

AN ANALYSIS OF FACTORS INFLUENCING SMALL SCALE DAIRY FARMERS CHOICE OF CO-OPERATIVES AS MILK MARKETING CHANNELS IN GITHUNGURI SUB COUNTY KIAMBU COUNTY.

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DECLARATION

This Project is my original work and has not been presented for a degree in any other University or for any other award.

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DEDICATION

This work is dedicated to my family, a source of my inspiration, encouragement and strength.

ACKNOWLEDGEMENT

I take this opportunity to thank God for giving me the courage and energy to undertake this Project. He has given me good health throughout my study. Completing of this research project would not have been possible without the support of my academic supervisors and colleagues, contributing participants, family and friends. First, my sincere gratitude goes to my supervisors Dr. Kamau Muthoni and Dr. Michael Ngala for their valuable comments, insights, and for providing valuable guidance throughout the process. Equally, my appreciations go to my academic friends and colleagues among others who walked with me through this journey of carrying out this project. Your constant reminder of the target, useful discussions, advice and assistance you accorded me during my study is highly appreciated.

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OPERATIONAL DEFINITIONS OF TERMS

Consumer - the buyer the farmer opts to sell milk to.

Customer Accessibility - proximity from the farmer's gate how easy it is to communicate and the nature of roads

Customer - person or organisation that buys milk from a farmer.

Direct Customer - buyer who gets milk from the producer for use as the ultimate consumer.

Milk - unprocessed white liquid from cows.

Small Scale Dairy Farmer - milk producer, whose land is less than two acres, owns between 1 and 5 cows and has sold milk for more than two consecutive months including the month of study.

Terms of Payment - price negotiation, credit period, contractual terms

Volume of milk produced - farmers were classified as high, medium or low producers depending on the number of litres.

LIST OF ABBREVIATIONS & ACRONYMS

FAO:	Food and Agriculture Organization
GDP:	Gross Domestic Product
KCC:	Kenya Creameries Co-operative
SPSS:	Statistical Package for the Social Science

ABSTRACT

In many parts of Kenya, small scale dairy farming is common. This can be attributed to increase in demand for milk due to increase in population in urban areas. Farmers sell milk through cooperatives, direct sale, brokers and processors. Dairy farming is practiced throughout the world. This research sought to determine to assess determinants of small-scale dairy farmer's choice of customer in Kenya. The study was carried out in purposively selected Githunguri Sub County in Kenya. The study was guided by 3 questions derived from the objectives. To what extent does customer accessibility, volume of milk produced and terms of trade determine choice of customer by small scale dairy farmers in Kenya. Empirical literature review presented a research gap for this project. The research was anchored on rational choice theory. The relationship between research variables was demonstrated by a configured conceptual framework. The study sampled 375 small scale dairy farmers in Githunguri Sub-county Kiambu County. Simple random sampling technique was employed in selecting the sample. Data was analyzed using descriptive and inferential statistics. Descriptive statistics was in form of frequency distributions and percentages. Inferences are in terms of Chi square test ($P < 0.05$). Data was presented in form of tables. The findings from the study indicated that customer accessibility, volume of milk produced, and terms of trade determined small scale dairy farmers' choice of customer in Kenya. The study concluded that majority of farmers chose dairy cooperatives and direct selling as the preferred customers compared to brokers and processors. The study recommends that County Governments improve the state of roads so that farmers can easily access their customers of choice, invest in technology so that small scale dairy farmers can communicate with their customers in real time, develop policies that will enable small scale dairy farmers improve livestock breeds for more milk production and educate farmers on the importance of written contracts.

CHAPTER ONE: INTRODUCTION

This chapter covers background of the study, statement of the problem, objectives of the study, research questions, significance of the study, scope of the study, limitation of the study and organization of the study.

1.1 Background of the Study

Food security is one of the big four agenda items in the government of Kenya's economic blueprint. It is envisaged that it will be a solution to one of the social economic problems that ordinary Kenyans face. The other agenda items include manufacturing, affordable universal health care and affordable housing. This study focuses on food security specifically milk. It intends to assess determinants of small-scale dairy farmer's choice of customer in Kenya.

1.1.1 Global Perspective

According to (Knechtges, 2011), over 900 million people out of the world's population of 3.3 billion depend on agricultural activities for food and income. Dairy farming activities enhance social economic benefits not only to farmers, traders and processors but to all participants of the milk chain distribution. The United Nations, International Labour Organization and the International Co-operative Alliance recognize that the Co-operative enterprise is best suited to address all dimensions of poverty reduction because they increase the bargaining power for their members as well as convert individual risks into collective risks. Co-operatives are autonomous associations of individuals integrated willingly to fulfil their mutual social, pecuniary, and traditional necessities and targets through collectively-owned and legitimately controlled establishments (ILO, 2016).

According to Rajendra (2014), Indian dairy co-operatives aim at maximizing farm output and profit for the members through networking and collaboration. Reinforced by a specialized administration, members choose their trading strategies, promotional techniques, and obtain services that they could not have enough money to buy or manage individually. According to Karmakar (2010); Sreenivasaiah and Chellakumar (2016), India was ranked number one and best exporter of milk and milk products. In low producing districts farmers used direct sales to consumers as their favorite channel while formal buyers were preferred in the high producing

districts. About 56 per cent of small-scale dairy farmer sold their milk directly to the consumers (Mishra & Goyal, 2015).

In a study by Cazzuffi (2012), which sought to find factors that influenced milk choice of choice of customer in Pakistan found that majority of farmers in the Country were small holders whose farm size was less than 4 hectares with a maximum of 10 dairy cows. They had difficulties in transportation and storage facilities could not store for a long time. Most of them had to sell their produce at the farm gate soon after harvest in order to pay back loans used in production despite the low prices. Selling at the farm gate was convenient for the household but entailed a more limited choice of buyers. The channels offered volatile price and differentiated buying prices between small and largescale farmers. Small scale farmers were offered lower prices.

1.1.2 Regional Perspective

Kuma, Baker, Getnet, Kassa (2013), studied factors affecting milk outlet choice in Wolaita Zone, Ethiopia. Wolaita was purposively selected because of its potentiality in milk production, processing and marketing in Ethiopia. They identified individual consumer, hotel/restaurant and cooperatives as the alternative milk outlets. Distance to the nearest urban centre, dairy farming experience, price offered by outlet and landholding size were the independent variables. Their finding indicated indicated length of experience in dairy farming and farm size positively and significantly influenced farmer's choice of milk outlet. Long experienced favoured cooperatives compared to individual milk outlet.

. Membership to cooperative positively and significantly affected accessing cooperative milk market outlet as compared with accessing individual consumer milk market outlet. Membership to cooperative positively and significantly affected accessing cooperative milk market outlet as compared with accessing individual consumer milk market outlet. Access to dairy extension services positively and significantly affected accessing hotel/restaurant milk market outlet as compared with accessing individual consumer milk market outlet. Distance to the nearest urban centre negatively and significantly affected accessing hotel/restaurant milk market outlet as compared to accessing individual consumer milk market outlet of milking cows owned by a household positively and significantly affected accessing hotel/restaurant milk market outlet as compared with accessing individual consumer milk market outlet

1.1.3 Local Perspective

The backbone of Kenyan economy is agriculture. Dairy contributes 3.5% of the total gross domestic product according to (Knechtges, 2011). Kenya has a herd of approximately 4 million dairy cows and produces an estimated 4 to 5 billion litres of milk annually. Small-holder dairy households are estimated to be over 1.5 million. (Wangui, 2013). Upon liberalization of the Kenyan dairy sub sector in 1992, small scale dairy farmers were given alternative markets for their milk. In Kenya, there has been a remarkable increase in urban population as well as improved levels of income among the middle level income earners. It is against this background coupled with limited regulatory entry barriers that has led to many dealers of milk. This has given farmers options of choosing their customers.

It is against this background that the researcher proposed to carry out a research to assess determinants of choice of customer by small scale dairy farmers in Kiambu. According to Karanja (2013), liberalization of the dairy industry led to fresh approaches in the way milk assemblage, processing and promotion were performed. The number of players increased, and the dairy Co-operatives were exposed to what they least anticipated. The researcher conceptualizes an oligopsony market made up of cooperatives, direct sale, brokers and processors.

After Kenya got independence in 1963, most large farms occupied by white settlers were bought by the locals and sub divided to create settlement schemes. Land buying companies were formed to buy land and thereafter subdivide it and sell small pieces individuals (Muriuki 2003). This can be said to be the origin of small-scale dairy farming which characterized by small sized farms, herds of pure and crossbred cows ranging from 1-5. The Kenyan dairy sector plays a critical role in the social economic development of Kenya. It is a source of food security, employment and enhances the livelihood of the dairy farmers, traders, processors and participants in the entire milk supply chain (Kinambugua, 2010). It gives the small-scale dairy farmer a source of livelihood. According to FAO, (2014) and Mutua-Kiio and Muriuki, (2013), about sixty five percent of total milk produced is available for sale leaving thirty five percent for the calves and the famer's family.

It is anticipated that an efficient and responsive market compensates farmers and hence improves their living standards as well as stimulate them to increase milk production thus contribute to the big four agenda. The researcher isolates customers' accessibility, volume of milk produced and terms of trade as factors that need consideration. The research aims at assessing whether these factors determine the farmers choice of customer in Kenya.

