management

Animal feed is a major input in dairy farming and results on the types of feeding systems are given in Table 4.10. From the results it can be gathered that grazing (natural pasture) is the major source of feeding used by smallholder dairy farmers. It is comprised of communal grazing, private grazing and zero grazing (stall feeding). Only 35% of farmers had improved forages and pastures on their grazing land. The majority of these were co-operative members. Farmers are unable to produce their own feed because of inadequate land and water resources. Therefore, they rely on purchased feed which increases production costs of farmers and results show that 67.5% of farmers across the whole sample relied on purchased feed. Supplementary feeding with crop residues and legumes in study areas was also a common practice among sampled dairy farmers. To overcome the seasonal shortage of feed, some farmers have developed their own coping mechanisms of feed conservation in the form of storing and stacking hay as well as crop residues.

Table 4.10: Feeding systems

	Non co-op members (%) n = 60	Co-op members (%) n = 60
Feeding systems:		
Communal grazing only	5	-
Private grazing only	36	55
Zero grazing only	3	10
Communal and private grazing	15	6
Private and zero grazing	18	25
Communal, private and zero grazing	23	4

Source: Survey data, 2010

Milk handling

Milking utensils affect the quality of milk. The type of utensils used as well as the methods and frequency of cleaning milking utensils affect the quality of milk and its products. Plastic containers commonly used by farmers for the storage and transportation of milk are susceptible to microorganisms and bacteria, yet farmers continually use them. With regard to the type and quality of milking utensils, results of the survey reveal that 74.5% of co-operative members and 37.5% of independent farmers use aluminium cans for milk handling, storage and transportation. This indicates that co-operatives have been effective in encouraging farmers to use proper milk handling practices. The co-operatives took the initiative to supply farmers with aluminium buckets and cans to ensure that farmers supply good quality milk. The frequency and methods of cleaning and types of material were the same for both co-operative and non co-operative farmers. Milking utensils are cleaned with detergent and warm water after every use; although not all farmers put this into practice due to a lack of water.

Water sources

According to Lukuyu, Romney, Ouma and Sones (2007:7), a milking cow requires five litres of water to produce one litre of milk, making water essential in dairy production. Limiting water availability to dairy cows lowers milk production rapidly. The quality of water also have to be considered because poor water quality often contributes to low production as well as negatively affect health of dairy cows. This necessitates the availability of adequate good quality water for cows at all times.

The survey results indicate that streams and rivers were the major sources of water supply used by dairy farmers, as shown in Table 4.11. This represents substantial energy loss for dairy cows in terms of travel time involved to and from the water source, which negatively contributes to productivity. In addition, this implies that water quality is a bit of a problem for farmers which might partly explain poor performance of dairy cows. From the results presented, it is evident that co-operatives are making an improvement to water availability and quality by ensuring that farmers have access to piped water as well as

boreholes. However their progress is constraint by their limited financial capacity hence not all cooperative farmers have access to very clean water.

Table 4.11: Sources of water supply

Water Sources	Non co-op members (%)	Co-op members (%)
	n=60	n=60
Rivers and streams	63	45
Piped water	19	30
Boreholes	18	25

Source: Survey data, 2010

Record keeping

Record keeping is a vital tool that enables farmers to make sound decisions, control production and reproductive performance of dairy cattle as well as help determine profit made. Approximately 65% and 45% of co-operative and independent milk producers respectively practised record keeping, as indicated by Table 4.12. However; only milk production marketing and breeding records were mostly available for a majority of farmers, especially independent farmers. Records on inputs used and other essential records were not available, which implied reliance on estimation. The culture of record keeping by co-operative members is attributed to training received from co-operatives on the importance of record keeping. Overall, smallholder farmers do not keep records, making it difficult for them to control their activities.

Table 4.12: Record keeping

	Non co-op members	Co-op members
	n=60	n=60
Keep records		
Yes	45	65
No	55	35

Source: Survey data, 2010

4.3.4 Milk marketed and consumed

The amount of milk marketed and consumed per week per household by co-operative and independent farmers is given in Table 4.13. There was a statistical significant in the difference between co-operative and non-co-operative members in milk consumed and sold. Co-operative members sold significantly higher quantities of milk than non co-operative members. This can be attributed to a higher milk production through better access to improved veterinary services, training received, improved husbandry practices as well as a reliable market provided by the co-operatives.

Out of the total milk produced, co-operative member farmers sold approximately 85%, whereas independent farmers sold 74.5%. This indicates a low home consumption level and a low level of milk losses from milk spoilages among co-operative farmers. The higher share of milk sold to the market by co-operative farmers is an indication that co-operatives have played a positive role in the increase of milk marketed by smallholder farmers compared to independent farmers. The low percentage of milk sold out of total production amongst independent farmers could be attributed to high home consumption and losses from spoilages.

The highest price received by producers was E8.00/Litre and these were independent farmers, while E3.50/Litre was the lowest price paid to co-operative members. Overall, the average price per litre of milk was higher for independent farmers (E6.50) than for co-operative members (E4.20). This implies that co-operative farmers only benefit from a guaranteed market and fixed milk prices hence they are not susceptible to price fluctuation risks while independent farmers benefit from high prices, although these are highly volatile. In this case, co-operatives have only eliminated the price fluctuation risk factor but not improve the actual price paid to farmers. Co-operatives determine the price that farmers use to sell their milk whereas independent farmers have the privilege of setting their own prices. This has contributed to independent farmer prices for milk being higher than co-operative farmer prices.

Due to the fact that cooperative farmers sell at fixed prices while non co-operative sell at fluctuating prices throughout the year, a weighted average price received by non co-

operative farmers is usually considered. This is calculated as total revenue divided by quantity of milk sold. Nevertheless, only the absolute average price of milk received by independent farmers was considered for this study.

Table 4.13: Milk marketed and consumed

Variable	Non co-op members	Co-op members	t value
Quantity marketed (litres)			
Per week	194.28	257.43	2.75***
Per month	777.11 (435.4)	1029.7 (556.42)	
Quantity consumed/spoiled (litres)			
Per week	37.91	30.4	1.37
Per month	151.7	121.5	
Price/Litre (E)	6.50	4.20	

Source: Survey data, 2010 (Figures in parentheses are standard deviations)

***Significant at 1%, **significant at 5%, *significant at 10%

4.3.5 Milk marketing channels

Marketing channels and marketing outlets are important in describing a marketing system. There are two marketing channels used in Swaziland for the marketing of dairy products; the formal and informal marketing channels. Results from the survey indicate that the informal marketing channel was the major channel used by farmers in the study areas and this is the case in all of Swaziland. More than 80% of the milk marketed in the study areas was channelled through the informal marketing system, as indicated by Figure 4.2. The marketing of milk mainly involves direct sales; delivery of raw milk by farmers to consumers in the immediate communities; or sales to traders or individuals and co-operatives. Informal markets are preferred because of the nonexistent or less quality control measures that farmers have to comply with.

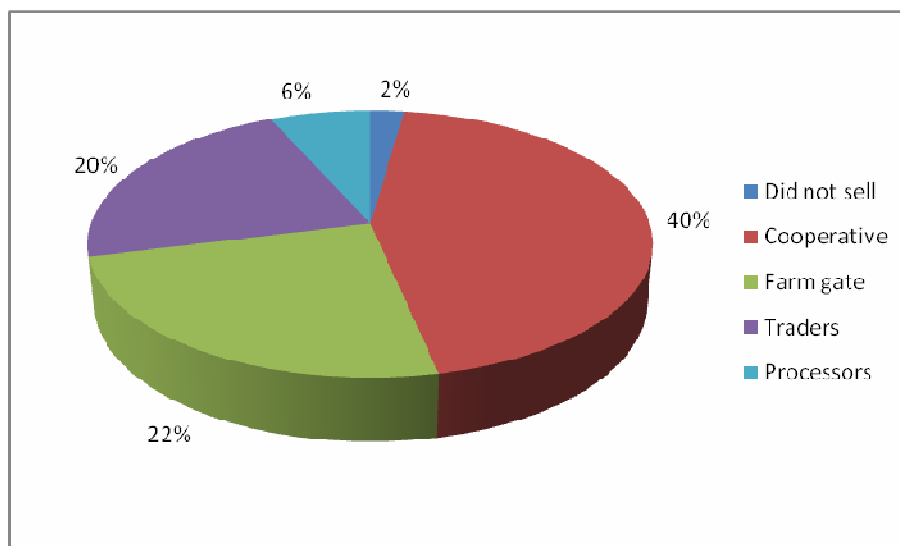
The primary marketing outlets in the studied areas are presented in Figure 4.1. According to the results of the survey, 50% of farmers sold their milk only to co-operatives; 22% sold at the farm gate and directly to consumers; 20% sold to traders such as shops,

restaurants; 6 % sold directly to processors; and lastly, 2% of the farmers did not sell. In addition, 32% of farmers selling to co-operatives reported selling part of their milk to other markets that pay a higher price than what co-operatives pay, which negatively affects milk supply to the collection centre.

