

**INFLUENCE OF SMALLHOLDER DAIRY
COMMERCIALIZATION PROGRAMME ON MILK
MARKETING IN BORABU DISTRICT, NYAMIRA COUNTY;
KENYA**

BY

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DECLARATION

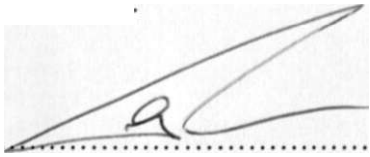
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This research project report has been presented for examination with my approval as the university

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DEDICATION

I dedicate this work to my dear wife Joyce, Sons Justine and Brian, and daughter Brigit. To my Father and Mother, I say thank you for being there for me.

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LIST OF ABBREVIATIONS

APSK:	Animal Production Society of Kenya
COSOP:	Country Strategic Opportunities Programme
CPE:	Country Programme Evaluation
DCA:	Dairy Commercialization Area
DivPIT:	Divisional Planning and Implementation Team
DPCT:	District Programme Coordination Team
GDP:	Gross Domestic Product
FAO:	Food and Agricultural Organisation
GOK:	Government of Kenya
IFAD:	International Fund for Agricultural Development
KARI:	Kenya Agricultural Research Institute
KCC:	Kenya Cooperative Creameries
Kshs:	Kenyan shillings
MFI :	Micro Finance Institution
MODE:	Market Oriented Dairy Enterprise
NGO:	Non Governmental Organasation
PCU:	Programme Coordinating Unit
PIM:	Project Implementation Manual
PRA:	Participatory Rural Appraisal
SDCP:	Smallholder Dairy Commercialization Programme
USS:	United States of America Dollar
UoN:	University of Nairobi
WTO:	World Trade Organisation

ABSTRACT

Smallholder Dairy Commercialization Programme (SDCP) is a joint development programme between the Government of Kenya and International Fund for Agricultural Development (IFAD) with an emphasis on commercialization of dairy and dairy products through the Market Oriented Dairy Enterprises (MODE) approach. The programme goal is to increase the income of the poor rural households that depend substantially on production and trade of dairy products for their livelihood. The Programme intervention is to reduce the production costs in dairy farming by increasing the financial viability of the smallholder farmers along the value chain, from production to post-harvest economic activities. Dairy production in Kenya is faced by a multitude of perceived and often experienced risks, which contribute to high costs of production and low average productivity. These factors cause low profit to the producer and price fluctuations for the consumer. Milk prices and payment to farmers is one of the most sensitive issues in the Kenyan dairy sub-sector due to the reported occurrence of low or non-payment of milk suppliers. In Borabu District, inefficient milk marketing is largely responsible for a large proportion of milk that is retained by producers for home consumption (estimated at 60 %). Thus majority of the smallholder dairy farmers in Borabu District have continued being poor. In the last decade, there has been an increased interest in conducting impact evaluations of development projects, including agricultural projects, with pressure to do so coming from two quarters, economists and communities. This is majorly to determine the effectiveness of development assistance, enhanced accountability as well as learning lessons for policy making. This study sought to establish the effects of SDCP on market-oriented dairy production, particularly milk marketing in Borabu. The overall objective of the study was to assess the influence of SDCP on milk marketing in Borabu district. The study tested the hypotheses to determine the variables which are significantly related to, and have significant effect on milk marketing. The variables associated with milk marketing included level of project funding, capacity building, adoption of new technologies, participation of grass-root institutions and creation of linkages with private sector. The study used both quantitative and qualitative approaches for data collection. Questionnaires and interview schedules were use for collecting data and other information relevant to the study. The sample for this study was 206 respondents for the programme beneficiaries who were be sampled using both probability and non-probability sampling methods within Borabu district. Multiple regression analysis technique was be used to identify real determinants milk marketing and the strength of each determinant. The hypotheses were tested at 0.05 level of significance. F test was used to determine significant predictors. The study found that SDCP has had a positive impact on milk marketing. A multiple regression analysis confirmed that the five predictors are significant determinants of milk marketing. The study concluded that level of funding, capacity building, adoption of new technologies, participation of Grass-root institutions and creation of linkages with private sector are all determinants of milk marketing. The study recommends timely and adequate funding of SDCP, adequate community contribution, up scaling farmers' participation in on-farm demonstrations, strengthening of cooperatives and other farmers' organizations. Areas that need further research are dairy value chain development and influence of infrastructural development on milk marketing in Borabu.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

The livestock sector is broad and covers highly diverse agro-ecological, social and political dimensions across continents, regions and countries. About 900 million of the world's 1.3 billion extremely poor people live in rural areas, most of them relying on agricultural activities for their food and income (IFAD, 2010). Nearly one billion head of livestock are raised by more than 800 million poor livestock keepers in marginal, rural and periurban areas of developing countries. Livestock contribution to the agriculture sector is projected to reach about 30 percent of the value of global production output and directly and indirectly use 80 percent of the world's agricultural land surface by 2020 (IFAD,2010). The dairy sub sector holds high promise as a dependable source of livelihood for the vast majority of the rural poor. Liberalization of world trade in dairy products under the new trade regime of the World Trade Organization (WTO) poses new challenges and has opened up new export opportunities for the dairy industry.

In the United States of America (USA), dairy farming is large scale and highly mechanized with milk marketing mostly done through cooperatives. Co-operative milk and dairy product sales represented 42 percent of total commodity marketing by all U.S. agricultural cooperatives in 2007 (Deville, Jacqueline, Penn and Eldon, 2009/ In USA, there are about 155 dairy cooperatives owned by 49,675 member-producers, or 84 percent of the nation's licensed dairy farms. They deliver 152.5 billion pounds of milk, or 83 percent of all milk marketed (Ling, 2009). Thus in the USA, cooperatives have afforded dairy farmers the organizational size that is necessary for exercising countervailing power to effectively bargain and deal with other market participants.

In developing countries, India has most organized milk marketing system owned by small scale milk producers. Over the span of three decades, India has transformed from a country of acute milk shortage to the world's leading milk producer, with production exceeding 100 million tonnes in 2004 (Rajendran & Mohanty, 2004). This phenomenal success is attributed to a Government initiative known as Operation Flood (1970-1996) and its intense focus on dairy

development activities. In that initiative, rural milk shed areas were linked to urban markets through the development of a network of village cooperatives for procuring and marketing milk. Development of rural milk sheds through milk producers' co-operatives and movement of processed milk to urban demand centers became the cornerstone of government policy. This single policy-making epoch in the late 1960s galvanized the Indian dairy industry, moving it into a growth path unprecedented in recent history in any country.

Africa accounts for just over 2% of world milk production. The principal exporters of milk products are the European Union (EU), New Zealand and the USA, with the EU typically accounting for up to half of the total. Only about 5% of world milk production is traded internationally; thus, world prices are highly vulnerable to small changes in either supply or demand in the principal producing areas. High guaranteed support prices for domestic producers in many industrialized countries, combined with controls on imports and the subsidization of exports, have distorted international trade and prices. Livestock products account for about one quarter of the food produced in Africa and milk accounts for about half of those livestock products, in terms of grain equivalents calculated using domestic price ratios (AASAP, 2005).

The overall goal of the Government of Kenya is to eradicate poverty, illiteracy and diseases (Sessional Paper No. 10 of 1965). Kenya is also a signatory to Millennium Development Goals of the United Nations, whose Goal Number One is that of reducing extreme poverty and hunger by the year 2015. To achieve this, countries are coming up with pro-poor macro policies, and in the agricultural sector the drive is towards intensification and commercialization. Kenya Vision 2030 aims to transform subsistence farming to market oriented production by processing and value addition of farm produce before reaching the market. This will be done through an innovative, commercially oriented and modern agriculture, livestock and fisheries sector (Government of Kenya, 2007). Emphasis is on improved access for the poor to domestic and regional markets as a way of stimulating production and hence escapes poverty trap thus transforming Kenya into "middle income country".

Today most of Kenya's 3 million dairy cattle are kept by smallholders in crop-livestock systems in areas of high and medium cropping potential (Thorpe et al, 2000). Dairy cattle farming accounts for about 3.5 % of the GDP. Smallholder dairy production accounts for over 70 % of the total milk production and supports more than 600,000 smallholder dairy farmers. Of the total dairy cattle milk produced, 55 % is marketed through cooperatives, traders, hotels and

milk bars. An estimated 84 % of the total milk production is sold in the raw form, while 16 % is processed (Sessional Paper No.2 of 2008).

Borabu is one of the five Districts in Nyamira County with an area of 284.3 square kilometres. The District has a human population of 73,426 with farm holding of 11,616 (KNBS, 2009). The district agricultural community is made up of small to medium-scale farmers who entirely depend on rain-fed agriculture with farm holdings of 2.15 Ha. Dairy farming is the most important livestock enterprise in the district. Cattle population is estimated at 19,400 grade and 3,600 zebu with annually milk production of 17 million litres (District Livestock Annual Report, 2011)

I.2 Statement of the Problem

In Borabu District, poor milk marketing is recognized as a major bottleneck as it impedes dairy development hence high incidences of poverty among smallholder dairy farmers. Milk losses are estimated at 1,220 litres per day with an annual market value of Kshs. II,132,500(SDCP/Publix Ltd.2010). Inefficient milk marketing is largely responsible for a large proportion of milk that is retained by producers for home consumption, estimated at 60 % (District Livestock Production Annual Report, 2011). In study carried in Machakos, 65% of milk produced is marketed efficiently through the farmers' co-operatives, self-help group dairies and individually owned milk shops (Njarui, et al.2010). The District is among the few in Nyanza Province which produces surplus milk for sale (Provincial Director of Livestock Production annual report 2011). However, in spite of expanding dairy farming and improved milk production in the District, there is not even a single commercial processor based in the region. The large milk processors are concentrated in Nairobi and the traditionally dairy regions of central highlands and Rift Valley region.

According to a Participatory Rural Appraisal (PRA) conducted by SDCP and Ministry of Livestock Development (MOLD) in Nyansiongo and Mekenene locations of Borabu in 2007, poor milk marketing channels was identified as one of the priority problem in the area. It was attributed to the collapse of KCC in late 1990s. The coping strategy employed at then was individual farmers hawking milk at throw away price.

Milk marketing in Borabu is characterized by instability and competition. In the late 1980s, milk sales were mainly through local dairy co-operative societies to KCC which had a

near monopoly over milk marketing. Even though only about 40% of the estimated milk production in Kenya (estimated at about 2.4 billion litres) enters the marketing system, the KCC used to handle over 90% of this marketed milk production(Thorpe et al, 2000). With marketing liberalization in May 1992, a number of new dairy processors entered the market. These intensified market competition among the existing dairy firms, especially the KCC. This undoubtedly caused the collapse of KCC which went under with farmers' money. KCC owes Borabu dairy farmers Kshs 4.5 million to date (Ministry of cooperative Development, 2008 Annual report). Thus with the advent of liberalization patterns in formal milk marketing the district, co-operative societies have indicated deterioration in performance. The amount of milk handled by societies has been fluctuating over the period. This has made milk prices and payment to farmers one of the most sensitive issues in Borabu District due to the reported occurrence of low or non-payment of milk suppliers.

In 2008, SDCP started implementing activities in Borabu as the second Dairy Commercialization Area (DCA 2) in Nyamira County using the MODE approach. The impact of SDCP on market-oriented dairy production, particularly milk marketing has not be studied in Borabu. Thus there was a need for detailed study on the actual situation of milk marketing in the District since the inception of SDCP. It was against this background that the study sought to investigate the influence of SDCP on milk marketing in Borabu District, Nyamira County.

1.3 Purpose of the Study

The purpose of this study was to determine the influence of Smallholder Dairy Commercialization Programme on milk marketing in Borabu District, Nyamira County.

1.4 Objective of the Study

This study was guided by the following objectives;

1. To examine the extent to which the level of funding influence milk marketing in Borabu District, Nyamira County.
2. To establish the extent to which the level of capacity building influence milk marketing in Borabu District, Nyamira County.
3. To determine the extent to which adoption of new technologies influence milk marketing in Borabu District, Nyamira County.

4. To establish the extent to which the participation of grass-root institutions influence milk marketing in Borabu District, Nyamira County.
5. To examine the extent to which creation of linkages with private sector influence milk marketing in Borabu District, Nyamira County.

1.5 Research Hypotheses

The study tested the hypotheses that:

- Hoi - There is no significant relationship between levels of funding and milk marketing in Borabu District, Nyamira County.
- H02 - There is no significant relationship between capacity building and milk marketing in Borabu District, Nyamira County.
- H03 - There is no significant relationship between adoption of new technologies and milk marketing in Borabu District, Nyamira County.
- H04- There is no relationship between participation of grass-root institutions and milk marketing in Borabu District, Nyamira County.
- H05- There is no relationship between creation of linkages with private sector and milk marketing in Borabu District, Nyamira County.

1.6 Significance of the Study

The first country programme evaluation (CPE) of Kenya by the Independent Office of Evaluation of IFAD was conducted in July 2011, since the Fund started its operations in the country in 1979(IFAD, 2011). The IFAD- Kenya Country Office requires annual performance evaluation of its projects. It was hoped this study would generate findings and recommendations that will be useful to IFAD and the Government of Kenya especially for the forthcoming Kenya results-based country strategic opportunities programme (COSOP). The Ministry of Livestock Development may find the study useful in developing new and refining existing policies in the dairy industry.

The findings and recommendations of the study may also be useful to SDCP implementers who include Programme Coordinating Unit (PCU) staff, District Programme Coordination Team (DPCT) and Divisional Planning and Implementation Team (DivPIT) members in the programme area. They will not rely on personal experiences or subjective judgments but base their decisions and actions on concrete knowledge of milk marketing

supported by research findings. This will improve programme management and coordination leading to cost effectiveness and efficiency. The study may assist in strengthening grass-root institutions in partnering with the private sector in milk marketing especially in co-financing of small scale milk processing.

The researcher hoped the study would form a basis for further research in identifying new innovations in milk marketing that can contribute to increased income to smallholder dairy farmers and hence reduced rural poverty in Kenya. It can also be a basis in studying dairy value chain development with greater engagement of the private sector in small scale milk processing.

1.7 Limitations of the Study

The research encountered bureaucratic procedures associated with obtaining government information. Officers responsible for information followed procedures of authorization which took time to obtain clearance. To address these concerns, the researcher booked appointments in advance and built consensus with officers in-charge. Further, pledges of commitment were made on policy of confidentiality of responses to allay fear of fault finding. Heavy rains rendered rural feeder roads impassable making some areas inaccessible. This necessitated the hiring of 4- wheel drive vehicle to reach far flung areas.

1.8 Delimitations of the Study

This study was delimited to dairy farmers, milk traders and SDCP implementing agencies in Borabu district. Firstly, the study dealt with milk marketing, an aspect of dairy farming. It therefore dealt directly with dairy farmers and milk traders involved in milk marketing.

Secondly, the study was restricted to Borabu district because it has the surplus milk and experiences milk glut during wet seasons. The researcher had noticed over time that the district experiences serious milk marketing problem than other districts in the region (Nyanza). Borabu district was among the few districts in Kenya piloting SDCP. It was therefore necessary to investigate why this was the case.

This study on influence of SDCP on milk marketing in Borabu district, Nyamira County was conducted in October 2012. A sample population was drawn from the boundaries of the district. Data was collected by the researcher using questionnaires and document analysis. The

study was limited to SDCP level of funding, capacity building, adoption of new technologies, participation of grass-root institutions and private sector partnership. The study further limited its scope to information and data generated in the years between 2007 and 2012.

1.9 Basic assumptions of the Study

The study assumed that the respondents would give adequate and reliable information. It also assumed that programme coordination offices kept good records on fund disbursement and expenditure. Grass-root institutions would have reliable records on milk production and marketing.

It further assumed that more men than women would participate in the study as respondents due to the prevailing socio-cultural dynamics in the region. Poverty levels and environmental factors influences milk marketing amongst other factors the researcher has hypothesized as determinants in the study.

1.10 Definitions of Significant Terms as used in the study

Capacity building - refer to the process of acquiring and strengthening the skills, competencies and abilities of farmers and staffs to enable them participate in developmental issues.

Grass-root Institutions - Refer to organized groups whose membership is drawn predominantly from the local community. They include self-Help groups, cooperative societies and farmers associations.

Market-oriented Dairy enterprise approach - Refer to stepwise/ gradual movement of Programme beneficiaries towards being successful business entities in milk or dairy products.

Private Sector Partnership - refer to collaboration between the Programme, and financial institutions, farm input suppliers and private milk processors.

The Programme - refer to Smallholder Dairy Commercialization Programme

Value Chain - defined as the full range of activities required to bring a product (milk), to final consumers passing through the different phases of production, processing and delivery.

1.11 Organization of the Study

The study was organized into five chapters. The first chapter provided details on the background of the study, statement of the problem, purpose of the study, objectives of the study, research hypotheses, justification of the study, significance of the study, limitations and delimitations of the study, and definition of terms used in the study. The second chapter offered a review of the relevant literature that provided a framework within which the data to be obtained would be contextualized. Chapter three covered the research methodology that was applied to source, process and analyze the requisite data. This included description of the research design, the study area, target population, sample size and sampling procedures, the research instruments, validity and reliability of the instruments, data collection procedures and data analysis techniques. Chapter four presented data analysis, presentation and interpretation. Finally, Chapter five contains a summary of the discussions, conclusions and recommendations as well as areas for further research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter discussed the literature related to the influence of Smallholder Dairy Commercialization Programme on milk marketing in Borabu District, Nyamira County. This section explored theoretical and empirical literature on smallholder dairying and milk marketing. The purpose of this section was to establish the foundation for the study and identify a framework within which primary data would be contextualized and interpreted. By exploring existing experiences from other parts of the world and from Africa, literature review was also meant to strengthen the findings of the study. Empirical studies on how agricultural programmes and projects have influenced the development of the dairy sub sector, particularly milk marketing were discussed. It also explored theoretical framework and conceptual framework to identify the concepts and variables in the study and showed how they are connected.

2.2 Smallholder Dairy

Nyangaga, J.,Staal, S.,and Muriuki,H. (2001) defined smallholder dairying as a form of small-scale farming systems where dairy animals (cattle, buffalo, camel and goats) play a central role as a source of milk, income and critical inputs for agricultural production (such as draught power and fertilising manure). Smallholding dairy producers are farmers who depend greatly upon milk and other dairy products for their livelihoods. Dairying is a biologically efficient system which converts large quantities of inedible roughage to milk. It is to a certain extent a more efficient and intensive system, in terms of nutrients and protein production for human consumption from a given area or quantity of feed, than beef or sheep farming. Milk production is more efficient than beef production when the nutritional potential of the feed resource base is high and therefore capable of supporting high levels of production.