According to Gitau (2013) the livestock sector in Kenya is estimated to contribute between 5% and 7% of national Gross Domestic Product (GDP), and the dairy sector makes up 30% of that percentage. According to a research titled competitiveness of smallholder milk production systems in Uasin Gishu County of Kenya, milk production by small scale farmers was identified as viable business. The researcher recommended further research is carried out to identify options of improving market accessibility (Kibiego, 2015), that recommendation is part of the driving force for undertaking this research on determinants of small-scale dairy farmers' choice of choice of customers in Kenya.

1.1.4 Small Scale Dairy Farmers Choice of Customer

Dairy studies conducted by Kurwijila (2010), categorized milk customers into formal and informal. Formal markets were made up of dairy cooperatives and milk processors. Formal markets are viewed as the customers who buy raw milk, bulks it, and there after process the milk for distribution to the ultimate consumer. On the other hand informal market is made up of both direct sale and sale to brokers.

1.2 Statement of the Problem

Since indigenous Kenyans were allowed to engage in commercial dairy farming from pre - independence, the government policies focused on enabling income earning of commercial farming through direct intervention in the marketing of milk through statutory control. Liberalization of the dairy sub sector in 1992 lifted price controls and exclusive processing and marketing of milk by KCC. In 1999 the collapse of KCC opened entry to other milk processors and other milk outlets to the farmer. This benefited small-scale dairy farmers by having alternatives of where to sell raw milk. According to annual report by Ministry of Livestock Development (2009), the total annual production of milk stood at 3.5 billion litres. The dairy sub sector contributed 14 % of the Gross Domestic Product (GDP). Despite these positive statistics, a

large quantity of milk in smallholder dairy farms was either sold through informal channels to rural markets or consumed by the producers. An estimate across the rural Kenya indicates that out of total milk from smallholder farmers only 40% enters the formal market (FAO, 2016). That report by FAO failed to state where and why 60% was not accounted for. Past studies have not addressed factors that determine choice of customer by small scale dairy farmers in Kenya.

In a research by Kuma ,Baker ,Getnet ,Kassa (2013), on factors affecting milk outlet choice in Wolaita Zone, Ethiopia (2013), the study found that market information, distance to nearest market, dairy farming experience, land holding size and milk price per outlet were critical factors affecting milk outlet choice .A study titled Analysis of Institutional Factors Influencing Farmer's Choice of Milk outlet in Nyabihu district, Western Province of Rwanda by Minagri (2016), found location of milk collection centers, forms of payments access to market information had significant influence in the farmers' choice. No study has been carried out to establish whether customer accessibility, volume of milk and terms of payment determine small scale dairy farmers choice of customer in Kenya. This study intended to fill this gap in literature

1.3 Objectives of the Study

The general objective of the study was to assess determinants of small-scale dairy farmer's choice of customer in Kenya.

1.3.1 Specific Objectives

The specific objectives of this study were:

1. To determine the effect of customer accessibility on choice of customer by small scale dairy farmers in Kenya
2. To examine the effect of the volume of milk produced on choice of customer by small scale dairy farmers in Kenya.
3. To establish the effect of terms of trade on choice of customer of customer by small scale dairy farmers in Kenya.

1.4 Research Questions

The researcher answered the following questions after analysing findings

1. Does accessibility influence choice of customer by small scale dairy farmers in Kenya?
2. Does volume of milk produced influence choice of customer by small scale dairy farmers in Kenya?
3. Do terms of trade by influence choice of customer by small scale dairy farmers in Kenya?

1.5 Significance of the Study

The study sought to assess factors that determined choice of customer by small scale dairy farmers in Kenya. The study findings will provide empirical evidence that will help milk buyers identify factors that determine farmers choice of customer hence strengthen them. This means there will be mutual benefit situation that will ensure sustainability of the dairy farming sector. The findings of the study will help small scale dairy farmers realise the factors that influence determine choice of customer. This will enable them to make informed decisions that will maximise their returns thereby improve their living standards. County governments may use the findings for policy formulation and development of supportive strategies that will improve competitiveness among customers to the benefit of small-scale dairy farmers. This will ensure fulfilment of food security as one of agenda four pillars. The findings will form basis for further research by other scholars.

1.6 Scope of the Study

The study targeted farmers who owned less than two acres of land, less than five dairy cattle and who had sold raw milk for more than two consecutive months prior data collection in the area of study. Customer accessibility, volume of milk produced and terms of trade as determinants for small scale dairy farmers' choice of Co-operatives, direct sale, agents or processors as customers for their raw milk in Kenya will be the objective of the study. The study sampled 375 small

scale dairy farmers spread over Githiga, Githunguri, Ikinu, Komothai and Ngewa administrative wards of Githunguri Sub County, Kiambu County. It was conducted between the month of October and Mid November, 2019. The findings of the study were generalized Kenya.

1.7 Limitations of Study

The researcher foresaw situations where some respondents sold milk to more than one customer. In such a case the researcher assumed that the one to whom most milk is sold was the ideal customer for the study. The researcher anticipated that some respondents could fail to comprehend some questions due to low literacy level. To mitigate this, the researcher instructed enumerators to interpret questions in vernacular when necessary. The researcher held briefing sessions with the enumerators and monitored them on phone during the exercise to clarify any matter that may arise.

1.8 Organization of the Study

The report is organized five chapters. Chapter one consists of the introduction and contains the background of the study, statement of the problem, the purpose of the study, general and specific objectives, research questions, and significance of the study, scope and limitations of the study. Chapter two covers history of small scale dairy farming in Kenya, rational theory of choice, empirical literature, conceptual framework and summary of gaps. Chapter three focused on research design, target population, sampling design, data collection instruments and procedures, data analysis and presentation and ethical consideration. Chapter four data analysis findings and interpretation with chapter five discussions, conclusions and recommendations

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter reviews the existing literature from previous studies linked to study subject. Literature from various scholars and organizations in the study of determinants of small-scale dairy farmer's choice of customer in Kenya was reviewed in this study. Areas of interest included history of dairy farming in Kenya customer accessibility, volume of milk produced and terms of payment to choice of customer. Theoretical framework was covered to give relevance to the study while conceptual framework connected the study variables in a clear way. The study was anchored on rational choice theory. The theory opines that people do their best under prevailing circumstances. Rational choice theory adopts a utilitarian belief that man is a reasoning actor who weighs means and ends, costs and benefits, and makes a rational choice.

2.2 History of Small Scale Dairy Farming in Kenya

This section is divided in to three parts pre-independence period, post-independence period and liberalization period. Before the colonial period, local Africans kept indigenous breeds producing low milk quantity. Commercial dairy farming in Kenya can be traced to the arrival of the white colonialists who imported superior breeds suitable for milk production.

2.2.1 Pre-independence Period

Livestock have played economic and social cultural roles in Africa (Ngigi, 2005). Zebus and other local breeds which were not economical in commercial dairying were used for dowry payment, barter trade, source of milk and beef among other uses. With the introduction of exotic breeds from Europe and South Africa by the white settlers, commercial dairy farming was introduced. By 1910, institutions such as national animal husbandry station at Naivasha and Kabete veterinary laboratory were established to enhance dairy farming (MOFLD, 2007).

2.2.2 Post- independence Period

After independence the government embarked on massive land subdivision to accommodate Africans in the former white owned farms. In 1964, a commission headed by Mr. Kibaki, abolished the quota milk marketing to Africans thereby opening up KCC to their milk without discrimination (MOLFD, 2007). These two factors increased the smallholder dairy farmers' participation in the dairy industry. KCC opened new factories and cooling plants especially in high milk producing areas dominated by smallholder dairy farmers (Ngigi, 2005). Despite the growth of smallholder dairying their level of output was low and as such, the cost of individual marketing of milk to KCC was high. This led to the formation of dairy cooperatives to amalgamate milk from various farms and market to KCC collectively. This was the genesis of cooperative societies in milk marketing.

2.2.3 Liberalization and Beyond

Through a ministerial statement in June 1992, the government liberalized the milk marketing sector (Lamuka, 1993). This led to the opening up of milk marketing outlets subject to hygienic regulations from Kenya Dairy Board (Jaffe, 1995) small processors such as Illara dairy in Rongai, Spin knit dairy in Nakuru, Delamere dairy in Naivasha, Roost limited in Kapsabet, Brookside dairy in Ruiru, Donana in Mombasa and Taita estate in Mwatate were formed. KCC faced intense, competition it was not prepared for. Debts weighed heavily on KCC and 1999 it eventually collapsed. It owed farmers money for unpaid milk deliveries. Most farmers were discouraged with marketing their milk to other formal buyers and resorted to informal channels (MOLFD, 2007). Since the informal sector, enjoyed tremendous growth in this period, smallholder dairy farmers opted for spot cash milk sales in urban centers.

2.2.4 Rational Choice Theory

The work of Cesare Beccaria in the 18th century is regarded as the origin of rational choice theory on which this research project was hinged. The theory was found appropriate for the study not only because of ease of application but also because of its relevance in the objectives of the study. The small scale dairy farmer, choice of customer, is determined by channel accessibility, volume of milk produced and terms of trade. Out of the options of selling to a cooperative,

selling directly to consumer, selling broker and selling to processors the farmer will evaluate each and choose the one that will give the highest utility or benefit.