When selecting a market outlet, 57% of sampled independent farmers reported using better price (47 %) as selection criteria, 17.7% used proximity and 13.5% reported using both price and proximity as criteria for selecting outlets. Farmers who sold their milk directly to consumers benefited from high consumer prices compared to those who sold to traders, processors and co-operatives, hence receiving high returns. Farmers therefore prefer selling their milk at the farm gate or to individuals in the immediate community because of the high returns involved.

On the other hand, farmers who sold their milk to traders were those with larger herd sizes who therefore produce more milk and require marketing outlets that easily accept large quantities of milk. This is an indication that existing market options need to be improved as well as the pricing system in order to encourage smallholder farmers to sell more milk. Subsequently, this will improve dairy production as well as marketing activities of smallholder farmers.

Figure 4.1: Milk marketing outlets and distribution



Source: Survey data, 2010

Price determination

Independent dairy producers set their own prices of milk when selling to consumers; however, at times they have to negotiate prices when selling to traders. Price determination in the study areas mainly depends on production costs, the competitor's price as well as supply and demand of milk in the country. These prices vary between rural and urban places. For farmers in urban and peri-urban places, prices are competitive because of the high demand of milk in urban areas, but lower for farmers in remote areas.

As stated in the previous section, the highest price attained by independent farmers for a litre of milk is E8.00 and the lowest price was E5.00. In addition to this, co-operative farmer selling price ranged between E3.50 and E6.00. The average price they received was E4.20 and this is 35 percent lower than average price received by independent farmers. Co-operative farmers only sell milk at prices set by the cooperatives.

The marketing channel used also has an influence on price determination. Farmers who sold direct to consumers, which in this case were mostly independent farmers, received higher prices for their milk, and hence higher returns compared to co-operative members and farmers who sold to traders. The average price for farmers who sold to traders was E6.00, which is 25% lower than farmers selling direct to consumers. This is because price determination for these farmers is partly based on the relationship between the trader and the farmer, however, in some instances the traders determine the price for the farmers resulting in lower prices per litre of milk. Co-operative members, on the other hand, sold their milk at fixed prices determined by the co-operatives. Although prices set by co-operatives are lower, the fixed price factor helps in controlling price uncertainties or fluctuations experienced by independent farmers.

Regardless of the high demand of milk in the country, farmers are unable to get profitable prices for their milk. Further, because of their poor record keeping systems, farmers cannot determine a justifiable standard price for their raw milk. The government does not extensively intervene in price setting in the dairy industry and the major involvement of government is through control of dairy imports to protect local farmers. However, efforts

need to be made especially by the government and all stakeholders involved because smallholder farmers do not benefit from the prevailing marketing system.

4.3.6 Access to services

Table 4.14 provides information on access to credit, extension and market information which play a vital role in the promotion of agricultural production and marketing, thereby improving farm income.

Access to credit

According to the survey results in Table 4.14, 35% and 14% of sampled co-operative and non co-operative members respectively had access to credit. This is an indication that co-operative participation of smallholder farmers has made a slight contribution in meeting farmers' credit needs. Access to credit is one of the factors for successful dairying as farmers need credit to improve their investment in new and improved technologies. Inability to access credit inhibits production and hence there is a need for the improvement of credit availability.

Access to extension services

The provision of extension services to farmers in Swaziland is mainly the government's role. It is meant to improve production capabilities of smallholder farmers; however, a number of smallholder farmers are still unable to access these services. As shown in Table 4.14, 80% and 51% of co-operative and non co-operative farmers respectively received dairy production extension services; and 75.5% and 59% of co-operative and non co-operative farmers respectively had access to current market information. Farmers in co-operatives have extension officers specially allocated to them. Extension officers also attend monthly co-operative meetings to monitor operations in the co-operatives. In most cases, extension officers become chief advisors of farm management practices and this have positively contributed to farmers' milk production and management practices.

Access to market information

The survey results indicate that dairy farmers had access to a selection of market information sources (Table 4.14). On average, 75.5% and 59% of co-operative and non co-operative members respectively had access to current market price information. Farmers relied on both formal and informal sources of information. From the results, the main sources of information were extension agents, co-operatives, friends and the media. A higher percentage of dairy co-operative farmers mainly relied on formal sources of information and the good network system facilitated disseminating of information in co-operatives.

Overall, the results in terms of the t statistics indicate that co-operative farmers had better access to services (credit, extension and information). This implies that co-operatives have enabled improvement of access to these services among farmers.

Table 4.14: Access to services

Variables		Non co-op members (%) n =60	Co-op members (%) n= 60	t value
Access to credit	Yes	14	35	2.9***
	No	86	65	
Access to extension services	Yes	51	80	8.4***
	No	49	20	
Access to market information	Yes	59	75.5	1.53*
	No	41	24.5	
Sources of market information	Extension agents	52	80	
	Friends/other farmers	33	10	
	Media (radio, TV, newspaper)	15	10	

Source: Survey data, 2010

4.4 BENEFITS OF CO-OPERATIVE PARTICIPATION

Farmers that are members of a dairy co-operative were asked to state the benefits of being a co-operative member compared to when they were operating individually. It is evident from the results (Table 4.15) that the main benefit of being a co-operative member is that it presents a secure market outlet (marketing of milk). However, farmers were not happy with the price they were paid for a litre of milk. Improvement of income has been through the lump sum payments made by co-operatives to the farmers monthly for their milk sales. Farmers are paid once every month for the milk they sell daily to the co-operative which is an inconvenience according to 70% of co-operative farmers because they often unable to meet their monthly expenses (e.g. feed, transport, etc). Farmers expressed their preference of receiving a lump sum compared to daily payments for small transactions; although they stated that would prefer the lump sum to be paid every two weeks. Co-operatives not only create economic benefits for member farmers but they are also a social group which improves social networks among farmers.

Table 4.15: Benefits of being a co-operative member

Benefits	Frequency n=60	Percentage (%)
Marketing of milk	47	78
Acquisition of new techniques and ideas	36	59.3
Provision of market information	28	47
Accessibility to credit	21	35
Accessibility to piped water	15	25
Improvement of income	20	33
Strengthening of social networks	17	28.3
Provision of inputs	16	27.4
Improvement in milk handling	12	19.7

Source: Survey data, 2010

4.5 CONSTRAINTS EXPERIENCED BY DAIRY CO-OPERATIVES

Problems experienced by co-operatives hinder their performance as well as fulfilling their objective of linking farmers to markets. Identification of problems experienced by co-operatives will help develop programs that will facilitate their performance and in turn

enhance performance of individual members. Co-operative members were asked to give their own view on major organisational problems they are faced with and they identified ten problems which were ranked according to their importance.

Table 4.16 presents the major problems experienced by co-operatives. From the results, the most important problems were a lack of access to capital, shortage of milk supply and poor management. Problems experienced negatively influence services provided to farmers as well as the amount of milk supplied to the co-operatives and co-operative growth, making it difficult for co-operatives to provide the required services to farmers. Poor governance in co-operative leadership is intensified by members' lack of participation in co-operative decision-making processes. Similarly, internal corruption has been cited as an important factor negatively contributing to co-operative expansion.

Table 4.16: Constraints in dairy co-operatives (farmer's views)

Constraint	Less important		Important		Very important	
	Number	%	Number	%	Number	%
Shortage of capital	6	12	35	72.1	8	15.9
Inadequate milk supply	7	13.5	35	71.6	7.3	14.9
Poor management	9	17.6	35	71.2	5	11.2
Transportation problem	10	19.6	34	69	5	11.4
Low member commitment	10.5	21.6	34	65.7	4.5	12.7
Low member participation	13	27	31	63.5	5	9.5
Poor technical support	15	30.8	30	61.1	4	8.1
Poor marketing system	15	30.5	27	55	7	14.5
Inadequate training	14.6	29.8	25	51	9.4	19.2
Lack of loyalty among committee members	19	38.9	23	46.6	7	14.5

Source: Survey data, 2010

4.6 OPPORTUNITIES IN THE INDUSTRY

According to secondary data available on the status of the dairy industry in Swaziland, the following were discovered to be existing opportunities that smallholder farmers have in the industry.

4.6.1 Local milk market

More than 50% of the country's milk and dairy products requirements are imported and projections indicate that the demand will continue to increase for the next decade. Milk produced by small-scale farmers would therefore have an assured market. However, this will require continued expansion of specialised dairy breeds and an increased level of inputs matched to good market linkages for milk sales and input acquisition. This can be achieved through formation and improvement of producer organisations and co-operatives to facilitate the improvement of market access and market functioning, as well as the improvement of services and input supply. Through producer groups and co-operatives, small-scale dairy farmers can practise value addition to enhance their income levels. However, it is vital that these co-operatives are well-functioning in order to meet their objectives.