Livestock contribute to the sustainable livelihoods and security of more than 800 million poor smallholders as Natural Capital (meat, milk, wool, hide, rangeland, and pasture); as Financial Capital (cash, saving, credit, insurance, gifts, remittance); and as Social Capital (traditions, wealth, prestige, identity, respect, friendship, marriage dowry, festivity, human

capital). Livestock offer poor households sources of high quality nutrition, especially as sources for the pregnant women and for improving the cognitive skills and mental growth of the children (IFAD, 2010).

Dairying is a centuries-old tradition for millions of Indian rural households; domesticated animals have been an integral part of the farming systems from time immemorial. India has the largest cattle and buffalo population in the World (Rajendran & Mohanty, 2004). More than 68 percent of dairy animals are owned by marginal and smallholder farmers. Milk contributes more to the national economy than any other farm commodity—more than 10.5 billion dollars in 1994-95 (Rajendran & Mohanty, 2004). More importantly, the farmers earn an average 27.3 percent of their income from dairying, with as high as 53 percent for landless and as low as 19 percent for the large farmers. Annual milk production in India has more than tripled in the last three decades, rising from 21 million tons in 1968 to an anticipated 100 million metric tons in 2004 (Rajendran & Mohanty, 2004). This rapid growth and modernization is largely credited to the government initiative known as Operation Flood (OF) Project (1970-1996), assisted by many multi-lateral agencies including the European Union, the World Bank, Food and Agriculture Organization (FAO), and World Food Program (WFP). In that initiative, rural milk sheds areas were linked to urban markets through development of a network of village cooperatives for procuring and marketing milk.

As Conolly (1998) and Omore (1999) have documented, market-oriented dairy farming with exotic cattle in Kenya started almost a century ago when European settlers introduced dairy cattle breeds from their native countries. Most of these settlers occupied the most agriculturally productive highland areas of Rift Valley and Central Provinces. Cross-bred dairy cattle production by Africans started after 1954 when a colonial policy paper, the Swynnerton Plan of 1954, allowed them to engage in commercial agriculture. After independence in 1963, many foreign settlers who opted to leave the country sold their farms to Africans or to the government. Many of these farms were rapidly sold to African smallholders resulting in a decline of the dairy cattle population in large-scale farms to 250,000 heads by 1965 and a rapidly expanding smallholder herd (Thorpe, Muriuki, Owango and Staal 2000)

The Kenyan dairy sector is made up of more than 600,000 smallholder dairy farms scattered around the country. These farmers account for 56% of the total milk production and 70% of the total marketed milk in the country (Omore, Muriuki, Kinyanjui, Owango and Staal

1999). Furthermore, livestock diversify production; provide year-round employment and spread of risk. Any factor that could lower or increase expenses is a source of risk to the economic performance of the dairy business (Bailey 2001). Some of these risks are: milk prices, purchased feed prices, hired labour, crop /forage production among others. Dairy production in Kenya is faced by a multitude of perceived and often experienced risks, which contribute to high costs of production and low average productivity (Muriuki, Kinyanjui, Owango and Staal 2003). These factors cause low profit to the producer and price fluctuations for the consumer

IFAD, an international financial institution and specialized UN has financed programmes geared toward livestock sector particularly dairy development. Since starting operations in 1974, IFAD has provided some US\$ 738M for livestock development activities. The primary beneficiaries are poor livestock farmers, particularly those who are economically or socially at risk and politically marginalized (IFAD, 2010). Activities related to livestock development such as the transfer of technology, training, credit for restocking, animal health service delivery, feed and breed improvement and best husbandry practice are considered core aspect of the majority of IFAD programmes and projects.

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To build broad local ownership of the programmes it sponsors, IFAD works in partnership with others - borrowing-country governments, poor rural people and their organizations, and other donor agencies. Its focus on local development has given it a role in bridging the gap between multilateral and bilateral donors on the one side, and civil society represented by NGOs and community-based organizations (CBOs) on the other. Extensive partnerships and global engagement enable IFAD to strengthen its catalytic role. Through careful monitoring and evaluation of the impact of its projects, the Fund identifies successful innovations for possible replication and cross-regional fertilization.

In Pakistan, IFAD funded Punjab Smallholder Dairy Development Project with the overall objective of raising milk production among the beneficiaries, thereby increasing the availability of milk products for home consumption and improving household income through greater milk sales. The project enhanced milk marketing through the establishment of a system of village milk collectors (VMCs) who supplied milk to collection centres linked to existing milk processing plants, assuring smallholders of a market for their products. The project provided about 78 km of farm-to-market roads, which helped to link remote areas with high milk

production potential to organized marketing channels. Livestock feed research resulted in improvements in cropping patterns, hybrid seed and grass varieties and fodder practices (IFAD 2010)

In Kenya, IFAD is funding the dairy subsector through the Smallholder Dairy Commercialization Programme (SDCP). The programme goal is to increase the income of the poor rural households that depend substantially on production and trade of dairy products for their livelihood in the nine programme districts (counties) of Nakuru, Nyamira, Bomet, Central Kisii, Uasin-Gishu, Lugari, Nandi North, Trans Nzoia and Bungoma. The Programme has been developed through a process of dialogue between the GOK and IFAD, originating with the approval of IFAD's first Country Strategic Opportunities Paper (COSOP) for the country in 2002. The financing agreement for the IFAD loan and grant to support the Programme was negotiated in November 2005 and approved by the Fund's Executive Board in December 2005. The Programme commenced in July 2006 with a completion date of 30th September 2015 (IFAD 2006)

2.2.1 Level of Funding and Milk Marketing

Available statistics indicated that in the first decade after Independence (1965-75) on average Kenya spent over 10 percent of its total government budget on agriculture (including livestock, fisheries and cooperatives). Since then there has been a dramatic decline in expenditure to an average of 7.5 percent over the period 1980 - 1989 and to just 3 percent in the 1990 - 2000 period. More recently agriculture spending has varied between 3.0 and 4.0 percent of total government expenditure and at around 0.7 - 0.8 percent of total GDP, or about 3 percent of agricultural GDP. This level of agriculture spending is low even by sub-Saharan Africa standards (Akroyds & Smith, 2007)

In their case-studies, Akroyds & Smith (2007), suggest that the contraction of funding to agriculture over the past two decades is derived from a combination of factors. These include changes in aid modalities involving a trend towards budget support (the budget process does not favour agriculture), and an increasing perception that the problems in agriculture can be addressed through other sectors (transport, infrastructure etc). Where donors continue to engage in agriculture, donor funds typically account for a major share of the sector budget, but disbursement rates can be below expectations and unpredictable. An ideological shift away from state intervention in the economy - structural adjustment, the liberalization of agricultural

parastatals, the adoption of market-led approaches and the reduction in subsidies has reduced the 'space' for public sector expenditures on agriculture.

Yunus, (1999) noted that only 10% to 25% of donor funds reach the beneficiaries. The bulk of the money is used on feasibility studies, appraisal mission, administration, monitoring, evaluation and reporting. He further said, "While it is undeniable that in some cases funds used for institution building have been helpful, the bulk of the funds have not been used in a cost-effective way in terms of meeting the credit needs of the poor". He advocated for donor agencies to raise the amount supporting the poor to at least 70% of the total fund.

In their study of the World Bank funded agricultural projects in Nigeria, Echeme & Nwachukwo, (2010) concluded that project funding is a limiting factor to successful delivery of Fadama II projects. Timely and sufficient injection of funds is critical for proper project implementation. They noted that most times Fadama experience late and insufficient supply of fund from the donor and recipient communities.

Akroyds & Smith (2007), noted that there is a general problem that expenditure data are not well recorded and this is especially true for donor funding which is known to be high in the agricultural sector (typically two-thirds of core funding) but for which actual expenditures are not properly recorded, if at all. They further suspected that a significant share of donor spending remains off-budget, despite improved central public finance management systems and an increasing requirement that donor contributions are included within the budget.

This study attempted to determine the SDCP budget allocation against actual expenditure in Borabu. It further tried to trace how much money coming from the Programme went to support milk marketing in Borabu. The time and rate of fund disbursement were also investigated.

2.2.2 Capacity Building and Milk marketing

Capacity building is a conceptual approach referring to strengthening the skills, competencies and ability of people and communities in developing societies to overcome their exclusion and suffering (Wikipedia, 2012). The United Nations Development Programme (UNDP) defines capacity building as a long term continual process of development that involves all the stakeholders (UNDP, 2011). It further noted that capacity building on an individual level requires the development of conditions that allow individual participants to acquire and enhance

knowledge and skills. It calls for establishment of conditions that will allow individuals to engage in the process of learning and adapting to change.

Cole, (1996) observes that the scope of training and development activities as in most other activities depends on the policy and strategies of the organization. Some organizations only carry out minimum staff training and development because, as a matter of policy, they prefer to recruit staff that are already trained or professionally qualified. Such organizations are prepared to pay for and benefit from what they do not put into training and development. Majority of organizations, however, do have a positive policy on training and development.

Singh (1999) further observes that training is needed because of the gaps in knowledge and gaps in technology information. Gaps about information include inadequate knowledge about professional management, current development and overall future orientation. Gaps in skills are concerned with the efficiency in handling a certain task with as much deftness as possible. Gaps in attitude deals with high bureaucratic attitudes, lack of open mind, and assumption of a "know it all attitude". Finally there are gaps in performance which focuses on the ambiguity in job related activities due to lack of accountability and deficiencies in the feedback system such as differences between the individual and organizational goals. Such differences are narrowed down through training.

There are several benefits of training and performance. Cole (1997) observes that benefits of training include high performance since training helps to improve quality and quantity of work output. On the other hand, a systematic training programme helps to reduce the time lost and time required in reaching the acceptable level of performance. At the same time, it creates uniformity of procedures. Informal training and best methods of performing work can be standardized for work procedure practices to help to improve the quality of performance. It also leads to economy of materials and equipment. Trained individuals make better workers and economize the use of materials and equipment. Wastage of materials and tools is reduced. Training also lessens supervision and greatly reduces the need for constant and close supervision workers. Dairy farming is a technical field that needs qualified extension officers to simplify the technical jargons for the farmers to understand them.

Slater and Narver (1995) underscore the importance of fine grained research that examines individual and group market driven learning processes. In this regard, social learning theory (Bandura, 1977) proposes two types of individual learning: reinforcement learning and vicarious learning. On the one hand, people learn from the consequences of their behavior (i.e., reinforcement); thus, they are likely to increase (decrease) the frequency of behavior that has resulted in positive (negative) consequences. This is also referred to as experiential learning (Huber 1996). On the other hand, people can engage in vicarious learning by observing others before engaging in a particular behavior because doing so enables them to avoid needless and costly errors (Bandura, 1977).

Information is required at all levels in the marketing channel. Before you decided to process and market any dairy product, it is important to know the potential market for each particular product (Kotler et al, 2009). This is important to enable the producers to know which types and when, where and how much of each product to produce and market. It is very crucial because unless goods can be supplied in the right form, place and times, consumers may not be able to buy (Kotler et al, 2009). This then requires securing and utilizing market information.

Echeme & Nwachukwo (2010) concluded that the level of capacity building have positive impact on the implementation of Fadama II projects. They recommended that Fadama should build up the capacity of their project support teams/ officials and beneficiaries by training and re-training them in relevant areas such as procurement and project management.

There is a need to improve the capacity of milk producers and trades to understand and deal with milk marketing increasing their awareness of global changes. In addition, training in agro ecological technologies and practices for the production and conservation of fodder improves the supply of animal feed and reduces malnutrition and mortality in herds. The survival of individual dairy producers and traders will very much depend on how successfully they can win consumer confidence in their products. This calls for knowledge and skills in marketing techniques. In the absence of comprehensive marketing information system such as is the case in many developing countries it may be necessary for each individual farmer or through their organization to organize the gathering and dissemination of such information. Short market survey and/or Consumer studies are useful tool for gathering such information (Kotler et al,

2009). The current study focused on the extent of SDCP capacity building and how it has influenced milk marketing in Borabu.

2.2.3 Adoption of New Technologies and Milk Marketing

Various authors define the term "technology" in a variety of ways. Rogers (1995) uses the words 'technology' and 'innovation' synonymously and defines technology as the design for instrumental action that reduces the uncertainty in the cause-effect relationship involved in achieving a desired outcome.

Perhaps a clearer definition of the term 'technology' can be obtained from the work by Enos and Park (1988), who, in their study of adoption of imported technology, define technology as "the general knowledge or information that permits some tasks to be accomplished, some service rendered, or some products manufactured" . Bonabana-Wabbi (2002) explain that it is the actual application of that knowledge that would be termed 'technology'. Although in the Enos and Park (1988) study, the focus was nonagricultural, this definition fits agricultural technologies too. From their definition, it is clear that technology is aimed at easing work of the entity to which it applies. In this study, a technology, as it relates to smallholder dairying, is a set of new practices integrated into a dairy production package that aims to assist smallholder farmer to produce milk more efficiently and effective than the conventional methods.

Adoption is an outcome of a decision to accept a given innovation. Feder, Just and Zilberman (1985) while quoting Roger's earlier work of 1962 define adoption as "a mental process an individual passes from first hearing about an innovation to final utilization". Usually, a technological innovation encompasses at least some degree of benefit for its potential adopters (Rogers, 1995). Several stages precede adoption. Awareness of a need is generally perceived as a first step in adoption process (Rogers, 1995). The other stages are: Interest, Evaluation, Acceptance, Trial, and finally, Adoption (Bonabana-Wabbi, 2002). The Lionberger analysis notes that these stages occur as a continuous sequence of events, actions and influences that intervene between initial knowledge about an idea, product or practice, and the actual adoption of it. However, not all decisions involve a clear-cut sequence.

According to Bonabana-Wabbi (2002), the dynamic process of adoption involves learning about a technology over time. In fact many innovations require a lengthy period often of many years from the time they become available to the time they are widely adopted (Bonabana-Wabbi, 2002; Rogers, 1995; Enos and Park, 1988).

The rate of adoption is usually measured by the length of time required for certain percentage of members of a system to adopt an innovation. Extent of adoption on the other hand is measured from the number of technologies being adopted and the number of producers adopting them.

Depending on the technology being investigated, various parameters may be employed to measure adoption. Measurements also depend on whether they are qualitative or quantitative. For instance in the study investigating the adoption of improved seed and fertilizer in Tanzania, Nkonya, Schroeder and Norman (1997) estimated the intensity of adoption by examining the area planted to improved seed and the area receiving fertilizer. For another study that investigated the adoption of use of single-ox technology, pesticide and fertilizer use, the dependent variable was the number of farmers using pesticide and fertilizer (Kebede, Gunjal and Coffin, 1990).

There are many possible sources of information about the new technology (Rogers, 1995). A farmer may learn from his or her own experimentation with the technology. Advice and technical information may be available from the extension service or the media. If there are many farmers in somewhat similar circumstances, then the process of learning about the new technology may be social. Farmers may learn about the characteristics of the new technology from their neighbor's experiments. In a study carried out in Ghana by Conley & Udry (1998), concluded that farmers learning occurs through social networks rather than in the context of the collective experiment.

Various models about the relationship between market orientation and innovation have been proposed (Verhees, 2007). Atuahene-Gima (1996) examined the impact of market orientation on innovation characteristics using Ruekert's measure for market orientation. Many studies that focus on factors discriminating between successful and unsuccessful innovations conclude that market orientation is one of the main contributing factors to innovation success (Verhees, 2007).

Most empirical studies using econometric models often relate the adoption decision to households and technological characteristics. Numerous studies have found that constraints imposed by these factors have discouraged technology adoption (Umali and Schwartz 1994; Nicholson et al 1999). These factors influence the awareness, availability, costs, benefits and

risks associated with the different livestock technologies and management practices (Benin et al 2003).

Therefore, understanding the factors affecting the farmers' adoption of various milk productions and marketing technologies is critical to success implementation of programs in liberalized dairy industry. Little work has been done to examine the adoption of new technologies influences milk marketing in Borabu District, the objective of this study.

2.2.4 Participation of Grass-Root Institutions and Milk Marketing

Grass-root institutions, also referred as community groups, are organizations whose membership is drawn predominantly from the local community (IFAD, 2006). The term does not in itself define the legal status of a particular group and may take any of a number of legal forms. Grass-root institutions may be registered as self-help groups, societies or associations. For the purpose of this study, the focus will be on self-help groups and cooperative societies which will be in here referred as "Dairy Groups".

The reasons for the establishment of grass-root institutions are related to local self-help initiatives for addressing common rural challenges, such as poverty and food security. A major argument in this line of thought is that these institutions provide a governance structure with implicit cost-savings and risk-sharing devices. Collective action is commonly supposed to assist smallholders' engagement in markets, contributing to improvements in rural economies.

Classic cooperative literature argues that the potential advantages of cooperative farming in generating economies of scale and scope give rise to higher production volumes and improved bargaining power vis-a-vis the market (Benin, Pender and Ehui, 2003). In the United States of America (USA), dairy cooperatives, as a group, represent the most prominent of all agricultural marketing co-operative sectors. Co-operative milk and dairy product sales represented 42 percent of total commodity marketing by all U.S. agricultural cooperatives in 2007 (Deville, Jacqueline, Penn and Eldon, 2009). Dairy cooperatives account for a majority of milk sold in the United States, especially at the first-handler level and in the manufacture of "hard" dairy products (butter, cheese and milk powders). In 2007, there were 155 dairy cooperatives in the USA owned by 49,675 member-producers, or 84 percent of the nation's licensed dairy farms. They delivered 152.5 billion pounds of milk, or 83 percent of all milk marketed (Ling, 2009). Thus cooperatives have afforded dairy farmers the organizational size that is necessary for exercising countervailing

power to effectively bargain and deal with milk buyers and other market participants.