This notwithstanding, rational choice theory has its shortcomings. Firstly without adequate information regarding variables, may find it difficult to make rational decisions and may opt for other ways of decision making. Secondly there is inadequate literature that explains how different situations call for different actions (Mills, & Bourne, 2005).

2.4 Empirical Review

This section focused on other researchers' experiences and observations. It helped to understand diverse scholars' opinions, problem addressed as well as social phenomena which ultimately helped to isolate the gaps for the study. It was organized according to variables of the study.

2.4.1 Choice of Customer

Determinants of choice of customer have been subject to research in prior past (Osterberg and Nilsson, 2018). Loyalty is regarded as a behavioral or an attitudinal concept. A loyal person exhibits repeat behavior, implying that he or she tends to patronize the same trading partner repeatedly. According to Islam et al. (2011), choice of customer is the channel that commodities follow from the producer to the consumer. This chain introduces agents whose objective other than making profit is to satisfy both producers and consumers for business continuity. During their transactions both parties develop relationships where each of them their requirements in terms of quantity to be sold place of delivery and terms of trade.

According to Moran (2009) milk markets are often categorized into two main types, informal and formal. Fussi (2011) differentiates the two terms: On one hand formal milk marketing is described as a process involving all the channels through which farmer delivers milk directly to the milk processing plant or to a Milk Collection Centre (MCC) or to traders who bought milk from the farmer and sell it to the MCC or processor. In the process retailers perform role of supplying the products that are mainly demanded and can influence what the processors produce. On the other hand, informal milk marketing involves the direct delivery of fresh milk by the farmer to the consumer or milk that may pass through two or more milk vendors before reaching the consumer; this is a typical example of traditional markets in developing countries. Despite being informal, during the transaction consumers develop relationships with traders and through

these relationships' suppliers are able to identify and supply products according to consumers' taste and preferences. According to Moran (2009), informal markets are usually small scale, local markets involving few participants and milk is often sold as raw product (unprocessed). Consumers in these markets are at the lower cost end where price is considered to be more important than milk quality. This project intended to determine whether accessibility, volume of milk produced and terms of trade influenced small scale dairy farmers choice of customer.

2.4.2 Customer Accessibility and Choice of Customer

The location where the small-scale dairy farmer delivers milk customer can be at the farm gate or at a distance. This study intends to assess whether proximity, communication with the customer and the nature of the roads influence choice of customer. The researcher identified four types of customers namely cooperatives, direct selling, selling to agents and selling to milk processors. In a study titled factors affecting milk outlet choice in Wolaita Zone, Ethiopia, the researchers identified individual consumer, hotel/restaurant and cooperatives as the alternative milk outlets available to the small-scale dairy farmer in the area of study. Distance to the nearest urban centre, dairy farming experience, price offered by outlet and landholding size were the independent variables. Distance to the nearest urban center negatively and significantly affected accessing hotel/restaurant milk market outlet as compared to accessing individual consumer milk market outlet (Kuma ,Baker ,Getnet ,Kassa , 2013)

In a study to identify and assess the technical and institutional factors influencing agricultural market participation behavior amongst smallholder farmers in the Kat River Valley of the Eastern Cape Province in South Africa, farmers indicated that they did not trust the information they had access to. Their source was other people in the village or from traders. They did not rely on the information for decision making. The farmers had difficulties in enforcing contracts and meeting stringent food safety standards. The farms are located in remote areas served by poor physical infrastructures and mostly relied on middlemen. Poor infrastructure, lack of transport, lack of market information, insufficient expertise on grades and standards, inability to have contractual agreements and poor organizational support led to the inefficient use of markets, hence, commercialization bottlenecks. Majority of the respondents used spot markets to sell their produce as compared to formal markets. (Jari and Fraser , 2009)

A study to analyze (Mutura, Nyairo, Mwangi & Wambugu, 2013) using multistage sampling technique found that households which received training on agricultural production were more likely to sell through farm gate as opposed to cooperative, households that had information of market prices preferred to sell on their own than to sell through the dairy cooperatives, households producing more milk volumes had a higher likelihood of selling through cooperatives and households that were headed by more educated heads sold more through the cooperatives than through the middlemen. The dependent variables were identified as farm gate, middlemen and own distribution. Although the study was done in the same area it did not consider cooperatives and selling to processors as is in this study. These studies did not address customer proximity, information access and transport infrastructure as factors that determine choice of customer by small scale dairy farmers in Kenya. This study intends to fill that gap.

2.4.3 Volume of Milk Produced and Choice of Customer

Studies have reported herd size being a significant determinant in market channel participation for modern market channels (Tsougiannis et al., 2014). As the herd size increases, farmers' shift to more organized dairy channels hence the negative relationship with farm gate and middlemen which could be argued to be less organized. Large producers are likely to get price incentives or higher prices for their milk because of high bargaining power as well as lower terms of trade which could be achieved in more organized market channels like cooperative societies. In addition, the number of animals kept by the farmer determines the total production costs and therefore influencing the amount of working capital needed on the farm forcing farmers with a large herd size to prefer supplying their milk to channels that handle big volumes and pay the whole lump sum milk revenues for continuity running of their dairy operations. However, these results are contrary to Vijay, et al. (2014) work who noted a negative relationship between herd size and choice of cooperative choice of customer among dairy farmers. This could be likely a case where farmers in cooperatives receive the same price like in other channels and in situations where there is no price incentive to farmers irrespective of quantity of milk they supply.

In their study of investigating the elements influencing smallholder agriculturalists' adoption of particular milk-promoting networks in Kenya, Ombui, et al. (2013) observed that most farmers preferred choice of customers that operated to benefit them. They preferred organizing themselves to form small-scale Co-operatives where they are involved in collecting, processing,

marketing and value addition of milk. Joint action assists moderate farmers to accomplish some degree of power to bargain, economies of scale and costs related to transaction. Murage (2012) examined the determinants of smallholder dairy farmers' use of breeding services in Nyandarua and Kiambu.

2.4.4 Terms of Trade and Choice of Customer

A study carried out in Nyabihu district, Western Province of Rwanda titled Analysis of Institutional Factors Influencing Farmer's Choice of Milk Choice of customer in Rwanda by Minagri (2016), made conclusion that access to market information, access to credit, form of payment and contract marketing influenced farmers' choice of choice of customers.

Data was collected by use of structured questionnaires on 96 respondents. Multinomial logit regression model was employed to estimate the data. The researcher considered two milk choices of customers in Rwanda formal and informal. This is different from the situation in this study which has four namely cooperatives, direct sale, sale through brokers and sale to processors. The researcher did not address the issue of price offered by the customer.

2.5 Summary of Literature and Gaps

Table 2.1 Gaps

Study	Variables Studied	Gaps
Factors affecting milk outlet choice in Wolaita Zone, Ethiopia (2013)	Individual consumer, cooperative, hotel, access to market information, distance to nearest market, dairy farming experience, land holding size and milk price per outlet.	The study was carried out in Ethiopia whereas this study was carried out in Kenya. The study did not specify whether was general but this study specifies small scale dairy farmers. Multinomial logit model was used for data analysis whereas this study used chi square. The study did not consider processors as possible customers the study did not consider state of road infrastructure, it ignored mode of transport.
Vertical and Horizontal Integration as Determinants of Market Channel Choice among Smallholder Dairy Farmers in Lower Central Kenya. (Mutura, Nyairo, Mwangi & Wambugu, (2013).	Level of education, milk output, access to information and transaction costs	The study used multistage sampling while current study used descriptive research design. The study used Multinomial logit regression model while the current one used chi square.
Determinant of market channel participation for modern market channels (Tsougiannis et al., 2014).	Level of education, milk output, access to information, transaction costs farm gate over cooperative societies and farmer training	Sale to brokers and sale to processors were not considered as customers. Multinomial logit regression model (MNL) was used to analyze factors influencing the choice of dairy market outlet by the small

<p>Murage (2012) examined the determinants of smallholder dairy farmers' use of breeding services in Nyandarua and Kiambu.</p>	<p>Terms of trade on choice of customer by small scale dairy farmers yielded a major gap in that viewed terms were in form of incentives, payment in cash or credit and if any contract existed. This is research views terms of trade in form of price offered, length of time taken to receive payment, and whether contacts are written or implied</p>	<p>holder dairy farmer whereas the current study used chi square. The study used multistage sampling while current study used descriptive research design</p>
<p>A study carried out in Nyabihu district, Western Province of Rwanda titled Analysis of Institutional Factors Influencing Farmer's Choice of Milk Choice</p>	<p>Local vendors, brokers, milk collection centers, forms of payments access to market information, cooperative membership and contract farming.</p>	<p>The research was carried out in Rwanda. Multinomial Logit regression model was employed to estimate the data. Processors and direct sales were not considered as it is in this study. State of road infrastructure and nature of contracts were not considered in the earlier study but they were included in this study.</p>

2.6 Conceptual Framework

Conceptual Framework describes or depicts the researcher's perception of how study variables relate to each other (Regoniel, 2015). It's the researcher's road map in undertaking the study and identifies the variables that the researcher requires in the investigation. The conceptual framework in this study consists of two variables, namely; Independent and Dependent variables. An independent variable, also called predictor variable is one whose change causes a change in the dependent variable (McLeod, 2018). A dependent variable, also called outcome variable is one which varies as a result of variations in the independent variable (McLeod, 2018) dependent variable is milk choice of customers adopted by Small scale dairy farmers 'whose indicators includes cooperative society, Direct selling, through brokers. This study seeks to determine the factors affecting milk choice of customers adopted by Small scale dairy farmers in Kenya. In this study the Independent Variables are; Distance to selling point (KM), volume of milk produced (litres) and service offered.