4.6.2 Good feeder roads

Swaziland has a good and reliable feeder road network that would facilitate the collection and distribution of milk. However, the government has to revive collection centres for the improvement of milk collection and marketing. Parmalat as the main processor in the country operates far below its capacity because of milk shortages, and can thus benefit from the collection centres. This in turn will provide farmers with a reliable market which will also stimulate milk production at farm level, although milk processors do not pay well.

4.6.3 The establishment of credit facility

SDB and Fincorp have jointly established a credit scheme specifically for smallholder dairy farmers which will go a long way to alleviate the problem of a lack of suitable credit for

small farmers. SDB guarantees loans to small-scale farmers who are supervised by extension officers from SDB and project officers from Fincorp to ensure that they are productive. However, the criterion used to access the loans is still stringent for farmers and need to be improved. In addition, the repayment period is short (three years) for smallholder farmers and is characterised by an interest that is still high for smallholder farmers.

4.7 SUMMARY

From the results presented above, it is apparent that dairy co-operatives in Swaziland do play a positive role in the production and marketing activities of smallholder dairy farmers. The hypothesis that co-operative farmers perform better is true only in terms of production and marketing. Herd sizes of co-operative farmers are not significantly different from those of independent farmers. Average income level is higher for independent farmers than co-operative members resulting from a higher price per litre of milk. In addition, co-operative farmers spend slightly less on inputs per cow attributed to pooling of resources as well as other services provided by co-operatives. However farmers spend more on feed irrespective of being a cooperative member or independent farmer and the high cost of feed renders smallholder dairies uneconomic because high yields cannot be maintained. There is therefore a need for improvement of co-operative effectiveness to facilitate better performance of individual farmers in all aspects of dairy production and marketing.

CHAPTER 5

DAIRY CO-OPERATIVES AND TRANSACTION COSTS IN DAIRY PRODUCTION AND MARKETING

5.1 INTRODUCTION

As discussed earlier, transaction costs in dairy production emanate especially from the unique attributes that milk possesses. These include milk's perishability, bulky nature, cyclical nature, its quality and the riskiness attached to marketing milk as a perishable product. In addition to this uncertainty, household attributes such as age, gender and education level also contribute to high transaction costs in dairy production. Co-operatives have the potential to minimise transaction costs and enable farmers to sell more of their produce. In this regard, the reviewed literature acknowledges the fact that farmers participating in co-operatives experience lower transaction costs per unit sold and hence sell higher quantities of their produce. This chapter therefore presents the results on whether participation in a co-operative has a positive influence on lowering transaction costs incurred by farmers. This was done by providing a detailed descriptive analysis of both observable and unobservable transaction costs in dairy production, made possible by using farmers' constraints, challenges, their differences in location as well as marketing systems. Econometric analysis was then performed to support the descriptive analysis.

5.2 ANALYSIS OF TRANSACTION COSTS IN THE SMALLHOLDER DAIRY INDUSTRY IN SWAZILAND

5.2.1 Transaction costs incurred by smallholder dairy farmers

Dairy producers are faced with different transaction costs in dairy production, both observed and unobserved. However, the nature of milk is the main cause of transaction costs in dairy production, as discussed in Chapter 3. Milk as a perishable product is associated with high transaction costs in production as well as marketing. This limits

marketing options available to smallholder farmers and implies greater losses due to spoilage of milk than non perishable products. Apart from the nature of milk, problems and challenges faced by farmers will be used to explain the effect of co-operative participation on transaction costs in this chapter. Table 5.1 presents transaction cost factors that co-operatives have positively contributed in their minimisation.

5.2.2 Nature of milk as a product

Transaction costs in milk production particularly materialise from the fact that milk is a time-specific product which puts farmers under pressure to sell it. Because of its perishability, recurrent deliveries have to be made to the market and during the transportation process; farmers have to preserve the quality of milk. These factors contribute to high transaction costs in dairy production.

The frequent deliveries that have to be made to the market to avoid losses from spoilages result in high transport costs which are the main contributor to transaction costs in dairy production. Processing of milk helps preserve milk quality however it is extremely minimal at farm level. In addition, farmers lack storage facilities such as milk coolers hence they are forced to sell their milk on daily basis to avoid milk spoilages considering that a number of them rely on informal markets to sell their product. Accessible markets are usually located far from where farmers are situated and hence they have to travel long distances to sell their milk. High transportation costs increase marketing costs and limit marketing options available to farmers. Subsequently, a higher percentage of milk is sold at the farm gate or to less lucrative markets.

From the results of the survey, co-operative members incur 38% lower transportation costs compared to independent farmers. High transportation costs can be attributed to the fact that farmers sell mainly to traders and other market outlets where they are required to travel longer distances to the market. In addition, 40% of independent farmers transported their milk by public transport, which is very costly for them. Because of a lack of access to credit, farmers are unable to invest in their own vehicles and therefore end up selling their milk to less lucrative markets, considered as a better option by farmers.

On another note, milk is easily spoiled because of its perishability, resulting in losses. The results also indicate that non co-operative farmers incur more losses compared to co-operative members. Milk losses mainly from spoilage of milk were considered. According to farmers interviewed, the main contributors to their losses/spoilage are unhygienic milk handling, inadequate cooling systems especially at farm level as well as inadequate markets. A considerable portion of milk appears to be lost through spoilages which accounts for 2.4 and 7.9 percent of milk produced per month for co-operative and non co-operative farmers respectively. This negatively affects the amount of milk sold by farmers.

To avoid spoilages, farmers are required to invest in chilling facilities as well as good quality transportation equipment to keep milk in good condition. Results of the survey indicate that farmers lack chilling facilities to maintain the good quality of their milk. Only 34% of smallholder farmers were in possession of refrigerators, 6% owned milk coolers. The lack of chilling facilities therefore creates a problem because evening milk cannot be properly stored, and thus it is either consumed, fed to calves or used for sour milk production. This results in losses to farmers because even if milk is used for sour milk production, almost two litres of milk is required to make one litre of sour milk.

From the above discussion, it can be gathered that co-operatives have indeed made a slight contribution to the minimisation of transaction costs resulting from the nature of milk. This is because co-operative members travel a shorter distance that is 45% less to the collection centre as their market outlet compared to the distance travelled by independent farmers. For this reason, co-operative farmers are spending less on transport. Because of the shorter distance travelled, farmers can sell their morning and afternoon milk. Results indicate that co-operative members sell 24.5% higher than independent farmers because of shorter distances, low consumption rates and low spoilage levels.

In addition, results indicate that farmers have a reliable market where they can sell their milk twice a day and all year round unless they decide to cease being co-operative members. Co-operatives therefore provide farmers with a reliable market outlet and farmers do not have to search for reliable buyers or markets. Because of the reliable market offered by co-operatives, smallholder dairy farmers can better withstand risks arising from production. This implies that farmers participating in co-operatives incur lower

search and bargaining costs associated with searching for reliable buyers and markets. Resultant lower search costs and lower risks from co-operative participation contributes to the higher milk marketed. A potential explanation to more milk sold can be attributed partly to availability of a market outlet (through co-operative) and hence lower transaction costs.

Moreover, co-operatives eliminate price fluctuations because milk prices are fixed compared to independent farmers who are faced with price fluctuation risk. Fixing the price per litre of milk reduces uncertainties associated with price determination and hence co-operative members incur lower negotiation costs, although the price paid by co-operatives is low. Co-operative farmers do not have to negotiate over the price while independent farmers do, especially those selling to traders. Although independent farmers sometimes sell their milk at higher prices, these prices fluctuate because their determination is partly based on the relationship between the farmer and the buyers of the milk. Bargaining power therefore becomes the determining factor for realising the sale of the milk, which can result in dairy farmers being subjected to opportunism.

5.2.3 Poor information sources

Smallholder farmers are constrained by a limited access to information which hinders their production and marketing activities. A limited access to information increases transaction costs by raising search, screening and bargaining costs. A limited access to information makes small-scale farmers unaware of prices as well as market opportunities available for their products and hence they find it difficult to participate in different markets. Information that farmers receive is mainly used for production and price determination to enable marketing of their product. Obtaining proper market information is crucial in dairy farming considering that milk is a time-specific product and that quality of milk is becoming more important.

For dairy farmers to be in a better position to sell their produce in more lucrative markets, they need information about those markets as well as prices they can use to sell their products. The information available to farmers varies, particularly with market outlets and locations of farmers. Farmers with better access to market information experience lower transaction costs because they can make informed decisions that positively affect their

production and marketing activities. Literature states that a key assumption in the institutional theory is that information is a commodity that can be purchased. Thus, for farmers to access information, they have to incur certain costs because institutions (government extension services) that are supposed to disseminate market information are poor.