In India, Operation Flood, launched in 1970, introduced co-operatives into the dairy sector with the objectives of increasing milk production, augmenting rural income, and providing fair prices for consumers. There are 22 state federations in India, with 170 district-level unions, more than 76,000 village-level cooperative societies, and 11 million milk-producer members in the different states. These co-operatives collect an average of 15 million liters of milk each day. Fresh liquid milk, packed and branded, is marketed in over 1000 cities and towns in India by these co-operatives; annual sales turnover exceeds 1.6 billion US\$(Rajendran & Mohanty, 2004). Dairy cooperative influenced positively the adoption of milk marketing through the dairy cooperative channel. Therefore, farmers marketing their milk through the cooperative were likely to be more knowledgeable than other farmers using other market channels. The dairy cooperatives thus were not only marketing channels, but also a significant source of other market information for farmers particularly with regard to concentrates, veterinary clinical drugs, and artificial insemination services and forage seeds. Consequently, they determined in many ways what breed of cattle should farmers keep and type of concentrates to feed in response to market demand. Cooperatives can thus unwittingly contribute to the failure or success of dairy industry.

In Kenya, a study carried out by Owango, Staal, Kenyanjui, Lukuyu and Thorpe (1998) found that between 1990 and 1995, the share of cooperative milk sales going to dairy processors fell by more than half in some cases. The market policy change caused dairy cooperatives to pursue the higher prices in the informal market. As a consequence, the same study showed that real milk prices paid to producers by the co-operatives rose significantly during 1990-1995 (Owango, Staal, Kenyanjui, Lukuyu and Thorpe 1998). In the more competitive and uncertain market post-liberalization, both individual producers and dairy farmer cooperatives have better opportunities for higher milk prices, but also face greater risks due to the uncertainties of relying on informal traders. As a consequence, more recent research has indicated that milk suppliers are returning to traditional outlets (the cooperatives and dairy processors) as the costs and risks of dealing with informal intermediaries are found to be too high (Morton, Coulter, Miheso and Tallontire, 1999).

Self-help groups are a relatively recent addition to the sorts of groups which exist in the health/welfare/social services areas. Their origin can be traced to the setting up of groups like Alcoholics Anonymous, Disabled Motorists and the Combined Pensioners Association in USA

(Akonga, 1989). Self-help groups are easy to set up and register, making them attractive to local communities. They are closely knit by cultural, religious and social ties, thus the commitment of the group remain personal to the individual members of the group. Members of self-help groups share a common condition or life circumstances, thus work together to overcome the difficulties they experience.

In their study, Echeme & Nwachukwo (2010) found out that community sensitization and participation of farmers' organizations have a positive effect on the implementation of Fadama II development projects. Adequate orientation and participation of the benefiting communities are needed for successful implementation of rural projects. Unfortunately, this was not sufficient in some Fadama intervention communities, hence resulting to misunderstanding between Fadama officials, farmers' organizations and Town Union members (Echeme & Nwachukwo, 2010).

Membership to farmers associations and saving societies has helped farmers to participate in trainings and agricultural events, which have formed a major source of knowledge and skills applied in the farm (Mburu et al, 2007). Because dairy groups are organizations of farmers, they have the comparative advantages of working closely with members for assembling milk, providing field services and performing farm-related functions. It is these advantages that accord them the predominant market share at the first handler level.

SDCP is promoting participatory and bottom-up approaches to dairy development by building strong grass-roots institutions and investing in dairy groups' empowerment. As such, this study looked at the SDCP contribution to empowerment of smallholder farmers through promoting grass-roots institution development that would provide them greater access to markets and better prices.

2.2.5 Creation of Linkages with Private Sector and Milk Marketing

Creation of linkages is partnership strategy between producers and other actors along the product value chain. It involves collaboration among producers, input suppliers, traders, processors and buyers (KIT, Faida Mali and IIRR, 2006). The partnership strategy is based on shared interests and mutual growth by all actors in the product value chain. By linking up with buyers, smallholder farmers can increase their business security and expand the enterprise. They want to collaborate with an attractive business partner to gain access to markets and get better prices for their producer. Smallholder producers have limited access to market information,

funding and production expertise to match product quality requirement in the market. To overcome these obstacles smallholder farmers need to partner with other actors along the product value chain. The key areas of partnership include procurement of farm inputs, transportation, micro-financing and processing.

In Uganda, small scale sorghum farmers partnered with SABMiller (South Africa Breweries) in the production of a new beer, Eagle Lager. The company has engaged over 800,000 small scale farmers in the transfer of agricultural knowledge and business skills as well as identification of new markets (Jenkins, et al, 2007). In their study, Jenkins et al (2007) showed that participating farmers in the Eagle Lager value chain raised their income by 50 percent while the beer achieved a market share of 50 percent in Uganda and 15 percent in Zambia. In Tanzania, a NGO Faida Mali linked sunflower farmers to a private company (Hai investment) based in Arusha. The farmers were organized into groups to benefit from economies of scale and market their produce collectively in partnership with Hai Investment. They were also facilitated to access short term loans to increase their production. This intervention resulted in reliable markets and high prices for sunflower producers as well as creating jobs for the local community (KIT, Faida Mali and IIRR, 2006).

In West Pokot, beekeepers partnered with Honey Care Africa (private company) in the production, processing and marketing of honey. This linkage increased farmers influence in the marketing of honey by attracting more discerning customers and negotiate for better prices (KIT, Faida Mali and IIRR, 2006).

Development experience in Kenya suggests that if smallholder dairy development action is to contribute to economic growth and poverty-reduction, then an approach based primarily upon the market and private sector agency will most likely provide the most effective, efficient and sustainable results and impact (IFAD, 2006). In Kenya, IFAD engagement of private sector is mainly focusing in supporting small firms that can provide agro-processing services for value addition (IFAD, 2011). This will however require greater investment in building partnership with multilateral development banks and other donors as well as engage the Government in policy dialogue. Other challenges experienced in creating linkages are securing commitment from the private sector and managing expectations from the community (Jenkins, et al, 2007). Investment by private sector in low-income communities can generate very high expectations, particularly employment and business opportunity creation. Business linkage programmes are long term

efforts requiring 5-15 years to achieve impact. Investment of money, time, expertise, technology and considerable personal persistence by key stakeholders are needed along the way.

SDCP priority partnership areas included collaboration in expanding existing milk collection routes in the programme area, reducing milk production costs, new product development and linking farmers to financial institutions. It was against this backdrop the study investigated the contribution of the various practitioners in the private sector participating in the implementation of the programme and their influence in milk marketing in Borabu.

2.2.6 Government policy and milk marketing

In India, planned development of the dairy sector started with the launch of the first five-year plan in 1951. Policies and programs under the first three five-year plans (1951-66) were inadequate to influence milk production and milk output continued to be stagnant (3 million tonnes, from 17 to 20 million tonnes). By the end of the third five-year plan the inadequacies were apparent and the government made a serious policy reorientation to engineer sustained increases in milk production. The plan "holiday" between the third and fourth plans (1966-69) saw some of the most momentous policy initiatives by the government in the livestock sector, particularly for dairy development. Development of rural milk sheds through milk producers' co-operatives and movement of processed milk to urban demand centers became the cornerstone of government policy. This single policy-making epoch in the late 1960s galvanized the Indian dairy industry, moving it into a growth path unprecedented in recent history in any country. This policy found institutionalization in the National Dairy Development Board (NDDB) and was translated into action by the Operation Flood Project and the nation-wide milk co-operative network promoted under the Project for marketing the rurally produced milk.

In Uganda, the government commissioned a comprehensive review of the sector in 1991, following a severe decline in the performance of the dairy sector in the 1970s and 1980s. A Dairy Master Plan was developed in 1993, in which a number of recommendations aimed at reviving the sector were made. In accordance with the Dairy Master Plan, the Government then liberalized the dairy industry in 1993. Five years later, parliament enacted the Dairy Industry Act of 1998, which provided the legal framework for the establishment of a body to regulate the liberalized dairy industry (Elepu, 2007).

In Kenya, government provision of livestock services began during the colonial area with the focus on providing artificial insemination and veterinary services for settlers. Artificial

insemination began in 1935, with the objective of reducing the need to import breeding stock. The milk parastatal, the Kenya Cooperative Creameries (KCC), began operation in 1925 but had no African members until shortly before independence in 1962. Africans were barred from owning grade dairy cattle, as they were barred from growing coffee, ostensibly to control the spread of disease. As with coffee, some Africans violated the law and began to keep high-quality cattle anyway.

Kenyan Government developed a new Dairy Development Policy in 2006 with the objective of correcting previous government policies which were unsupportive of small-scale farmers, traders and consumers who constituted a large proportion of the market. The new dairy policy now openly acknowledges the role of informal milk markets in the development of the sector and will help to legitimize small-scale milk traders, subject to them being trained and certified in milk hygiene. The role of government should be to direct, coordinate, and regulate the activities of various organizations engaged in dairy development; to establish and maintain a level playing field for all stakeholders; and to create and maintain a congenial socio-economic, institutional, and political environment for smallholder dairy development.

2.2.7 Climate and Milk Marketing

While climate change is a global phenomenon, its negative impacts are more severely felt by poor people in developing countries who rely heavily on the natural resource base for their livelihoods. Rural poor communities rely greatly for their survival on agriculture and livestock keeping that are amongst the most climate-sensitive economic sectors.

The African continent is subject to drought and food insecurity. Even before climate change issues became evident, serious concerns had been raised about agriculture in Africa, which has the slowest rate of productivity increase in the world (Seo and Mendelsohn, 2006).

The direct effects of climate change will include, for example, higher temperatures and changing rainfall patterns, which could translate into the increased spread of existing vector-borne diseases and macro parasites, accompanied by the emergence and circulation of new diseases. In some areas, climate change could also generate new transmission models.

Water scarcity is increasing at an accelerated pace and affects between 1 and 2 billion people (IFAD, 2009). Climate change will have a substantial effect on global water availability in the future. Not only will this affect livestock drinking water sources, but it will also have a bearing on livestock feed production systems and pasture yield.

As climate changes and becomes more variable, niches for different species alter. This may modify animal diets and compromise the ability of smallholders to manage feed deficits. Changes in the primary productivity of crops, forage and rangeland

Rising temperatures increase lignifications of plant tissues and thus reduce the digestibility and the rates of degradation of plant species. The resultant reduction in livestock production may have an effect on the food security and incomes of smallholders. Interactions between primary productivity and quality of grasslands will require modifications in the management of grazing systems to attain production objectives.

Livestock keeping will be a safety valve for smallholder farmers if warming or drought causes their crops to fail.

2.3 Milk Marketing

Marketing may be defined as "the performance of all business activities involved in the flow of goods and services from the producer to the consumer"(Kotler et al, 2009). This implies that there are several categories of key players in the marketing chain each with its own vested interests. Consumers want to get what they need at the lowest price possible. Producers on the other hand are interested in getting the highest possible return for their milk. Between them, there are market intermediaries or middlemen who perform various marketing functions such as transportation or retailing. Their interest is to make the highest profit possible from their particular business operation.

Delgado, Rosegrant, Steinfeld, Ehui and Courbois (1999) have estimated that between 1993 and 2020, the annual demand for milk and dairy products in developing countries will more than double, from 168 to 391 million tonnes. Driven by population growth, urbanisation and increased purchasing power, the estimated annual growth in the consumption of milk and dairy products is 3.3%. These market opportunities represent exciting challenges for all associated with smallholder agriculture in eastern Africa, and in Kenya particularly, and its continued intensification through dairy production and marketing. If these market opportunities for milk are to be exploited by Kenyan smallholders in the way that they have during the last 40 years, it will require the continued expansion of Kenya's population of specialised dairy cattle and increased levels of inputs (nutrition and health care) matched to good market linkages for milk sales and input acquisition. Along with favourable agro ecology, these market factors will play the major role on smallholder dairy

development in Kenya.

India transformed its milk production and marketing due to Government initiative known as Operation Flood (1970-1996). The project linked dairy producers to urban markets through the development of rural milk sheds. Development of rural milk sheds through milk producers' co-operatives and movement of processed milk to urban demand centers became the cornerstone of the dairy sector (Rajendran & Mohanty, 2004). Until 2002, cooperatives traditionally were the dominant players in the formal milk marketing. However with liberalization of the dairy industry, private investment has increased significantly, with 70-85% of marketable milk going through informal channels (Rajendran & Mohanty, 2004).

In Uganda, of the total milk produced annually, it is estimated that only 70% of it is marketed and the other 30% is consumed on the farm. There are two marketing channels for milk: informal and formal marketing channels. The informal milk market trade accounts for about 80% of the total milk trade in Uganda today (Elepu, 2007). The key players in this channel are mobile traders/hawkers, transporters, and milk bars. The trade in unprocessed milk has had a tremendous impact in mopping surplus milk from dairy farmers and hence, it provides an important source of income to many people (traders and farmers).

Milk marketing in Kenya is characterized by instability and competition. In the late 1980s, milk sales were mainly through local dairy co-operative societies, with some to neighbours. However, following market liberalization in 1992, marketing channels have diversified. It is estimated that approximately 85-90% of marketed milk is not processed or packaged, but instead is bought by the consumer in raw form (Thorpe et al, 2000). Marketing liberalization aimed at improving efficiency in resource allocation by facilitating more or less automatic price adjustments in response to market competition through the forces of supply and demand. The rationale is that market competition, over time, should lead to stability in production and consumption. The result is thus expected to be beneficial to the society as a whole.

Until recently the dairy industry in Kenya was characterized by one major processor, the Kenya Co-operative Creameries (KCC). Before liberalization of the dairy industry in 1992, KCC enjoyed a near monopoly of the Kenya Dairy market. With the emergence of numerous small scales to medium scale dairy processors, the market has become more competitive. In this competitive market, KCC is facing a challenge from the new manufacturers while the new manufactures have to compete first against a well established and large processor like KCC and

secondly between themselves for a slice of the same market: the Kenya consumer.

Even given the extensive formal marketing network in Kenya (KCC; private processors; dairy co-operatives), estimates (Omoro, 1999) show that currently approximately 85-90% of marketed milk is not processed or packaged, but instead is bought by the consumer in raw form. The factors driving the continued importance of the informal market are traditional preferences for fresh raw milk, which is boiled before consumption, and unwillingness to pay the costs of processing and packaging. By avoiding pasteurizing and packaging costs, raw milk markets offer both higher prices to producers and lower prices to consumers. Recent surveys in the Kenyan highlands consistently show some 15% higher farm-gate prices and 25-50% lower retail prices through the raw milk market compared to the formal packed milk market (Owango, 1998). As a consequence, the largest single market outlet for smallholder farmers, comprising over half the marketed milk, consists of direct sales of raw milk from producer to consumer, typically through farmer delivery to nearby households. Other important players in the informal market are small milk traders, who handle about a third of marketed milk, and who deliver milk to consumers or other retail outlets. In the more formal market, dairy farmer cooperatives are the largest players, while private dairy processors are thought to capture only some 12%.

2.3.1 The milk marketing channel

A study of the milk marketing system in Kenya has shown that there are at least 8 different marketing channels as shown in Table 2.1.

Table 2.1: Milk marketing channels.

Milk marketing channels	Number of intermediaries
Producer-consumer	0
Producer-milk hawker-consumer	1
Producer-processor-consumer	1
Producer-processor-retailer-consumer	2

Producer-dairy cooperative-processor-retailer-consumer	3
Producer-milk transporter-processor-retailer-consumer	3
Producer-milk trader-processor-retailer-consumer	3
Producer-dairy coop-milk transporter-processor-retailer-consumer	4

Source; *Technoserve, 1995. Mala Manual*

The number of intermediaries involved will have a bearing on both producer and consumer milk prices. The shorter the channel the more likely that the consumer prices will be low and the producer will get a higher return. From the consumer point of view, the shorter the marketing chain, the more likely is the retail price going to be low and affordable. This explains why, following the liberalization of the dairy industry, direct sales of raw milk from producers to consumers (channel 1) or through hawkers (channel 2) has been on the increase despite the public health risks associated with the consumption of untreated milk and milk products. Milk producers may not necessarily benefit from a short marketing chain i.e. milk processors in channels 5 - 6 may be paying farmers the same price as hawkers. However, farmers sometimes prefer selling milk to hawkers because other factors such as prompt payments and inaccessibility to formal market outlets such as producer co-operatives or lack of nearby milk processing factory. The biggest disadvantage of direct milk sales to consumers by hawkers is the total lack of quality control and the frequent rate of adulteration of milk with (dirty) water, which is illegal. An efficient milk marketing chain is one which enables farmers to receive at least 50% of the retail price of milk (Technoserve, 1995/

2.3.2 Marketing and Pricing of Milk and Milk Products

The price of a product in the market is an important factor influencing consumer demand. Hence to be marketable, a dairy product must be competitively priced. This implies that the costs involved in raw material procurement, processing, packaging, storage, marketing and distribution must be kept as low as possible. Overpricing can lead to uncompetitiveness of the product while under pricing can cause financial loss and eventual collapse of the business. In order to arrive at a realistic costing of a product, all those elements involved at each stage must be carefully calculated on a unit basis. This is known as Cost Accounting (Kotler, Keller, Koshy & Jaha, 2009).

Milk prices and payment to farmers is one of the most sensitive issues in the Kenyan dairy

sub-sector due to the reported occurrence of low or non-payment of milk suppliers. With milk supply exceeding demand during wet season (flush period), producers prices drop below or close to production costs. The Programme intervention is to reduce the production costs in dairy farming by increasing the financial viability of the smallholder farmers along the value chain, from production to post-harvest economic activities. The reduction in production costs per litre of milk will be a very important result of the Programme, as high production costs are often cited as one of the major factors hindering the competitiveness of the smallholder dairy sub-sector in Kenya (Republic of Kenya, SDCP 2006).

2.4 Empirical Studies

In the last decade, there has been an increased interest in conducting impact evaluations of development projects, including agricultural projects, with pressure to do so coming from two quarters. First, economists have increasingly emphasized the use of randomised trials to better understand economic theory and to determine the effectiveness of development assistance (Duflo and Kremer, 2005). Economists seem to agree on the value of carefully collecting data to evaluate the impact of development projects and on the importance of using appropriately constructed datasets and empirical approaches to identify impact. Second, the development community has increasingly emphasised the need to evaluate the impact of development projects both for accountability purposes as well as learning lessons for policy making (Duflo and Kremer, 2005). Various studies have been carried out on dairy production in many parts of the world. Scholarly works have been documented on how agricultural programmes and projects have influenced the development of the dairy sub sector, particularly milk marketing.

