

**INFLUENCE OF CREDIT UTILIZATION BY SMALLHOLDER
FARMERS ON COFFEE PRODUCTION: A CASE OF KARITHATHI
FARMERS COOPERATIVE SOCIETY IN KIRINYAGA COUNTY KENYA**

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DECLARATION

This research project is my original work and has not been presented to any other University for award of a degree.

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DEDICATION

With sincere appreciation, I dedicate this work to my wife Eunah Wambui and son Ryan Kiai who have been my greatest source of strength, encouragement and unwavering support as I pursued my degree.

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LIST OF ACRONYMS AND ABBREVIATIONS

- AGRA - Alliance for Green Revolution in Africa.
- AFC - Agricultural Finance Corporation.
- AISP - Agricultural Input Subsidy Program.
- CAN - Calcium Ammonium Nitrate.
- CAGR - Compounded Annual Growth Rate.
- CBK - Coffee Board of Kenya.
- CCGS - Coffee Credit Guarantee Scheme.
- CIC - Coffee Industry Corporation.
- CoDF - Coffee Development Fund.
- CRF - Coffee Research Foundation.
- CSU - Credit and Savings Union.
- EC - European Commission
- FCS - Farmers Cooperative Society.
- FMC - Farmers Management Company
- GDP - Gross Domestic Product.
- ICO - International Coffee Organization.
- IFAD - International Fund for Agricultural Development.
- NAIVS - National Agriculture Input Voucher Scheme
- K - Kina (Papua New Guinea Currency).
- MK - Malawian Kwacha (Malawian Currency).
- MZCPU - Mzuzu Coffee Planters Cooperative Union.
- SACCO - Savings and Credit Cooperative.
- SPSS - Statistical Package for Social Scientists.
- USD - United States Dollar.
- VBRAD - Vietnam Bank for Agricultural and Rural
Development.

ABSTRACT

Credit helps in reducing poverty amongst small-scale farmers, by enabling them to increase agricultural productivity and this leads to improved standards. Ministry of Agriculture and Livestock lacks clear policy on how to deal with the problem of access to credit facilities by smallholder farmers hence leaving farmers to negotiate on their own with financial institutions. The Kenyan government has taken bold steps over the last twenty years, to increase access to affordable financing to smallholder coffee farmers.

Increase in coffee production has not been realized despite government commitment to waiving loans owed by smallholder coffee cooperatives societies amounting to Kshs 1.3 Billion and Stabex funds to the tune of Kshs 1.7 Billion. The research study specifically tried to establish the utilization of credit by smallholder coffee farmers and its influence on coffee production in Karithathi Farmers' Cooperative Society in Kirinyaga County.

Objectives of the research study were to: Assess the influence of cash advances utilization on coffee production, establish the influence that credit vouchers utilization have on coffee production and determine the influence of farm inputs credit utilization on coffee production.

Descriptive Survey design method was used, there are 2,378 active farmers in Karithathi Farmers Cooperative Society who formed the population of the study, owing to limited resources in form of finances and time that the researcher had, a sample of only 783 farmers of the target population. The study revealed that 61.51% of the farmers utilized their farm inputs on credit mainly fertilizers only in coffee farming while 38.49% of the farmers either diverted part or all farm inputs credit to farming other crops or sold it, the study found a positive relationship to those who utilized farm inputs on coffee and increase in coffee production. The use of farm inputs credit in coffee farming had a strong positive impact in increasing coffee production. The study also revealed that only 76.42% of the farmers had access to credit vouchers which they utilized for paying school fees thus it had no positive impact in increasing coffee production. All respondents in the study 82.64% had access to cash advances while 17.36% had no access to cash advances. Majority of those with access to cash advances 95.89% used it to pay school fees and attend to household needs with only 4.11% using the cash advances for paying labour. This had no impact in increasing coffee production.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Agriculture indirectly contributes 27 per cent of the country's GDP mainly in sectors associated with manufacturing and services and 60 per cent of foreign export earnings. The Kenyan economy is generally agro-based, the agricultural sector employs more than 80 per cent of Kenya's labour force and 57 per cent share of the national income both directly and indirectly(G.O.K, 2010)..

Over thirty percent of Kenya's agricultural produce is exported, and this represents 65 per cent of Kenya's total exports. The agricultural sector has over five million smallholder farmers involved in different types of agricultural activities in the country sector contributes, it also to 18 per cent of total official employment in the country. Coffee estates and coffee plantation farms of various sizes are fewer in number and make up a smaller part of the sector. Between the years 2001 and 2005, the official employment in the sector grew at a very slow rate of one per cent only, the exports expanded at a higher rate, of 8 per cent while the compound average growth rate in agriculture sector, was 5.2 per cent (Republic of Kenya, 2008).

French missionaries introduced coffee in Kenya in 1893 and has been cultivated for over a hundred years now. Kenya is one of finest producers of Arabica coffee in the world, the entire area under coffee production is approximated at 160,000 hectares under coffee with an approximately 700,000 growers producing mild Arabica coffees from commercial cultivars, both smallholder and large scale farmers are involved, with the former currently accounting for 55 percent of the total production with around 30 percent being in the plantation sector. There are two seasons in a year, the coffee which is harvested and processed in the months of September to December and marketed in the months between January to July is from the main season, which flowers in March/April. The coffee harvested in the months between April and June and marketed in the months between September and December is from the second season, also known as the Fly crop which flowers in the months between October to December. The

Government of Kenya, with the funding from the European Union (EU) started a coffee development program aimed at increasing coffee production in coffee growing areas in former Central and Eastern provinces of Kenya and new areas in formerly Rift Valley, Coast and Western provinces in Kenya. This was aimed at reinvigorating coffee farming which has faced stiff competition from real estate development and other commercial enterprises in rural and suburban areas in the last twenty years. Coffee restoration and improvement has also been taken up by county governments and have given it priority in their development plans (EC, 2013).

Smallholder coffee farms coordinated by producer and marketing cooperatives produced 56% of the 45,200 tonnes of coffee in the year 2005, with coffee estates making up for the remaining 44%. Productivity in large coffee estates was bigger than in smallholder farms by a factor of 10. Presently coffee is ranked fourth after tea, tourism and horticultural sectors coffee was Kenya's top foreign exchange earner before 1998 and (Government of Kenya, 2010). Coffee sector contributes 30% of the work force employed in the agriculture industry while contributing about 10% of the total agricultural export earnings, the sustenance of rural livelihoods is significantly contributed by the coffee industry. Coffee industry has about 700,000 Smallholder farmers in the coffee sector are estimated at 700,000 while small and medium coffee estate growers are estimated at 4,000 (Coffee Board of Kenya, 2012).

Coffee production has declined from a high of 130,000 tonnes in 1988, where it had peaked from 43,778 at Kenya's independence in 1963, in the last twenty years it has again fallen drastically to about 50,000 metric tons in 2011/12 season (C.B.K, 2012). Increasing coffee volumes and productivity per tree in the smallholder sector has been seen the government put in place policies for, new ways of increasing efficiency at production level while also finding ways of adding value and marketing coffee to increase coffee earnings. Costly farm inputs has led to farmers doing without them especially fertilizer and seeds, Huge yield losses have been also caused by poor coffee husbandry especially weeding and pruning, lack of pests and diseases control, limited knowledge on crop husbandry has been caused by lack of extension services to most farmers, most smallholder farmers are yet to adopt irrigation and depend on rainfall to do farming, low bargaining power with buyers and lack of diverse markets linkages, and limited application of agricultural technology and innovation are factors which have led to decrease in productivity. For some crops like wheat which is cultivated by large scale farmers, for some

crops cultivated by Kenyan farmers, the productivity is close to international standards, the yields are only 20% below yields realized in the United States of America. This indicates that it is possible to substantially raise levels of productivity in agriculture (Republic of Kenya, 2008).

Amongst small-scale farmers improving their living standards and their livelihoods requires credit which can help them increase productivity. In Kenya, access to financing by smallholder farmers has been dwindling over time, financial institutions consider smallholder farmers as high risk clients, this has led to credit access to financing for smallholder farmers dwindling over time. Smallholder farmers have to negotiate on their own with financial institutions because there is no policy or legislation in place by the Ministry of livestock and Agriculture on how to deal with the problem of financing in the sector.

The problem of credit accessibility at affordable rates has been compounded by financial institutions like the Agricultural Finance Corporation, K-Rep bank and Equity Bank use their own discretion in lending credit to farmers. In the past, before market reforms settling school fees for their children, immediate household needs like health care, and acquiring farm inputs was not a major problem since the smallholder farmer cooperative societies issued credit vouchers which were used for this purpose . Based on the quality and quantity of their coffee, farmers could expect to receive payments within a fairly reasonable time; today this is not the case (FAO, 2007).

With very little published data relating to the financing gap and similar little scrutiny of the cause of inadequate financing, it's hard to find solutions related to comprehensive means of addressing such gaps even with the ongoing dialogue relating to inadequate financing for the coffee industry across the world. With limited knowledge, banks are unwilling to provide enough levels of financing to the coffee sector, many studies in the coffee sector are related to the development of the provision of finance to the coffee sector to this day focused on specific financing mechanisms like warehouse receipts, financing against agreements and collateral. Improved risk management across the coffee sector might result in better access to finance has been hindered by the minimal knowledge.

Strengthening the financial institutions to give services to the coffee sector by availing viable financial services for agriculture remains an uphill task in spite of concerted efforts like providing funding to the tune of billions of dollars in form of grants. Liberalizations which were done after the collapse of the controlled financing regime after the market reforms, have not worked because agriculture sector still gets allocated a small share of total formal credit. Re-introduction of state controlled agricultural development financial institutions have been championed by experts who argue that controlled markets and a return to active governmental mediation through reintroduction of interest rate capping on agricultural loan products and services as the best solution (Meyer, R.L., 2011).

Coffee farming is a major economic activity in Kirinyaga County with majority of the smallholder farmers depending on its earnings for their livelihoods. A study by Minai, J. M, Nyairo, N. and Mbataru, P. in 2014 revealed that low yields have affected smallholder coffee farmers' economic status for the worse due to the loss of income. One of the problems the study identified as hindering increase in coffee yields is: the high cost of farm inputs such as fertilizers, foliar feeds and agrochemicals coupled with inaccessible credit.