Farmers who sell to co-operatives have the privilege of using the co-operative and extension services as sources of market information; as a result, they do not search for market information, unlike independent farmers. Contact with extension officers alone is not sufficient in improving marketable surplus; however, a higher education level is vital because it enables better interpretation of information received. Sampled farmers who had a higher education level could thus better interpret information received, which was reflected by the slightly higher amount of milk sold by co-operative farmers. This indicates that co-operative members experience lower information search costs than those experienced by independent farmers.

From the results of the survey, access to market information is made possible by the regular visits (7.5/year) paid by extension officers who also attend all monthly meetings held by co-operatives. Independent farmers are visited by an extension officer four times a year, especially those who use the AI service. Two extension officers are assigned to focus areas and provide farmers with current and reliable dairy-related information as well as advice that farmers may need. This implies that farmers have regular access to accurate and current market information they need for their production and marketing activities, and can hence make informed decisions.

Unregistered farmers as well as those not using AI for breeding rarely get visited by extension officers because of limited resources for the provision of such services. This limits their easy access to market information implying that farmers have to search for market information, which in turn promotes reliance on informal sources of information. Over 80% of co-operative members relied more on formal sources of market information compared to 60% of independent farmers. Over 30% of independent farmers mainly depended on family, friends and fellow farmers for information. These sources of information can be unreliable at times and result in uncertainties in production and

marketing activities of independent farmers, compared to co-op members who have a reliable source of information. In this regard, co-operatives are said to have played a positive role in lowering costs associated with information search.

Co-operatives therefore have made it possible for farmers to access current and reliable market information despite their location, in the process lowering information search costs. This is also facilitated by the fact that the flow of information in co-operatives is much more successful as it is channelled through established social networks and is therefore likely to have a higher multiplying effect.

In the following sections, factors contributing to high search and bargaining costs are discussed to give a clear picture of whether co-operatives have positively contributed to lowering these costs.

5.2.4 Limited access to resources

Smallholder dairy farmers in Swaziland lack access to resources which seriously hinders their production and marketing activities. Limited access to resources is said to contribute to high search and bargaining costs incurred by smallholder farmers. This mainly includes a lack of access to credit and dairy breeds. As indicated in the previous chapter, majority of farmers lack access to credit. Farmers have to search for credit providers that will help them to access credit on affordable terms, considering that farmers do not have collateral which most credit providers require. Credit providers offer this service on a short-term basis, which is not conducive for small-scale farmers, and consequently farmers have to search for cheap credit providers. Farmers are unable to improve their production, because they are limited by lack of investment, improved technology, such as improved dairy breeds and hence produce lower quantities of milk resulting in lower marketable quantities.

In this regard, co-operatives have made a slight contribution to access of credit by smallholder farmers. Results presented indicate that 35% and 14% of co-operative and independent farmers respectively had access to credit, although a higher percentage of farmers are still limited from accessing credit. This has been made possible by the regular

income received monthly (compared to variable income received by independent farmers) which provided some sort of security that farmers will be able to repay the loan. Searching for credit providers is therefore lower in the case of co-operative members compared to independent farmers. Despite the above, co-operatives have not made much contribution in the access to credit because, judging from the results, farmers are still citing a lack of credit as a major problem. This may be attributed to the fact that farmers are granted small loans that do not cater for their requirements; thus improvement in credit sources is a necessity.

In addition, dairy breeds have to be mainly procured from South Africa and, in some cases, locally from large-scale farmers. Farmers end up buying poor quality animals available in the country because of problems associated with obtaining good quality breeds. The lack of easy access to breeds also causes farmers to search for cheap providers of these breeds, resulting in higher search and bargaining costs resulting from bounded rationality. When farmers decide to buy dairy breeds through SDB, the opportunity cost of waiting for animals to be delivered is high. According to extension officers, farmers have to wait for more than three months for their animals to be delivered to them because bulk buying has to take place. Co-operatives therefore facilitate easy access to dairy breeds, since being in a group enables farmers to buy collectively, whereas independent farmers have to wait for other farmers who need animals before they are able to acquire their own. The opportunity cost of waiting for other farmers translates to unobservable transaction costs because farmers are limited in accessing animals in time, which has a negative effect on the amount of milk produced and sold.

5.2.5 Seasonal availability and high cost of feed

Seasonal availability and the high costs of feed contribute to search and bargaining costs (Table 5.1). Feed is the most important input in dairy production. It can be gathered from the previous chapter that grazing is the primary source of feed and grazing is mainly possible in summer. During the winter season, pastures become dry and result in a scarcity of feed. Farmers are then compelled to either practise inventory management in the sense that they harvest grass in summer to conserve its nutritive value and store it as hay or rely on purchased feed. Due to the scarcity of feed in winter, animals are given

feed of poor quality which negatively contributes to poor milk productivity and low income. Farmers are forced to search for good sources of feed supplies, resulting in transaction costs.

In addition, seasonal availability of feed implies that farmers have to rely mostly on purchased feed (concentrates and fodder) which becomes expensive for farmers. This is indicated by the high cost of feed that farmers spend monthly. This is a problem for smallholders in Swaziland. Not all farmers rely on purchased feed because some farmers practise inventory management in summer as well as grow legumes and produce silage as concentrates to be used in winter. These farmers constitute 25% and 40% of co-operative and independent farmers respectively. Feed concentrates are expensive to smallholder farmers, and hence to avoid the use of poor quality feed, farmers have to look for alternative suppliers of cheap good quality feed. They sometimes have to spend time searching for suppliers offering lower prices because of their low bargaining power which results in high bargaining costs caused by information asymmetry. This result in high transaction costs that in turn result in lower income as well as lower quantities of milk sold in markets.

Co-operatives on the other hand help farmers to purchase feed (concentrates and hay), particularly in winter when feed is scarce. Co-operatives purchase dairy meal and hay in bulk depending on the demand by farmers and the money is deducted at the end of the month from farmers' pay checks. Co-operative member farmers in this way are able to maintain a continuous supply of good quality feed throughout the year, hence lower search costs. However, farmers still pay the same price as prevailing market prices for feed provided because of limited membership that makes it impossible for co-operatives to achieve economies of scale despite of bulk purchasing. As a way of minimising costs, farmers then use less than the recommended rate of feed which results in low production levels especially in winter with cows producing milk between 5-7 litres per day.

5.2.6 Sale of animals

Part of dairy farmers' income comes from the sale of farm animals, especially male calves. This contributes 10% to the total income received by farmers. When farmers venture into

the process of selling their animals, they incur search and bargaining costs. Limited feed resources do not allow farmers to keep male calves and sell them when they are older. For rural farmers, rural sale yards act as a market outlet for their animals and flexibility for farmers to charge their own prices do not exist. Instead, the buyers are responsible for determining the prices, which results in extremely low prices. Their low bargaining power results in lower prices for their animals because finding a buyer who is willing to pay a good price is challenging for smallholder farmers. Farmers require market information on sale dates and those who sell to random buyers need to search for those buyers and negotiate for a price. In the process, farmers incur transaction costs associated with searching for information and buyers.

Co-operative farmers, on the other hand, sell their calves through the co-operatives, although some farmers do search for buyers who will pay a better price. Therefore, it can be stated that their efforts to obtain information and search for buyers decreases in comparison to the efforts of independent farmers. Extension officers supply farmers with information on where and when to sell their animals. Farmers in co-operatives have the assurance that their animals will be sold, whereas independent farmers often have to wait for long periods before their animals can be sold, which also contribute to transaction costs.

5.2.7 Processing and distribution of milk (quality standards)

The production and processing of milk impose strict quality standards that farmers cannot meet because of their limited investment and poor hygiene standards, especially when they have to sell to formal marketing channels. Although formal marketing channels, such as processors and supermarkets, require farmers to meet product quality, timeliness and traceability requirements, many farmers are unable to meet these requirements which are often too high to comply with. For farmers to improve their milk quality, they need to invest in improved milk handling equipment and good practices. Undercapitalisation and lack of access to credit inhibit farmers from making these investments.

Co-operatives are a source of technical and management skills that can be applied to ensure that farmers meet quality standards. For this reason, co-operatives have invested

in milk coolers, pasteurisers and transport, and are still in the processing of buying more processing equipment. The main challenge is at farm level because farmers have yet to improve their milk handling skills. It is estimated that 50% of farmers (both co-op and non-co-op) complained of insufficient water, hence they cannot consistently keep milking equipment and the milking parlour clean and free from bacteria. Co-operative members do not suffer losses due to their poor milk handling practices because co-operatives accept milk and use it for sour milk production despite its poor state. However, a lower price (E3.00/litre) is then paid to discourage farmers from selling poor quality milk. On the other hand, independent farmers suffer losses when their milk is rejected by traders, processors or individuals, resulting in transaction costs. This implies that they have to search for alternative buyers or consume the milk (forced consumption).