Rajendran and Mohanty (2004) carried out a study to examine the existing status of milk marketing in India and analyze the constraints and opportunities in milk marketing. Operation Flood and its effects on milk marketing, particularly through dairy co-operatives were studied. The study reviewed the existing status of milk marketing and dairy co-operatives in India and provided recommendations to meet future challenges. The results of the study indicated that 80 percent of the milk produced by the rural producer was handled by an unorganized sector and the remaining 20 percent was handled by an organized sector. It is found that the dairy co-operatives play a vital role in alleviating rural poverty by augmenting rural milk production and marketing.

Involvement of intermediaries; lack of bargaining power by the producers; and lack of infrastructure facilities for collection, storage, transportation, and processing were the major constraints which affected the prices received by producers in milk marketing. Milk quality, product development, infrastructure support development, and global marketing were found to be future challenges of India's milk marketing.

Echeme, I. and Nwachukwu, C. (2010) carried out an investigation on the impact of FADAMA II project implementation in Imo State, Nigeria. Data for the study were collected from primary and secondary sources. Questionnaire was designed based on Likert's five point scales, such that respondents could indicate how strongly they agree or disagree with each of the statements. Regression Analysis was employed in the investigation to determine the level of relationship between the dependent variable - successful implementation of FADAMA II development project objectives and the five independent variables; project funding, local government support, community sensitization/support, depressed economic environment, capacity building. Regression Analysis of collected data revealed that FADAMA II projects and similar projects obtained a correlation coefficient (R) of 45.5% between successful implementation of development project and the 5 variables of project implementation. These variables explained a percentage of coefficients of determination (R²) of 20.7% of the total variation in project implementation objectives among FADAMA II. The F-test of the hypotheses confirmed that the variables are significantly related to, and have significant effect on success level of project implementation. The study revealed that the success level of Fadama II project delivery was 38.4%. In view of these findings, the study recommended timely and adequate funding; consistent government and community support, improved economic environment and enhance the capacity of FADAMA User Groups (FUGs) and FADAMA officials needed to implement FADAMA III rural development projects.

Francesconi, G and Ruben, R. (2007), carried out study on Impacts of Collective Action on Smallholders' Commercialisation: Evidence from Dairy in Ethiopia. The study aimed at bringing some empirical evidence on the impacts of collective action on smallholders' commercialisation. A unique set of bio-economic data was collected in 2003 and 2006, comprising information from 50 cooperative farmers and 50 individual farmers located within the same milk-shed in proximity of Addis Ababa. This dataset allowed comparing commercial performance of individual and cooperative dairy farmers, across 2003 and 2006. The empirical

findings obtained with an adapted difference in difference analysis suggested that dairy cooperative farmers outperform the otherwise similar individual producers in terms of quantitative performance (market access, herd size and productivity), but also that cooperatives had an overall negative impact on milk quality (fat and protein content) and safety (bacteria contamination) at the farm gate. Finally, between 2003 and 2006, cooperatives showed horizontal expansion (increased number of cooperative members and herds size), but coop-members appeared incapable to either upgrade or intensify their farming systems.

In Uganda, Bonabana-Wabbi (2002), Assessed Factors Affecting Adoption of Agricultural Technologies. The Case of Integrated Pest Management (IPM) in Kumi District, Eastern Uganda. The study analyzed adoption of eight IPM technologies on cowpea, sorghum and groundnuts. Low levels of adoption (<25%) were found with five of these technologies while three technologies had high adoption levels (>75%). Results indicated that farmers' participation in on-farm trial demonstrations, accessing agricultural knowledge through researchers, and prior participation in pest training were associated with increased adoption of most IPM practices. Size of farmer's land holdings did not affect IPM adoption suggesting that IPM technologies were mostly scale neutral, implying that IPM dissemination may take place regardless of farmer's scale of operation. Farmers' perception of harmful effects of chemicals did not influence farmers' decisions in regard to IPM technology adoption despite their high knowledge of this issue, suggesting that these farmers did not consider environmental and health impacts important factors when choosing farming practices. Farmers' managerial capabilities were not important in explaining cowpea IPM technology adoption.

Mburu, L M Wakhungu, J W and Gitu, K W (2007), investigated the Determinants of smallholder dairy farmers' adoption of various milk marketing channels in Kenya highlands. Understanding the factors affecting smallholder dairy farmers' adoption of various milk marketing channels was essential to implementation of dairy marketing liberalization policies in Kenya Highlands. Purposive multi stage using Probability Proportion to Size sampling design across different agro-ecological zones in Kenya highlands was used to evaluate the rationale underlying smallholders' milk marketing channel choice using Econometric Logit Models. Logit models of milk marketing channels through itinerant traders (hawkers, neighbors and hotels) were non-significant ($P > 0.05$) but dairy cooperative was significant ($P < 0.05$). Eleven explanatory variables were significant ($P < 0.05$) in explaining farmers' adoption of milk

marketing through the dairy cooperative channel. Leases land, average milk price, total number of cow milked and farm acreage negatively influenced farmers' adoption of milk marketing through the dairy cooperative channel. Upper midlands, lower highlands, hired permanent labour, household head worked off-farm, average milk production per cow (kg / day), dairy cooperative as a source of animal production information, and availability of credit services had positive influence. They recommended that farmers should be encouraged to undertake additional activities which stabilize household incomes to enable them adopt dairy technologies without exposing them to additional risk e.g. off-farm activities facilitate adoption of dairy technologies by the risk oversee farmers. Programs to improve and strengthen cooperatives can contribute to the development of dairy industry and substantially contribute to alleviating poverty.

2.5 Theoretical Framework

This study was modeled on Market-Oriented theory which is one of the economic growth theories traced back to Adam Smith's publication on *Wealth of Nations* in 1776 (Dwivedi, 1985). He argued that an economic system is operated by "invisible hands" of the market forces of demand and supply, that in free competitive market, right commodities will be produced in right quantities and price of each commodity would be equal to its cost. Adam Smith argues the market oriented economy maintains integrity because someone will provide whatever is needed. As demand increases for a product, the potential to make profit will increase. The potential of earning profit will encourage someone to produce those commodities that are in demand. Thus competition acts as an economic regulator. Competition not only regulates the supply of desirable commodities, it also ensures that prices remain fair and product quality remains high.

Market oriented economy is organized so that firms, prices and production are controlled naturally by the law of demand and supply rather by government. Supply and demand is an economic model which states that in a competitive market, the unit price for a particular good will vary until it settles at a point where the quantity demanded by consumers (at current price) will equal the quantity supplied by producers (at current price), resulting in an economic equilibrium of price and quantity (Dwivedi, 1985).

Draaijer and Boer, (1995) while advancing market oriented theory argued that the best economic outcomes result when individuals are free to make their own economic decision,

uninhibited by any form of government constraint. Constraints might include efforts by Third world governments to set prices and wages.

Market orientation theory as advanced by Narver and Slater (1990) cannot suffice because of its emphasis on the organizational culture that is most suited in studying firms. According to Narver and Slater (1990), market orientation consists of three behavioural components, customer orientation, competitor orientation, and interfunctional coordination, and two decision criteria, long-term focus and profitability. It provides strong norms for learning from customers and competitors, which is instrumental in creating superior value for buyers, innovating successfully, and generating superior firm performance (Lam et al, 2010).

The only meaningful way to study an agricultural enterprise (including dairy farming) is to regard it as an economic system whereby there is interaction between supply and demand in a free market economy.

As Omore, (1999) have documented, market-oriented dairy farming with exotic cattle in Kenya started almost a century ago when European settlers introduced dairy cattle breeds from their native countries. Underpinning these production responses are strong local demand for milk (rural communities and neighbouring urban populations) and effective market mechanisms, which link smallholder producers to local and distant markets (Omore, 1999). The liberalization of milk marketing in 1992 (Dairy Development Policy, 1993), which effectively ended KCC's monopoly in milk marketing, stimulated increased small-scale trading in fresh milk (Owango, 1998). Its major impact has been increase of the overall social and economic benefits of market-oriented dairying to smallholder producers, market agents and consumers in Kenya.

The Programme implementation approach is based on the model of a Market Oriented Dairy Enterprise (MODE), which is envisaged to promote the gradual movement of Programme beneficiaries to increasingly access more benefits from their milk and dairy products. The approach is characterized by a stepwise movement towards being a successful enterprise or business entity which is primarily concerned with milk or dairy products. The model emphasizes the value of collective action and market oriented decision-making by beneficiaries for the viability and sustainability of their dairy enterprises.

However, in adopting the market oriented theory for this study, the researcher has taken into account its shortcomings. In the market oriented theory, the quantity demanded and the quantity supplied is a function of the price of the good. In reality, the price may be distorted by

other factors, such as tax and other government regulations. The assumption that in free competitive market, right commodities will be produced in right quantities and price of each commodity would be equal to its cost will only be applicable in an efficient milk marketing channel.

2.6 Conceptual Framework

A conceptual framework is a scheme of concepts or variables which the researcher will operationalize in order to achieve set objectives (Oso & Onen, 2008). It is a visual picture to illustrate the relationship between the independent, extraneous and dependent variables. It allows the researcher to identify the concepts and variables in the study and shows diagrammatically how they are connected (Amin, 2005). This study was guided by the conceptual framework described in Figure 2.1 below.

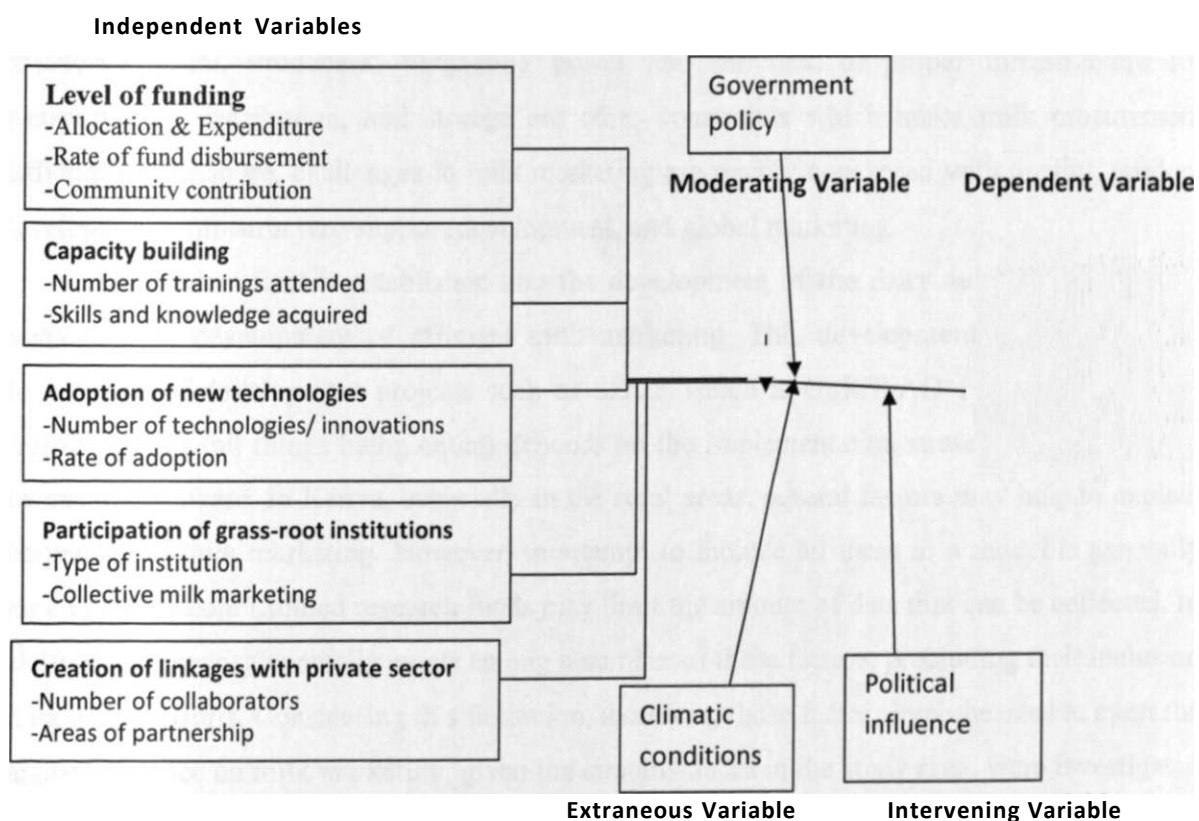


Figure 2.2. The Conceptual Framework

The variables in the study included the dependent variable which in this case was milk marketing in Borabu district, Nyamira County. The determinants were hypothesized as level of

project funding, capacity building of farmers / implementing staff, adoption of new technologies by farmers, participation of grass-root institutions and creation of linkages with the private sector. The study assumed that with adequate project funding and capacity building of farmers /staff, if there was accelerated adoption of new technologies in dairy production, if there was active participation of grass-root institutions in project activities and creation of strong linkages with the private sector then there would be improved milk marketing hence expanded opportunities for market-oriented dairy activities. However, this relationship could be influenced by government policies, political factors, and climatic conditions.

2.7 Summary of Literature Reviewed

From the review of literature, it was clear that there exist gaps in linking smallholder dairy farmers to market for them to access more benefits from their milk and dairy products. In other words, bridging the gap between the producer and the consumer can increase the producer's share. Producers' bargaining power and the lack of proper infrastructure for transportation, distribution, and storage are other constraints which make milk procurement difficult. Furthermore, challenges in milk marketing are mainly concerned with quality, product development, infrastructure-support development, and global marketing.

The review further established that the development of the dairy sub-sector is largely predicated on development of efficient milk marketing. This development can be achieved through use of development projects such as SDCP which is GoK/IFAD funded programme. Project success (all things being equal) depends on the implementation strategy adopted during the execution phase. In Kenya, especially in the rural areas, several factors may help to explain the pattern of milk marketing. However, to attempt to include all these in a model is generally not a viable option. Limited research funds may limit the amount of data that can be collected. In addition, co linearity generally exists among a number of these factors, precluding their inclusion in modeling efforts. Considering this limitation, therefore, those factors hypothesized to exert the largest influence on milk marketing, given the circumstances in the study area, were investigated in the analyses. As discussed above, they include, level of funding, capacity building, adoption of new technologies, participation of grass-root institutions and creation of linkages with private sector.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter described the methodology that was used in conducting the study. This included description of the research design, the study area, target population, sample size and sampling procedures, the research instruments, validity and reliability of the instruments, data collection procedures and data analysis techniques.

3.2 Research Design

This study was conducted through descriptive survey research design. This is a present oriented methodology used to investigate populations by selecting samples to analyze and discover occurrences (Oso & Onen, 2008). The descriptive survey design was most suitable because of its ability to elicit a wide range of baseline information about the relationships between SDCP and milk marketing. The design enabled the study to describe the influence of the Programme on milk marketing without having to manipulate variables as in experimental research. Being a social research, it was difficult to put farmers and traders in a laboratory. Further, against the backdrop of time and financial constraints, the survey design reduced operational costs and enabled rapid data collection, as studying the entire target population would have been expensive. But it was the absence of manipulation that made the choice of the survey design ideal.

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3.3 Target Population

The study targeted Borabu District in Nyamira County. Borabu District is divided into 3 administrative divisions namely, Borabu, Esise and Kiangeni. The target population comprised the entire Households/farmers in Borabu District. The total human population of Borabu District was 73,426 with about 11,616 farm holding scattered over an area of 248.2 square kilometres with a population density of 296 persons per square kilometre (KNBS, 2009). The population of farmers was arrived at on the basis of the fact that every household keeps at least an animal and are therefore farmers.

The study further targeted Programme implementing officers in the lead ministries of Livestock Development and Co-operatives Development, and private service providers in dairy sub-sector in Borabu District.

3.4 Sample Size and Sampling Procedures

The sample size for this study was 206 respondents from the programme beneficiaries who were sampled from the 9 sub locations of the District using both probability and non-probability sampling methods. Fisher et al in Mugenda and Mugenda (1999) noted that in social science research, the following formula could be used to arrive at the right sample size:

$$n = \frac{Z^2 p q}{d^2}$$

Where;

n= Desired sample size (if the target population is greater than 10,000)

Z= the standard normal deviate at the required confidence level

p= the proportion in the target population estimated to have characteristics being measured

q= 1-p

d= the level of statistical significance set

The estimates available for the proportion in the target population to have characteristics of interest (farmers), was 11,616 farm holding of the total population 73,426 (KNBS 2009 Census). Therefore, p= 0.16

Therefore, taking a statistical significance (Z) of 1.96 at 0.05 confidence level, the sample size for this study was;

$$n = \frac{1.96^2 (0.16) (0.84)}{(0.05)^2}$$

n= 206

A simple random sampling method was used to pick on five sub locations in the District. The choice of the number of sub locations to be studied was guided by Gay (1987) assertion that a sample of 10% to 30% was good enough to make inference. The study further used snowball sampling technique to select the respondents in the five sub locations. Snowball technique is usually employed to locate individuals who are difficult or impossible to locate by other means (Kathuri & Pals, 1993; Oso & Onen, 2008). This strategy takes advantage of social networks and the fact that people with similar characteristics tend to know one another. Farmers who have participated in SDCP are therefore in a position to know others like them. The researcher identified in collaboration with local leaders, few farmers who were SDCP beneficiaries in the sampled sub locations within the district. Once such individual(s) were identified, the researcher engaged them in locating other farmers like them. This process continued until the desired sample of 206 farmers was attained. The study further sourced for the requisite information from programme implementing staff.

This target population was chosen because the whole District is classified as Dairy/Pyrethrum Zone (Farm Management Handbook of Kenya) exhibiting characteristics of smallholder farmers. The population uniqueness was able to provide an understanding on how SDCP has influenced dairy farming particularly milk marketing in the district.

3.5 Research Instruments

The study used both quantitative and qualitative data from primary and secondary sources. Questionnaires were used for collecting data and other information relevant to the study. The selection of these tools was guided by the nature of the study, the time available as well as the objectives of the study. The research was mainly concerned with views, opinions, perceptions, feelings and attitudes. Such information is best collected through the use of questionnaire and interview techniques (Bell, 1998).

Questionnaires are the most suitable tool for survey research (Oso & Onen, 2008). A questionnaire is a self-report instrument used for gathering information about variables of interest in an investigation (Cochran, 1977). Further, the study collected data on views, attitudes, opinions and perceptions of farmers on SDCP, such issues are best collected through questionnaires. The sample size in the study was also quite large (206) and considering time and

other resource constraints, questionnaires were the best tool. Oso and Onen (2008) concur with Cochran, (1977) that questionnaires are ideal for large samples.