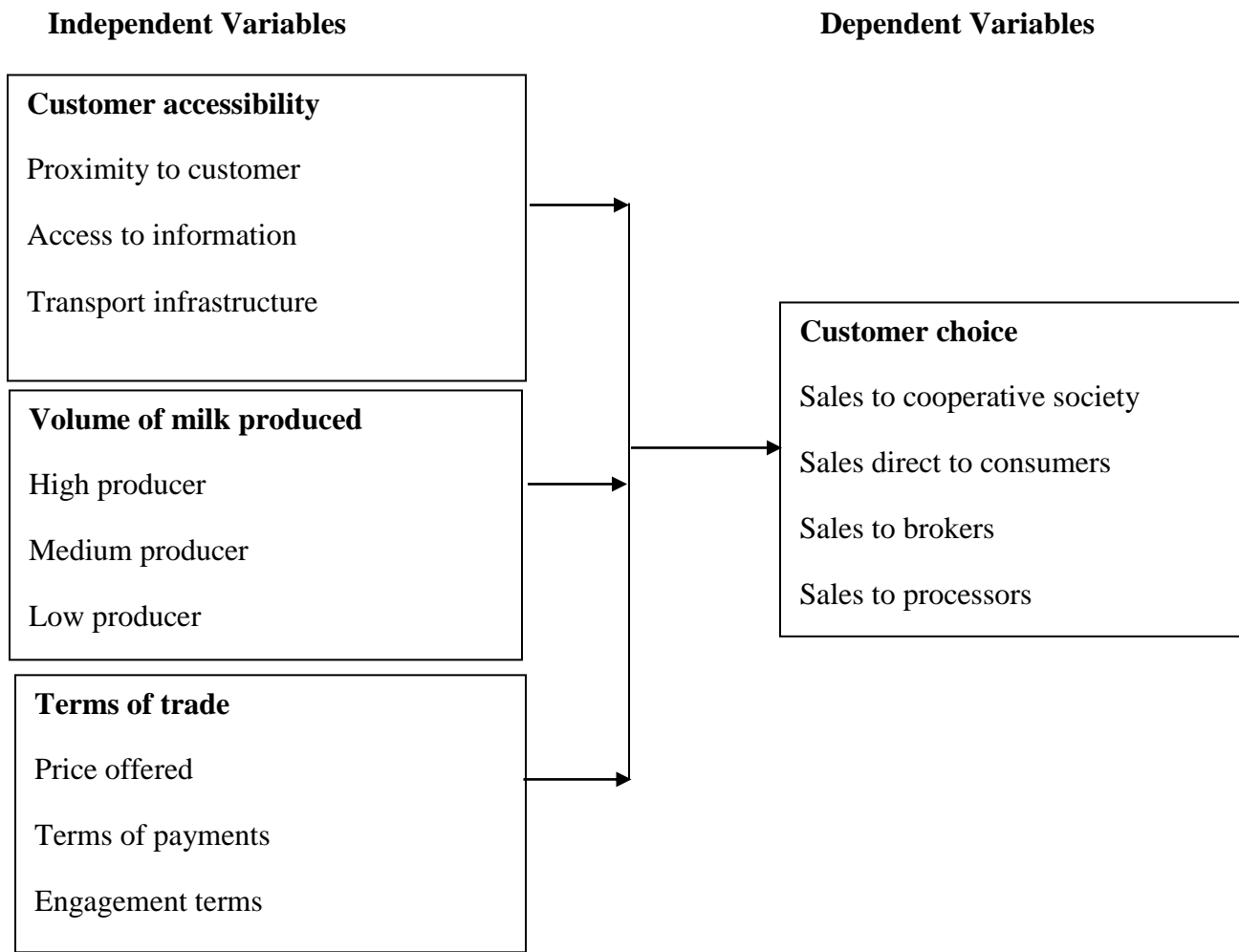


Fig. 2.1 Conceptual Framework: Source (Researcher, 2020)

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the research methodology and covers research design, population, sampling strategy, data collection tools and analysis techniques, employed to realize the research objectives. The chapter provided a systematic approach to which the objectives were tested and fulfilled.

3.2 Research Design

The study adopted descriptive research design because of its ability to describe characteristics of a population under study as well as the phenomena being studied as it is, without any manipulation. The study was more concerned with determinants of small scale dairy farmers' choice of customer in Kenya.

3.3 Target Population

Kothari, (2008) defines population as any group that shares similar characteristics or common traits and therefore refers to the entire group of people, events or objects of interest that a researcher wishes to investigate. The population should possess some common characteristics thus making it possible for the researcher to draw the study sample, in this case; the study targeted 1.5 million small scale dairy farmers in Kenya (IFAD, 2019).

3.4 Sample Size and Sampling Technique

The study employed Krejcie & Morgan (Appendix IV) to determine the sample size from a target population of 12787 at a confidence level of 95% which was 375 small scale farmers. Using Stratified sampling technique, the researcher prorated respondents in each ward as follows:

Table 3.1: Number of Small-Scale Dairy Farmers

Ward	Prorated Sample size per ward	Sample size
Githiga	375/5	75
Githunguri	375/5	75
Ikinu	375/5	75
Komothai	375/5	75
Ngewa	375/5	75
Total		375

Simple random sampling method was applied to determine the individual dairy farmer to participate in the study.

3.5 Data Collection Instrument

Structured questionnaire that had five parts was administered to the respondents by the researcher and his assistants. Part A solicited general information of respondents, parts B, C, D targeted independent variables and part E targeted dependent variables.

3.6 Data Collection Procedures

Upon acceptance of the research proposal by Cooperative University the researcher sought authority to conduct research from the National Council for Science, Technology and Innovation. Thereafter the researcher sought a formal request from the county government of Kiambu to commence on data collection.

3.7 Pilot Study

Validity and reliability of the instrument was tested through a pilot study.

3.7.1 Validity of Data Collection Instrument

Qureshi, (2016), defines validity of a research instrument as the extent to which the research instrument measures what it's intended to measure. The research instrument in this study was a structured questionnaire. Staff members from the Department of Co-operatives and Agribusiness Management of The Cooperative University of Kenya validated the instrument.

3.7.2 Reliability of Research Instrument

The measure of how consistent a research instrument is consistent with results is known as reliability of the research instrument (Surbhi, 2017). Cronbach alpha test with $\alpha \geq 0.7$ was considered reliable and acceptable for this research.

3.8 Data Analysis and Presentation

To identify omissions and remove non-answered questions, data was screened. Thereafter the data was coded and grouped into various categories. Analysis was both qualitatively and quantitatively. Quantitative data was analyzed using descriptive and inferential statistics. Frequency distribution and percentages was used for descriptive analysis while Chi square test ($P < 0.05$) was used to infer if significant relationship existed between the independent and dependent variables.

Table 3.2: Operationalization and Measurement of Variables

Variable	Type	Operationalization	Operational definition of variable	Measurement	Hypothesized direction
Accessibility to the customer.	Independent variable	Proximity to the customer	Proximity means how close a customer is from the farm gate.	ordinal	Customer chosen with short distance.
		Information access from the customer.	How fast there is exchange of information between the two parties.	ordinal	Customer chosen with shorter information access.
	Independent variable	Transport infrastructure	It is the state of the road to the delivery point accessible	Ordinal	Customer chosen with good state of the road.
Volume of milk produced	Independent variable	High producer Middle producer Low producer	Volume of milk produced.	Nominal	Customer chosen based on volume of milk they can purchase
Terms of trade		Offer price	Amount of money offered by the buyer.	Nominal	Customer chosen based on amount offered
		Terms of payment	Cash/Credit on delivery or deferred payment.	Nominal	Choice of customer based on cash requirements
	Dependent	Engagement terms	Number of	Ordinal.	

variable		days it takes to get paid		rt
	Terms of contract	Written or verbal	Nominal	Customer chosen based on how fast they can pay
Choice of customer	Sale to Co-operative Society	Agreement with the customer	Ordinal	
	Direct Selling to consumer		Nominal	
	Sale to Brokers		Nominal	
	Sale to Processor		Nominal	

3.9 Ethical Considerations

Confidentiality of data and the participants was adhered to by ignoring any information could reveal the identity of a respondent, the principle of voluntary appearance was followed and finally the study objective was revealed to the participants from the start.

CHAPTER FOUR: DATA ANALYSIS FINDINGS AND INTERPRETATION

4.1 Introduction

This chapter presents results from data analysis and discusses the findings of the study in line with the stated objectives. The first part gives a descriptive analysis of responses per variable followed by an inferential analysis using chi square per objective.

4.1.1 Response Rate

The sample size for the study was 375 respondents. Out of 375 questionnaires administered 350 were returned giving a response rate of 93.3%. The response rate was achieved because enumerators contacted respondents face to face and any query that arose was resolved immediately.