Farmers in Kirinyaga are now turning to bananas after coffee became unprofitable. Bananas are reportedly earning the farmers up to 6 billion shillings annually, compared to 3.5 million shillings from coffee. Coffee has been the livelihood of locals for decades, but the farmers have been left with no choice but to change due to declining prices. "Most people here are now actively involved in banana farming which is giving them better returns compared to their traditional crop, coffee," said Kirinyaga Governor Joseph Ndathi (Sunday Nation, September 21, 2014)

1.2 Statement of the Problem

Over the last two decades, the government has taken several initiatives aimed at boosting the coffee sector. These measures include enactment of Coffee Development Fund (CoDF) in the year 2006, debt forgiveness to smallholder farmers to the tune of Kshs 3.2 billion shillings in the year 2006 and another debt waiver of about 2 billion shillings in 2012 (CBK, 2012). These attempts have been directed towards encouraging coffee production by forgiving debts owed by smallholder coffee farmers and availing cheap credit.

Despite efforts undertaken by the Kenya government and the substantial increase in coffee prices since 2002, yields have continued to stagnate. This is not in line with the basic law of supply which says that as the price of commodity increases, producers increase their supply into the market (Lipsey, 1986). In the production season 2010/2011 for example, the Nairobi Coffee Auction realized an average of USD 329.12 per 50kg bag, (CBK, 2012). This was a 293% price increase from 83.73 US dollars realized in 2003/04, on the flip side, there has been no comparable increase in yields increase. This study therefore sought to investigate why there has been no substantial increase in coffee production despite credit being offered by government, banks and rural financial institutions to coffee farmers.

1.3 Purpose of the Study

The purpose of this study is to find out the influence of credit utilization by smallholder farmers on coffee production in Karithathi Farmers' Cooperative Society in Kirinyaga County.

1.4 Objectives of the Study

The research study had three objectives

- i. To assess the influence of utilization of farm inputs by smallholder farmers credit on coffee production in Karithathi Farmers' Cooperative Society in Kirinyaga County, Kenya.
- ii. To establish the influence voucher credit utilization by smallholder farmers has on coffee production in Karithathi Farmers' Cooperative Society in Kirinyaga County, Kenya.
- iii. To determine the influence of cash advances credit utilization by smallholder farmers on coffee production in Karithathi Farmers' Cooperative Society in Kirinyaga County, Kenya.

1.5 Research Questions

The research questions for the study were:

- i. How do farm inputs credit utilization by smallholder farmers influence coffee production in Karithathi farmers cooperative society in Kirinyaga County, Kenya?
- ii. How does access to credit vouchers utilization by smallholder farmers influence coffee production in Karithathi Farmers Cooperative Society in Kirinyaga County, Kenya?
- iii. How does cash advances utilization by smallholder farmers influence coffee production in Karithathi Farmers' Cooperative Society in Kirinyaga County, Kenya?

1.6 Significance of the Study

The outcome of this study has identified options and institutional arrangements that would serve as an input for policy makers at County and National Government levels in formulating sustainable rural agricultural credit policy in coffee subsector. The research will also assist the national government, financial institutions and its agencies in assessing effectiveness of its various interventions in providing credit to smallholder coffee farmers.

1.7 Limitations of the study

The farmers affiliated to Karithathi Farmers Cooperative Society are spread across a huge area, the researcher devised a good time management strategy and incurred costs to reach all the respondents. The researcher arranged early enough with the respondents for meetings at their time of convenience. Some of the farmers were illiterate and so they filled the questionnaires with assistance from the Research Assistants.

1.8 Delimitation of Study

The research was conducted in Karithathi Farmers' Cooperative Society, one of the coffee processing and marketing cooperatives in Kirinyaga County, Kenya.

1.9 Assumptions of the Study

The study was based on the assumption that

- a) Respondents would be cooperative and open enough to provide reliable information to the researcher during the study.

1.10 Definition of significant terms

Credit refers to money or any other resources advanced to coffee farmers by the cooperative or financial institution for purpose of coffee production to be repaid at a later date.

Farm Inputs refers to resources that are used in coffee production, such as fertilizer, chemicals, equipment, seed and labour.

Joint Liability refers to an obligation to repay a debt between two or more coffee farmers. A joint liability allows coffee farmers to share the risks associated with taking on additional debt, and to protect themselves in the event of default.

Smallholder Farmer refers to a farmer with less than five acres of coffee farm

Cash advance refers to a form of finance extended by the coffee cooperative society or financial institution to coffee farmers to supplement their income and manage the cost of agricultural inputs.

Voucher refers to a small printed piece of paper that entitles a coffee farmers to a discount, or that may be exchanged for farm inputs or a service.

1.11 Organization of the Study

The study has five chapters in total, chapter has the following sections: background to the problem, statement of the problem, purpose of the study, objectives of the study, research questions, significance of the study, limitations of the study, delimitation of the study, basic assumptions, definition of significant terms and organization of the study.

Chapter two comprises of literature review of the study focusing on empirical studies on credit vouchers and coffee production, cash advances and coffee production, farm inputs credit and coffee production, research gaps theoretical framework and conceptual framework.

Chapter three outlines research methodology covering the following sections: research design, population, sampling and sample size, research instruments, validity and reliability of research instruments, procedure for data collection and data analysis. Chapter four has the following sections: Data analysis, interpretation of findings and presentation while chapter five deals with summary of findings, discussions, conclusions and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter has detailed literature related to credit which include: Cash advances, credit vouchers and farm inputs credit. A conceptual frame work has been included to illustrate how each of these independent variables influences the dependent variable.

2.2 Cash advances and coffee production

The World Bank conducted studies focusing on investigating coffee sector price risk and evaluating the employment of market based uncertainty administration tools between 2005 and 2009. The studies found that increased price risk management was attainable at the enterprise level but was not achievable at the smallholder farmer level. The study also evidently found that better price uncertainty administration was not enough on its own to help address the financing void of coffee sector enterprises. A focus on price uncertainty did not necessarily increase connection to finance as it left many other risks unresolved for example production perils, management risks and counterparty dangers. These findings revealed that an understanding and more knowledge of how such risks might be more effectively managed, or at least prevented, is likely to be necessary if bank providing credit to the sector is going to increase (World Bank/ICO, 2012).

The many causes of inadequate credit for supply chain actors and the failure to examine the full picture of interdependent risks, may lead to coffee sector actors and governments being unable to address interdependent risks on an ex-ante, holistic basis, as well as being unable to fully understand the barriers to better access to finance for the coffee sector. While examining individual risks can be both helpful and beneficial, such a method risks failing to consider the inter-dependence of multiple coffee sector perils and prevents the creation, and adoption, of

wholesome risk administration mitigation plans. Likewise, considering only independent causes for inadequate finance, risks lacking to address the broader hurdles to finance, and fails to identify more complete remedial actions (World Bank/ICO, 2012).

While diversification is being encouraged to help reduce the producer's financial circumstances, a more substantive panacea is required. Some smallholder producers have bought into the rural Savings and Credit Cooperative Society (SACCO) formation, which brings together farmers from across the agricultural sector. In the SACCO smallholder producers receive credit facilities at low interest rates and benefit from a wide range of backgrounds of their counterparts. Despite this positive move, the smallholder farmers contribute little to the SACCO because of irregular and unpredictable payments from coffee. They are therefore unable to realize full benefits from the system (FAO, 2007).

A study in Papua New Guinea by J. Mauro in 2010 show that the government in 1996 set aside K20 Million for a Coffee Credit Guarantee Scheme (CCGS) administered by Coffee Industry Corporation(CIC), Credit facility to be lent to smallholder farmers with viable coffee enterprises who did not satisfy lending requirements of commercial banks. It also subsidized the interest rates, whereas, the annual interest rates charged by commercial banks ranged between 18% – 24%, the CCGS charged only 5%. Despite efforts by CCGS to enhance coffee production, there has been a decrease in production instead since 1998. The coffee income had also declined because of farmers neglecting their coffee. The decline in coffee production was also related to low coffee prices, breakdown in Law and order, old tree stocks, climate change, unsuitable research, extension and knowledge delivery mechanisms, dilapidated rural infrastructure and service and scarcity of land and labour(J. Mauro, 2010)..

CIC'S research and Growers services division reported that Loan inquiries from small scale farmers were increasing at an alarming rate and claimed that CIC did not have sufficient resources to administer the CCGS. It also reported that farmers had defaulted on the loans made by CCGS and attributed this to both internal and external factors such as poor assessment and monitoring of clients, high transport costs low returns to coffee and poorly educated farmers .The

previous paragraphs suggest that small scale growers face many constraints including liquidity problems(J. Mauro, 2010).

Individual farmers in Vietnam were able to have access to credit to fund further coffee expansion after land reforms were done. Financing for the farmers was mainly done by state owned financial institutions with a complete rural banking system. Measures to ensure the success of the program were taken by ensuring the government controlled financial institutions froze loans or extended the credit periods in times of deprivation and depressed coffee prices. Public institutions have been critical to almost every part of the coffee industry development, the government has also played a critical role in coffee development through policy making and planning. All coffee industry responsibilities such as coffee production, supply of agricultural farm inputs, rural finance provision, value addition and processing, marketing and export were done by State Owned Enterprises formed at the outset by public institutions. (FAO, 2007).

The coffee industry has been able to develop and stabilize under government direction and granting mainly by freezing and extending credit periods in times of difficulties and depressed coffee prices. Liberalization in the coffee sector has seen these financial institutions moved over to the private sector. The gradual growth of these institutions over time has been enabled by them providing credit for the coffee sector. The government has been able to manage this growth. By lending large amounts of credit in the critical growth years during the low coffee prices of 2000 to 2004, the government has been able to stimulate growth by directing credit to specific areas. A government financial institution, farmers Vietnam Bank for Agricultural and Rural Development with 1,600 branches in rural areas, and a market share of 75 percent is principal source of credit for smallholder coffee (VBARD), (FAO, 2007).

For a farmer to increase efficiency access to enough credit is critical to enable them to have ability to apply inputs and implement farm management decisions in a timely manner. Timely access and utilization of farm inputs results in enhanced economic efficiency and this is possible if smallholder farmers have access to credit helps remove financial hurdles according to Amadou, (2007)

Many smallholder farmers in many areas of rural Africa cannot get or have limited access to credit like insurance and farm inputs due to market under development, whereas the technology to allow smallholder farmers increase production and productivity exists, market failures often leave them in a poverty trap which they struggle to leave. Institutional innovations can help overcome these market malfunctions, but in some cases stronger state intervention through policies and legislation may be required for instance the use of farm input subsidies is one of the policy solutions that can help. The availability of credit may result in limited benefits to millions of the poorest farmers at times. Surpluses in food production which are needed to reduce family hunger may not be solved by piece meal production from improved farm inputs (Kesley. J.B, 2013).