Secondary data was obtained through documents analysis to obtain data on trend of fund disbursement. Records of disbursed SCDP funds to the district between the year 2007 and 2012 were reviewed. Further review was done on available records of farmers projects financed through SDCP.

3.5.1 Piloting of the Study

The instruments were piloted in Nyamira District which is also implementing SDCP. During piloting, the instruments were modified to improve their validity and reliability coefficients to at least 0.70. Items with validity and reliability coefficients of at least 0.70 are accepted as valid and reliable in research (Kathuri & Pals, 1993)

3.5.2 Validity of Instrument

Validity is the extent to which the results of a study can be accurately interpreted and generalized to other populations (Cohen, 1988). It is the extent to which research instruments measure what they are intended to measure (Oso & Onen, 2005). Validity was ensured through use of two experts. The questionnaires and interview guides were given to two experts on project to evaluate the relevance of each item in the instruments to the objectives. The experts rated each item on the scale: very Good (4), Good (3), Poor (2) and very Poor (1). Validity index was determined from the assessors agreement scale using Content Validity Index (C.V.I). $C.V.I = \frac{\text{Items rated 3 or 4 by both judges}}{\text{total number of items in the instrument}}$ (Oso & Onen, 2005). The instruments were modified until a validity index of 0.70 was attained. An index of 0.70 is the "least accepted value of validity in research" (Amin, 2005, p. 288; Oso & Onen, 2008, p. 90). This means that out of any ten items in the instruments, at least seven items must accurately measure what they are supposed to measure.

3.5.3 Reliability of Instrument

Reliability is the extent to which research results are consistent and replicable (Amin, 2005; Kothari, 1990). This was established by the use of internal consistency technique by spit-half reliability. The instruments were administered to a convenient sample of 30 respondents. Thirty is the least accepted sample size in correlation studies (Kathuri & Pals, 1993). The responses (items) were then divided into two comparable halves- odd and even numbers. The

two sets of scores were correlated using Spearman-Brown Prophecy correction formula which is given by.

$$r = \frac{2r'}{1 + r'^2}$$

Where

r'_{xx} = the correlation between the two halves

r_{xx} = split-half reliability coefficient

3.6 Data Collection Procedures

The process of data collection took about 14 working days. During this period two sets of instruments were administered to the appropriate respondents. Survey questionnaires were administered to respondents in the sampled sub locations. Document analysis was carried out in the District office of livestock Production by the researcher. Document analysis was done by the researcher while questionnaire to the general respondents were done by five research assistants who were trained on data collection techniques and ethical concerns in research and supervised by a qualified statistician. The researcher oversaw the whole process; made spot checks to ensure conformity to set standards and guidelines by the five member team of research assistants headed by a qualified statistician.

3.7 Data Analysis Techniques

According to Bryman and Cramer (1997), data analysis seeks to fulfill research objectives and provide answers to the research questions. The choice of analysis procedures depended on how well the techniques are suited to the study objectives and scale of measurement of the variable in question. The study applied both qualitative and quantitative approaches to process, analyse and interpret the data.

Quantitative data processing and analysis began with field editing to minimize errors. This was done by a field supervisor. This was followed by coding the open-ended data, entry, cleaning, transformation, analysis and interpretation. The Statistical Package for Social Sciences (SPSS) was applied to run descriptive analysis to produce frequency distribution, percentages, charts and tables. Under the SPSS package, multiple regression analysis technique was used to identify real determinants of the milk marketing and the strength of each determinant.

Multiple regression dealt with several predictor variables on a criterion variable and took the general model of $Y' = a_0 + p_1X_1 + p_2X_2 + p_3X_3 + \dots + p_nX_n + e$; where Y' is the estimated value of milk marketing; a_0 is the regression constant; p_i is the un-standardized regression coefficients; and e is error, t statistic was calculated to determine significant predictors. A value of t less than 2 in magnitude in the regression model always indicates a non significant predictor (Amin, 2005; Cohen, 1988). The study determined whether all hypothesized factors of SDCP were significant determinants of milk marketing or not by testing subsidiary null hypotheses on p_i ($H_0: p_i = 0$; $H_a: p_i \neq 0$) using t values. The hypothesis was tested at 0.05 level of significance. This is the most popular significant test in most studies.

For the qualitative data processing and analysis, the content analysis technique was undertaken as an activity simultaneous with data collection. According to Best *et al*, (2004) the major challenge of qualitative data analysis is to make sense of massive amounts of data, reduce the volume of information, identify significant matter and construct a framework for communicating the existence of what the data reveals. Based on this realization, information obtained through qualitative methods was processed and analyzed following three steps.

First data was organized in key thematic areas in line with the objectives of the study. Secondly data was summarized into daily briefs. Finally the briefs were expanded to incorporate additional insights from observations made in the field. Thereafter a systematic analysis and interpretation was undertaken and synthesized to form interim report.

3.8 Ethical Considerations

The major ethical issues of concern of the study were informed consent of the respondents and confidentiality of information given. The respondents might have felt that the information given may be used against them, or might be passed to some other parties without their consent. Once the respondents were identified, their informed consent was sort before administering the questionnaires. Above all, the study ensured that information provided by each and every respondent was privileged and not to be passed to third parties. And to avoid individual exposure, the study reported data as a pool instead of individual data.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION, INTERPRETATION AND DISCUSSION

4.1 Introduction

This chapter presents the findings of the study that have been analyzed and discussed under five themes. It focuses on socio-demographic attributes of the respondents and the influence of level of funding, capacity building, adoption of new technologies, participation of grass-root institutions and creation of linkages with private sector on milk marketing in Borabu District.

4.2 Response Return Rate

Data was collected from all the sampled 206 Questionnaires were given out, 189 were returned giving a response rate of 91.7%. The high return rate was attributable to the snowball sampling technique where the researcher was led to farmers who have participated in SDCP. Most respondents were requested to fill the Questionnaires as the Research Assistants waited and this ensured a good return rate.

4.3 Socio-Demographic Attributes of the Respondents

Demographic information was collected on the gender, level of education, block, and age of the respondents. Demographic data was intended to enable the researcher describe the distribution of farmers along major demographic variables for a fuller explanation of the factors influencing milk marketing. The results of the analyses were further discussed in the following subsections.

4.3.1 Distribution of Respondents by Age and Gender

The respondents were asked to indicate their ages and gender. Since farming is mainly manual in Borabu, age and gender are crucial factors in determining the agricultural output. The responses were summarized in Table 4.1.

Table 4.1: Distribution of Respondents by Age and Gender

Age (years)	Gender		Gender		Total	Percent
	Male	Percent	Females	Percent		
Less than 25	0	0	0	0	0	0
25-34	5	2.6	2	1.1	7	3.7
35-44	21	11.1	14	7.4	35	18.5
45-54	32	16.9	20	10.6	52	27.5
55 or more	56	29.6	29	15.3	85	45.0
Total	114	60.3	75	39.7	189	100.0

Table 4.1 shows that majority of the farmers 85(45.0%) were aged over 55 years which is outside the most productive age of 35 - 44 years. The fact that there are very few farmers 7(3.7%) aged below 35 years means that the community has not taken dairy farming very seriously as the youth are not involved. This means that as the old generation ages out, there are no new farmers to take over and this may hamper the growth of dairy production in the district. Freeman et al (1998) linked age to productivity and argued that the most productive age is between 35-45 years old. It can be assumed that this age bracket should also participate actively in developmental programmes such as SDCP since they are ambitious and want to be achievers.

The table further indicated that majority of the respondents 114 (60.3%) were males with only 75 (39.7%) being females. The fact that there were more males than females in the study was expected because it is men who own most of the properties in the Kisii community due to cultural belief. The females were therefore not expected to own as many animals or land as Men. Gender issues in agricultural production and technology adoption have been investigated for a long time. Most show mixed evidence regarding the different roles men and women play in technology adoption. In the most recent studies, Doss and Morris (2001) in their study on factors influencing improved maize technology adoption in Ghana, showed insignificant effects of

gender on adoption. It is therefore expected that should gender be related to influence of SDCP on milk marketing, then this would also be reflected among dairy farmers in Borabu district, as there are more male farmers than females involved in cattle farming. As Northouse (2004) pointed out, man tends to inherently resist new technologies or ideas and this reflects directly on this finding.

4.3.2 Respondents by Marital Status

On the demographic factor of marital status, the respondents were asked to state their marital status. The responses were as indicated in Table 4.2.

Table 4.2: Marital status of respondents

Status	Number of Respondents	Percent
Single	5	2.6
Married	140	70.1
Divorced	2	1.1
Widowed	39	20.6
Separated	3	1.6
Others	0	0.0
Total	189	100.0

Table 4.2 shows that most farmers 140 (70.1%) are married and that a substantial number 39 (20.6%) are widowed. This can be attributed by the age distribution of the respondents, which indicated that majority of farmers are aged over 45 years in Borabu. The marital status of individuals has impact on participation on community development programmes. Some societies tend to discriminate against widows and single mothers due to inherited cultural beliefs. These exiting conditions make it difficult for the vulnerable groups to substantially participate in

SDCP. This information is necessary in targeting Programme beneficiaries and mainstreaming the vulnerable groups in the grass-root institutions to enhance milk marketing.

4.3.3 Distribution of Respondents by Level of Education

On the demographic factors of the level of education, the respondents were asked to state their highest levels of education because education is known to influence understanding and hence upgrading of innovations. The responses were as indicated in Table 4.3.

Table 4.3: Distribution of Respondents by Level of Education

Level of Education	Number of Farmers	Percent
None	4	2.1
Primary	33	17.5
Secondary	73	38.6
Tertiary	79	41.8
Total	189	100.0

Table 4.3 shows that most farmers 79 (41.8%) have tertiary level education and that only 4 (2.1%) have no education at all. In total, over 97% of all farmers have attained at least primary level of formal education. This should make understanding of the concept of dairy farming and milk marketing easier if the right methods capacity building and technology transfer are used. Education is a key factor in dairy farming and milk marketing. Literacy levels are expected to be high in the District since Borabu is a settlement scheme where the elite of Kisii Community bought land from the white settlers. In the final analysis, it can be said that the farmers in Borabu District have the relevant basic education to enable them to absorb the basic ideas about SDCP and milk marketing.

In his study, Amollo (2005) asserts that the role of education in innovation and uptake of new knowledge is very critical. According to Singh (1999), the higher the level of education, the faster the adoption of new technologies. Generally education is thought to create a favorable

mental attitude for the acceptance of new practices especially of information-intensive and management-intensive practices (Bonabana-Wabbi, 2002). What is more, adoption literature (Rogers 1995) indicates that technology complexity has a negative effect on adoption. However, education is thought to reduce the amount of complexity perceived in a technology thereby increasing a technology's adoption. But on average, there were more highly educated farmers than the lowly educated ones. The relatively high participation in capacity building and adoption of technologies of SDCP in Borabu District can be explained by this observation.

4.3.4 Land acreage by Farmers in Borabu District

The respondents were asked to indicate the farm size in acres. The responses obtained were summarized in Table 4.4.

Table 4.4: Land acreage by Farmers in Borabu District

Acres	Number of Farmers	Percent
Less 5	36	19.0
5- 10	68	36.0
10-15	27	14.3
15-20	24	12.7
20 -30	16	8.5
30-40	10	5.3
>50	3	1.6

Table 4.4 indicates that 36 (19.0%) of the respondents owned less than 5 acres of land with majority 68(36.0%) owning between 5-10 acres. Only 3 (1.6%) respondents owned more than 50 acres of land. The land size held by individuals greatly influenced the type of pasture grown and the technologies adopted for dairy production. Land of less than 10 acres will call for

intensive dairying (zero grazing) while land holding of more than 20 acres permits extensive grazing.

Land size affects adoption costs, risk perceptions, human capital, credit constraints, labor requirements, tenure arrangements and more. With small farms, it has been argued that large fixed costs become a constraint to technology adoption (Bonabana-Wabbi, 2002) especially if the technology requires a substantial amount of initial set-up cost, so-called "lumpy technology."

Furthermore, access to funds (bank loan) is expected to increase the probability of adoption of technologies and creation of linkages with micro financing institutions. Yet to be eligible for a loan, the size of operation of the borrower is crucial. Farmers operating larger farms tend to have greater financial resources and chances of receiving credit are higher than those of smaller farms.

4.3.5 Number of Cattle by Farmers in Borabu District

The respondents were asked to indicate the number of cattle they keep. The responses obtained were summarized in Table 4.5.

Table 4.5: Number of Cattle by Farmers in Borabu District

Number of Cattle	Number of Farmers	Percent
1	0	0
2	19	10.1
3	32	16.9
4	36	19.0
5	57	30.2
6	28	14.8
>7	17	9.0

Table 4.6 indicates that majority 93(49.2%) of the respondents owned 4-5 cattle. 17 (9.0%) respondents owned more than 7 animals. There were no farmers who owned one animal. The number of animals held by individuals was greatly influenced by land ownerships since a majority of the farmers have adequate land for intensive dairying.

Traditionally, the more animals one owned, the higher the respect he commanded in society as he was regarded as being wealthy. However, in terms of small scale dairying, large herd numbers of the local breed reflected non-commercialization of dairy farming.

4.3.6 Farmers knowledge of SDCP

On farmers' knowledge of SDCP, the respondents were asked to state whether they have heard of SDCP and when. The responses were as indicated in Table 4.6.

Table 4.6: Farmers' knowledge of SDCP

Sublocation	None	Period			Total
		2007-2008	2009-2010	2011-2012	
Isoge/ Kineni	0(0.0%)	23(12.2%)	17(9.0%)	6(3.2%)	46(24.3%)
Nyansiongo/ Gesima	0(0.0%)	27(14.3%)	14(7.4%)	3(1.6%)	44(23.3%)
Mogusii	0(0.0%)	13(6.9%)	12(6.3%)	5(2.6%)	30(15.9%)
Mwongori	0(0.0%)	15(7.9%)	10(5.3%)	6(3.2%)	31(16.4%)
Matutu	0(0.0%)	18(9.5%)	13(6.9%)	7(3.7%)	38(20.1%)
Total	0(0.0%)	96(50.8%)	66(34.9%)	27(14.3%)	189(100.0%)

Table 4.6 shows that majority of farmers 96 (**50.8%**) heard SDCP in the period of 2007-2008 when the Programme was initiated in Borabu. The significance of this is that 2007/08 financial year marked the beginning of SDCP activities which enlisted a lot of interest and high

expectations from farmers. All the respondents had heard of SDCP, these being attributed to the snowball technique used in sampling.

Further analyses of responses by sub locations showed that more farmers from Nyansiongo/Gesima, 27(14.3%) knew SDCP immediately it was started, with the least being Mogusii, 13(6.9%) which is the furthest from District offices where the Programme is coordinated from. Majority of farmers 102 (53.4%) with knowledge of SDCP got to hear of it from workshops/trainings organized by Livestock Production. The significance of this source of information is that it forms the best channel to communicate matters of dairy development to the community. This single most accessed source was followed by public barazas 30(15.8%) and word of mouth by other farmers 27(14.3%).

4.4 Level of Funding and Milk marketing

After presenting the demographic data, the study then focussed on the main themes which were drawn from the objectives of the study. The first objective of the study was to examine the extent to which the level of funding influences milk marketing. Level of funding was characterized by the trends of fund disbursement, cost sharing by farmers, and the adequacy of project funding. The analyses of the responses were summarized in the subsections as follows:

4.4.1 Trend of SDCP funding between 2007 and 2011

Key informants were asked to provide records on fund allocation and disbursement held in the District Livestock Production Office Nyamira since 2007/08 to 2010/11. Records produced showed that the amount of money disbursed has progressively been on the upward trend in the County as shown in Figure 4.7.

Table 4.7: SDCP funds allocation and disbursement

	Financial year			
	2007/08	2008/09	2009/10	2010/2011
Budget Kshs	4,636,749	5,361,300	10,695,155	12,700,165
Disbursement	2,925,727	3,355,367	7,320,800	8,125,300
Percent	63.1	62.5	68.5	63.9

Table 4.7 indicated there has been great disparity between amount budgeted and disbursement with an average of 64.5%. This implies that annually some project activities are not accomplished due to inadequate funding. This has a direct bearing on milk marketing since SDCP is milk commercialization project.

For projects to be fully implemented, they must be adequately budgeted for and funded. Failed projects throw a nation backward through different ways and these include; the financial loss of the failed projects, the loss of the alternative projects, the mortgaging of future development of the nation through the servicing of the debts used in funding the failed project from sources other than internally generated revenue (Echeme, I. and Nwachukwu, C. 2010).

4.4.2 Community Contribution

On farmers' cost sharing of SDCP activities, the respondents were asked to state whether they have cost-shared. The responses were as indicated in Table 4.8.

Table 4.8: Cost-sharing in SDCP activities

Response	Cost-shared			Total
	Yes	No	Don't know	
Frequency	131	50	8	189
Percent	69.3	29.5	4.2	100.0

From Table 4.8: majority of farmers 131 (69.3%) cost-shared in SDCP activities. This is significant as it enhances community ownership and project sustainability. In their study, Echeme, I. and Nwachukwu, C. (2010) found out that FADAMA communities' low contribution by beneficiaries due to poverty in rural areas delayed the prompt release of project funds. This also delayed the project implementation because prompt release of project funds fosters project implementation.

4.4.3 Views of Farmers on Level of Funding

On the level of funding, the respondents were asked to give their opinion on the adequacy of SDCP funding. The responses were as indicated in Table 4.9.

Table 4.9: Views of Farmers on level of funding

Responses	Not adequate	Fairly adequate	Adequate	More than adequate	Don't know	Total
Frequency	28	97	61	3	0	189
Percent	14.8	51.3	32.3	1.6	0.0	100.0

The information in Figure 4.9 indicates that most farmers (51.3%) viewed SDCP level of funding as fairly adequate. This supports the finding of table 4.7 on SDCP budget and allocation. This view on funding should correlate directly with milk marketing. If this argument is sustained, it can be deduced that there is inadequate funding in SDCP which affects milk marketing.