Table 5.1 presents some of the transaction cost factors that co-operatives have positively contributed in their minimisation. These are the factors identified from looking at farmers' problems and constraints in the industry.

Table 5.1: Transaction cost factors co- operatives have contributed on

Transaction cost factor	Type of transaction costs co-operatives have positively contributed on	Implications
Distance	Transport	Lower distance travelled, reduction in losses
Transport costs	Transport & transfer	Lower transport costs
Extension services	Information	Improved access to market information
Market access	Search & bargaining	Reduction in losses, high marketable milk, low bargaining and search for buyers of milk, low opportunism
Access to resources	Search & bargaining	Improved access to necessary resources such as feed, credit, production stock.
Sale of animals	Information, search & bargaining	Timely & improved sale of dairy animals,
Milk quality standards	Search	Reduction in milk losses, high marketable milk, low opportunism

Source: Survey results, 2010

Table 5.1 indicates that co-operative members incur lower transaction costs because they have better opportunities compared to independent farmers. They travel shorter distances, have better access to market information, improved access to resources as well as sell higher quantities of milk compared to independent farmers. Through co-operatives, farmers have access to current and reliable market information despite their location, in the process lowering information search costs.

In addition farmers have a ready market available for their produce as well as their animals implying that they do not have to search for buyers. Information on where and when to sell their animals is readily compared to independent farmers who often have to wait for long periods before their animals can be sold. However, contribution of co-operatives to lower transaction is still minimal hence improvement in co-operatives can contribute significantly to lower transaction costs.

5.3 ECONOMETRIC ANALYSIS

5.3.1 Introduction

The descriptive results presented in the above section suggest that co-operatives in Swaziland have a positive influence on certain transaction cost factors, such as access to market information and transportation costs as well as location of farmers. This is in line with similar studies in the literature showing that dairy co-operatives have improved market participation, technology used by farmers, capital accumulation, milk output and sales as well as access to market information.

The econometric analysis in this section was employed to confirm whether dairy co-operatives in Swaziland have indeed contributed to a reduction of transaction costs in the production and marketing of milk.

5.3.2 Model estimation

One of the main objectives in the study is to determine whether co-operatives have a positive influence in minimising transaction costs among dairy producers. A multiple linear regression model was chosen for this analysis because of the dependant variable being of count data. Various studies have pointed out that the level of transaction costs incurred can be determined through the level of market participation or the amount of output marketed because of the difficulty involved in determining transaction costs. As mentioned earlier, transaction costs have a large unobservable component that makes their determination difficult. Staal *et al.* (1997:782) suggested the use of the marketable portion of milk as evidence of commercialisation by smallholder farmers because of difficulties in observation of transaction costs. Accordingly, the amount of marketable milk will be used in the study as a proxy for transaction costs to determine the effectiveness of co-operatives in minimising transaction costs.

It is hypothesized that co-operative farmer members incur lower transaction costs per output sold as they sell higher quantities of milk compared to independent farmers. Co-operative membership has been cited as a solution for farmers to minimize transaction

costs, given the transaction costs incurred when accessing both input and output markets. Indeed, this is widely acknowledged in literature.

The following model was therefore used for this exercise:

Marketable surplus = F(age, farm experience, co-operative participation, herd size, household size, milk output, access to credit, access to market information, distance,)

A high correlation between herd size and total milk output resulted in elimination of herd size from the model.

5.3.3 Variables in the model and hypotheses

Dependant variable

Marketable milk quantity in litres (Mktblemlk): This is the observed amount of milk that can be sold or effectively supplied by a farmer. It is a proxy for transaction costs and indicates the effectiveness of co-operatives in minimising transaction costs. The higher this quantity is, the lower the transaction costs incurred by farmers.

Independent variables (explanatory)

Co-operative participation (Co-oppart): This is measured as a dummy whereby a value of 1 indicates a farmer is a co-operative member and zero indicates a farmer is not a co-operative member. Co-operative participation is hypothesised to have a positive contribution on the amount of milk sold. Co-operative farmers are expected to sell higher quantities which will be an indication of lower transaction costs incurred. Co-operative participation contributes to reduction in losses, market availability, access to market information as well as reduction in distance travelled resulting in lower transportation costs. Thus co-operatives enable farmers to sell more milk.

Age: This is expected to have a positive effect on the amount of milk sold. Older farmers are more knowledgeable and are believed to be more efficient in resource use than younger farmers, and therefore produce higher quantities of milk which results in a higher proportion of milk sold.

Farm experience of household head in years (FMEXP): Farmers with extensive experience are likely to allocate resources effectively, resulting in higher quantities of milk produced and hence more milk available to be marketed. Marketable surplus is expected to be positively related to farm experience.

Family size (FMLSZ): Dairying is a labour-intensive activity; therefore, the quantity of milk marketed is influenced by labour. A negative sign is therefore expected because larger households consume more milk hence have less marketable surplus.

Milk output in litres (Tmotpt): The amount of milk produced significantly influences the amount of milk sold, hence it is hypothesised to have a positive contribution on milk marketed because an increase in total milk output results in a higher quantity of marketed milk.

Access to credit (Accrdt): This is measured as a dummy, assuming a value of one if the household has access to credit and zero otherwise. It is expected to positively influence the marketable supply of milk on the assumption that it improves the financial capacity of dairy households, enabling dairy farmers to buy more improved dairy cows, thereby improving milk production which in turn results in more milk being marketed.

Access to market information (Acmkinf): Access to information significantly influences the amount of milk sold by farmers. It is represented by the extension service which is the number of visits by an extension officer per year. The extension service broadens farmers' knowledge, especially with respect to the use of improved production technologies and provides farmers with current market information. This improves dairy production as well the use of resources and enables farmers to make informed decisions. A positive coefficient implies that access to the extension service improves access to information

and hence lowers information costs incurred. The higher the number of visits, the lower the transaction costs incurred because of improved access to market information.

Distance to market in km (Distnc): This is the location of the dairy household from the nearest milk market outlet and it has a bearing on access to markets. The closer the household is to a market, the lower the transportation costs, losses due to spoilage and better access to market information and facilities. This improves the amount of milk sold and increases the farm gate prices. Distance is hypothesized to negatively affect the marketed amount of milk, because the shorter the distance, the higher amount of milk sold due to lower transaction costs incurred by farmers.

Table 5.2: Description of variables used in the linear regression model

Variable	Description	Values	Expected sign
Mktblemlk	Amount of milk sold	Litres	
Co-oppart	Farmer participation in a co-operative	Yes = 1 No = 0	+
Age	Age of household head	Number of years	+
Fmexp	Farm experience of farmer	Number of years	+
Fmlsz	Family size	Man equivalent	-
Ttmotpt	Total output of milk per day	Litres	+
Acmkinf	Access to market information	Number of visits by extension officers per year	+
Accrdt	Dummy variable measuring access to credit	1= access 0= no access	+
Dist	Distance to point of sale	Kilometres	-

5.3.4 Impact of co-operatives on transaction costs

This section presents the results of the model used to determine whether co-operatives do minimise transaction costs. This has been achieved by using marketable surplus as a proxy for transaction costs in the sense that a higher amount of milk sold would imply less transaction costs per unit of output sold. A linear regression model was used for this

purpose and the estimation procedure was performed through STATA 10. The model used is stated in the above section.

Table 5.3 presents the results of the model estimation on the effect of co-operatives on minimizing transaction costs. As shown by Table 5.3, the model correctly explains 67% of the variation and is highly significant. According to the results presented, Co-operative participation, milk yield and access to market information were positively related to marketable surplus, whereas distance and household size were negatively associated with marketable surplus of milk as expected. The variables used both significant and non significant had expected signs.

The results indicate that being a co-operative member has a considerable, significant effect on increasing the amount of milk sold by farmers, and it was significant at 5%. This suggests that co-operative farmers sell higher amounts of milk compared to independent farmers, hence lower transaction costs are incurred. Therefore, being a co-operative member lowers transaction costs incurred by smallholder dairy farmers because it facilitates access to new reliable market opportunities where they can sell their produce.

Total milk output also exhibited a positive relationship with the marketable surplus of milk, and was also significant at 1%. The positive relationship signifies that farmers producing high quantities of milk sell a higher amount of milk compared to farmers producing lower quantities of milk. From the results presented in the previous chapter, co-operative members produce more milk and, with a higher output, farmers tend to look for unrestrictive market outlets, particularly because milk is easily spoiled, and hence needs to be sold within 6 hours of milking if it cannot be processed or stored. Co-operatives therefore enable farmers to sell both their morning and afternoon milk without any restrictions which increases the amount of milk sold. With a decrease in losses incurred, farmers can sell a higher percentage of their total production, and thus lower transaction costs are incurred.