Producers are in dire need of rural credit, this can be done by significant capital investments which can help sort out the Kenyan coffee sector which is heavily indebted. Today, coffee farmers go for extended periods of time without payments unlike previously before liberalization when producers would receive appropriate compensation based on the quality of their coffee and expect to receive payment within a reasonable amount of time. A farmer may deliver coffee beans in March and may not receive payment until September. In the meantime, the farmer has to spend his meager income from his own sources, hiring labour to grow and harvest the coffee and buying expensive farm inputs. Even without access to credit or any other funds, the farmer is also burdened with other household needs like school fees, daily subsistence needs and a lack of additional farm inputs to grow more coffee and food crops, Nyoro (2004).

Smallholder farmers affiliated to processing and marketing cooperative societies which are heavily weighed down by debts are the cause of decline in production quality and processing quality of coffee in the after reforms in the market after liberalization, Nyoro (2004) found that is mainly associated with. Farmers find that they are unable to either obtain farm input advances at normal rates or receive timely payment for their produce., Farm input advances are necessary because cooperative coffee farmers wait a long time to get paid yet they need to pay for farm inputs and have to grow more crops for food. A big percentage of farm input costs is in the purchase of these farm inputs like fungicides and pesticides that are needed to regularly spray against pests. Big coffee estate farmers who are not weighed down by debts and are managed

more professionally produce more unlike smallholder farmers affiliated to producer and marketing cooperatives cannot afford the high price of the farm inputs they need, so their farms only produce very little coffee.

The Coffee Development Fund (CoDF) was started by the government of Kenya in May 2006 as a vehicle for financing boosting the coffee sub-sector. The role of CoDF is to provide viable, inexpensive credit to coffee farmers for farm inputs, farming activities and for providing income security. Most of the loans are given to smallholder coffee farmers organized in producer and marketing cooperatives. Currently, the CoDF provides about USD 13 million in loans and advances to approximately 61,000 coffee farmers. According to Patrick Nyaga, the CoDF Managing Trustee, the coffee sector requires approximately USD 125 Million to be able to meet the needs of coffee farmers. The interest rate levied on CoDF loans is 10%, while the average inflation rate in the years between 2006 and 2010 was approximately 9%. The total grant component of this program, therefore, is relatively small, considering reasonably good default rates. The CoDF loans are available to growers over and above those available through other financial institutions spread in all coffee growing areas, which are assumed to be free of subsidy (FAO, 2013).

A study on the determinants of agricultural productivity in Kenyan highlands done by Ekborm (1998) established a favourable and notable correlation between labour input per farm and productivity. Non-agricultural farm incomes are positively related to agricultural productivity as the study found, household capital, represented by the value of domestic animals and capital availability. Increasing labour and capital availability is therefore important for productivity increases in the country. Lack of credit is often mentioned as a major hurdle to increasing agricultural productivity in Kenya especially among small-scale farmers. By increasing the farm's capital base by improving access to credit can influence productivity positively. Enhancing agricultural productivity will be accelerated when smallholder coffee farmers have access to credit, so that they are able to acquire farm materials such as fertilizers, improved seeds, and agrochemicals.

(Nyoro, 2004) in his study on processing of coffee in a liberalized market found that the decline in production quality predominantly affects small holder coffee farmers whose cooperative societies are involved with debts. Smallholder coffee producers find that they are unqualified obtain farm input advances at market interest rates or receive timely payment for their coffee. Because cooperative coffee farmers wait a long time to get paid, farm input advances are necessary to pay for inputs that farmers have to buy to grow more crops. These inputs include fungicides and pesticides that are needed to regularly spray against pests which make up a big percentage of farm input costs. Small holder farmers affiliated to processing and marketing cooperative societies cannot afford the price of the farm inputs they need, this leads to reduced production as compared to large coffee estates that are not burdened by the cooperative debt situation and are managed more professionally.

Equity Bank has mobile banking and agency banking that offer banking goods and services to micro, small and medium businesses and small holder farmers, they offer their customers the similar financial services as in their main branch network including making cash and cheque deposits, savings, electronic money transfers, remittance processing, insurance and loan products. In May, 2008, the Alliance for Green Revolution in Africa (AGRA), Equity bank, the International Fund for Agricultural Development (IFAD) and the Kenya Ministry of Livestock and Agriculture established a lending facility of USD 50 Million to accelerate access to inexpensive financing for 2.5 million smallholder farmers and 15,000 agricultural value chain members such as rural input shops, fertilizers, agrochemicals seed suppliers and wholesalers and importers, grain traders and food processors (Salami. A, Kamara, A.B. Brikioza.Z, 2010).

Smallholder coffee farmers in Kenya are faced with a myriad of problems in marketing their produce. They almost lose control over their produce once it leaves their cooperative and passes they have no knowledge of how coffee milling and marketing agent will grade his coffee, the amount of money he will pay for the coffee and even when that payment will be made. Before market liberalization, farmers were guaranteed a minimum return on their coffee and this motivated them to produce more coffee. District cooperative unions also gave them access to credit vouchers with which they could use to purchase farm inputs, pay school fees to learning institutions for their dependants, and attend to their immediate household needs.

The coffee Farmers have reported delayed payments some exceeding up to four months yet Coffee Board of Kenya which is the regulator in the coffee industry stipulates that farmers are supposed to receive payment not more than 14 days after their coffee is auctioned (Republic of Kenya, 2002).

In Kisii, a study on credit smallholder coffee farmers established that 51.4% of farmers received advance payments occasionally provided to them by their Farmer Cooperative Society (FCS), 23% of the farmers indicated they were rarely provided with advance payments, while a total of 21.9% of the farmers said they were always given advance payments and 3.6% of the farmers said that they had never been given advance payments for the coffee delivered for marketing Chemiat, J.N., (2014).

The study further discovered that 62.6% of the farmers agreed that they always receive credit for purchasing farm inputs for coffee farming from their cooperative society, 23% of the farmers rarely received credit as 13.7% of the farmers occasionally received while 0.7% of the farmers had never received credit for farm inputs from their cooperative society. The result indicates that despite most FCS not providing advance monetary payments to farmers for their coffee delivered for marketing, most of them provided agricultural inputs like fertilizers and chemicals as part of advance payments. However there is contention about the timing of purchase, type of fertilizer and the pricing (Chemiat, J.N., 2014).

2.3 Credit Vouchers and Coffee production

A fertilizer subsidy program targeting smallholder coffee farmers was introduced in 2008 by the government. The national agriculture input voucher scheme (NAIVS) was aimed accelerating fertilizer use in specific, high-potential areas, stimulate the return to fertilizer use and ultimately increase food production. The total fertilizer bought and distributed by private sector for the NAIVS program was 151,000 Metric tons accounting for 57% of the market share as a result of introduction of this scheme, total fertilizer consumption in Tanzania expanded, in the year 2010,.

The voucher system enabled a farmer to get maximum of two bags of fertilizers to be used in only one acre. This amount allocated was insufficient given the farm sizes owned and cultivated

by the households in the area. In addition, the fertilizer under the voucher system was reported to be unavailable to farmers at right time. The Agents delayed to take fertilizers to the villages and this affected farmers negatively. In most cases, farmers ended up not using fertilizer especially for the basal application (Hepelwa.A.S, Selejio.O. and Mduma.K.J, 2013)

The crop production during the time before the introduction of the voucher system found to differ significantly with the crop production during the voucher system. It could be noted that the average production in 2012 was high compared to the harvest in 2007 before the introduction of the subsidy program; this difference was also brought about by the differences in the area cultivated during the two periods.

On average the area cultivated by the same households increased more than double in 2012. The average crop yield (production per area) was relatively higher in 2012 than yield in 2007. Thus the fertilizer voucher system was beneficial to farmers and this can be maintained if the implementation hurdles are rectified. For example, the value of the voucher if indexed with the market price of the fertilizer would make more sense to poor farmers who fail to top up the additional money required to get a bag of fertilizer (Hepelwa.A.S, Selejio.O. and Mduma.K.J, 2013)

A generally positive impact of the subsidy on farm input use, agricultural production and national food sustenance was found after the assessment of the Agriculture Input Subsidy Program (AISP) in Malawi, while the effect of the farm inputs subsidy itself on both national and household food security and poverty could not be held in isolation in the analysis. Increased use of farm inputs was determined by the volumes of sales of subsidized inputs and the level of displacement from commercial sales as a result of the subsidy. Subsidized fertilizer sales increased by 34% in the first year and by 54% in the third year of the program implementation this was determined during evaluation of the targeted AISP.

In the 2005/2006 season quite substantial displacement of 20-30% in impact of increased farm input use was recorded. It's almost impossible to isolate the impact of increased use of farm inputs because yield increase or decrease depends on the efficiency of farm input use and weather patterns. Generally farm input sales increased and agricultural production increased as well during the program period. Dorward (2009) approximates that the subsidy program was

about 400 000 tons of maize in 2005/06 season and 950 000 tons in 2008/09, with a stable increase throughout the program period (Dorward and Chirwa, 2011).

The findings indicated indirect impacts and multiplier effects within the rural economy for example for wages and labour was more limited. A negative impact on the program's impact on poverty reduction and food security for the poorest farmers who are net maize buyers was realized despite increase in maize prices by 38% from their long-term average. Trials seem to show a positive impact on livelihood and labour for beneficiaries and non-beneficiaries but the overall effect of the subsidy on household incomes could not be determined. Household income increases incrementally matched output price increases over the program period Doward, (2009).

A positive correlation between the initiation of the subsidy and increase outcomes was found in agricultural production in Malawi and Zambia, but below the national government's estimates. In Zambia the subsidy raised fertilizer use by 12.5% among smallholder farmers and increased their maize yields by 14.6% between 2002 and 2007. This positive performance can, however, be attributed in part to heavy rainfall in the 2005 to 2007 agricultural seasons. In Malawi, Smallholder coffee is still in a growth stage, over the last decade the Trust has made a major effort to rehabilitate smallholder coffee by replacing the low yielding indigenous variety (Geisha) and replacing it with a higher yielding variety (Catimor). Presently, As a result During the season 2004/05 production level of 234 MT doubled by 2007/8 and tripled in 2009/10 season this came from the 3.6 million coffee bushes planted, only 1.3 million were mature and producing. (Oliva.M., Agar.J, 2006).