4.4.4 The Relationship between level of funding and milk marketing

To establish a statistical relationship between level funding and milk marketing, the responses obtained on attitude were compared against a standard scale developed by the researcher. The responses were ranked according to the Likert scale to determine the opinion of each respondent on level of project funding. The responses were rated such that those respondents who ranked 70-100% were considered as adequate or good funding for milk marketing, 50-69% as fair or moderate funding and below 50% as inadequate or funding. The milk marketing of each respondent was also determined from computing the number of correct responses against a standard checklist under milk production and marketing. The average rate of milk marketing for each farmer was compared against the status of his or her opinion on funding to determine if there a statistical relationship between SDCP level of funding and milk marketing. The results of the analysis are summarized in Table 4.10.

Table 4.11: Relationship between level of funding and milk marketing

Level of funding	No. Farmers	Milk marketing	Standard Deviation
Good	61	66.32	18.35
Moderate	84	64.82	19.32
Poor	44	60.91	17.06
Total	189	64.39	18.52

According to the information in Table 4.10, adequate funding influenced milk marketing by 66.32%, while moderate and poor funding influenced by 64.82% and 60.92% respectively. From these results, it can be deduced that there is a statistical relationship between SDCP level of funding and milk marketing. It can be said therefore SDCP level of funding is a determinant of milk marketing among dairy farmers in Borabu District and that the more the funding of SDCP activities undertaken by the farmers the better the milk marketing. But, to confirm these results, it was necessary to carry out a regression analysis and test hypothesis one.

Hypothesis 1 (Ho 1)

Level of funding was hypothesised as a significant determinant of milk marketing in Borabu District. A subsidiary null hypothesis was tested at 0.05 level of significance. As Amin, (2005) and Cohen, (1998) state, *t* statistic was calculated to determine significant predictors. They further indicate that a *t* value of less than 2 in magnitude in the regression model indicates a non significant predictor.

From the analysis, it can be deduced that level of funding could be a determinant of milk marketing in Borabu District. A null hypothesis that "There is no significant relationship between levels of funding and milk marketing in Borabu District, Nyamira County " was tested at 0.05 level of significance.

The data in Table 4.10 was subjected to a regression analysis to test that the hypothesis that "level of funding has not influenced milk marketing in Borabu District" and determine if the

relationship depicted in Table 4.11 is statistically significant. The results of the regression analysis are summarized in Table 4.11.

Table 4.11: Summary of Regression Analysis on level of funding and milk marketing

Variable	R	R ²	R ² adj.	Std. Est.	B	Std. E	p	t	F	a
Level of funding	.566	.320	.316	1182	20.60	135	.000	-6.75	56.20	.000
Constant								20.09	43.57	.050

The results indicated in Table 4.11 confirm the results in Table 4.10 and supports the research hypothesis as the absolute t value in Table 4.11 is greater than 2; F value (56.20) is greater than the critical value (F_c) of 43.57, and the α (.000) value is less than the critical alpha (α_c) of 0.05. The hypothesis that level of funding has no significant influence on milk marketing in Borabu District was therefore rejected. It was therefore established that level of funding has a significant effect on milk marketing among dairy farmers in Borabu district. This implies that SDCP funding levels, direct beneficiary support, and cost-sharing by farmers (community contribution) influences the degree of milk marketing among dairy farmers in Borabu District.

The R and R adj values of 0.566 and 0.316 respectively in Table 4.11 are measures of the strength of the dependence. The R²adj implies that level of funding accounts for 31.6% of the variance in milk marketing, other factors notwithstanding. From the B values and the constant indicated in Table 4.11, a general regression equation for the relationship between level of funding and milk marketing can be written as $MM = 83.62 - 20.06LF$; where MM is milk marketing and LF is level of funding. Thus level of funding alone accounts for 31.6% of milk marketing by SDCP farmers in Borabu district. This finding supports the findings of Echeme, I. and Nwachukwu, C. (2010) on the impact of FADAMA II project implementation in Imo State, Nigeria. The study revealed that the success level of Fadama II project delivery was 38.4% was dependant on timely and adequate funding. From this standpoint, it means that adequate SDCP level of funding can achieve a maximum project success of only 68.4%. Thus there is need for adequate and timely release of funds, coupled with community contribution to achieve the desired level of milk marketing in Borabu District.

4.5 Capacity Building and Milk marketing

Capacity building was assessed by the farmers' source of agricultural information, number of trainings, demonstrations, tours and farm visits facilitated by SDCP to the dairy farmers. The analyses of the responses were summarized in the subsections as follows:

4.5.1 Farmers' Sources of Agricultural Information

The respondents were also asked to indicate their main source of Agricultural information related to dairy farming. This was necessary to estimate the extent and scope of livestock extension activities. The responses were summarized in Table 4.12.

Table 4.12: Access of Agricultural information

Sources	Number of Farmers	Percentage
Radio	32	16.9
Newspapers/Bulletins	13	6.9
Neighbours/Friends	49	25.9
Extension Staff/Researchers	75	39.7
NGO/Private Service Providers	16	8.5
Others	4	2.1
Total	189	100.0%

From table 4.12 the majority of the respondents 75(39.7%) received information through extension staff, 49(25.9%) received information through neighbours/ friends, 32(16.9%) through radio and only 16(8.5%) thorough private service providers. It can be deduced from these data that the most popular method used by the extension officers is home visits. However whereas this method could be effective because it involves face to face interaction, it is nevertheless slow as the officers can only meet one farmer at a time. The use of radio which has not been exploited could be more effective in reaching a large number of people in a short time.

Acquisition of information about a new technology demystifies it and makes it more available to farmers. Information reduces the uncertainty about a technology's performance hence may change individual's assessment from purely subjective to objective over time (Caswell, 2001).

4.5.2 Farmers' participation on SDCP trainings/demonstrations

Respondents were asked whether they had been involved in trainings, demonstrations, and tours funded by SDCP. The responses were summarized in Table 4.13.

Table 4.13: Farmers' participation on SDCP trainings/demonstrations

Responses	Very frequently	Frequently	Rarely	Never	Not sure	Total
Frequency	63	84	32	8	2	189
Percent	33.3	44.4	16.9	4.2	1.1	100.0

Table 4.13 indicates that majority of the respondents 84 (44.4%) participated frequently in SDCP capacity building activities. In overall analysis, 147(77.7%) participated fully with only 40(20.4) participated rarely. From this analysis, it can be deduced that farmers easily access and actively participate in SDCP capacity building programmes.

Good extension programs and contacts with farmers are a key aspect in small scale dairy farming especially technology dissemination and adoption. Most studies analyzing this variable in the context of agricultural technology show its strong positive influence on adoption. In fact Bonabana-Wabbi (2022) show that its influence can counter balance the negative effect of lack of years of formal education in the overall decision to adopt some technologies.

4.5.3 The Relationship between capacity building and milk marketing

For further analysis of the relationship between capacity building and milk marketing, the responses obtained were compared against a standard scale and ranked according to the Likert

scale to determine the capacity building of each farmer using a standard response schedule. The milk marketing level of each respondent was also determined from computing the number of correct responses against a standard checklist under milk marketing. The average rates of milk marketing by respondents were compared against the status of capacity building to determine if there was any relationship. The results of the analysis were summarized in Table 4.14.

Table 4.14: Relationship between capacity building and milk marketing

Capacity building	No. Of farmers	Milk marketing (%)	Standard Deviation
Good	66	76.18	20.65
Moderate	67	64.70	16.18
Poor	36	40.36	19.59
	189	64.39	18.52

Table 4.14 shows that the rate of milk marketing among farmers with good (skills) capacity building (76.18) was higher than the rates milk marketing among farmers with moderate (64.70) or poor (40.36) skills. This suggested that there was a relationship between the level of capacity building of farmers and Milk marketing among dairy farmers in Borabu District, such that the higher the capacity building, the better the marketing of milk. From these results, it could be deduced that capacity building was a determinant of milk marketing among dairy farmers in Borabu District.

Hypothesis 2: (Ho 2):

To determine whether capacity building was a significant factor in milk marketing, a regression analysis was done and a subsidiary null hypothesis tested at 0.05 level of significance, t statistic was also run to determine significant predictors. Amin, (2005) and Cohen, (1998) assert that a *t* value of less than 2 in magnitude in the regression model indicates a non significant predictor.

From table 4.14, it could be deduced that awareness was a determinant of cattle upgrading technology. To proof the deduction, the null hypothesis that "there is no significant relationship between capacity building and milk marketing in Borabu District, Nyamira County" was tested at .05 level of significance.

The data in fable 4.14 was further subjected to a regression analysis under the hypothesis "capacity building has no significant influence on milk marketing in Borabu District" to determine if the relationship depicted in Table 4.14 was a significant relationship. The results of the regression analysis were summarized in Table 4.15.

Table 4.15: Summary of Regression Analysis on capacity building and milk marketing

Variable	R	i?	R ² adj.	Std. Est.	B	Std. E	jj	t	F	~
Capacity building	.632	.399	.381	1.82	-21.61	1.89	1.84	-12.48	95.80	.000
Constant	86.43							24.20	43.57	.050

The information in Table 4.15 confirmed the decision made from the means indicated in Table 4.15 since the absolute t value in Table 4.15 was greater than 2; F value (95.80) was greater than the critical value (F_c) of 43.57, and the α (.000) value was less than the critical alpha (α_c) of 0.05. The hypothesis that capacity building has no influences on milk marketing in Borabu District was, therefore, rejected. This implied that number of trainings, demonstrations, study tours and the visits to farmers by extension staff as facilitated by SDCP influenced the extend of milk marketing among dairy farmers in Borabu District.

Taking the results in Table 4.14 together with results in Table 4.15, then it can be deduced that the more the training of farmers, demonstration, study tours and advisory farm visits the better the milk marketing.

An examination of Table 4.15 indicates R^2 and R^2_{adj} values of 0.399 and 0.381 respectively. The R^2_{adj} implies that capacity building account for 38.1% of the variance in milk marketing, other factors notwithstanding. Form the B values and the constant indicated in Table 4.15, a general regression equation for the relationship between capacity building and milk marketing can be written as $MM = 86.43 - 21.61 CB$ where MM is milk marketing and CB is

capacity building. This finding is in line with the findings and the views already expressed by Cole (1997) who observed that benefits of training include high performance since training helps to improve quality and quantity of work output. Echeme & Nwachukwo (2010) concluded that the level of capacity building have positive impact on the implementation of Fadama II projects. They recommended that Fadama should build up the capacity of their project support teams/ officials and beneficiaries by training and re-training them in relevant areas such as procurement and project management.

4.6 Adoption of New Technologies and Milk Marketing

This study also investigated the effect of adoption of new technologies on milk marketing among dairy farmers in Borabu District. The uptake of new technologies by the farmers were gauged through the system of dairy production, technologies learned and adopted, and views on milk production. The responses to these items were used to determine the influence of adoption of new technologies by respondents on milk marketing. The responses were summerized in subsequent subsections.

4.6.1 Type of dairy production system

The respondents were asked to state the type of dairy production system they mostly practice. The results were summerized in Table 4.16.

Table 4.16: Type of dairy production system

Sublocation	Zero-grazing	Semi-zero	paddock	Others	Total
Isoge/ Kineni	12(6.3%)	16(8.5%)	18(9.5%)	0(0.0%)	46(24.3%)
Nyansiongo/ Gesima	19(10.1%)	10(5.3%)	14(7.4%)	1(0.5%)	44(23.3%)
Mogusii	8(4.2%)	15(7.9%)	6(3.2%)	1(0.5%)	30(15.9%)
Mwongori	10(5.3%)	17(9.0%)	4(2.1%)	0(0.0%)	31(16.4%)
Matutu	6(3.2%)	13(6.9%)	19(10.1%)	0(0.0%)	38(20.1%)
Total	55(29.1%)	71(37.6%)	61(32.3%)	2(1.1%)	189(100.0%)

Table 4.16 indicates that majority of the respondents 127 (66.7%) practice either zero grazing or semi zero, while 61(32.3%) practice open grazing. From this analysis, it can be deduced that zero grazing is being adopted by farmers in Borabu despite the area being settlement scheme with relatively large land holding.

4.6.2. Farmers that have learned and adopted new technologies.

The respondents were asked to state the technologies learned and adopted. The results were summerized in Table 4.17.

Table 4.17: Farmers that have learned and adopted new technologies.

Type of technology	No. of Farmers learned	Percent	No. of Farmers adopted	Percent
Artificial Insemination	161	85.2	119	63.0
Silage making	147	77.8	83	43.9
Hay making	75	39.7	33	17.5
Stover treatment	150	79.4	122	64.5
Milk testing	92	48.7	51	27.0
Mala/Yogurt	56	29.6	12	6.3
Feed rationing	63	33.3	18	9.5
Biogas	34	18.0	7	3.7
Rocket jiko	88	46.6	45	23.8

Table 4.17 indicated that the rate of adoption of technologies varied greatly from 3.7% for Biogas to Stover treatment. This was mainly influenced by the cost involved. The decision to adopt is often an investment decision. This agreed with finding of Caswell (2001) noted that adoption can be expected to be dependent on cost of a technology and on whether farmers possess the required resources. Technologies that are capital-intensive are only affordable by wealthier farmers (Bonabana-Wabbi (2002)) and hence the adoption of such technologies is limited to larger farmers who have the wealth (Khanna, 2001). In addition, changes that cost

little are adopted more quickly than those requiring large expenditures; hence both extent and rate of adoption may be dependent on the cost of a technology. Economic theory suggests that a reduction in price of a good or service can result in more of it being demanded.

4.6.3 Relationship between adoption of new technologies and milk marketing.

For further analysis of the relationship between adoption of new technologies and milk marketing, the responses obtained were compared against a standard scale and ranked according to the Likert scale to determine the status of adoption of new technologies of each farmer. The responses of each farmer were compared against a standard response schedule and scored depending on how many items a respondent got correct. The milk marketing of each respondent was also determined from computing the number of correct responses against a standard checklist under milk marketing. The average rates of milk marketing was compared against the status of adoption of new technologies to determine if there any relationship. The results of the analysis were summarized in Table 4.18.

Table 4.18: Relationship between adoption of new technologies and milk marketing

New technologies	No. of Farmers	Milk marketing	Standard Deviation
Good	yg	67.90	17.53
Moderate	^	63.06	19.07
Poor	25	57.81	17.96
	189	64.39	18.52

Table 4.18 indicates that rate of milk marketing among farmers with good adoption of new technologies (67.90) is higher than the rates of milk marketing among farmers with moderate (63.06) or low adoption (57.81). This suggests that there is a relationship between adoption of new technologies and milk marketing such that the higher the rate of adoption of

new technologies the better the milk marketing. It can be deduced from this relationship that the adoption of new technologies by farmers influences milk marketing in Borabu District.

Hypothesis 3: (Ho 3)

To determine whether adoption of new technologies is a significant factor as hypothesized in influencing milk marketing, a subsidiary null hypothesis that "there is no significant relationship between adoption of new technologies and milk marketing in Borabu District, Nyamira County" was tested at 0.05 level of significance, t statistic was also calculated to determine significant predictors, according to Amin, (2005); and Cohen, (1998), a t value of less than 2 in magnitude in the regression model indicates a non significant predictor.

To confirm the findings suggested by the means in Table 4.18, the data was further tested using a regression analysis to determine if there is a significant relationship between adoption of new technologies and milk marketing at .05 level of significance. The results summarized in Table 4.19 were obtained.

Table 4.19: Summary of Regression Analysis on adoption of new technologies and milk marketing

Variable	R	R⁵	R² adj.	Std. Est.	B	Std. E	P	t	F	a
Technologies	.654	.428	.422	18.03	-20.34	2.37	-.654	-8.56	73.29	.000
Constant					84.27	5.21		19.79	43.57	.050

Information indicated in Table 4.19 confirms the findings suggested by the means in Table 4.18 since the absolute t value in Table 4.19 was greater than 2; F value (73.29) was greater than the critical value (F_c) of 43.57, and the a (.000) value was less than the critical alpha (α_c) of 0.05. The hypothesis that adoption of new technologies has no influences on milk marketing in Borabu District was, therefore, rejected. The study therefore established that adoption of new technologies is a determinant of milk marketing among dairy farmers in Borabu District. This finding agrees with the views of Kebede, Gunjal and Coffin, (1990) who investigated the adoption of use of single-ox technology, pesticide and fertilizer use, where

dependent variable was the number of farmers using pesticide and fertilizer. Bonabana-Wabbi (2002) indicated that farmers' participation in on-farm trial demonstrations, accessing agricultural knowledge through researchers, and prior participation in pest training were associated with increased adoption of most IPM practices. Clay (2004) had also expressed the same views which are further supported by the study. It therefore means that the adoption of new technologies on dairy farming has an impact on milk marketing.

Further examination of Table 4.19 indicates R^2 and R^2_{adj} values of 0.428 and 0.422 respectively where R^2_{adj} is adjusting for errors in R^2 using the standard error estimate and R is a regression factor between adoption of new technologies and milk marketing. R^2_{adj} implies that adoption of new technologies accounts for 42.2% of the variance in milk marketing, other factors notwithstanding. Using the B values and the constant indicated in Table 4.20, a general regression equation for the relationship between adoption of new technologies and milk marketing can be written as $MM = 84.27 - 20.34AT$; where MM is milk marketing and AT is adoption of new technologies.

This finding is significant because it has provided a general equation for the relationship between adoption of new technologies and milk marketing makes it possible for milk marketing to be predicted once the status of adoption of technologies has been determined.

4.7 Participation of Grass-Root Institutions and Milk Marketing

This study determined the effect of participation of Grass-Root Institutions on milk marketing in Borabu District. Participation of Grass-Root Institutions was conceptualized as type of organization, frequency of meetings, milk marketing arrangement and the milk customers. The respondents were asked to state which farmers' organization they belong to, how often they hold meetings and their organizations form of milk marketing. The respondents were further asked to state how much milk they sell by day and to whom they sell their milk to. The responses were ranked against a set of items intended to measure them using the Likert scale. The results obtained were presented in the subsections that follow.

4.7.1 Type of farmers' organization

The respondents were asked to state the type of farmers organisations they belong to. The results were summarized in Table 4.20.

Table 4.20: Type of farmers' organization

Type	Number of Farmers	Percentage
Self-help group	97	51.3
Cooperative society	65	34.4
Association	17	9.0
Others	1	0.5
None	9	4.8
Total	189	100.0

Table 4.20 indicates that majority of the respondents 97 (51.3%) belong to self-help groups, while 65(33.4%) belong to cooperatives. These findings are in agreement with Akonga, (1989), who indicated that Self-help groups are easy to set up and register, making them attractive to local communities. They are closely knit by cultural, religious and social ties, thus the commitment of the group remain personal to the individual members of the group. From this analysis, it can be deduced that nearly all farmers are members of grass-root institutions. Participation of dairy farmers in grass-root institutions grass-root institutions is critical in milk marketing in Borabu.