Household size exhibited a negative relationship to marketable surplus as expected however it was not significant. This implies that co-operative farmers have bigger family sizes contributing to high consumption of milk which reduces quantity of milk marketed. In

spite of this, co-operative farmers sell more milk compared to independent farmers attributed to readily available market and the fact that they are situated close to co-operatives. This is also an indication that these farmers could be selling more than what they currently sell.

Access to market information significantly increases the amount of milk sold by farmers. It was significant at a 5% level. In this case, it is represented by the extension service, which is the number of visits by an extension officer per year. The extension service broadens farmers' knowledge, especially with respect to the use of improved production technologies and provides farmers with current market information. Being a perishable product, milk requires current and rapid information about markets. The extension service assists in providing farmers with current market information and marketing processes which farmers do not have to pay for. This improves the use of resources and enables farmers to make informed decisions due to better utilisation of market information provided, and hence an increase in marketable surplus. With access to extension service, information as well as marketing costs are reduced as farmers do not have to search for information. The higher the numbers of visits, the lower the information costs are and, overall, the lower transaction costs incurred. This implies that co-operatives do have an impact in minimising transaction costs resulting from information costs.

The results also indicate that the distance to the market or point of sale also significantly increases marketable surplus of milk. The distance was significant at a 5% level and it is one of the main contributors to high transaction costs through transportation costs. From the previous chapter, it has been indicated that co-operative farmers travel shorter distances to sell their produce and hence they sell more milk. The results imply that they spend less on transport costs and incur minimal losses which in turn reduce transaction costs. The results concur with the above descriptive analysis that co-operatives do have a positive influence on minimizing transaction costs resulting from high transportation costs, because of the reduction in distance from the farm gate to the point of sale.

Factors such as farm experience, age and access to credit were expected to positively and significantly influence marketable surplus of milk. However, the survey found these factors to be only positive and not significant. It was expected that older farmers with

extensive experience as well as with access to credit would sell higher quantities of milk and hence experience low transaction costs.

Table 5.3: Results of the model

Variable name	Estimate	Std err
Co-oppart	0.2989073***	0.0865878
Age	0.2054246	0.004703
Fmexp	0.1704181	0.067235
Hhlsz	-0.0126480	0.011073
Ttmo1pt	0.8065218***	0.0637023
Acmkinf	0.0182075**	0.0139509
Accrdt	0.1423854	0.0740960
Dist	-0.0283325**	0.0100190
R ²	0.6989	
Adjusted R ²	0.6743	
Prob>F	0	

***Significant at 1 %, **significant at 5 %, *significant at 10 %

Dependant variable is marketable amount of milk.

Table 5.4 presents results of the same model used however with total milk output excluded. From the results, when total output is excluded from the model, R² as well as adjusted R² goes down significantly. In addition, all the variables apart from age and access to credit are highly significant with high standard errors. Household size has a positive sign yet a negative sign is expected as in the previous model. This indicates that total milk output is the main explanatory variable or main contributor to marketable amount of milk. Exclusion of this variable therefore can result in biased conclusions formulated. Milk output has a strong influence on marketable amount of milk hence improves precision of the model being estimated. Therefore, results presented in Table 5.4 cannot be used to formulate conclusions for this study because they are not a true picture of desired results. Model presented in Table 5.3 can be considered as a fair representation of reality because of its adequate R² and the signs of estimated variables are as expected.

Table 5.4: Results of the model- without milk output

Variable name	Estimate	Std err
Co-oppart	0.4489682***	0.12238
Age	0.003214	0.1432422
Fmexp	0.2940561***	0.06981
Hhlsz	0.0423742***	0.01618
Ttmopt	-	-
Acmkinf	0.0458172**	0.02016
Accrdt	0.1609525	0.10776
Dist	-0.0419896**	0.01468
R ²	0.3333	
Adjusted R ²	0.2914	
Prob>F	0	

***Significant at 1%, **significant at 5%, *significant at 10%

Dependant variable is marketable amount of milk.

5.4 INSTITUTIONAL ISSUES WITHIN CO-OPERATIVES IN SWAZILAND

Co-operatives are also susceptible to organisational costs that inhibit their performance and success. From the results of the survey, free riding was identified as one of the main contributors to organisational costs that influence co-operatives' performance. Free riding exhibited by the members in studied co-operatives was indicated by non attendance in meetings as well as the share of milk members sold to the co-operative compared to the total amount of milk members sold.

Decisions that affect co-operative operations as well as members are taken during farmers' monthly general meetings and results indicate that not all farmers attended these meetings, which portray lack of participation and commitment by members. Out of the twelve meetings held in the last year, 35% of farmers attended not more than five of these meetings. Reasons given by most farmers for non attendance were other commitment issues and lack of satisfaction with leadership of the co-operative. They further expressed their wish for certain changes in leadership, particularly transparency and accountability in the utilisation of co-operative funds. This is an indication that a lack of trust prevails in co-operatives and is aggravated by dissatisfaction from delayed payment of farmers' income

by the co-operatives. Farmers often receive their payment 5–10 days later than the stipulated date. Another instance that has contributed to a lack of trust is that funds contributed by members towards a certain investment project were diverted somewhere else without the consent of the members. This resulted in a loss of members and deteriorating trust within the group.

The study also indicated that farmers sell part of their milk to alternative markets other than the co-operative. According to the results, 32% of co-operative members reported selling part of their milk to alternative markets (e.g. directly to consumers) that pay a higher price co-operatives. This is one of the main difficulties co-operatives are faced with because it negatively affects milk supply. Farmers utilise resources, services and support offered by co-operatives to their own advantage by acquiring services and the support needed, but sell part of their milk to other market outlets. Consequently, the milk shortage resulting from members' free riding inhibits growth because it negatively contributes to poor performance of co-operatives.

Moreover, the survey found that farmers (25%) do not subscribe or pay their membership fee, yet they have access to all the benefits offered by the co-operative. This is characterised as free riding because farmers do not pay for services offered, yet they have access to all the benefits. By not paying their membership fee, farmers inhibit the growth and performance of the co-operatives because that money could be used for investment purposes. Farmers benefit in market access, training and extension as well as in any other services offered; they do not have to pay for these services yet they fail to pay their membership fee. This demonstrates a lack of commitment on the part of farmers.

Farmer co-operatives remain small because of the opportunistic behaviour exhibited by members which inhibits co-operatives from growing. For co-operatives to be the best developmental instrument and to assist the smallholder sector to improve their production and marketing activities in Swaziland, the above problems have to be eliminated because they critically affect the growth and performance of co-operatives. Co-operatives' success as well as the success of individual members depends on the ability of the co-operative to concurrently manage opportunity maximisation and opportunism minimisation. In this regard, trust as a major ingredient to successful co-operation has to be promoted,

especially through capacity building. Benefits in the form of higher prices from co-operatives can enhance farmers' commitment and as such reduce farmers' likelihood of behaving opportunistically.

5.5 SUMMARY

It can be gathered from both the descriptive and econometric analyses that in the case of Swaziland, co-operatives do have a positive effect in minimising transaction costs resulting from transportation costs, losses incurred as well as information costs; although their contribution is not very prominent. This has been made possible by the reduction in the distance from the farm gate to the point of sale, the provision of market information as well as the provision of a reliable market where farmers can sell unlimited amounts of milk. Moreover, co-operatives have minimised risks associated with price determination by fixing the price of milk paid to farmers. Although co-operatives have made a positive contribution in minimising transaction costs, they are inhibited from better performance by members' opportunism and free riding. Therefore, considerable support is needed for the improvement of co-operatives to enhance their effectiveness in providing necessary services to farmers, which in turn will significantly lower transaction costs. Internal organisation of co-operatives also needs improvement through capacity building.

CHAPTER 6

SUMMARY AND CONCLUSION

6.1 SUMMARY

The study was undertaken to determine the role of co-operatives in smallholder dairy production and marketing activities in Swaziland. It was a survey research whereby a sample size of 120 farmers (60 co-operative members and 60 independent farmers) was randomly selected and interviewed through a questionnaire. Data on their production and marketing activities was collected and analysed through Microsoft Excel and STATA 10. Both descriptive and econometric analyses were performed. An econometric analysis was performed to determine whether co-operatives have a positive influence in minimising transaction costs incurred by smallholder dairy farmers.

Results indicated that production systems of co-operative and non co-operative members do not significantly differ from each other. Both uses specialised dairy breeds, and have almost similar herd sizes as well as use the same feeding systems. However, farmers in co-operatives perform better in terms of production and productivity as well as sell more milk than independent farmers. This is mainly attributed to the fact that co-operative members have regular training and extension programmes that constantly provide them with vital information required for production and marketing of milk. Farmers sell more milk because of the reliable market offered by co-operatives enabling them to sell both their morning and afternoon milk, whereas independent farmers often only sell their morning milk.