Financing needs still exist for the smallholder growers although credit alone may not provide the solution. The most critical farmer-level gap raised was the amount of fertilizer and chemicals/sprayers they are able to access due to cost, which is insufficient for the levels of application needed for optimum production. However, farmers were apprehensive of taking on additional credit as this will be deducted from their coffee proceeds. One farmer expressed concern that if too much is borrowed then most of his coffee proceeds will be taken to repay loans, stating that this is especially true for new growers whose production levels are still low as their coffee is not fully matured (Oliva.M.,Agar.J, 2006).

Generally, the overall impact on household food security in Malawi is not definite: easier access to maize and reduced food shortages were reported in the study but, this was undermined by increased output price. The study data from the household surveys reveal that increases in food production led to improved livelihoods as measured by the reduction in the number of malnutrition cases reported, the number of daily meals consumed by households, the length of post harvest time that food stocks lasted and in how household discerned food security and prosperity; However, it was impossible to determine more rigorously a trend of increase in household food security status; Dorward and Chirwa, (2011).

The effect of the subsidy itself from alternative sources is mainly positive but inconclusive from the available proof from the studies undertaken. The impact on production differed with varying intensity the rates of market displacement also differed, this was caused by fertilizer use rose everywhere. Favourable effects were established in Mali, Rwanda and Tanzania, among others, in Rwanda maize production increased by 7.9% up from 3.8% prior to the program implementation. Personal calculations other than fertilizer use and the result of the combination of several measures in the technical expertise led to increase in production came from expansion in cropped maize areas. Impact on yields of fertilizer use has not been clarified. In the case of the Tanzania, production results evidently followed the change of weather patterns (FAO, 2012).

Tanzania Financing for farm inputs was attached into coffee sales before liberalization, the system, then used to function well and helped in removing the prospect of grower non-payment because the unions or the Coffee Board, during the time when the unions were disbanded, through their producer cooperative societies, were monopsony buyers. Before liberalization, financing for farm inputs input use was available to only a few credit worthy often large scale farmers. the policy reforms removed the connection between inputs and coffee sales and, because of high non-payment rates. The smallholder farmers accessed credit at very high interest rates or accessed no credit at all, this then led to decrease in farm inputs John.B, (2003).

A quarter of small holder coffee growers used purchased inputs after 1994; this is according to a survey done by Farm Management Survey carried out by the Economic Research Bureau of the University of Dar es Salaam. Labour inputs were insufficient for both Arabica and Robusta and

the prevention of pests and diseases was poor leading to huge yield losses, the non existence of credit was attributed to the low farm input use. These findings applied primarily to smallholder farmers, and much less to the estates.

The European Union using Stabex funds partnered with the Coffee Association of Tanzania and the Coffee Board of Tanzania to initiate the National Input Voucher Scheme, to alter the dwindling use of farm inputs. The voucher scheme allowed farmers to have access to credit vouchers which were used for purchasing farm inputs, and be delivered to the farmers in the next season, their coffee buyers put part of farmers' coffee income into a special fund, the program was a compulsory savings mechanism the vouchers were equivalent to about 4 percent of the value of the coffee sold started in 1996.

The voucher scheme accounted for approximately twenty percent of farm inputs for coffee production during the second season of operation. Farmers did not stop trading vouchers and applying the farm inputs to other crops despite this system being in place and this adversely affected production. There were several reports of forged vouchers as well as trading at a discount for non-input uses despite the program being received positively by the industry. (Government of Tanzania 2000).

Smallholder coffee farmers in Kenya are faced with a myriad of problems in marketing their produce. They almost lose control over their produce once it leaves their cooperative and passes they have no knowledge of the grade it will be assigned by the coffee milling and marketing agent, the amount they will receive as payment and even when that payment will be made. Before market liberalization, farmers were guaranteed a minimum return on their coffee and this motivated them to produce more coffee. District cooperative unions also gave them access to credit vouchers with which they could use to purchase farm inputs, pay school fees to learning institutions for their dependants, and attend to their immediate household needs. The coffee Board of Kenya which is the regulator in the coffee industry stipulates that farmers are supposed to receive payment not more than 14 days after the coffee auction, many of the farmers however have reported payment delays exceeding up to four months (Republic of Kenya, 2002)

Credit vouchers can be exchanged at any permitted agro-dealer shop and this helps private sector participation in wealth creation. Smallholder farmers involved in the program can obtain farm inputs at a determined reduced price either by reducing the price of the farm inputs below market value or by permitting smallholder farmers to exchange their purchasing power. Smallholder farmers exchange the value of the vouchers for farm inputs at local, often small and medium, private farm input suppliers. For farm inputs suppliers, the vouchers are a way to assure demand, possibly gain economies of scale in their business and lower their risk, they suppliers, in turn, take the voucher to an appointment dealer, who reimburses them for the value (FAO, 2012).

Farm Input vouchers are one practical way of making subsidies smart, in that they can concurrently be used as a system to target subsidies, create demand in private markets (exchange of vouchers is done at private-sector farm inputs suppliers) and relate the voucher program with financial institutions issuing credit to farmers or retailers. Farm inputs vouchers have greater flexibility in the implementation of the subsidy and have the supplementary advantage of giving greater transparency. Even with a consensus with preferable delivery system to direct distribution, proper implementation of credit vouchers program is necessary in order to reap all the possible benefits (FAO, 2012).

In Ahero Irrigation Rice Scheme, Kisumu County in Kenya the voucher mechanism is used a way of giving agricultural farm inputs on credit to smallholder rice farmers using a combination of methods mainly staggered credit voucher and cash, the provision of credit in voucher form reduces the likelihood of credit diversion to other life cycle needs as farm inputs are given in kind in exchange for the vouchers. Three quarters of the credit is disbursed through the credit vouchers and a quarter of the credit through cash vouchers. The voucher scheme program is implemented through a partnership with various stakeholders involved: Savings and Credit Cooperative where smallholder rice farmers are members through acquisition of shares; a micro finance institution which runs the SACCO; farm input stockists from where the farmers exchange vouchers for farm inputs; government which provides the irrigation water and infrastructure; the donor who provides credit guarantee to repay the loaned amount up to a certain amount in case of default and buyer of the agricultural output. (Kibaara. B, Nyoro. J, 2007).

2.4 Farm inputs Credit and Coffee Production

Before liberalization in most world economies, state-controlled firms used to distribute heavily subsidized inputs on credit to state and collective farms, this system broke down in the early 1990s after liberalization and market reforms. New structures were created, but while some worked well, others were not as successful.

In Tajikistan a Presidential Decree in 1998 started a state bank, Agroinvest bank that helped cotton farmers have working capital finance and private investors signed a tripartite agreement in which farmers were to be supplied farm inputs by the private investors and were to be paid a certain amount with cotton. Agroinvest bank was to provide the funds for the acquisition of farm inputs and secure repayment through a monopoly right on farmers' cotton sales. The mechanism of supplying farm inputs to over 80 percent of them sourced farm inputs from the private investors became the main way for input finance for Tajik cotton farmers; however, the performance of the program was very poor. The system failed because farmers were levied too much for the farm inputs and were paid too little for the cotton, making farming highly unprofitable. The government continued piling pressure on the cotton farmers to continue producing cotton that most felt they had no choice and had to continue supplying the private investors with the crop, even at a loss (FAO, 2012).

In the season from 2007 to 2008, results of the system indicated a highly indebted cotton farm sector and huge loan non repayment. In most countries largely effective approaches have been established in Kazakhstan, Russia and Ukraine, the approach in input finance established over avoids the problem of having to deal with a large number of individual producers: large investment groups acquired or leased the land of thousands of farmers to create large-scale viable production units which are able to maximize on economies of scale (FAO, 2012).

World over, there are a few examples of how financing and agreement between producers and buyers have been used in transition countries. A US farm equipment manufacturer in Ukraine partnered up with local distributors to sell heavy farm machinery and equipment. The equipment dealer was given the license to a certain pre-stipulated area to ensure they were able to recover their money and the rights to harvest, transport, and store and sell the grain. The largest sugar manufacturer in Slovakia assured payments for farm inputs purchases, and also gave payment assurances for other loans to farmers. Foodmaster, has supplied pedigree cows to its in

Kazakhstan milk were supplied with pedigree cows which, the payments were recovered through milk deliveries to the milk processor Foodmaster. After the land reforms in the early 1990s in Kazakhstan, many independent smallholder cotton farms were created. Cotton ginneries signed agreements with smallholder farmers for provision of pre-harvest finance, the ginneries would in return to market their cotton produce at a price related to world cotton prices, the credit given in kind included improved seeds, fertilizers, fuel for farm machinery and water and infrastructure for irrigation (FAO, 2012).

One type of farm inputs credit systems have been used in many parts of the world is secured distribution which would be of an important consideration they would seem of interest in transition countries. To bring affordable international credit lines nearer to the buyer of the farm inputs, lessen the funding burden and the overall input costs the systems can be used for supplying imported inputs. A credit support firm, which retains control over the commodities until they are paid for is contracted by an international investor, which could be a financial institution or a merchant in transition countries with a good legal and regulatory environment and readily enforceable contracts, if one can benefit from the world bank counter-guarantee on a local bank guarantee on this type of finance under the world Bank's Global Trade Facilitation Programme secured distribution is easy to implement (FAO, 2012).

Where guarantees do not exist, it may still be possible to have a sound distribution scheme, with shorter transaction cycles thus making implementation more expensive and complex. A full credit wrap on the value chain is another input financing system that has not been fully utilized yet, a credit support agency which could be a collateral management agency, or a farm management company administers input provision to sale of the final products. In Ivory Coast, this financing model has been used to revive the cotton sector after its civil war. In transition economies where traditional input and marketing arrangements were disrupted by the collapse of the planned economy or civil strife, the model can be replicated to revive agricultural sectors. To build new supply chains linking smallholders to new markets, the system is specifically useful in situations where one has to gain loyalty of a large smallholder agricultural sector, and whether urban or international (FAO,2012).