4.7.2 Farmers' involvements in Grass-root institutions.

The respondents were also asked to give views on the frequency of meetings in their organizations, collective milk marketing arrangement, and mode of milk marketing. This was necessary to gauge farmers' involvements in the running of grass-root institutions. The results were summarized in Tables 4.21, 4.22, 4.23.

Table 4.21: Views of Respondents on the frequency of dairy groups meetings.

Frequency of meetings	Weekly	Monthly	Quarterly	Annually	Others	Total
Responses	11	110	42	14	3	180
Percent	6.1%	61.1%	23.3%	7.8%	1.7%	100.0%

Table 4.21 shows that majority of respondents 110 (61.1%) hold monthly meetings in their organizations. In the overall analysis, it can be deduced from these results that majority of farmers are actively involved in the management and decision making in their organizations. Institutions that produce significant gains can motivate people to participate more fully in them. In fact, people do not participate unless they believe it is in their best interest to do so.

Table 4.22: Farmers views on collective milk marketing arrangements

Has your organization any form of collective milk marketing arrangements?				
Response	Yes	No	Don't know	Total
Frequency	78	99	3	180
Percent	43.3	55.0	1.7	100.0

Table 4.23 shows that majority of respondents 99 (55.0%) belong to organizations which do not have collective milk marketing arrangements, 78(43.3%) belong to organizations with collective milk marketing arrangements. In the overall analysis, it can be deduced from these results that majority of farmers organizations are actively involved in collective milk marketing arrangements. Collective milk marketing arrangements is necessary if farmers are to achieve economies of scale.

Table 4.23: Buyer of farmers' milk

Buyer	Number of Farmers	Percentage
Consumer (Farm gate)	81	42.9
Milk trader	53	28.0
Group/Cooperative	35	18.5
Processor	20	10.6
Others	0	0.0
Total	189	100.0

Table 4.23 shows that majority of respondents 81 (42.9%) sell their directly to consumers, 53(28.0%) sell to milk traders and only 35(18.5%) sell through their organizations. In the more competitive and uncertain market post-liberalization, both individual producers and dairy farmer cooperatives have better opportunities for higher milk prices, but also face greater risks due to the uncertainties of relying on informal traders. As a consequence, more recent research has indicated that milk suppliers are returning to traditional outlets (the cooperatives and dairy processors) as the costs and risks of dealing with informal intermediaries are found to be too high (Morton, Coulter, Miheso and Tallontire, 1999). In the overall analysis, it can be deduced from these results that majority of farmers organizations have not taken up collective milk marketing.

4.7.3 The Relationship between participation of Grass-root institutions and milk marketing

For analysis of the relationship between participation of Grass-root institutions and milk marketing, the responses obtained were compared against a standard scale and ranked according to the Likert scale to determine the participation of each farmer in Grass-root institutions using a standard response schedule. The milk marketing level of each respondent was also determined

from computing the number of correct responses against a standard checklist under milk marketing. The average rates of milk marketing by respondents were compared against the status of participation of Grass-root institutions to determine if there was any relationship. The results of the analysis were summarized in Table 4.24.

Table 4.24: Relationship between participation of Grass-root institutions and milk marketing

Grass-root institutions	No. of farmers	Milk marketing	Standard Deviation
Good	6 ^g	76.85	18.79
Moderate		64.22	18.44
Poor	3 [?]	50.26	17.89
	189	64.39	18.52

Table 4.24 indicates that the rate of milk marketing among farmers with good participation of Grass-root institutions (76.85) is higher than the rates of milk marketing among farmers with moderate (64.22) or poor (50.26) participation. This suggests that there is a relationship between participation of Grass-root institutions and milk marketing. It can be deduced from these results that participation of Grass-root institutions is a determinant of milk marketing among dairy farmers in Borabu District. But this is further subjected to a statistical test for confirmation.

Hypothesis 4 (Ho 4)

To determine whether participation of Grass-root institutions is significant factors as hypothesized in the milk marketing in Borabu District, a subsidiary null hypothesis was tested at 0.05 level of significance, t statistic was also calculated to determine significant predictors, a t value of less than 2 in magnitude in the regression model indicates a non significant predictor according to Amin, (2005) and Cohen, (1998).

To determine whether differences indicated in Table 4.24 are significant, the data was subjected to a regression analysis to test that the hypothesis that "there is no relationship between participation of grass-root institutions and milk marketing in Borabu District, Nyamira County". The results of the regression analysis were summarized in Table 4.25.

Table 4.25: Summary of Regression Analysis on participation of Grass-root institutions and milk marketing

Variable	R	R ⁵	R ² adj.	Std. Est.	B	Std! E	p	t	F	<T~
Grass-root institutions	.62	.580	.575	1sTo	-21.85	1.82	.74	-12.10	106.44	.000
Constant						5.21		19.79	43.57	.050

Table 4.25 confirms the suggestions derived from the means in Table 4.24, because the absolute t value is greater than 2; F (106.44) value on participation of Grass-root institutions is greater than the critical value (F_c) of 43.57, and the a value is also less than the critical alpha (α_c) of 0.05. The hypothesis that the participation of Grass-root institutions do not influence milk marketing in Borabu District was therefore rejected. This means that management of farmers' organisations and collective milk marketing arrangements determines the milk marketing in Borabu District.

This finding fits in well with the study carried out by Francesconi, G and Ruben, R. (2007). The study brought some empirical evidence on the impacts of collective action on smallholders' commercialization. This view further agrees with findings of Mburu, L M Wakhungu, J W and Gitu, K W (2007), who investigated the Determinants of smallholder dairy farmers' adoption of various milk marketing channels in Kenya highlands.

The information in table 4.25 indicates R² and R²adj values of 0.580 and 0.575 respectively. R²adj implies that participation of Grass-root institutions account for 57.5% of the variance in milk marketing, other factors notwithstanding. Using the B values and the constant indicated in Table 4.25, a general regression equation for the relationship between participation

of Grass-root institutions and milk marketing can be written as $MM = 87.05 - 21.85GI$; where MM is milk marketing and GI is participation of Grass-root institutions. As a result of the general equation derived from this study, the milk marketing of dairy farmers can be predicted so long as the participation of Grass-root institutions can be measured.

4.8 Creation of Linkages with Private Sector and Milk Marketing

Finally, this study determined the influence of creation of linkages with private sector on the milk marketing in Borabu District. Creation of linkages with private sector was characterized by number of private service providers farmers have, how they were linked to them, the areas of partnership and where they get credit for dairy production. The respondents were asked to indicate the number of private service providers they have, who linked them, areas of partnership and where they borrowed money from to finance dairy. The aim of these questions was to gauge farmers' partnership with private sector on areas of dairy development particularly milk marketing. The responses are summarized in the following subsections.

4.8.1 Number of Private Service Providers

The respondents were asked to indicate the number of private service providers they have. The responses are summarized in Table 4.26.

Table 4.26: Farmers number of private service providers

How many private service providers?					
Response	None	Few	Many	Don't know	Total
Frequency	7	114	66	2	189
Percent	3.7	60.3	34.9	1.1	100.0

Table 4.26 shows that majority of respondents 114 (60.3%) have few private service providers. In the overall analysis, it can be deduced from these results that majority of farmers are poorly linked to private service providers. It also forms a basis of engaging the private sector in the provision of non-core Government services to benefit from the dairy commercialization initiatives of SDCP in Borabu.

4.8.2 Linkages to private services providers

The respondents were also asked to indicate who linked them to the private service providers and areas of partnership. This was necessary to determine the influence of SDCP in the creation of linkages with private sector to enhance milk marketing. The results were summarized in Tables 4.27,4.28

Table 4.27: Farmers' linkages to private service providers

Response	Who linked you to private service providers?				Total
	Friends	SDCP/MOLD	NGO	Others	
Frequency	53	91	27	18	189
Percent	28.0	48.1	14.3	9.5	100.0

Table 4.27 shows that majority of respondents 91 (48.1%) were linked to private service providers extension staff, 53(28.0%) were linked by other farmers/friends and only 27 (14.3%) were linked by NGO. In the overall analysis, it can be deduced from these results that extension staff through SDCP have strengthened farmers' linkages with the private sector.

Table 4.28: Areas of partnership

Area of partnership	Number of Farmers	Percentage
Trainings	13	6.9
Farm inputs	65	34.4
Micro financing	48	25.4
Transportation	20	10.6
Milk marketing	39	20.6
Milk processing	4	2.1
Total	189	100.0

Table 4.28 indicate that major areas of partnership are farm input (34.4%), micro financing (25.4%) and milk marketing (20.6%). It can be deduced from these results that linkages in milk marketing is still poor in Borabu.

4.8.3 Farmers' source of credit to finance dairy production

The respondents were also asked to indicate their source of borrowing to finance dairy production. This was necessary to determine the influence of SDCP in the creation of linkages with financial institutions to strengthen milk marketing. The results were summarized in Tables 4.29

Table 4.29: Farmers' source of credit to finance dairy production

Source of credit	Number of Farmers	Percentage
MFI	58	30.7
Group	79	41.8
Friends	31	16.4
Others	18	9.5
None	3	1.6
Total	189	100.0

Table 4.29 shows that majority of farmers (41.8%) source credit from their groups, followed by MFI (30.7%) and friends (16.4%). In the over all analysis, it can be deduced from these results that farmers organizations and MFIs play a crucial role the provision of credit for dairy farming.

4.8.4 Relationship between creation of linkages with the private sector and milk marketing.

For further analysis of the relationship between creation of linkages with the private sector and milk marketing, the responses obtained were compared against a standard scale and ranked according to the Likert scale to determine the status of partnership of each farmer with private service providers. The responses of each farmer were compared against a standard response schedule and scored depending on how many items a respondent got correct. The milk marketing of each respondent was also determined from computing the number of correct responses against a standard checklist under milk marketing. The average rates of milk marketing were compared against the status of creation of linkages with private sector to determine if there is any relationship. The results of the analysis were summarized in Table 4.30.

Table 4.30: Relationship between creation of linkages with private sector and milk marketing

Linkage with private sector	No. of Farmers	Milk marketing	Standard Deviation
Good	77	68.02	18.10
Moderate	84	63.64	17.86
Poor	28	56.66	19.58
Total	189	64.39	18.52

Table 4.30 indicates that rate of milk marketing among farmers with good linkages with private sector (68.02) is higher than the rates of milk marketing among farmers with moderate (63.64) or poor linkage (56.66). This suggests that there is a relationship between creation of linkages with private sector and milk marketing such that the higher the rates of creation of linkages with private sector the better the milk marketing. It can be deduced from this relationship that the creation of linkages with private sector by dairy farmers influences milk marketing in Borabu District.

Hypothesis 5: (Ho 5)

To determine whether creation of linkages with private sector is a significant factor as hypothesized in influencing milk marketing, a subsidiary null hypothesis that "there is no significant relationship between creation of linkages with private sector and milk marketing in Borabu District, Nyamira County" was tested at 0.05 level of significance, t statistic was also calculated to determine significant predictors, according to Amin, (2005); and Cohen, (1998), a t value of less than 2 in magnitude in the regression model indicates a non significant predictor.

To confirm the findings suggested by the means in Table 4.31, the data was further tested using a regression analysis to determine if there is a significant relationship between creation of linkages with private sector and milk marketing at .05 level of significance. The results summarized in Table 4.31 were obtained.

Table 4.31: Summary of Regression Analysis on creation of linkages with private sector and milk marketing

Variable	R	R ¹	R ² adj.	Std. Est.	B	Std. E	p	t	F	a
Capacity building	.714	.510	.502	15.82	- 22.65	1.89	.784	- 11.40	105.73	.000
Constant	89.23							24.78	43.57	.050

The information in Table 4.31 confirmed the decision made from the means indicated in Table 4.30 since the absolute t value in Table 4.31 was greater than 2; F value (105.73) was greater than the critical value (F_c) of 43.57, and the a (.000) value was less than the critical alpha (α) of 0.05. The hypothesis that creation of linkages with private sector has no influences on milk marketing in Borabu District was, therefore, rejected. This implied that farmers partnership with private service providers as facilitated by SDCP influenced the extend of milk marketing among dairy farmers in Borabu District.

An examination of Table 4.31 indicates R² and R²adj values of 0.510 and 0.502 respectively. The R²adj implies that creation of linkages with private sector account for 50.2% of the variance in milk marketing, other factors notwithstanding. Form the B values and the constant indicated in Table 4.31, a general regression equation for the relationship between creation of linkages with private sector and milk marketing can be written as $MM = 89.23 - 22.65 LP$ where MM is milk marketing and LP is creation of linkages with private sector. This

finding is in line with the findings and the views already expressed by Jenkins et al (2007) whose study showed that participating farmers in the Eagle Lager value chain raised their income by 50 percent.

4.9 Level of funding, capacity building, adoption of new technologies, participation of Grass-root institutions and creation of linkages with private sector, and milk marketing

The study determined whether all hypothesized factors were significant determinants of the uptake of cattle upgrading technology or not by testing subsidiary null hypotheses on P_j s (H_{0j} : $p_j = 0$; H_{aj} $P_j \neq 0$) using t values. The hypothesis was tested at .05 level of significance and t value of 2. This is the most popular significant test in most studies. This was processed using SPSS and a regression analysis run.

The five variables investigated and tested individually in this study do not work in isolation. It was therefore necessary to determine the combined effect of all the variables on milk marketing among dairy farmers Borabu district. This analysis was done through a multiple regression analysis and the results summarized in Table 4.32 were obtained.

Table 4.32: Summary of Multiple Regression Analysis on level of funding, capacity building, adoption of new technologies, participation of Grass-root institution and creation of linkages with private sector, and milk marketing

Variable	Constant	R	R²	R⁵ adj.	Std. Est.	B	Std. E	P	t	F	«
All		.842	.709	.685	8.12					98.05	.000
Constant	94.18					94.18	3.18		40.45		.000
Level of funding						-7.35	1.48	-.244	-6.10		.000
Capacity building						-9.2	1.64	-.324	-5.93		.000
New technologies						-11.28	1.42	-.361	-7.19		.000
Grass-root institutions						-7.63	1.54	-.276	-4.98		.000
Private sector						-6.36	1.41	-.217	-4.48		.000

The results in Table 4.32 confirm the results presented in the preceding sections that all factors significantly influence milk marketing in Borabu District. This is because the absolute t values in Table 4.32 are greater than 2; F value (98.05) is greater than the critical value (F_c) of 43.57, and the α (.000) values are less than the critical alpha (α_c) of 0.05. These confirm that level of funding, capacity building, adoption of new technologies, participation of Grass-root institutions and creation of linkages with private sector altogether are significant determinants of milk marketing among dairy farmers in Borabu district.

The R^2 and R^2_{adj} values of 0.709 and 0.685 respectively imply that all the five factors account for 68.5% of the variance in milk marketing. 31.5% is accounted for by other factors. By examining the beta values, it can be seen that the most significant factor is adoption of new technologies, followed by capacity building, then participation of Grass-root institutions, level of funding and creation of linkages with private sector in that order. From the B values and the constant indicated in Table 4.33, a general regression equation for the relationship between level of funding (X_1), capacity building (X_2), adoption of new technologies (X_3), participation of Grass-root institutions (X_4) and creation of linkages with private sector (X_5), and milk marketing (Y) can be written as $Y = 94.18 - 7.35 X_1 - 9.20 X_2 - 11.28 X_3 - 7.63 X_4 - 6.36 X_5$. This means that the value for milk marketing can be predicted for any value of level of funding, capacity building, adoption of new technologies, participation of Grass-root institutions and creation of linkages with private sector.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This section presents summary of key study findings which are logically arranged in line with the objectives of the study. This is based on the findings from the field survey, key informant interviews and literature review from secondary sources as well as conclusions and recommendations.

5.2 Summary of Findings

The study was organised along five objectives of themes and several preliminary findings were made within each theme. These preliminary findings led to the major findings which are answers to the objectives of the study. It therefore made five major findings, one under each objective.

Firstly, the study examined the relationship between SDCP level of funding and milk marketing. Level of funding was assessed through fund allocation, community contribution and direct programme support to beneficiaries. Preliminary analyses suggested that level of funding is a determinant of milk marketing in Borabu District. This impression was later confirmed by a regression test. The study therefore established the level of programme funding influences milk marketing by about **31.6%**, with a general regression equation expressed as $MM = 83.62 - 20.06LF$; where MM is milk marketing and LF is level of funding.

Secondly, the study determined the relationship between capacity building and milk marketing. Capacity building was assessed number of trainings, demonstrations, tours and farm visits facilitated by SDCP to the dairy farmers. Preliminary analyses suggested that capacity building influence milk marketing. This view was confirmed by a regression analysis. The study therefore found out capacity building influence milk marketing by about **38.1%**. A general regression equation written as $MM = 86.43 - 21.61 CB$ where MM is milk marketing and CB is capacity building.

Thirdly, the study investigated the relationship between adoption of new technologies and milk marketing, with adoption being characterized by the system of dairy production, number of technologies learned and practised by farmers. Preliminary analyses pointed to the fact that

adoption of new technologies by farmers influences milk marketing, which was further confirmed by a regression analysis. The study therefore found out that adoption of new technologies influences milk marketing by about 42.2%, with a general regression equation written as $MM = 84.27 - 20.34AT$; where MM is milk marketing and AT is adoption of new technologies.

Fourthly, the study examined the relationship between participation of Grass-root institutions and milk marketing. Level of participation of Grass-root institutions was assessed through management of farmers' organisations, collective milk marketing and mode of milk sales. Preliminary analyses suggested that participation of Grass-root institutions is a determinant of milk marketing. This impression was upheld by a regression test. The study therefore established the participation of Grass-root institutions influences milk marketing by about 57.5%, with a general regression equation expressed as $MM = 87.05 - 21.85GI$; where MM is milk marketing and GI is participation of Grass-root.

Lastly, the study investigated creation of linkages with private sector relationship between attitude and milk marketing, assessing views of farmers on linkages and areas of partnership with the private service providers. Preliminary analyses indicated that there is a relationship between creation of linkages with private sector and milk marketing. This position was further confirmed by a regression analysis. It was established that creation of linkages with private sector influences milk marketing by 50.2%, with a general relationship defined by regression equation $MM = 89.23 - 22.65 LP$ where MM is milk marketing and LP is creation of linkages with private sector.