In addition, independent farmers are not efficient in the use of variable inputs in the sense that more of variable inputs are employed compared to co-operative members. Informal marketing channel was mainly used to sell farmers' milk because of minimal restrictions on product quality. Main market outlets used were co-operatives, traders, farm gate and local community as well as processors. Moreover, the price paid by co-operatives was 35% lower than the average price received by independent farmers which then results to

lower income on the part of co-operative members compared to non co-operative members. The main benefits as indicated above include the provision of guaranteed market access as well as technical services, such as training and extension.

The results of the descriptive analysis on transaction costs as well as results of the Linear Regression model revealed that co-operatives do have a positive influence in minimising transaction costs incurred by smallholder farmers. This has been facilitated by lower information and transportation costs as well as by the provision of a reliable market where farmers can sell their milk.

On the other hand, the main problems co-operatives are faced with include a shortage of capital, inadequate milk supply, poor management, transportation problems, low member commitment and poor technical support. Further, opportunities available to farmers include the availability of local milk markets characterised by a high demand of milk, the establishment of a credit guarantee scheme and good feeder roads that will facilitate milk collection.

6.2 CONCLUSIONS

Conclusions are formulated on the basis of the extent of the role that co-operatives play in both production and marketing in the case of Swaziland. They are discussed in the following manner:

6.2.1 Role of co-operatives in production

Dairy co-operatives have made a positive contribution to the production activities of smallholder farmers. However, their contribution is not significant when comparing them to co-operatives in other countries. Results indicate that co-operative farmers produce slightly more milk than independent farmers and this can be attributed to an improvement in access to training and extension services. Further, co-operative farmers use more dairy breeds for production. Training provided may have contributed to a slight improvement in farm management skills and animal husbandry practices of farmers because it is designed according to the specific needs of farmers. Although herd sizes of co-operative and

independent farmers are not significantly different, some farmers reported to have acquired more animals after being a co-operative member.

Briefly, co-operatives have played a positive role in the provision of inputs, although farmers could not access all the required inputs through co-operatives attributed to challenges co-operatives are faced with. Farmers are still not in a better position to access credit to improve their production activities as well as to invest in improved dairy technology. Apart from the use of AI for breeding, aluminium, milk cans and buckets have been introduced by co-operatives to enable proper milk handling and transportation. Majority of co-operative farmers have adopted the use of aluminium buckets compared to independent farmers who use plastic containers for milk handling and transportation.

6.2.2 Role of co-operatives in marketing

From the results presented in Chapter 4 and Chapter 5, co-operatives have made a positive contribution to the marketing activities of farmers in Swaziland. However, their contribution to marketing is impaired by the challenges that co-operatives are faced with. Currently, co-operatives in Swaziland do not offer significant benefits to farmers compared to co-operatives in other countries. In the case of Swaziland, co-operatives have improved the amount of milk sold by farmers, improved the regular flow of income as well lowered transaction costs incurred. Moreover, losses incurred are now lower for farmers because they can now sell both their morning and afternoon milk, made possible by the shorter distances they have to travel in order to sell their milk. Nevertheless, the price offered by co-operatives is very low and, on average, the price attained by independent farmers is 35% higher than price offered by co-operatives. This puts independent farmers at an advantageous position because the enterprise is profitable regardless of whether they are in a co-operative.

Overall, co-operatives have played a positive role in stimulating production, linking farmers to markets, input providers as well as in the development of farmers' skills. Income received has increased, considering that farmers are now selling more and getting a regular income monthly. Although co-operatives are potential development instruments in

the smallholder sector, their contribution is still marginal because of their limited capacity, and hence they cannot provide farmers with all the benefits of being in a co-operative.

6.3 RECOMMENDATIONS

Based on the results of the study, the following recommendations are made for the improvement of smallholder production, marketing and the improvement of co-operatives.

The success of smallholder dairy farming and dairy co-operatives depends on four factors, namely the provision of technical inputs, institutional support, improvement in government policies and socio economic initiatives; which all influence the success of smallholder dairy farming and decisions to expand and improve dairy operations. Therefore, there is a need for support programs by government and all stakeholders involved that will help to motivate individual farmers and strengthen co-operatives for better promotion of production and marketing of smallholder farmers. This includes a more supportive policy environment to reduce obstacles inhibiting the effective formation and management of co-operatives, infrastructure development, access to financial and credit services, improvement of markets, and provision of effective training and extension to provide more extensive and dynamic opportunities for smallholder dairy development in Swaziland. This will positively contribute to reducing the high demand of milk that prevails in the country and enable co-operatives to diversify their operations, which in turn will facilitate their effectiveness and sustainability.

In addition, there is a shortage in milk supply to co-operatives because the quantity of milk collected is small as well as the membership base. This prevents further processing of milk since the demand for raw milk is far too high. There is a need to expand the capacity of milk collection centres by improving the membership base, increasing the price per litre of milk or providing price incentives considering that low price promotes free riding by farmers. With an increase in the number of milk collection centres, the volume of milk collected and processed will also increase. Co-operatives with very few members never achieve their goal of becoming a proficient tool for development.

Co-operatives' effectiveness is constrained by organisational problems, such as free riding, a lack of commitment and participation, low managerial capacities and a lack of trust. Hence, there is a need for capacity building and member training to strengthen co-operative functioning and internal structure. The improvement of management capabilities and skills of co-operative members are essential for the development and sustainability of co-operatives. Further, trained and experienced leaders will be in a better position to solve arising problems to enable better performance of the co-operatives.

6.3.1 Policy recommendations

Co-operatives have a smaller membership base and they are not effective in promoting dairy production and marketing of smallholder farmers. Therefore, complementary institutions need to be designed to address the specific needs of the smallest farmers. This will motivate more farmers to join co-operatives and hence improve their membership base.

Smallholder farmers are receiving low prices for their products, which is attributed to the prevailing marketing system in the country. This discourages investments in milk production and quality improvement. Therefore, there is a need for a pricing policy improvement which will incentivise farmers to produce and sell more as well as invest in quality improvement.

One of the main constraints cited by most farmers was inadequate land for production purposes. Farmers are unable to grow their own feeds and herd size improvement is restricted, which in turn limits milk production. Therefore, there is a need to provide farmers with more land through policy efforts. This will improve milk production in the country.

6.3.2 Recommendations for further research

- The study on the role of co-operatives in smallholder dairy production and marketing was undertaken in only two areas in the country which may not be representative of

dairy co-operatives in the whole country. Therefore, it is suggested that a similar study be undertaken in all other areas.

- Due to limited time and funding allocated for undertaking the study, the performance of co-operatives could not be studied. Therefore, it is also suggested that a study on the performance of co-operatives be undertaken in the country in order to focus on development programs of co-operatives in specific areas. This will also enable the identification of success factors to enable replication of successful co-operatives.

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APPENDIX A

data collection instrument

Farmer's Questionnaire

Title: An assessment of the role of co-operatives on smallholder dairy development in Swaziland

Farmer's Questionnaire

An assessment of the role of co-operatives in smallholder dairy production and marketing in Swaziland

A. General information

Name of farmer.....

Date of interview:

Location of farm: 1. Rural 2. Urban 3. Peri-urban

Village name.....

Member of co-operative: Yes No

If yes, name of co-operative.....

B. Household characteristics

1. Gender of farmer: Male
Female

2. Age (years): < 30
30 – 40
41 – 50
51 – 60
> 61

3. Education level (years): No formal education
Primary education
Secondary education
Tertiary education

4. Household size:

5. Number of adults (above 18 years): working on the farm
Working off the farm
Total

6. Number of children (below 18 years): Working on the farm
Total

7. Dairy herd size: 1. < 5 2. 5 - 10 3. > 10



8. Farming experience (years): 1. < 5
 ..2. 5 – 10
 3. > 10

9. Sources of income: 1. Dairy 2. Other agricultural activities
 3. Off-farm employment 4. Remittances 5. Pension
 Other.....

10. Type of assets in the farm:

	Type of asset	Initial cost (E)	Estimated useful life (Years)	Current value of asset (E)
1.	Milking parlour			
2.	Milking machine			
3.	Milking utensils 1..... 2..... 3..... 4.....			
4.	Dairy cows 1..... 2..... 3.....			
5.	Chilling facilities 1..... 2..... 3.....			
6.	Other			

C. Livestock owned at present

11. What type of livestock do you currently own?

	Type of animal	Type of breed	Total
1.	Cows		
2.	Oxen		
3.	Bulls		
4.	Heifers		



5.	Sheep		
6.	Goats		
7.	Chickens		

D. Farm inputs

12. What are the inputs used for dairy production?

12.1 Non labour inputs:

Type of input	Quantities used	Unit cost (E)	Total cost/ month (E)
Feed: Forage Hay Supplements Concentrates			
Breeding: AI Bulls			
Veterinary			
Transport costs			
Electricity costs			
Water			
Other			

12.2 Labour input

	Activity	Unit cost (E)		Total cost (E)
		Family labour	Hired labour	
1.	Milking			
2.	Feeding			
3.	Cleaning of milking parlour			
4.	Marketing of milk			
5.	Transporting milk for sale			
6.	Dairy animals care (e.g. administering drugs)			



7.	Caring for calves			
8.	Culling of dairy animals			

E. Production

13.