In a study "*Fair Trade Impact Assessment of Gikanda Farmers Cooperative Society*" in Nyeri County, Kenya by *Africa Now*, Producers were able to purchase inputs on credit from the

cooperative. The prices are however said to be equal or higher than small retail shops. Though the provision of these inputs was considered to be important, it was not fully capitalized on as farmers bought some inputs directly from these shops whenever they felt there was a significant difference. The issue of the high costs of inputs offered by the cooperative was raised in most of the interviews, focus group discussions and meetings held. Farmers said that while Calcium Ammonium Nitrate (CAN) was Kshs 1,900 at the cooperative, it was Kshs 1700-1900 in the shops. This was despite the 18-20% the shops had to pay in interest rates. The cooperative stated that it borrowed the money from Stabex funds at 5% interest. Prices fail to capitalise on the economies of scale of purchases and transport (Africa Now, 2010)

In Malawi, the application of fertilizers among smallholder farmers is quite high, with 97.9 percent of farmers interviewed revealing that they had applied fertilizers in the past 12 months and 62.5 percent had used pesticides. On average coffee farmers used 297 kilograms of fertilizers on all crops, with 53 percent of the fertilizers applied on coffee farm at an average cost of MK19,000 per coffee farm. The cash purchases of fertilizers are high with 47.6 percent of the farmers indicating cash purchase as the main source of fertilizers while 45 percent relied mainly on credit from cooperatives. The study also reveals that 89 percent of farmers had access to credit facilities and 85.5 percent obtained agricultural credit in the past 12 months of the interviews (E. W. Chirwa, A. Dorward and J. Kydd, 2007).

The high use of fertilizers is not surprising due to the subsidy on maize and tobacco fertilizers and the availability of input loans from the cooperative. The fertilizers used by smallholder farmers are provided by the Mzuzu Coffee Planters Cooperative Union (MZCPCU) at cost. MZCPCU centrally procure fertilizers for its members, the fertilizer is then provided on credit a processes facilitated by the grassroots structures of the farmer organisation. At business centre level, smallholder farmers, using application forms, apply for fertilizers on credit through to the business zones. However, farmers that can afford cash purchases buy their inputs from the private retailers. The applications are aggregated at Cooperative level. The aggregate fertilizers from the cooperative form the basis for bulk purchase by the Mzuzu Coffee Planters Cooperative Union (E. W. Chirwa, A. Dorward and J. Kydd, 2007)

The seed capital that is used to finance fertilizer purchases was provided by the European Union. The creation of a Credit and Savings Union (CSU) has enabled smallholder coffee farmers to augment the capital fund with their savings and shares in the CSU. Nonetheless, most poor farmers shun input loans due to the high interest rates on loans. The availability of input loans from the Cooperative, make fertilizer application quite high although most farmers complain that the increasing cost of fertilizers is eroding the profitability of coffee farming given modest increases in coffee prices. Over the last two seasons farmers have had limited access to highly subsidised maize and tobacco fertilizers, but there are no subsidies on the price of fertilizers that are critical for coffee production (E. W. Chirwa, A. Dorward and J. Kydd, 2007).

The smallholder coffee sector that constitute 3,200 farmers do not benefit from the policy of subsidization on commercial crops as do tobacco farmers. Interviews with smallholder farmers revealed that the high cost of fertilizers and chemicals is a major constraint to smallholder coffee expansion given that most of the farmers are poor. Interestingly, the use of subsidized fertilizers on coffee farms is not widespread. However, farmers noted that it is quite common to apply fertilizers obtained on loan from the cooperatives to be used for maize production. This behaviour just demonstrates the importance that farmers place on their own food production over food supplies from the market based on the incomes from coffee sales. In the 2004/05 season, coffee did not do well and many farmers did not receive any income and had outstanding input loans with the cooperative due to poor sales, this placed the households at greater risk of food insecurity (E. W. Chirwa, A. Dorward and J. Kydd, 2007).

In Tanzania, starting in the 1970s and early 1980s a substantial reduction in aid to the country led to a drastic reduction in imports of agricultural inputs, including pesticide and fuel (Skarstein, 2005). Until the early 1990s cooperative unions were still in charge of input provision through the village primary societies but their ability to provide these came under increasing difficulty as financial woes intensified. As cooperative unions lost their monopsony purchasing power at the village-level, producers were able to obtain subsidized inputs from the cooperatives but then sold their crop to private buyers offering higher cotton and coffee prices. This desertion by producers at the point of purchase left many cooperative societies with vast debts and hindered their future ability to provide an input service. Furthermore, fertilizer subsidies were gradually lowered from

70% in 1990/91 to 0 in 1994/95 and producers in the mid-1990s were for the first time, at the mercy of local, open market input prices for fertilizers and pesticides (Skarstein, 2005).

As a result of the above fertilizer and pesticide application has declined, although exact figures for Tanzanian cotton production are hard to estimate, (Gibbon, 1999). Once input supply (mainly chemicals and seeds) and credit for purchasing inputs were no longer integrated into a single cotton marketing channel, use of inputs declined sharply. Loss of the single marketing channel pushed up the costs of marketing chemicals and led to a collapse in supply and distribution.” (Baffes, 2004). For coffee, a comparison of regional figures for Kilimanjaro region indicate a reduction in use of pesticide, insecticide and herbicide by households from 51 to 35 percent between 1994/95 and 2002/03. (United Republic of Tanzania, 2006).

In Malawi, enhanced trade credit is generally accessible for the purchase of inputs, which is a major part of working capital; orders are placed in the May to July period for delivery between September and November prior to application, which commences between November and December. There are essentially two models for financing inputs. The first is when inputs are ordered directly from international sources. The grower must pay when ordering via Letters of Credit (LC) or similar issued through the grower’s bank. The LC is funded out of the growers’ own resources, borrowing via overdraft facility or through a seasonal loan (Oliva.M., Agar.J, 2006).

The second main method is when the order is placed through an input supplier, which then orders and pays for the inputs by letters of credit or similar at the time of order, financed from its own or borrowed resources. The normal pattern is for the input supplier to cover the cost of financing until the inputs are delivered to the customer, typically in the September to November period. Payment is then due at the time of delivery and subject to the terms of trade credit on offer by the input supplier. In effect, the input supplier carries the cost of financing the inputs from the time of ordering to the time of delivery, which would be paid for by the grower if the grower orders directly (Oliva.M., Agar.J, 2006).

The input suppliers normally offer a period of trade credit to the grower, typically 30 days from date of delivery/invoicing. However, above this, the input suppliers indicated that they often enhance the trade credit terms offered on a client-by-client basis. One input company reported extending terms by 30, 60 or 90 days from delivery date into the country, requiring financial security of between 50-100% of the order value, depending on the customer's track record. This input supplier charges for the additional time taken, at a rate of 2% above , in effect lending to the grower. Another input supplier reported offering terms ranging from cash payment up to 120 days from date of invoice. While this supplier reserves the right to charge 3% interest per month on outstanding balances, it is not generally applied because the supplier wants to maintain the relationships with its clients (Oliva.M.,Agar.J, 2006).

In most developing countries, market reforms have greatly limited the direct market intervention done by governments and agricultural marketing boards. To trade away much of the price uncertainties, options such as stabilization funds, it is however possible for producer countries, by using modern market instruments such as futures option and commodity exchange. The high cost of purchased farm inputs was the major cause for the coffees decline in productivity as a result of the escalation of coffee production costs. Significantly depressed coffee yields have been as a result of low and declining trends in fertilizer use, Karanja and Nyoro (2002).

Costs involved in diseases and pest control have also led to increased costs of production; fertilizers have also been substituted with manure by the smallholder famers as a result of increased costs. The cost of labor has also increased significantly during the market reform period. For example, the daily wage for casual labor had increased from Ksh 24 in 1990 to around Ksh 120 in 2001. Equally, the cost of picking coffee has increased from Ksh 10 in 1990 to the Kshs 25-30 per 30 kilograms in the year 2002, Farmers were also found to be investing in other farm enterprises like horticulture farming which is known to bring in faster returns owing to poor returns from coffee production, Karanja and Nyoro (2002).

2.5 Theoretical Framework

The economic process of converting inputs into outputs constitutes the theory of production. Production uses resources to create a good or service that is suitable for use. This can

include manufacturing, construction, storing, shipping, and packaging. Other than the final purchase as some form of production, some economists define production broadly as all economic activity other than consumption, they see every commercial activity. Production is a process, and as such it occurs through time and space. Being a process that occurs time and space, there are three stages in production processes: the measure of the goods or services produced, creation of the form of the good or service, the distribution of the good or service produced.

A production process can be defined as any activity that increases the similarity between the pattern of demand for goods and services, and the quantity, form, shape, size, length and distribution of these goods and services available to the market place. Production is act of creating output, a good or service which has value and leads to the utility of individuals. It is the process of combining various material inputs and immaterial inputs in order to make a good or service for consumption.

Satisfaction of human needs either directly or indirectly is created in a production process, meaning all economic activities that aim to well economic well-being The measure of economic well-being is in the degree to which the needs are satisfied. Two concepts which explain increasing economic well-being in production, these are: improving quality-price-ratio of commodities and increasing incomes from growing and more efficient market production, we must understand these three production processes. Household, public and market production are the most important forms of production for us to understand the origin of the economic well-being. All of them contribute to well-being of individuals by producing commodities which have value.

When the commodities which are produced are used, it leads to satisfaction of needs. As quality-price-ratio of the commodities improves, the need satisfaction increases and more satisfaction is achieved at lower cost. Improving the competitiveness of products of the commodities is done through a quality price ratio which is very critical but production data cannot help measure this kind of gains distributed to customers. Lower product prices, is a means of improving the competitiveness of the product this therefore leads to losses in incomes growth in sales volumes helps to offset these costs.