5.3 Conclusion

The aim of this study was to determine the influence of SDCP on milk marketing. The study established that each of the variables investigated are significant determinants of milk marketing, but the researcher was also aware that these variables do not work in isolation though they were investigated individually.

The study found that level of programme funding influences milk marketing by about 31.6%, with a general regression equation expressed as $MM = 83.62 - 20.06LF$; where MM is milk marketing and LF is level of funding. Capacity building influence milk marketing by about 38.1% with a general equation $MM = 86.43 - 21.61 CB$ where CB is capacity building. It can be

further established that adoption of new technologies influences milk marketing by about 42.2%, with a general regression equation written as $MM = 84.27 - 20.34AT$; where AT is adoption of new technologies. Participation of Grass-root institutions is a significant determinant of milk marketing contributing about 57.5% with a general formula $MM = 87.05 - 21.85GI$; where GI is participation of Grass-root. Finally, the study established that creation of linkages with private sector influenced milk marketing by 50.2% with a general relationship equation $MM = 89.23 - 22.65 LP$ where LP is creation of linkages with private sector.

A multiple regression analysis confirmed that all factors are still significant determinants of milk marketing even if taken together. Based on these findings, the study concludes that level of funding, capacity building, adoption of new technologies, participation of Grass-root institutions and creation of linkages with private sector are all determinants of milk marketing and account for up to 68.5%. Adoption of new technologies is the most significant because it has the largest coefficient among all of them.

5.4 Recommendations

In view of the findings and the conclusion drawn above, this study makes the following recommendations:

1. The study recommended timely and adequate funding by SDCP and adequate community contribution to improve milk marketing especially milk bulking. The putting up of cooling facilities by the Programme will go a long way in reducing milk spoilage especially in the evenings
2. Up scaling farmers' participation in on-farm demonstrations, trainings and follow ups by extension staff to increase adoption rate of SDCP new dairy technologies. This will create great spillover effect after Programme closure and hence sustainability.
3. The study also recommends the development of Programs to improve and strengthen cooperatives and other farmers' organizations which substantially contribute to collective milk marketing.

5.5 Suggestions for further Research

This study focused on only five variables, but the researcher is convinced that there should be other determinants which this study did not investigate but which are significant. This is supported by the fact that level of funding, capacity building, adoption of new technologies, participation of Grass-root institutions and creation of linkages with private sector are all determinants of milk marketing and account for 68.5%. There is need therefore, to determine which other factors account for the other 31.5%. The study recommends further research on:

1. A detailed study of dairy value chain development with greater engagement of the private sector in small scale milk marketing and processing.
2. The influence of Government policy on milk marketing in the liberalised dairy industry.
3. The effect of infrastructural development on milk marketing.

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APPENDICES

APPENDIX I: Letter of Transmittal

Dear Sir,

As you may already know, Borabu district is one of the areas in the country where the GOK/IFAD-supported Smallholder Dairy Commercialization Programme (SDCP) has been operating for the past five years. The programme goal is to increase the income of the poor rural households that depend substantially on production and trade of dairy products for their livelihood. Staff on the project working with Dairy Groups have developed strategies that are geared towards supporting dairy farmers to adopt Market Oriented Dairy Enterprise (MODE) approach. The impact of SDCP on market-oriented dairy production, particularly milk marketing has not been studied in Borabu. Thus there is a need for detailed study on the actual situation of milk marketing in the District since the inception of SDCP. It is against this background that the study seeks to investigate the influence of SDCP on milk marketing in Borabu District, Nyamira County. This survey is a study being conducted by Mr. Thomas Atunga Sagwe, a Master of Arts Degree student in Project Planning and Management at the University of Nairobi. Results of this study will be used by researchers and program administrators to evaluate the program in the areas of its operation. Feel free to support and give information that you think may be useful in study. Your responses will be highly appreciated.

Yours sincerely,

Thomas Sagwe

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APPENDICES

APPENDIX I: Letter of Transmittal

Dear Sir,

As you may already know, Borabu district is one of the areas in the country where the GOK/IFAD-supported Smallholder Dairy Commercialization Programme (SDCP) has been operating for the past five years. The programme goal is to increase the income of the poor rural households that depend substantially on production and trade of dairy products for their livelihood. Staff on the project working with Dairy Groups have developed strategies that are geared towards supporting dairy farmers to adopt Market Oriented Dairy Enterprise (MODE) approach. The impact of SDCP on market-oriented dairy production, particularly milk marketing has not be studied in Borabu. Thus there is a need for detailed study on the actual situation of milk marketing in the District since the inception of SDCP. It is against this background that the study seeks to investigate the influence of SDCP on milk marketing in Borabu District, Nyamira County. This survey is a study being conducted by Mr. Thomas Atunga Sagwe, a Master of Arts Degree student in Project Planning and Management at the University of Nairobi. Results of this study will be used by researchers and program administrators to evaluate the program in the areas of its operation. Feel free to support and give information that you think may be useful in study. Your responses will be highly appreciated.

Yours sincerely,

Thomas Sagwe

Department of Extra Mural Studies, University of Nairobi

APPENDIX II: QUESTIONNAIRES

QUESTIONNAIRE ON FARMERS' PERCEPTIONS ON THE INFLUENCE OF SDCP ON MILK MARKETING

This questionnaire is designed to solicit for your responses on the influence of SDCP on milk marketing. Your responses will be used for academic purposes only and are highly appreciated.

Declaration: Answers to questions contained in this questionnaire will be kept confidential.

Enumerator's NameDate of Interview

Sub location Location

Please read this section carefully before you proceed to the next page

This survey is a study being conducted by Mr. Thomas Atunga Sagwe, a Master of Arts Degree student in Project Planning and Management at the University of Nairobi. The purpose of this study is to determine the influence of SDCP on milk marketing in Borabu. There is no right or wrong answers. Your responses may help in the development of strategies that can help strengthen performance of the Programme and make it more beneficial to the farming community. You are requested to display utmost honesty as your responses will be treated with confidentiality.

Participation in this study is voluntary. You should feel confident about answering these questions because, you do not give your name anywhere on the papers and no attempt will be made to identify or link you in the collected data in anyway; Results of this study will be reported only in terms of group scores without identifying the location of the research subjects; If you volunteer to participate, please respond to the questions as truthfully and completely as you can by marking the options you choose on the questionnaire or questions asked by the interviewer.

This interview will take no longer than 30 minutes.

SECTION A: BIO DATA OF BENEFICIARIES/INTERVIEWEES (*Beneficiaries*)

Demographic

1. Age _____ Years

2. Gender _____ Female (1) _____ Male (2)

3. Marital status

Single (1)

Married (2)

Divorced (3)

Widowed (4)

Separated (5)

Other specify (6)

4. Level of Education

None (1) _____ Primary (2) _____ Secondary (3) _____ College (4) _____ University (5)

5. Number of people living in your household?

6. For how long have you been a farmer? _____ Years

Background

7. What is the total size of your farm? _____ Acres

8. Are you a dairy farmer? _____ Yes (1) _____ No (2)

9. If yes, which type of dairy animals do you keep? (Tick all that apply) _____ What is the number of each

	Type of dairy animals	Tick appropriately	Number kept
1	Grade cattle		
2	Crosses (upgrades)		
3	Zebu		
4	Dairy goats		
5	Others (specify)		

10. Which pasture/fodder crops do you grow? (Tick all that apply)_____What is the acreage on each

	Pasture/ Fodder	Tick appropriately	Acres
1	Natural pasture		
2	Napier Grass		
3	Rhodes grass		
4	Lucerne		
5	Desmoduim		
6	Fodder trees		
7	Others (specify)		

11. How much milk do you produce per day?_____Litre

SECTION B: KNOWLEDGE, PARTICIPATION AND BENEFITS FROM SDCP TO FARMERS

12. How do you access agricultural information?

	Sources	Yes	No
1	Radio		
2	Newspapers		
3	Bulletins		
4	Neighbours		
5	Farmers organizations		
6	Friends		
7	Extension staff		
8	Researchers		
9	NGO		
10	Private service providers		
11	Others		

13. Have you heard of SDCP?

Yes (1)_____No (2)

14. When did you hear about SDCP?

	When	Yes	No
1	2007 -2008		
2	2009-2010		
3	2011-2012		

15. How did you get to know about SDCP?

Letter of invitation by Livestock Production (1) _ Workshops /Trainings organized by Livestock Production(2)___Public baraza(3) _ Newspaper article(4)___Word of mouth by other farmers(5)___Others(6) (Specify)

16. Have you participated in SDCP activities?

Yes (1)___No (2)

17. If yes, in what capacity?

Level of Funding

18. Have you been supported financially by SDCP?___Yes (1)___No (2)

19. Which area were you supported?

Fodder production/ conservation (1)___Breeding (2)___Milk marketing (3)___Energy conservation/ Biogas (4)___Others (5) Specify.

20. Have you cost-shared in SDCP activities?

Yes (1)___No (2)___Don't know (3)

21. In your opinion do you think the present level of SDCP funding is adequate?

Not adequate (1)___Fairly adequate (2)___Adequate (3)___More than adequate (4)

22. In your opinion do you think the level of SDCP funding has a bearing on milk marketing?

Yes (1)___No (2)___Don't know (3)

Capacity Building

23. How often have you been invited to attend SDCP trainings?

_ Very frequently (1)___Frequently (2)___Rarely (3)___Never (4)

24. How often have you participated in SDCP on-farm demonstrations?

Very frequently (1)___Frequently (2)___Rarely (3)___Never (4)

25. Have you ever gone for farmers study tour?___Yes (1)___No (2)

26. Who organized/sponsored the study tour?

_ SDCP (1) _ Farmers(2) _ Others(3) (specify)_

27. Do you think the study tour was useful?___Yes (1)___No (2)

28. Have you attended trainings on milk marketing?___Yes (1)___No (2)

Don't know (3)

29. How has the knowledge gained during trainings been utilized?

Explain_

30. In your opinion do you think the knowledge gained during trainings has influenced the way you market milk?___Yes(1)___No (2)___Don't know (3)

Adoption of Technologies

31. Which system of dairy production do you practice?

Zero-grazing (1)___Semi- zero grazing (2)

Open grazing/ paddocking (3)___others(4) (specify)

32. Which new technologies have you learned and adopted as result of SDCP?

	Technology	Learned		Adopted	
		Yes	No	Yes	No
1	Silage making				
2	Hay making				
3	Maize stovers treatment				
4	On Farm milk testing				
5	On farm mala / yogurt				
6	Feed compounding				
7	Biogas				
8	Rocket jiko/ liners				
9	Artificial insemination				

33. Have you increased your milk production as a result of new methods of dairy farming?

Yes (1)___No (2)___Don't know (3)

34. If yes, by how much? _____ litre/ day

Participation of Grass-Root Institutions

35. Do you belong to a farmer organization? ___Yes (1)___No (2)

36. What is the status of your organization?

_ Self-help Group (1) _ Cooperative society (2)

_ Association (3)_____Others (4) (specify)

37. Which position do you hold in the organization?

_ Executive member (1) _ Committee member (2)

_ Ordinary member (3) _ Others (4) (specify)

38. How often are meetings held? Tick where applicable

Weekly (1) _ Monthly (2) _ Quarterly (3) _ Annually (4)

Others (5) (specify)

39. Has the group received any assistance?

Yes (1)___No (2)___Don't know (3)

40. Type of assistance:_____by who;

41. Has your organization any form of collective milk marketing arrangements?

Yes (1)___No (2)___Don't know (3)

42. How many litres of milk do you sell per day?

43. To whom to you sell your milk? (Tick where applicable)_____and at what price?

	Buyer	Tick appropriately	Price per litre
1	Consumer		
2	Milk trader		
3	Group / Cooperative		
4	Processor		
5	Others (specify)		

Creation of Linkages with the Private Sector

44. How many private service providers do you have?

None (1) ___ Few (2) ___ Many (3) ___ Don't know (4)

45. Who linked you to private service providers?

Friends (1) ___ SDCP/MOLD staff (2) ___ NGO (3) ___ Others (specify) (4)

46. What are the areas of partnership?

Trainings (1) ___ Farm inputs (2) ___ MFI (3) ___ Transportation (4) ___ Marketing (5)

Processing (6) ___ Others (7) specify.

47. Do you ever borrow to finance dairy production? ___ Yes (1) ___ No (2)

48. Where did you borrow from?

MFI (1) ___ Group (2) ___ Friends (3) ___ Others (specify) (4)

49. What was the money used for?

50. What benefits have you got from being linked to private service providers? Explain

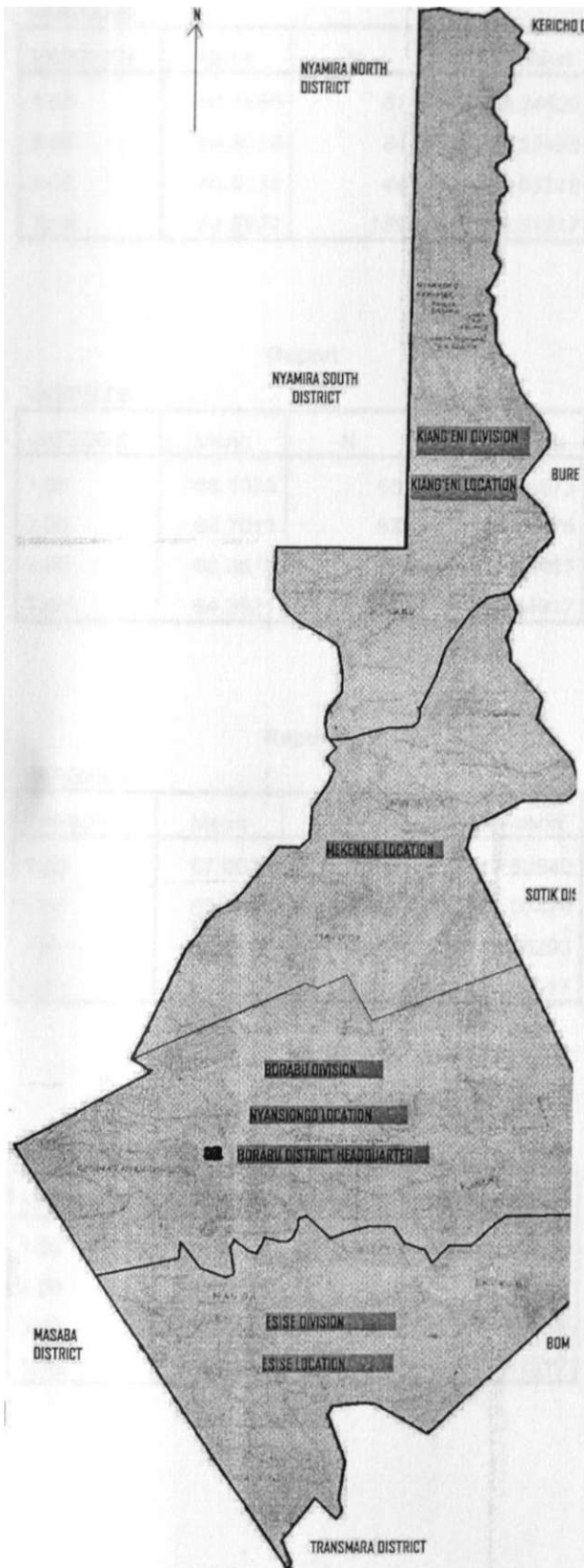
Appendix III: Work Plan

	Phase	Time (Months)	2012	Dependency
A	Development of proposal and approval.	2	January -June	
B	Development of Instruments, piloting and quality control.	y_2	July	A
C	Data collection.	Y_i	August	B
D	Data Organization, Analysis and Interpretation.	1	September	C
E	Report Writing.	1	October	D

Appendix B: The Research Budget

S/N	Item	Description	Estimated Cost (Ksh)
1	Stationery	i. 3 reams of photocopy papers @ 600.00 ii. Computer accessories & other writing materials.	1,800 12,000 13,800
2	Research Assistants.	6 research assistants @ 1000 per day for 14 days.	84,000 84,000
3	Referencing	i. Internet surfing. ii. Printing of relevant pages	3,000 2,000 5,000
4	Support Services	i. Secretarial and binding services. ii. Consultations.	14,000 7,000 21,000
5	Contingency	@ 10% of the total cost	10,000. 10,000
6	Administration	@ 10% of the total cost	10,000 10,000
7	Total		151,000

MAP OF BORABU DISTRICT



County. It came to existence in December 2007 and started operating as from January 2008. The district has 3 divisions namely Rnrahn, Fcico and Kiancroni

Regression Analysis

VAR00006

<i>VAR00001</i>	<i>Mean</i>	<i>N</i>	<i>Std. Deviation</i>
1.00	66.3180	61	18.34620
2.00	64.8155	84	19.32495
3.00	60.9136	44	17.05742
<i>Total</i>	<i>64.3921</i>	<i>189</i>	<i>18.51917</i>

Report

VAR00006

VAR00002	Mean	N	Std. Deviation
1.00	66.1833	66	20.64673
2.00	64.7011	87	16.18375
3.00	60.3611	36	19.59457
Total	64.3921	189	18.51917

Report

VAR00006

VAR00003	Mean	N	Std. Deviation
1.00	67.9076	79	17.52640
2.00	63.0600	85	19.07479
3.00	57.8120	25	17.96293
Total	64.3921	189	18.51917

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Report

VAR00006

VAR00004	Mean	N	Std. Deviation
1.00	76.8529	68	18.79379
2.00	64.2179	84	18.44371
3.00	50.2649	37	17.89853
Total	64.3921	189	18.51917

Report

VAR00006

VAR00005	Mean	N	Std. Deviation
1.00	68.0221	77	18.10324
2.00	63.6405	84	17.86381
3.00	56.6643	28	19.57735
Total	64.3921	189	18.51917

Model Description

		Type of Variable
Equation 1	VAR00006	dependent
	VAR00001	predictor & instrumental
	VAR00002	predictor & instrumental
	VAR00003	predictor & instrumental
	VAR00004	predictor & instrumental
	VAR00005	predictor & instrumental

MOD_10

Model Summary

Equation 1	Multiple R	.319
	R Square	.102
	Adjusted R Square	.077
	Std. Error of the Estimate	17.788

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Equation 1	Regression	6572.363	5	1314.473	44.154	.000
	Residual	57904.075	183	316.416		
	Total	64476.438	188			