4.1.2. Respondents Background Information

The study sought to establish respondents' bio data in terms of age, level of education, experience in dairy farming, if they were members of farmers groups and if they had other sources of income. This is shown in Table 4.1.

Table 4.1 : Respondents Background Information

Variable	Category	Frequency	Percentage
Age	20-25 Years	38	10.8
	26-30 Years	43	12.3
	31-35 Years	138	39.4
	Above 45 Years	131	37.4
	Total		350
Level of Education	Primary	158	45.1
	Secondary	136	38.9
	College	32	9.1
	University	24	6.9
	Total		350

Experience in Dairy Farming	1-5 Years	38	10.8
	5-10 Years	72	20.5
	10-15 Years	116	33.1
	Over 15 Years	124	35.4
	Total	350	100.0
If respondent is member of farmer's groups?	Yes	194	55.43
	No	156	44.57
	Total	350	100.0
If farmer has other Sources of Income?	Yes	290	82.86
	No	60	17.14
	Total	350	100.0
Sources of other income	Farm produce	191	54.57
	Employment	60	17.14
	Business	51	14.57
	Pension	31	8.86
	Other activities	17	4.86
	Farm produce	191	54.57
	Total	350	100.0

In terms age, the study found that 76.8% of respondents were more than 31 years. Majority of the respondents were elderly and therefore appreciated the importance of the study. The researcher concluded that the findings were as a result of young people not owning land and in most cases they are in colleges. Respondents with primary level of education constituted 45.1% while 38.9% had secondary education with 16% college and university level. The researcher interpreted this to mean that the dairy farming was practiced by educated farmers who could make informed decisions. Regarding years of experience in dairy farming, 68.5% had more than 10 years' experience. This was perceived to be an indicator that dairy farming was sustainable. This meant that the respondents were conversant with milk marketing and their responses reflected a true picture of determinants of small scale dairy farmers' choice of customer.

Regarding membership to farmers groups, 55.43 of the respondents were members of farmers groups. The researcher interpreted it to mean that there were benefits derived from such membership. Finally the study sought to determine whether respondents had other sources of income. Findings indicated that 82.86 % had other sources of income. Other farm activities as a source accounted for 54.57 % followed by employment at 17.14 %, businesses accounted for 14.57 % while 8.86 % were pensioners and 4.86 % of the respondents indicated they had income from other activities. This was interpreted to mean that income from dairy farming subsidized income generation in the area of study.

4.2 Choice of Customer by Small Scale Dairy Farmers

The study sought to establish choice of customer by small scale dairy farmers in Kenya. The findings are as shown in table 4.2:

Table 4.2 Farmers Choice of Customer

Choice of Customer	Frequency	Percentage
Sale Cooperative societies	130	37.0
Sale Processors	54	15.0
Sale to Brokers	70	20.0
Direct Sale	98	28.0
TOTAL	350	100

The findings indicated that 37.0% of the respondents preferred cooperative societies as their customers of choice followed by direct sales at 28.0%, brokers at 20.0% and processors at 15.0%. The findings were attributed to respondents' membership to farmers groups.

4.3 Customer Accessibility and Choice of Customer by Small Scale Dairy Farmers

The first objective of the study was to determine the effect of customer accessibility on choice of customer by small scale dairy farmers in Kenya. Distance of customers' location from respondents' farm gate, source of information on milk marketing, frequency of communication with customer, mode of transport used and state of roads were parameters for this objective. Results are indicated below:

4.3.1 Distance Customers' Location from Respondents' Farm Gate

The study sought to establish distance of customers from respondents' farm gate. The findings are as shown in table 4.3 below:

Table 4.3 : Distance Customers' Location from Respondents' Farm Gate

Distance	Frequency	Percentage (%)
0 KM to 2 KM	77	22
2KM-3KM	205	58.57
More than 3 KM	68	19.43
Total	350	100.0

The study found that 58.57 % of the respondents' customers were within a radius of 2 to 3km while 22% indicated a distance of less than 2 km and 19.43% were located more than 3km from the respondent's farm gate. This was interpreted to mean that respondents delivered their milk to centralized locations. Those who were located within 2km radius could be direct sales. This is supported by the findings of the study that cooperatives and direct selling were the most preferred customers.

4.3.2 Sources of Information Regarding Milk Marketing

The study sought to establish respondents' sources of information regarding milk Marketing.

The findings are as shown in table below:

Table 4.4 : Sources of Information Regarding Milk Marketing

Source	Frequency	Percentage (%)
Leaders and farmers representatives	125	35.71
Others farmers and friends	115	32.86
Direct communication with customer	70	20.0
All of above	40	11.43
Total	350	100.0

The study found that the most dominant source of marketing information was leaders and farmers representatives at 35.71 % followed by other farmers and friends at 32.86 % while 20.0% indicated direct communication with customer. 11.43 % indicated they gathered information from multiple sources. The study concluded that farmers’ representatives were elected officials in the farmers groups and as such their information was dependable.

4.3.3 Frequency of Communication with Customers

The study sought to establish frequency of respondents’ communication with customers.

The findings are as shown in table below:

Table 4.5 : Frequency of Communication With Customers

Timing	Frequency	Percentage (%)
Weekly	119	34
Monthly	67	18.29
Quarterly	101	28.86
Never	63	17.14
Total	350	100.0

Majority (34 %) of the respondents communicated with their customers on weekly basis, 28.86 % indicated they communicated quarterly, 18.29% communicated monthly while 17.4% indicated that they didn’t communicated with their customers.

4.3.4 Mode of Milk Transport

The study sought to establish how farmers transported milk to customers from farmers who participated in the study.

The findings are as shown in table 4.6 below:

Table 4.6 Mode of Milk Transport

Mode	Frequency	Percentage (%)
Bicycle	78	22.3
Motor Bike	47	13.4
Customer Collects	85	24.3
Human Potters	140	40
Total	350	100

The study found that human potters were the most common at 40.0%. Collection by customers accounted for 24.3%, transport on bicycles 22.3% and motor bikes at 13.4%

4.3.5 State of Roads

The study sought to determine respondents' perception of the state of roads in the area of study.

The findings are as shown in table 4.7 below:

Table 4.7 : Description of the State of Roads

Description	Frequency	Percent
Easily Accessible	138	39.4
Accessible	53	15.2
Moderately Accessible	105	30
Inaccessible	39	11.1
Totally Inaccessible	15	4.3
Total	350	100.0

The study established that 39.4% of the respondents described the roads as easily accessible, 15.2% as accessible with 30% describing them as moderately accessible 15.4 % described the roads as inaccessible at 11.1 % or totally 4.3 %.

4.3.6 Inference Analysis of Customer Accessibility on Choice of Customer

A chi square test was done to determine the degree and level of relationship between customer accessibility on choice of customer at 95percent level of confidence (0.05). The findings are in the table below.

Table 4.8 Chi-Square Tests for Customer Accessibility and Choice of Customer

Choice of Customer * Customer Accessibility Cross Tabulation		farm gate				Total
		Count	Less than 1 Km	1-2 Km	2 to 3 km	
choice of customer	cooperative society	24	20	53	33	130
	Direct sales	38	41	19	0	98
	Sales to brokers	54	16	0	0	70
	sales to processors	32	9	8	3	52
	Total	148	86	80	36	350

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	143.121 ^a	9	.000
Likelihood Ratio	163.769	9	.000
Linear-by-Linear Association	80.224	1	.000
N of Valid Cases	350		

Table 4.8 shows a calculated Chi-square value of $\chi^2 = 143.121$ at a significance level of $p < 0.05$ which was found to be greater than the tabled critical value of $\chi^2 = 16.919$. This established that a strong relationship existed between customer accessibility and choice of customer. This meant that improved customer accessibility influenced choice of customer by the respondents. The findings were consistent with findings by Milczarek et al (2008) where proximity to collection point facilitated retention of old customer. These findings collaborated earlier reports that farmers with access to marketing information coupled with high level of education are assumed to have higher ability to utilize the information to new customers (Elzo et al., 2010).

4.4 Volume of Milk Produced and Choice of Customer

The second objective of the study was to examine the effect of the volume of milk produced on choice of customer by small scale dairy farmers in Kenya. Size of land in acres, number of cows milked, litres of milk produced per day variations in the volume of milk bought were considered. Results are indicated below.

4.4.1 Size of Land in Acres

The study sought to determine respondents' size of land in form of acre age

Table 4.9: Size of Land in Acres

Size Of Land	Frequency	Percentage (%)
Less than 1acre	175	50.0%
Between 1 and 2 acres	126	36.0%
More than 2 acres	49	14.0%
TOTAL	350	100

The study sought to determine sizes of land owned by respondents in the study area. 50.0% had less than 1 acre, 36.0% had between 1 and 2 acres while 14.0% had more than 2 acres.

With 86.0 % owning less than 2 acres, the respondents were found to fit in the target population of the study.

4.4.2 Number of Cows Owned by Small Scale Dairy Farmers

The study sought to find number of cows owned by respondents.