Cows	No of dairy cows	No of lactating cows	Average milk yield		Average milk sold		Average milk consumed (litres)
			Per day (litres)	Per month (litres)	Per day (litres)	Per month (litres)	
Indigenous: 1. Nguni							
Breed: 2. Friesian 3. Holstein 4. Jersey 3 Other							
Total							

F. Dairy marketing activities

14. Where do you sell your produce?

1. Co-operative 2. Farm gate 3. Traders 4. Local markets
5. Do not sell 6. Other

15. Reasons for the specified marketing channel:

1. Close to production site 2. Offer better price 3. Can get immediate cash
4. Collection centre is close by

Other (specify).....

16. Distance travelled to market (Km): 1. < 5 2. 5 – 10 3. 10 – 15
4. > 15

17. Are you satisfied with the marketing channel you use? 1. Yes 2.No

.....

18. If not, why?



19. Quantity of milk sold

Receiving agents	Quantity sold per week (Litres)	Price/ Litre (E)	Amount of money received per week (E)	Amount of money received per month (E)
Dairy co-operative				
Farm gate				
Traders				
Local markets				
Other				

G. Transport

20. How do you transport your milk to the market?

1. Public transport 2. Own transport 3. On foot
 4. Ox cart 5. Car hire 6. Other (specify).....

21. How much does it cost to use the mode of transport you have mentioned?

.....

22. Are there any major constraints in relation to transportation of your produce to the market?

1. Expensive 2. Poor roads 3. Long distances
 4. Other (specify).....

H. GOOD MANAGEMENT AND FARM PRACTICE

Milking system

23. Which milking system do you use?

1. Manual 2. Portable milking machine 3. Fixed dairy parlour

Feeding system

24. Which type of feeding system do you use?

1. Stall feeding 2. Grazing 3. Both

25. Types of grazing

1. Communal 2. Private 3. Zero

26. Please indicate the type of feed given to the following animals:

	Type of animal	Type of feed	Season
1.	Lactating		
2.	Pregnant		
3.	On dry period		
4.	Calves		

Pasture establishment and management

27. Do you have planted pasture? 1. Yes 2. No
28. How big is the grazing area?.....
29. Do you sell fodder and at how much?.....

Milk handling and hygiene

30. Are there any quality control measures taken to ensure milk is of good quality?
.....
.....
31. What cost do you incur in application of the quality control measures?
.....
.....
.....
32. What are the problems encountered in ensuring milk is of good quality?
1. Lack of training 2. Poor milking utensils 3. Expensive/Costly
4. Other.....
33. Is record keeping practised on the farm? 1. Yes 2. No
34. If so, which type of records are kept and why?
1. Milk production 2. Inputs used and costs 3. Marketed milk
4. Income 5. Other (specify).....
35. Is there a health management program practised in the farm?
1. Yes 2. No

36. Please state the type of disease, control and cost for each disease:

	Type of disease	Season	Control	Cost/animal (E)
1.				
2.				
3.				
4.				
5.				

Water sources

37 Which source of water do you use?

1. Rivers and streams 2. Piped water 3. Borehole
4. Other.....

Milk losses

- 38 Do you incur any milk losses? 1. Yes 2. No
39. If so, how much do you lose/week? 1. < 5 2. 5 - 10 3. > 10
40. What do you attribute the losses to?
1. Long distance to market 2. Poor milk handling 3. Lack of chilling facilities
4. Minimal market opportunities 5. Other
41. How do you deal with spoiled milk? 1. Used for home consumption 2. Fed to calves
3. Used to make sour milk 4. Given to neighbour
5. Other.....

I. Household Income

42. Sources of income

Sources of income	Amount per month (E)	Total amount per year (E)
Milk sales		
Livestock sales		
Off-farm employment		
Remittances		
Other		

J. PROVISION OF SERVICES

Training

43. Have you ever participated in dairy production training for the past three years?



1. No 2. Yes

44. If the answer is no, what are the reasons?

- 1.....
2.....
3.....

45. If yes, specify the type of training and the organisation responsible for the training:

	Type of training	Duration	Organisation
1.	Proper milking and clean milk handling		
2.	Record keeping		
3.	Milk marketing		
4.	Dairy health		
5.	General farm management		
6.	Pasture establishment and management		
7.	Dairy cattle feeding		
8.	Heat detection		
9.	Other		

46. Has the training been helpful in gaining knowledge and skills to solve your practical problems related to dairy production and marketing? 1. Yes 2. No

If not, why?

.....
.....

47. What is your source of market price information?

1. Extension officer 2. NGO 3. Radio 4. Newspaper
5. Co-operative 6. Other.....

Extension service

48. Do you have an extension officer operating in the area?

49. How many times does he visit in a year? 1. <3 times 2. 3- 5 times
3. 5- 10 times 4. > 10 times 5. Not at all

50. Have the visits been helpful? 1. Yes 2. No

51. If yes, how?.....
.....
.....

Support provided

52. Please state support provider and type of support provided.

Support provider	Type of support									
	1	2	3	4	5	6	7	8	9	10
1.SDB										
2.NGOs										
3.Co-operative										
4.MOAC										
5.Microfinance institutions										
6.Others										

1= training, 2= advisory services, 3= credit provision, 4= provision of AI services, 5= provision of bull services, 6= veterinary services, 7= concentrated feed, 8= fodder seed, 9= breeding, 10=other (specify)

K. Co-operative members

Membership of the dairy marketing co-operatives and benefits obtained

53. What were the main reasons motivating you to be a member of the dairy co-operative?

- 1. To get secured market for the milk
- 2. To get dairy inputs timely and with fair price.
- 3. To get dividends from the co-operative
- 4. To get education, training & extension advisory services from the co-operative
- 5. To gain access to credit
- 6. Others (specify)

54. How long have you sold milk to the co-operative?

- 1. Less than a year
- 2. 1- 3 years
- 3. Greater than 3 years

Benefits of being a co-operative member

55. Ways in which the co-operative has been of help to you:

1. Marketing of milk 2. Provision of inputs 3. Procurement of cows
 4. Provision of vet services 5. Extension services 6. Feed and concentrates
 7. Provision of AI services 8. Access to credit 9. Improvement in milk quality
 10. Provision of training

11. Other (specify).....

56. Are there any changes since you have been marketing your milk through a co-operative?

1. Production level 2. Income

Please explain.....

57. Do you think being a member of a co-operative is more advantageous than being on your own? 1. Yes 2. No

58. Please explained why.....

59. As a member of the dairy co-operative, have you gained any new information:

1. Related to access to technology: 1. Yes 2. No

Please explain.....

2. Related to price and marketing: 1. Yes 2. No

Please explain.....

3. Related to production, milk handling and good farm management practices:

1. Yes 2.No

Please explain.....

60. Do you believe that the dairy co-operative is doing a good job in solving problems farmers are facing these days?

1. Yes 2. No

61. If not, what are the major commonly felt problems that are not being solved by the co-operative in your area?

- 1. Lack of adequate milk collection centres near to my home
- 2. Lack of adequate dairy inputs for members
- 3. Lack of access to necessary services
- 4. Lack of chilling facilities to preserve milk
- 5. Lack of support by Govt and other stakeholders
- 6. High transaction costs
- 7. Others (specify)

Governance of co-operatives

62. Are you satisfied with co-op leadership? 1. Yes 2. No
Please explain.....

63. Are leaders elected through voting of members? 1. Yes 2. No

64. Are you satisfied with the way elections are held? 1. Yes 2. No
Please explain.....

65. Are the leaders transparent and accountable, especially in utilisation of funds?
1. Yes 2. No
Please explain.....

66. Are you satisfied with member participation in decision making? 1. Yes
2. No
If not, why?.....

67. What are the main problems the co-operative is faced with?

Problem	Very important	Important	Least important

68. Do you wish to remain a co-operative member? 1. Yes 2. No



69. Why/why not?.....
.....
.....

(Applicable to all farmers)

L. Constraints in dairy production and marketing

70. What are the major milk production constraints you have observed?

	Production constraints	✓	Marketing constraints	✓
1.	Lack of grazing land		Distance of milk collection centres from my home	
2.	Inadequate water supply		Lack of access to adequate markets	
3.	Inadequate feed		Inadequacy of labour to transport milk	
4.	Prevalence of diseases		Spoilage of milk during transportation	
5.	Dairy cattle procurement		Inadequate market information	
6.	Poor veterinary services		Inadequate infrastructural development	
7.	Other			

71. What are your suggestions on improving dairy production and marketing activities?

	Improving production	Improving marketing
1.		
2.		
3.		
4.		
5.		
6.		