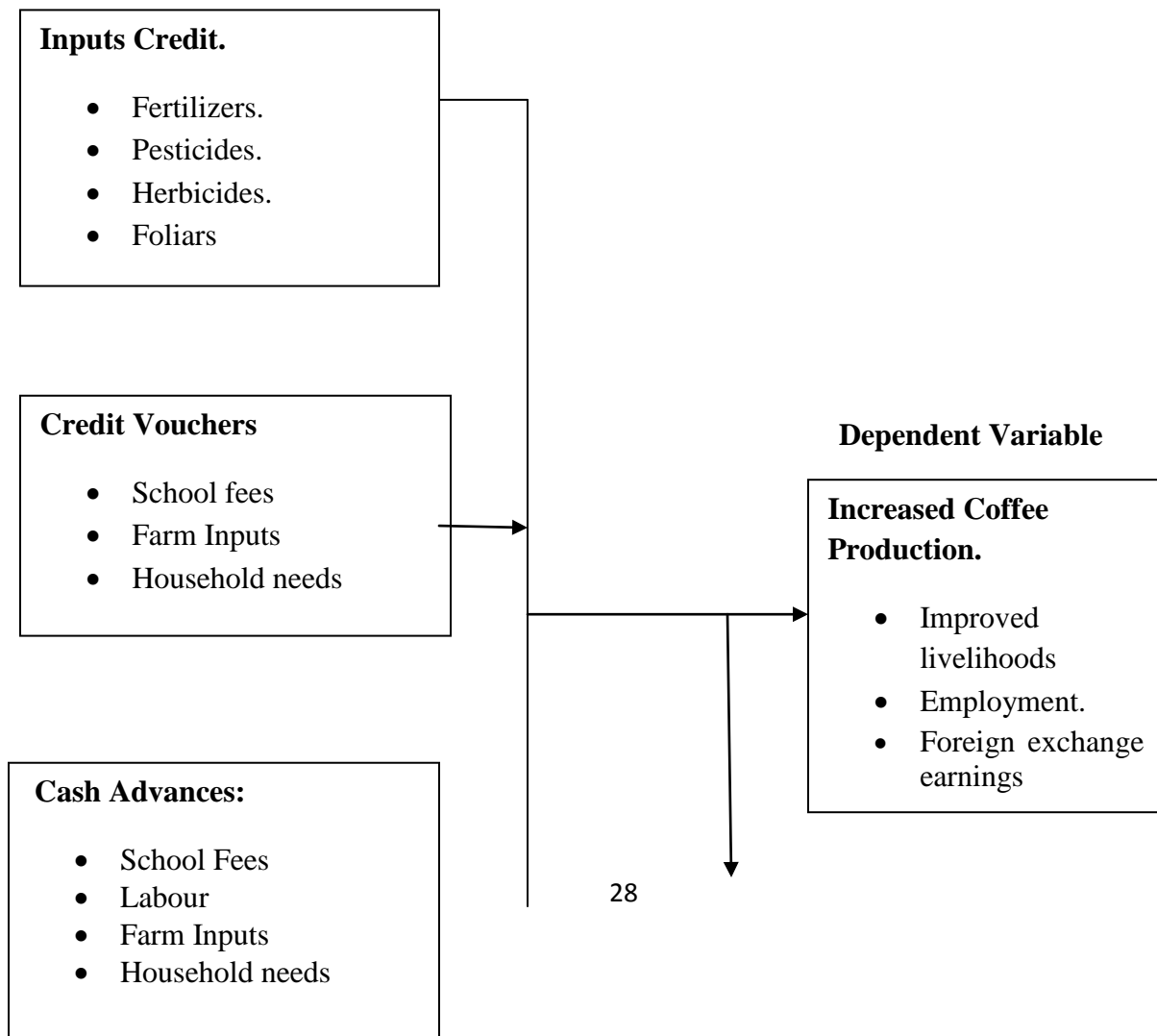
Economic well-being also increases due to the growth of incomes that are gained from the growing and more efficient market production. Market production is the only one production form which creates and distributes incomes to stakeholders. Public production and household production are financed by the incomes generated in market production. Thus market production has a double role in creating well-being, i.e. the role of producing developing commodities and the role to creating income. Because of this double role market production is the “primus motor” of economic well-being and therefore here under review

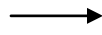
2.6 Conceptual Framework of the Study

Figure 2.1 shows the relationship between independent variables that influence coffee production which is the dependent variable. The independent variables are cash advances, credit vouchers and farm inputs credit. The researcher identified government policy and weather patterns as the moderating variable that influences coffee production and the researcher has no control over.

Figure 2.1: Conceptual framework

Independent Variables





Moderating Variables

- Government policy
- Weather Patterns

The conceptual framework in figure 2.1 was used in the study to examine the influence of credit utilization on coffee production in Karithathi Farmers Cooperative Society. Independent variables are not changed by other variables being measured while dependent variable depends on other factors. The independent variables for the study were: farm inputs credit, credit vouchers and cash advances while the dependent variable was coffee production. The moderating factors were: government policy on credit to the coffee sector and weather patterns in coffee growing areas.

2.7 Research Gap

The study sought to examine the influence of credit utilization on coffee production in Karithathi Farmers Cooperative Union. A review of existing literature established gaps that the present study sought to fill. While many studies have focused on the characteristics of consumers or businesses that obtain credit lines, very little is known factually about credit line utilization after origination.

This study fills that gap by testing hypotheses concerning credit line utilization. The literature on bank credit obligations (or lines of credit) to businesses is extensive, and the link between firm quality and credit lines is well documented, for example, Qi, Jianping and Shockley (2003) found that higher quality firms finance via loan commitments, while Shockley and Thakor (1997) found that loan commitment costs decline with credit quality. Furthermore, Klapper (2002) finds that higher risk firms are more likely to use secured lines of credit than unsecured lines. In addition, Berger and Udell (1995) discuss the use of credit commitments by small firms and find support for theoretical models showing that relationship lending produces information about borrower quality.

Berger and Udell (1995) document that those firms with longer bank relationships borrow at lower rates than firms with shorter relationships. They also note that their results are consistent with the theory that banks accumulate private information about borrower quality and utilize this information in setting loan contract terms.

As this brief review demonstrates, much is known about the implications of originating credit commitments, as well as the characteristics of firms that originate them. However, few studies have factually tested the predictions concerning risk and credit utilization. This study seeks to fill this gap in the literature using information on consumer credit lines. Although consumer and business credit lines are distinct, the contractual features of consumer and business credit lines are remarkably similar. Thus, consumer credit lines provide an interesting market to empirically test the theoretical predictions concerning credit utilization and risk that have been derived from studies of business credit

2.8 Summary of Literature Review

From the literature review from all over the world, it is evident there are major challenges with access and utilization of credit which in turn leads to low crop productivity. In Papua New Guinea by J. Mauro in 2010 show that the government in 1996 set aside K20 Million for a Coffee Credit Guarantee Scheme (CCGS) administered by Coffee Industry Corporation(CIC), Credit facility to be lent to smallholder farmers with viable coffee enterprises who did not satisfy lending requirements of commercial banks. It also subsidized the interest rates, whereas, the annual interest rates charged by commercial banks ranged between 18% – 24%, the CCGS charged only 5%. Despite efforts by CCGS to increase coffee production, there has been a downward trend since 1998.

In Tanzania, a fertilizer subsidy program was introduced in 2008. The national agriculture input voucher scheme (NAIVS) intended to facilitate fertilizer use in targeted, high-potential areas, boost the return to fertilizer use and ultimately increase food production. Following the introduction of this scheme, total fertilizer consumption in Tanzania increased. In year 2010 the fertilizer purchased and distributed by private sector for the NAIVS program was 151,000 Metric tones or 57% of the market. The voucher system enables a farmer to get maximum of two bags of fertilizers to be used in only one acre. This amount allocated is insufficient given the farm sizes owned and cultivated by the households in the area. For example, in Tajikistan in 1998 a Presidential Decree established that cotton farmers, a state bank, Agroinvest bank, and private investors called “futurists” were to sign tripartite contracts for working capital finance. The futurists were to supply inputs, and to be paid in a certain amount of cotton. Agroinvest bank was

to supply the funds for the purchase of the inputs and secure reimbursement through a monopoly right on farmers' cotton sales. This system became the primary one for input finance for Tajik cotton farmers; over 80 percent of them procured inputs from the "futurists". However, the results were dismal.

In Malawi, the application of fertilizers among smallholder farmers is quite high, with 97.9 percent of farmers interviewed revealing that they had applied fertilizers in the past 12 months and 62.5 percent had used pesticides. On average coffee farmers used 297 kilograms of fertilizers on all crops, with 53 percent of the fertilizers applied on coffee farm at an average cost of MK19,000 per coffee farm. The cash purchases of fertilizers are high with 47.6 percent of the farmers indicating cash purchase as the main source of fertilizers while 45 percent relied mainly on credit from cooperatives. The study also reveals that 89 percent of farmers had access to credit facilities and 85.5 percent obtained agricultural credit in the past 12 months of the interviews (E. W. Chirwa, A. Dorward and J. Kydd, 2007).

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents a detailed description of the research design, target population, sample size and sampling procedures, research instruments, pilot testing of the research instruments, validity and reliability of research instruments, operational definition of variables, data collection procedures, data analysis techniques and ethical considerations to be used in this study .

3.2 Research Design

The descriptive survey research design was used in the study, the researcher. The researcher collected primary data from the farmers using a questionnaire and an interview schedule. Secondary data was collected from journals, textbooks publications and the internet. Burns and Grooves (2001) describe research design as a plan that guides the researcher in planning and implementing the study in a way that is mostly likely to achieve the intended goals. The study adopted descriptive survey research design, the design describes “what is” and is concerned with conditions or relationships that exist, opinions that are held, processes that are going on and effects that are evident or trends that are developing (Best and Khan, 1993).

3.3 Target Population

Cooper and Schindler, (2003), describes a population as the total collection of elements about which we wish to make some inferences. The target population for this study was 2,378 farmers who process and market their coffee with Karithathi Farmers Cooperative Society in Kirinyaga County, Kenya. The reason for choosing this cooperative society is because it is one of the cooperatives that has benefited from various types of credit facilities from the government and private sector financial institutions aimed at enhancing coffee production. The cooperative society is in Ngariama ward, Ngariama Location, Kabari Sublocation in Kirinyaga County, The cooperative has divided it’s farmers into three blocks for ease of administration as shown in Table 3.1.

Table 3.1: Target Population

| Block | Population | Percent |
|--------------|-------------------|----------------|
| Kiambatha | 864 | 36.33 |
| Kithima | 721 | 30.32 |
| Kiambuku | 793 | 33.35 |
| Total | 2,378 | 100 |

3.4 Sample Size and Sampling Procedure

The following section discusses the sample size and sampling procedures that were used in the study

3.4.1 Sampling Procedure

The study employed stratified random sampling technique in coming up with the sample size of 783 respondents from a total of 2,378 in Karithathi Farmers cooperative Society. Stratified random sampling was used, it's unbiased sampling method of grouping heterogeneous population into homogeneous subsets then making a selection within the individual subset to ensure representativeness (Bryman & Bell, 2003).The goal was to achieve the desired representation from various subgroups in the population. The method was used since the population was divided into two distinct groups bearing distinct characteristics in gender. From each of the three groups, simple random sampling was used to select the respondents for the questionnaires and interview schedules.