The findings are as shown in table below:

Table 4.10: Number of Cows Owned by Small Scale Dairy Farmers

No. Of Cows	Frequency	Percentage (%)
1 cows	17	4.86
2 cows	34	9.71
3 cows	105	30.00
4 cows	120	34.29
More than 4 cows	74	21.14
TOTAL	350	100.0

The study found that 34.29 % respondents had 4 cows, 30% had 3 cows, 21.14 % had more than 4 cows and 14.57 % had between 1 and 2 cows. The findings befit the researcher's definition of small scale dairy farmers. The results qualify the respondent as target population for the study.

4.4.3 Liters of Milk Produced Per Day

The study sought to establish number of liters of milk that respondents' cows produced.

The findings are as shown in table below:

Table 4.11: Litres of Milk Produced Per Day

Volume (Litres)	Frequency	Percentage (%)
1-20	65	18.57
21-40	150	42.86
Above 40	135	38.57
Total	350	100.0

The study found that 42.86 % of the respondent's produced 21 to 40 liters of milk per day, followed by 38.57 % who indicated they produced more than 40 liters while 18.57 % of respondents produced less than 20 liters of milk per day.

The researcher interpreted that the respondents were medium and low producers of milk. This may explain why they chose different customers.

4.4.4 Farmers Perception of Volume of Milk Purchased and Choice of Customer

The study sought to determine the respondents' perception on the variations of milk purchased.

The results are as indicated below

Table 4.12: Extent of Variation on Milk Purchase

Extent	Frequency	Percentage (%)
Very large	140	40.0
large	70	20
Moderate	84	24
Low	36	10.29
Very low	20	5.71
Total	350	100

The study sought to determine the extent to which customers demand for milk varied. Findings indicated that 40.0 % of the respondents experienced variations to very large extent, 20% indicated to a large extent, 24.0% indicated moderate extent, while minority; 16.0 % indicated variations were between low and very low extent accounting.

Table 4.13: Chi Square Between Volume of Milk Produced and Choice of Customer

Choice of customer * Volume of milk Cross Tabulation					
Count					
		volume of milk			Total
		1-20 litres	21-40	more than 40 litres	
Choice-of customer	cooperative society	20	83	27	130
	Direct sales	71	22	5	98
	Sales to brokers	34	27	9	70
	sales to processors	20	19	13	52
Total		145	151	54	350

Chi-Square Tests

	Value	df	Asymp. (2-sided)	Sig.
Pearson Chi-Square	81.092a	6	.000	
Likelihood Ratio	85.798	6	.000	
Linear-by-Linear Association	5.907	1	.015	
N of Valid Cases	350			

A Chi-square value of $\chi^2 = 81.092$ at a significance level of p value < 0.05 was found to be greater than the tabled critical value of $\chi^2 = 12.592$. It can be interpreted that, statistically, there was a strong relationship between volume of milk produced and choice of customer by the respondents. The study agrees with Tsougiannis et al., (2014), who reported volume of milk being a significant determinant in market channel participation for modern market channels. According to the study as the herd size and volume of milk increases, farmers' shift to more organized dairy channels hence the negative relationship with farm gate and middlemen which could be argued to be less organized.

4.5 Terms of Trade and Choice of customer by Small Scale Dairy Farmers

The third objective of the study was to determine whether terms of trade determined choice of customer by small scale dairy farmers in Kenya. Respondents involvement in milk pricing decisions, terms of payments, frequency of payment, contract and disputes mechanisms were used as the parameters to be analyzed.

4.5.1: Extent of Involvement in Milk Pricing Decisions

The study sought to determine the extent to which the respondents were involved in pricing decisions. The responses are as indicated below

Table 4.14 : Extent of Involvement in Milk Pricing Decisions

Extent	Frequency	Percentage (%)
Very large	11	3.14 %
large	35	10.0 %
Moderate	52	14.86 %
Low	56	16.0 %
Very low	196	56.0 %
Total	350	100

Respondents were asked to their level of involvement in pricing decisions. The study found that 56% of the respondents were involved to a very low extent, 16% to a low extent, 14.86% were moderately involved while 10% were largely involved in milk pricing decisions. The researcher attributed this to the oligopsony structure of milk markets.

4.5.2 Duration of Payment

The study sought to determine the duration it took the respondent to receive payment

The results are as indicated below

Table 4.15 Duration of payment

Duration of Payment	Frequency	Percentage (%)
1. Instant	55	15.7 %
2 weekly	67	19.14 %
3. Fortnightly	31	8.88 %
4. Monthly.	157	44.8%
5. Over one Month	40	11.4.0 %
Total	350	100

The study found that majority of the respondents 44.8% were paid monthly with 11.4% waiting for longer than months .15% of the respondents were paid instantly, 19.14 % weekly, while 8.8% indicated they were paid fortnightly. This was interpreted to mean that each alternative customer had arrangements regarding payments with the farmer. Since majority sold to the cooperatives this is why 44.8% were paid monthly.

4.5.3. Contracts with Customers

The study sought to establish whether respondents had contracts with customers.

The findings were as indicated below.

Table 4.16 Contracts with Customers

Contract	Frequency	Percentage (%)
Contracts	224	64%
No contract	119	34%
Total	350	100

The findings indicated that 64% had contracts while 34% indicated they had no contract.

4.5.3. Nature of Contracts

The study sought to determine whether the contracts were written or implied.

The results are as indicated below.

Table 4.17 Nature of Contracts

Nature of Contract	Frequency	Percentage (%)
Implied contracts	217	62.0%
written contracts	133	38.0%
Total	350	100

62.0% of the respondents had no written contracts. 38.0% indicated they had written contracts.

These results could be attributed to level of trust the respondents had with their customers.

4.5.4 Reasons for Signing Contracts.

The study sought to determine reasons for signing contracts indicated. The findings are as shown in Table below

Table 4.18 Reasons for Signing Contracts

Reason	Frequency	Percentage (%)
Customer dependability	134	38.29
Provision of inputs	91	26.0
Hedge Fluctuation of milk prices	70	20.0
Routine	35	10.0
Others	20	5.71
Total	350	100.0

The results show that the main reason for signing contracts 38.29% was for guaranteeing the farmers market for milk. This was interpreted to mean that neither the producer nor the customer could vary the amount of milk they traded in independently. 26% signed so that they could get farm inputs from the customer. This was attributed to membership of farmers groups that provided respondents with farm inputs on credit guaranteed with milk delivery.

4.5.5. Existence of Business Disputes

The study sought to establish whether the respondents had any business dispute with their customer.

The results are as indicated below

Table 4.19 Existence of Business Disputes

With disputes	Frequency	Percentage (%)
YES	63	18
NO	287	82
Total	350	100

The findings were that majority of the respondents 82 % indicated that they had not had any business dispute with their customers as opposed to 18 % who indicated had experienced disputes with their customers. This indicated existence of a good relationship; the above results portray a high level of trust between the respondent and the customer.

4.5.6. Extent of Effects of Business Dispute with Customers' Relationship

The study sought to establish the extent of effect of business dispute with customers' relationship.

The results are as indicated below

Table 4.20 Extent of Business Dispute with your Customer

Extent	Frequency	Percentage
Very large	55	15.71 %
large	175	50.0 %
Moderate	70	20.0 %
Low	27	7.71 %
Very low	23	6.57 %
Total	350	100

15.71% indicated that disputes had affected their relationships to very a large extent, the majority which comprised of 50% indicated that disputes had affected their business relationships to a large extent, 20.0% indicated it affected only to a moderate extent with 7.71 % to low extent while 6.57 % to very low extent. This portrayed a high level of trust between parties.

4.5.7 Chi Square between the Terms of Trade on Choice of customer of Customer by Small Scale Dairy Farmers

For further tests, inferential statistical analysis was computed and a chi square developed out to test the degree and level of relationship between terms of trade on choice of customer of customer by small scale dairy farmers in Kenya at 95percent level of confidence (0.05).

Table 4.21 Chi Square between Terms of Trade and Choice of Customer of Customer by Small Scale Dairy Farmers

Choice of customer * Duration terms of Payment Cross Tabulation							
Count							
		Duration terms of payment					Total
		Instantly	weekl y	Fortnightly	Monthly	more than 1 month	
choice of customer	cooperativ e society	1	1	1	88	39	130
	Direct sales	33	36	15	13	1	98
	Sales brokers	21	28	5	16	0	70
	sales processors	0	2	10	40	0	52
Total		55	67	31	157	40	350

Chi-Square Tests

	Value	Df	Sig.
Pearson Chi-Square	256.493a	12	.000
Likelihood Ratio	304.415	12	.000
Linear-by-Linear Association	32.227	1	.000
N of Valid Cases	350		

A Chi-square value of $\chi^2 = 256.493a$ at a significance level of p value <0.05 was found to be greater than the tabled critical value of $\chi^2 = 21.026$. It can be interpreted that, statistically, there was a strong relationship between duration of payment and choice of customer by the respondents. The study finding agree with another research carried out in Nyabihu district, Western Province of Rwanda titled Analysis of Institutional Factors Influencing Farmer's Choice of Milk Choice of customer in Rwanda by Minagri (2016), made conclusion that access to market information, access to credit terms of payment and contract marketing influenced farmers' choice of choice of customers. The study supports results of Kadigi (2013) who revealed that terms of payment based on duration of payment and favorable choice of customer helps farmers in expanding their scale of operation.

CHAPTER FIVE: DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter has four parts. It starts with discussions of the research findings, followed by conclusions and finally the researcher's recommendations. It concludes with the suggestions for further research.