3.4.2 Sample Size

Sample size is described as a subset of a population, it comprises of some members selected from a population. The sample size for this research study was 783 respondents from a target population of 2,378. In order to get the most efficient representative statistical sample size for the study, the researcher applied the Krejcie & Morgan (1970) table

Table 3.2 Sample Size

| Block | Population | Sample size |
|--------------|-------------------|--------------------|
| Kiambatha | 864 | 269 |
| Kiambuku | 793 | 260 |
| Kithima | 721 | 254 |
| Total | 2,378 | 783 |

3.5 Data Collection Instruments

Data was collected using questionnaires and structured interviews, the questionnaire used varied in structure and content but had both closed and open ended questions to enable the respondents answer the questions freely. The questionnaire and the interview guide had a series of questions and other prompts for the purpose of gathering information from respondents especially on the frequency of occurrences; this was designed to make use of action verbs describing primary functions. The research utilized this instrument by ticking the appropriate option from a list of possible responses provided. Structured interviews were used to control the verbal exchanges between the respondents and the researcher.

This tool listed possible questions to act as guidelines during the face to face interviews which helped the research remain objective and focus on study objectives. All questions were prepared beforehand and put across in the same order to each interviewee this was aimed at guarding against free flow of the interview that may have resulted in irrelevancies and instead helped the study pick a fixed format

3.5.1 Piloting of Research Instruments

In order to determine the efficiency of the research instrument which was used in the study, the researcher carried out a pilot study; this was done prior to the actual process of data collection. According to Mugenda and Mugenda (2003), a sample size of 10% of the sample size is considered adequate for descriptive study. Therefore, 10% of the study population which is 78 respondents was picked from Karithathi Farmers Cooperative Society as they had the same characteristics of respondents used in the actual study.

In order to avoid bias when analyzing data once the respondents filled in the questionnaires, the researcher analyzed the questionnaires and determined from the responses given whether the respondents understood the concepts given in the questionnaires. The researcher made corrections and adjustments to the questionnaires accordingly. For the interview schedule, the researcher reframed the questions that were ambiguous or not clear to the respondents.

Once corrections were made, the researcher repeated the exercise with the same respondents used in the pilot study after one week. This helped the researcher know whether the respondents had actually understood the concepts in the questionnaire and the interview guide by crosschecking responses given in the second exercise. The pilot testing helped the researcher sharpen his skills before conducting the main research study. Pilot testing the instrument ensured that the questions were understood by the respondents and there were no problems with wording or measurement.

3.5.2 Validity of Research Instruments

Validity is the accuracy and meaningfulness of inferences, which are based on the research results. In other words, validity is the degree to which results obtained from the analysis of the data actually represent the phenomenon under study (Mugenda and Mugenda, 2003). Data collected during pilot testing was analyzed and helped in assessing the accuracy of the instrument.

Content validity was measured by taking representative questions from each of the sections of the questionnaire and evaluating them against the desired outcomes. The researcher further shared the details and structure of the research instruments with the supervisors and research experts for analysis, the supervisors crosschecked and affirmed that indeed the research instruments capture the full concept of the study.

3.5.3 Reliability of Data Collection Instruments

Reliability is a measure of the degree to which the research instrument yields consistent results or data after repeated trials (Mugenda and Mugenda, 2003). The reliability of the questionnaire and the interview guide was determined using the split half method. The questionnaire and the

interview schedule was divided into two halves one with odd numbered questions and the other with even numbers. Each of the half was administered to different respondents, they were then scored and the results correlated to estimate reliability the respondents comprised of 78 farmers. Using SPSS, the coefficient of reliability was measured and the Spearman brown coefficient of 0.828 obtained for the questionnaire and a coefficient of 0.864 for the interview schedule. The reliability of the questionnaire and the interview guide was established to be adequate according to (Mugenda and Mugenda, 2003), who state that a coefficient of 0.8 or more implies a high degree of data reliability.

3.6 Data Collection Procedure

Data was collected using the questionnaire and interview guide on farmers, documents analysis was also done at the cooperative society offices to confirm some details like number of kilograms harvested by farmers. A letter of introduction from the University of Nairobi to the Management of Karithathi Farmers Cooperative Society for authority to conduct research was presented. The researcher made a pre-visit to the cooperative to establish rapport and familiarize with respondents before the actual date of data collection. Arrangements were made to meet the farmers at a date and time convenient to the respondents while ensuring this was within the scheduled timelines of the study. Questionnaires were administered through interviewing the respondents during the meeting using local language, the other information was collected through direct observation during the administration of the questionnaire and this enabled the researcher to know and get information that the respondents did not provide.

3.7 Data Analysis

The study employed descriptive statistics technique, the technique is used to present quantitative descriptions in a manageable form by providing simple summaries about the sample and the measures (Bogdan, et al., 1992) as quoted in Otieno, 2011). Once the researcher assembled the questionnaires and the interview guides, responses to questions were then be coded by categorizing both the quantitative and qualitative data, coding according to Mugenda & Mugenda, 2003, is the process of assigning numbers to the Subject's responses. They were then analyzed using Statistical Package of Social Scientists (SPSS) version 21.

The descriptive data analysis technique used assisted the researcher in to summarize and organize data in an effective and meaningful way. According to (Nachimas, 1996), descriptive data analysis provides tools for describing collections of statistical observations and reducing information to understandable form. Data for the questions was then analyzed by examining the responses trends that assisted in identifying common themes. A summary of the responses was then presented in a descriptive text incorporating narratives directly from the respondents.

3.8 Ethical considerations

The researcher presented the introductory letter given by the university to the respondents as proof of authorization. The researcher then sought voluntary consent of the respondents to partake the research without coercion, so as to avoid any cases of discomfort and misinterpretation of any given data. The researcher also explained the benefits of the study to the respondents and assured them of confidentiality by concealing their identity, respecting their views, concerns and their culture.

3.9 Operational Definition of Variables

According to Mugenda (2006) this refers to the description of operations that are used in measuring the study variables. This includes research objectives, type of variables, indicators, measure and level of scale, data collection methods and data analysis methods which are put in a diagram to show how they interact with the variables. A variable can be defined as an empirical property that can take two or more values, in this study, independent variables include farm inputs credit, credit vouchers and cash advances. These were tested to asses if they are determinants of performance of coffee production, the dependent variable.

Table 3.2 Operationalization of Variables

| Research Objectives | Type of variable | Indicator | Level of Scale | Data collection Method | Type of Analysis |
|---|---|--|--------------------------------------|-----------------------------------|-------------------------|
| Asses the influence of farm inputs credit on coffee production in Karithathi Farmers Cooperative Society | Independent Variable: Farm inputs credit Dependent Variable: Coffee Production | Fertilizers Pesticides | Nominal scale Ordinal Scale | Questionnaire, Interview guide | Descriptive |
| Establish the influence vouchers on coffee production in Karithathi Farmers' Cooperative Society. | Independent variable: Vouchers Dependent Variable: Coffee production | School fees Inputs | Nominal Scale Ordinal Scale | Questionnaire, Interview guide | Descriptive |
| Determine the influence of cash advances on coffee production in Karithathi Farmers' Cooperative Society. | Independent Variable: Cash advances Dependent Variable: Coffee production | School fees Cash for labor Cash for inputs | Nominal Scale Ordinal Scale | Questionnaire Interview guide | Descriptive |

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

This chapter presents data analysis, presentation and interpretation of results based on response rate of the study, demographic characteristics of the respondents, influence of farm inputs credit on coffee production, influence of cash advances on coffee production and finally influence of credit vouchers on coffee production.

4.2 Response return rate

Mugenda and Mugenda, (2003), advises that response rate of 70% and above is very good. This implies therefore that the response rate of 92.2% obtained by the researcher was very good and representative of the target population for enabling the researcher to generate a conclusive report

4.2.1 Questionnaire response rate

The researcher targeted respondents who had distinct characteristics and therefore it was necessary to analyze their response, the results are shown in Table 4.1.

Table 4.1: Questionnaire response return rate

| Block | Sample | Returned | Percent |
|--------------|---------------|-----------------|----------------|
| Kiambatha | 269 | 242 | |
| Kiambuku | 260 | 238 | |
| Kithima | 254 | 242 | |
| Total | 783 | 722 | 92.2 |

There were 783 respondents; those who responded to the questionnaires were 722. Those who were unable to return the questionnaires were mainly those who had full time jobs and would get home late in the evening.

4.3 Demographic and household information of the respondents

This section represents the characteristics of the respondents which were considered very significant to the study. This includes: gender, age, level of education, number of dependants and education, number of kilograms, number of coffee trees.

4.3.1 Gender of the respondents

The researcher sought to determine the gender of the respondents to ensure views of each gender were well represented in the study; results are presented in Table 4.2.

Table 4.2: Gender

| Sex | Frequency | Percentage |
|--------------|------------------|-------------------|
| Female | 324 | 44.91 |
| Male | 398 | 55.01 |
| Total | 722 | 100 |

From the results, there were more men than women who took part in the study. This can be explained by the fact that coffee has traditionally been owned by men. This is because more men had ceded part of their coffee to women and concentrated on tea farming since it traditionally used to have higher earnings than coffee.

4.3.2 Age of the respondents

Determining the age of the respondents was very crucial to the study and the researcher sought to determine the age of the respondents as presented in Table 4.3.

Table 4.3: Age of the respondents

| Age Bracket | Frequency | Percent |
|--------------------|------------------|----------------|
| 21-40 | 123 | 16.98 |
| 41-60 | 313 | 43.40 |
| Over 60 Years | 286 | 39.62 |
| Total | 722 | 100.00 |

Majority of the farmers were aged between 40 years and above with only 16.98% being farmers below 40 years of age. This can be explained by the fact that most youth do not have coffee farms and majority of the youth seems are disinterested in coffee farming because of the long period it takes to get paid after delivering coffee (6 months on average) and have either migrated to urban areas in search of employment or are in rural areas engaged in horticulture farming which pays in one and a half months for some crops like French beans or motorbike transport business where there is quick money.