5.2 Discussions

5.2.1 Customer Accessibility

Findings of the study indicate that several factors determine choice of customer by small scale dairy farmers in Kenya. Customer's location from the farmers' farm gate was found not very critical in choice of customer. This was attributed to the location of milk collection centers for consolidation. The study found that the most dominant source of information was leaders and farmers representatives. This supported findings that majority of the respondents were members of farmers groups. Communication with customers was rare with 29% communicating quarterly. This could be when they held group meetings. Human porters were the main mode of transport despite the roads being described as easily accessible by majority of the respondents. This meant that improved customer accessibility influenced choice of customer by the respondents.

5.2.2 Volume of Milk Produced

The study found that volume of milk produced determined choice of customer by small scale dairy farmers in Kenya. Most farmers owned between 1 and two acres of land and were medium producers of milk with output ranging between 21 and 40 litres per day. As the farmers milk production increased, the farmers indicated that they preferred Cooperatives. On the other hand, when the milk production reduced the farmers indicated their preference of direct selling and brokers. Amount of milk purchased by customers varied to a large extent from time to time.

5.2.3 Terms of Trade

The study found out most of the small-scale dairy farmers was not involved pricing decisions. This could be attributed to farmers' group leaders negotiating pricing decisions on their behalf. Payment depended on the customer that the farmer chose. Cooperatives paid monthly while those who made direct selling varied on frequency of payments. Majority of the farmers had

implied contracts with only 26% who had signed contracts mainly for the purpose of getting farm inputs.

5.3 Conclusion of the Study

5.3.1 Customer Accessibility

The study conclude that accessibility of market is a crucial determinate in the choices of customers where the road accessibility was found to be key issue. The study recommends that County Governments allocate more funds to improve the state of roads so that farmers can easily access their customers of choice.

5.3.2 Volume of Milk Produced

The study found small scale dairy farmers choice of customer was determined by the volume milk they produced. This can be explained to mean that some of the customers demand for milk could be lower than others hence the farmer chose the one who made economic sense. Most farmers produced more than 40 litres of milk per day.

5.3.3 Terms of Trade

The study concluded that customer accessibility, volume of milk produced and terms of payment determined choice of customers in Kenya. The study concluded that majority of farmers preferred dairy Co-operatives and direct selling. Majority of farmers tend to go for those distribution channels that offer the highest price per litre of milk and favorable terms of payment due to the anticipated profit in the dry season when milk is scarce but when rains come there is high milk production provoking the laws of demand and supply.

5.4 Recommendations of the Study

5.4.1 Customer Accessibility and Choice of customer

The study recommends that county governments should invest in technology so that small scale dairy farmers can communicate with their customers in real time. Internet accessibility through installation of free ore subsidized Wi-Fi by Count Governments would be ideal. Allocation of more funds to improve the state of roads will also simplify customer accessibility which will in essence give the small scale dairy farmer room for bargain by virtue of more alternative markets.

5.4.2 Volume of Milk and Choice of Customer

The study recommends that county governments should develop policies that should enable small scale dairy farmers improve their livestock breeds for more milk production. That the National Government through the relevant Ministry and State Departments join hands with dairy cooperatives and undertake nationwide campaign to promote stocking of quality dairy breeds through easily accessible financial arrangements. County governments should encourage smallholder dairy producers to form dairy marketing cooperatives.

5.4.3 Terms of Trade and Choice of Customer

The study recommends that farmers should be educated on the importance of written contracts. It further suggests that county governments should set legal frameworks so that farmers are involved in the setting of milk prices. Setting minimum guaranteed returns to the farmer was recommended as a way of boosting milk production which will lead to food security.

5.5 Suggestions for Further Research

In view of the study findings, the researcher recommends research on the influence of gender and income levels in choice of customer by small scale dairy farmers in Kenya. Determinants of choice of customer by large scale dairy farmers are another area that needs to be researched on. Findings of the two can help redefine milk marketing policy in Kenya.

REFERENCES

- Ajwang, F. O. (2014). *Factors influencing smallholder dairy farmers' choice of milk marketing outlet in Kipkaren Division of Nandi County, Kenya* (Doctoral dissertation, Egerton University).
- Atieno, R., & Kanyinga, K. (2008). The revitalisation of Kenya Cooperative Creameries: The politics of policy reforms in the dairy sector in Kenya. *Future Agricultures Research Paper*, 9.
- Bhuyan, N. (2007). The role of character in ethical decision-making: *Journal of Value Inquiry*, 41(1), 45-57. Retrieved from <http://dx.doi.org/10.1007/s10790-007-9063-y>
- Borgen A; Nielsen B (2001). *Effects of acetic acid in control of seed borne diseases*. Proceedings of the BCPC symposium Seed treatment - challenges and opportunities 26-27/2-2001.
- Cazzuffi, C., & McKay, A. 2012 Rice market participation and channels of sale in rural Vietnam. In 2012 .*Conference of International Association of Agricultural Economics*, August 18–24, Foz do Iguacu, Brazil (No. 126566)
- CBS 2001 the 1999 *Population and Housing Census: Counting Our People for Development*. Volume 1, 2001. Ministry of Planning and National Development, Central Bureau of Statistics, Nairobi, Kenya, Pp 1-5.
- Cooper D. R, (2011). *Business Research Methods*, 12th Edition Florida Atlantic University-Boca Raton (Vol. 9). New York: McGraw-Hill Irwin.
- Elzo, A., Suwanasopee, T., Yeamkong, S., & Koonawootrittriron, S. (2010). Effect of experience, education, record, labor and decision making on monthly milk yield and revenue of dairy farms supported by a private organization in central Thailand. *Asian-Australian Journal of Animal Science*, 23, (2) 814-824.
- FAO, 2005.FAO action program for the prevention of food loses. Milk and dairy products, post-harvest loses and food safety in Sub-Saharan Africa and the near East. *Regional Approaches to National Challenges, Synproject Report*, International Livestock Research Institute, Addis Ababa, Ethiopia.

Fulton, Joan R. & Adamowicz, Wiktor L., (1993). "Factors That Influence the Commitment of Members to Their Cooperative Organization," *Journal of Agricultural Cooperation*, National Council of Farmer Cooperatives, vol. 8.

Gitau K. J (2013) factors influencing milk production among small scale dairy farmers in Mirangine in Nyandarua County and Mauche in Nakuru County, Kenya. (Unpublished PhD Thesis. JKUAT), Nairobi.

Gray, Thomas W. and Charles A. Kraenzle (1998), *Member Participation in Agricultural Cooperatives: A Regression and Scale Analysis*. Washington DC: Rural Business Cooperative Service Research Report 165, United States Department of Agriculture.

Hakelius, K., 1996. *Cooperative values: Farmers cooperatives in the minds of the farmers*. Ph.D. Thesis, Department of Economics, Swedish University of Agricultural Sciences, Uppsala.

IFAD (International Fund for Agricultural Development) 2019. Small Holder Dairy Commercialization Programme- Appraisal Report: Africa Division 11, Programme management Department. Rome, Italy.

Jari and Fraser (2009). Pig producers' choice of slaughterhouse – co-operative or investor-owned? *International Journal of Co-operative Management*, 2(2): 40-46.

Karanja, A. M. (2003). *The dairy industry in Kenya: The post-liberalization agenda*. Tegemeo Institute of Agricultural Policy and Development, Egerton University, Kenya.

Kibiego M B, L. J. (2015). Competitiveness of Smallholder Milk Production Systems in Uasin County of Kenya. *Journal of Economics and Sustainable Development* .www.iiste.org, 44.

Kuma B., Baker D., Getnet K. Kassa B. (2013). factors affecting milk outlet choice in wolaita zone, ethiopia. *African journal of agricultural marketing* . Volume 1 , 024-031.

Kuma, B, Baker, D, Getnet, K and Kassa, B.(2013) *Factors Affecting Milk Market Outlet Choices in Wolaita Zone*, Ethiopia. *African journal of agricultural research*. Vol 8(21):2493-2501.

Kurwijila, L. R. (2010). *An overview of the dairy industry in Tanzania: Situation, challenges and expectations*. In: Proceedings of the Agricultural Council of Tanzania Dairy Stakeholders forum held at Mkongwe Hotel, Tanga Tanzania, 10th December 2010.

Mabiso, A., Abouaziza, M., Wood, B., & Balint, T. (2018). *Ifad Impact Assessment - Project for Rural Income through Exports (PRICE)*: Rwanda. Mabiso, A., Abouaziza, M., Wood, BDK Balint.

Mills, H., Smart, A., & Bourne, M. (2005). Theory and practice in SME performance measurement systems. *International journal of operations & production management*, 21(8), 1096-1115.

Moran, J. (2009). *Business Management for Tropical Dairy Farmers*: Department of Primary Industries. Victoria. Landlinks Press, Australia.

Odero-Waititu, J. A. (2017). Smallholder dairy production in Kenya; a review. *Livestock Research for Rural Development*, 29(7).

Omore A, Muriuki H, Kenyanjui M, Owango M and Staal S J 1999 The Kenya Dairy sub-sector: A rapid appraisal. *MoA/KARI/ILRI Smallholder (Research and Development) Project Report*, Ministry of Agriculture (Kenya), Kenya Agricultural Research Institute (KARI) and International Livestock Research Institute (ILRI), Nairobi, Kenya. 51 pp.

Sarwar, A., Haque, A., & Yasmin, F. (2013). The usage of social network as a marketing tool: Malaysian Muslim consumers' perspective. *International Journal of Academic Research in Economics and Management Sciences*, 2(1), 93.

Staal S J, Chege L, Kenyanjui M, Kimari A, Lukuyu B, Njubi D, Owango M, Tanner J, Thorpe W and Wambugu M. Characterization of Dairy Systems Supplying the Nairobi market, *KARI/MoA /ILRI Collaborative Research Project Report*, Nairobi, Kenya, 69 pp.

APPENDICES

APPENDIX I: LETTER TO RESPONDENT

James Wanjau Kamamia,
The Co-operative University of Kenya
P O Box 24814-00502
Karen, Nairobi.
Mobile No: 0722663497

Dear respondent,

I am a student of the above-mentioned University and pursuing a Master's Degree in Co-operative management. I am requesting for candid information on the attached questionnaire to facilitate my research on determinants of small-scale dairy farmers choice of customer in Kenya, Kenya.

Duly completed questionnaires can be handed back to me.

I look forward for your favourable response and I pledge utmost confidentiality to information given. Thanks in advance for your time.

Yours Sincerely,

JAMES WANJAU KAMAMIA

APPENDIX II – QUESTIONNAIRE

PART A: GENERAL INFORMATION

Instructions

Please tick (✓) where appropriate or fill in the required information on the space provided.

1. Gender of respondent Male Female

2. Age category of respondents in years

Age	20-25	26-30	31-45	Above 45 years

3. Highest level of education Primary Secondary College University

4. What is your experience in dairy farming?

1-5yrs

5-10yrs

10-15yrs

Over 15yrs

5. Who is the main customer for your milk?

Direct selling

Dairy cooperative

Broker

Processors

6. Are you a member of a farmers' group? YES () NO ()

7. Other than dairy farming, do you have another source of income? YES () NO ()

If your answer to number 7 above is yes, indicate the source by ticking where appropriate.

- 1. Employment
- 2. Other farm produce
- 3. Pension
- 4. Business
- 5. Others Specify

PART B: CUSTOMER ACCESSIBILITY

1. How far is the customer located from your farm gate?

- 2. Less than 1km ()
- 1km-2km ()
- 2km-3km ()
- More than 3km ()

2. Which is your source of information regarding milk marketing Tick appropriately.

- Other farmers and friends ()
- Leaders and farmers representatives ()
- Direct communication with customer ()
- All of the above. ()
- Any other. Specify

3. How often do you communicate with your customer?

- Weekly ()
- Monthly ()
- Quarterly ()
- Never ()

4. How do you transport milk to the customers?

- Bicycle ()
- Motor bike ()
- Customer collects ()

Human potters ()

Any other. Specify

5. How can you describe the roads that you use to transport your milk?

Easily Accessible ()

Accessible ()

Moderately Accessible ()

Inaccessible ()

Totally inaccessible ()

PART C: VOLUME OF MILK PRODUCED

1. What is the size of your land in acres?

Less than 1acre () between 1 and 2 acres () more than 2 acres ()

2. How many cows are you milking this season? 1() 2() 3() 4() More than 4()

3. How many liters of milk do they produce per day in total? 1-20 () 21- 40 () above 40

4 Indicate to what extent your customer varies the amount of milk they buy from you on monthly basis indicating numbers between 1 and 5, where 5=VERY LARGE EXTENT and 1= VERY LOW EXTENT

Very large extent
large extent
Moderate extent
Low extent
Very low extent

5. Indicate to what extent to which the volume of milk available for sale influences decisions on your choice of customer by indicating numbers between 1 and 5, where 5=VERY LARGE EXTENT and 1= VERY LOW EXTENT

Very large extent	
large extent	

Moderate extent	
Low extent	

PART D: TERMS OF TRADE

1. **Indicate to what extent you are involved in milk pricing decisions indicating numbers between 1 and 5, where 5=VERY LARGE EXTENT And 1= VERY LOW EXTENT.**

Very large extent	
large extent	
Moderate extent	
Low extent	
Very low extent	

2. **How long does it take for your customer to pay you for delivered milk?**

- 1. Instant payment
- 2 weekly
- 3. Fortnightly
- 4. Monthly.
- 5. Over one Month

3. **Have you signed any contract with your milk buyer? YES () NO ()**

If yes, is contract in writing? YES () NO ()

3. **Indicate reasons for signing the contract in question 3 above.**

- a. customer dependability ()
- b avoid price fluctuations ()
- c it was compulsory ()
- d routine ()
- c other reasons () specify.....

5. Have you had any business dispute with your customer? YES () NO ()

If your answer to number 5 above is yes, to what extent did it affect your business relationship with the customer? Indicate numbers between 1 and 5, where 5=VERY LARGE EXTENT and 1= VERY LOW EXTENT

Very large extent	
large extent	
Moderate extent	
Low extent	
Very low extent	

PART E: CHOICE OF CUSTOMER






6. The table below shows alternative choice of customers. Please rank each in order of your preference when making a decision of whom to sell your milk to, where 5=most preferred choice of customer and 1= least preferred.

Choice of customer	Rank
Co-operative Society	
Direct Consumer	
Brokers	
Processors	
None of the above	

If your answer is “None of the above”, please specify your preferred customer.....

THANK YOU FOR PARTICIPATION

APPENDIX III: PERMIT FOR DATA COLLECTION FROM NACOSTI

 REPUBLIC OF KENYA	 NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION
Ref No: 548417	Date of Issue: 21/January/2020
RESEARCH LICENSE	
	
This is to Certify that Mr. James Kamamia of The Co-operative University of Kenya, has been licensed to conduct research in Kiambu on the topic: DETERMINANTS OF SMALL SCALE DAIRY FARMERS CUSTOMER CHOICE IN KIAMBU COUNTY KENYA for the period ending : 21/January/2021.	
License No: NACOSTI/P/20/3517	
548417 Applicant Identification Number	 Director General NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION
	Verification QR Code 
NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.	

APPENDIX IV - KREJCIE & MORGAN SAMPLING TABLE

<i>N</i>	<i>S</i>	<i>N</i>	<i>S</i>	<i>N</i>	<i>S</i>
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	100000	384

Note.—*N* is population size. *S* is sample size.

APPENDIX V: CHI SQUARE DISTRIBUTION TABLE

		Chi-Square (χ^2) Distribution							
		Area to the Right of Critical Value							
Degrees of Freedom		0.99	0.975	0.95	0.90	0.10	0.05	0.025	0.01
1		—	0.001	0.004	0.016	2.706	3.841	5.024	6.635
2		0.020	0.051	0.103	0.211	4.605	5.991	7.378	9.210
3		0.115	0.216	0.352	0.584	6.251	7.815	9.348	11.345
4		0.297	0.484	0.711	1.064	7.779	9.488	11.143	13.277
5		0.554	0.831	1.145	1.610	9.236	11.071	12.833	15.086
6		0.872	1.237	1.635	2.204	10.645	12.592	14.449	16.812
7		1.239	1.690	2.167	2.833	12.017	14.067	16.013	18.475
8		1.646	2.180	2.733	3.490	13.362	15.507	17.535	20.090
9		2.088	2.700	3.325	4.168	14.684	16.919	19.023	21.666
10		2.558	3.247	3.940	4.865	15.987	18.307	20.483	23.209
11		3.053	3.816	4.575	5.578	17.275	19.675	21.920	24.725
12		3.571	4.404	5.226	6.304	18.549	21.026	23.337	26.217
13		4.107	5.009	5.892	7.042	19.812	22.362	24.736	27.688
14		4.660	5.629	6.571	7.790	21.064	23.685	26.119	29.141
15		5.229	6.262	7.261	8.547	22.307	24.996	27.488	30.578
16		5.812	6.908	7.962	9.312	23.542	26.296	28.845	32.000
17		6.408	7.564	8.672	10.085	24.769	27.587	30.191	33.409
18		7.015	8.231	9.390	10.865	25.989	28.869	31.526	34.805
19		7.633	8.907	10.117	11.651	27.204	30.144	32.852	36.191
20		8.260	9.591	10.851	12.443	28.412	31.410	34.170	37.566
21		8.897	10.283	11.591	13.240	29.615	32.671	35.479	38.932
22		9.542	10.982	12.338	14.042	30.813	33.924	36.781	40.289
23		10.196	11.689	13.091	14.848	32.007	35.172	38.076	41.638
24		10.856	12.401	13.848	15.659	33.196	36.415	39.364	42.980
25		11.524	13.120	14.611	16.473	34.382	37.652	40.646	44.314
26		12.198	13.844	15.379	17.292	35.563	38.885	41.923	45.642
27		12.879	14.573	16.151	18.114	36.741	40.113	43.194	46.963
28		13.565	15.308	16.928	18.939	37.916	41.337	44.461	48.278
29		14.257	16.047	17.708	19.768	39.087	42.557	45.722	49.588
30		14.954	16.791	18.493	20.599	40.256	43.773	46.979	50.892

APPENDIX VI: MAP OF GITHUNGURI SUB-COUNTY, KIAMBU COUNTY, KENYA