4.3.3 Level of education

Since coffee farming is a business, having some level of education is key to determining how profitable or viable the farming is or even being able to understand how to apply farm inputs or even keep farm records, on this basis, the researcher sought to know the level of education of the respondents, the results are in Table 4.4

Table 4.4: Level of education

| Level of education | Frequency | Percent |
|---------------------------|------------------|----------------|
| Primary | 312 | 43.21 |
| Secondary | 383 | 53.02 |
| Tertiary | 27 | 3.77 |
| Total | 722 | 100 |

The study found out that almost a half of the respondents had basic primary level of education and only 3.77% of the respondents had tertiary level of education. This can explain why almost half of the respondents applied only fertilizers and did not apply agrochemicals and foliar feeds as they did not understand how important it is to protect the crop from pests and diseases which lead to huge losses of the crop. Breakdown in farmer extension services had also exacerbated the problem leading to lack of information on good coffee husbandry practices. It also explains why majority of the farmers were not keeping records and were not doing coffee farming as a business but as a cultural activity.

4.3.4 Number of dependants of the respondents

The researcher sought to find out the number of dependants each farmer had, this was very important as it helped in demining their level of commitment of school fees and other household needs, the results are recorded in Table 4.5.

Table 4.5: Number of dependants of the respondents

| Number of dependants | Frequency | Percent |
|-----------------------------|------------------|----------------|
| 1 | 99 | 13.77 |
| 2 | 305 | 42.26 |
| 3 | 155 | 21.52 |
| 4 | 72 | 9.81 |
| More than 4 | 91 | 12.64 |
| Total | 722 | 100 |

The respondents had more than one dependant only 13.77% of the respondents had one dependant only. This can explain why most of the farmers used their cash advances to pay school fees and attend to immediate household needs instead of investing the cash advances towards coffee production .It also explains why credit vouchers were used in paying school fees only since most of the farmers have children in either primary, secondary or tertiary levels institutions.

4.3.5 Occupation

Occupation of the farmers was an area which the researcher was interested in investigating, some few farmers had full time jobs while majority of them were full time farmers with coffee being the main crop, the results are in Table 4.6

Table 4.6: Occupation

| Occupation | Frequency | Percent |
|-------------------|------------------|----------------|
| Employed | 95 | 13.21 |
| Farmer | 627 | 86.79 |
| Total | 722 | 100 |

Majority of the respondents were full time farmers and though they were also engaged in tea, dairy and horticulture farming, they considered coffee farming as their main source of income. This explains why most farmers diverted their farm inputs borrowed from the cooperative to horticulture farming, it also explains why only very few farmers were using cash advances to purchase farm inputs in that those in employment could afford to spare cash from their employment to invest in farming and also attend to immediate household needs.

4.3.6 Number of coffee trees

The researcher sought to establish the number of coffee trees owned by the respondents as shown in Table 4.7

Table 4.7: Number of coffee trees

| Number of coffee trees | Frequency. | Percent |
|-------------------------------|-------------------|----------------|
| 1-100 | 112 | 15.47 |
| 101-300 | 369 | 51.13 |
| 301-500 | 212 | 29.43 |
| Over 500 | 29 | 3.96 |
| Total | 722 | 100 |

From the findings majority of the farmers (66.6%) owned less than 300 coffee trees. This explains why the production is low as the land sizes are very small in the area. The only way to increase coffee production is through intensive farming by increasing productivity per tree by use of farm inputs.

4.3.7 Number of kilograms

The study sought to find out the number of Kilograms harvested per season by the respondents and results are presented in Table 4.8

Table 4.8: Number of kilograms

| Kilograms | Frequency | Percent |
|------------------|------------------|----------------|
| 1-100 | 257 | 35.66 |
| 101-1000 | 379 | 52.40 |
| 1001-3000 | 65 | 9.06 |
| 3001-5000 | 15 | 2.08 |
| Above 5000 | 6 | 0.8 |
| Total | 722 | 100 |

Majority of the farmers (88.06%) had less than 1,000 kilograms of coffee. This shows low productivity of their coffee trees which can be explained by low use of farm inputs in coffee production a good number of farmers also indicated they diverted either part or all farm inputs to farming other crops.

4.3.7 Farm records

The researcher sought to determine whether respondents kept farm records and gave results in Table 4.9

Table 4.9: Farm records

| Keeping farm records | Frequency | Percent |
|-----------------------------|------------------|----------------|
| No | 505 | 70 |
| Yes | 217 | 30 |
| Total | 722 | 100 |

Majority of the farmers did not keep any form of farm records, only 30% of the respondents kept records. Those who kept records mainly kept records of coffee harvested during the season while

ignoring records for farm inputs used and also expenses used in coffee production. This can explain the lack of motivation amongst farmers in increasing coffee production since it is for the farmers to know how profitable coffee farming is.

4.4 Farm inputs credit and coffee production

The researcher in this objective sought to investigate whether type of farm inputs, quantity of farm inputs, timing of accessing of farm inputs and frequency of accessing farm inputs, influenced coffee production.

4.4.1 Type of farm inputs

The researcher wanted to find out the type of farm inputs credit taken by farmers from the cooperative. The findings are presented in Table 4.10

4.10: Type of farm inputs

| Farm Input | Frequency | Percentage |
|------------------------------|------------------|-------------------|
| Fertilizer and agrochemicals | 634 | 87.74 |
| Fertilizers | 65 | 9.06 |
| Agrochemicals | 16 | 2.26 |
| Foliar feeds | 7 | 0.94 |
| Total | 722 | 100 |

The results indicate that most farmers only take fertilizers and do not bother to take agrochemicals and foliar feeds which can help in increasing coffee tree productivity thus affecting coffee production. Zinc and Boron are micro nutrients which are very key to coffee flowering and are available to coffee trees in form of foliar feeds when farmers fail to apply them, it leads to less flowering and less production. Failure to use agrochemicals against pests and diseases leads to substantial crop loss of crop leading to less yields.

4.4.2 Quantity of farm inputs

The study examined whether the quantities of farm inputs issued to farmers were enough and gave the results in Table 4.11

4.11: Quantity of farm inputs

| Enough quantity | Frequency | Percentage |
|-----------------|------------|------------|
| Yes | 162 | 22.45 |
| No | 560 | 77.55 |
| Total | 722 | 100 |

From the findings, majority of the farmers (77.55) felt that the farm inputs credit given by the cooperative was enough. This can be explained by the fact that most farmers only took fertilizer and ignored other farm inputs like foliar feeds and agrochemicals.

4.4.3 Frequency of accessing farm inputs credit

How frequent a farmer applies farm inputs determines the pattern of crop production. The researcher sought to investigate how frequently farmers took farm inputs credit, the findings are in Table 4.12.

Table 4.12: Frequency of accessing inputs

| Seasons | Frequency | Percentage |
|-----------------------|------------|------------|
| One Season | 575 | 79.62 |
| Two seasons | 84 | 11.70 |
| More than two Seasons | 45 | 6.23 |
| Never received | 18 | 2.45 |
| Total | 722 | 100 |

Majority of the farmers took farm inputs credit every season, only 20.38% of the farmers did not take farm inputs credit every season. However, this did not translate into higher production for majority of farmers as they diverted the farm inputs to farming other crops. While majority of the farmers took farm inputs credit every season, most of it was only fertilizer leading which could not work in isolation without agrochemicals and foliar feeds in enhancing coffee production. The irregular application of farm inputs by some farmers led to fluctuations in coffee production.

4.4.4 Use of farm inputs

After taking farm inputs credit from the cooperative, the researcher sought to understand how farmers used it, the results are in Table 4.13.

Table 4.13: Use of farm inputs

| Use | Frequency | Percentage |
|--|------------|------------|
| Applied all on coffee | 444 | 61.51 |
| Applied part in coffee part in other crops | 249 | 34.53 |
| Applied all in other crops | 29 | 3.96 |
| Total | 722 | 100 |

Majority of the farmers applied all the farm inputs to coffee farming (61.51%), other farmers diverted all the farm inputs credit to farming other crops, others diverted part of the farm inputs credit to farming other crops. While a good number of farmers utilized all farm inputs credit to coffee production, this was not enough to increase coffee production as only fertilizer was applied leaving out very important farm inputs like foliar feeds and agrochemicals.

4.4.5 Correlation analysis between farm inputs utilization credit and coffee production

The study sought to investigate the relationship between coffee production and farm inputs use and gave the results in Table 4.14

Table 4.14 Correlation analysis for farm inputs utilization and coffee production

| | |
|-------------|--------|
| Correlation | 0.8242 |
| P value | 0.0000 |
| r^2 | 0.1870 |

From the correlation analysis presented between credit utilization and coffee production the dependent variable was found to be 0.8242, the P value was found to be 0.0000 which is less than 0.05 this implies that use of farm inputs in coffee production increases coffee production.

The coefficient of determination r^2 was found to be 0.1870 this means farm inputs credit use explains 18.70% variance in coffee production to the extent of 18.70%.

4.5 Credit vouchers and coffee production

The researcher in this objective sought to investigate whether type of credit voucher, type of collateral required for accessing the credit voucher, and the use of the credit voucher influenced coffee production

4.5.1 Type of credit vouchers

The researcher sought to examine the type of credit vouchers taken by the farmers as shown in Table 4.15.

Table 4.15: Type of credit vouchers

| Type of voucher | Frequency | Percentage |
|-----------------|------------|------------|
| Cheque | 552 | 76.42 |
| Cash | 0 | 0 |
| Cash and Inputs | 0 | 0 |
| None | 170 | 23.58 |
| Total | 722 | 100 |

The evidence shows that only 76.42% of the respondents had accessed credit voucher credit and had used it for paying school fees only. this explains the fact that credit vouchers had no direct impact on coffee production. The other respondents who had not accessed credit vouchers had either exhausted their credit limits with farm inputs credit and cash advances or had paid their school fees using other sources of income.

4.5.2 Quantity of credit voucher credit

The security required for accessing credit vouchers was key to the study and the researcher found the following results presented in Table 4.16

Table 4.16: Quantity of credit voucher credit

| Enough | Frequency | Percentage |
|---------------|------------------|-------------------|
| Yes | 497 | 68.87 |
| No | 225 | 31.13 |
| Total | 722 | 100 |

From the results, majority of the respondents felt that the credit obtained through vouchers was enough while few felt it wasn't enough. Since credit voucher was only used for paying school fees, those who said it was enough had fewer commitments in school fees payments and had fewer dependants while those who said it wasn't enough had bigger commitments in school fees payments as a result of many dependants.

4.5.3 Timing of receiving credit voucher

Timing of receiving credit voucher was also examined in the study and the results presented in Table 4.17

Table 4.17: Timing of receiving credit voucher

| Voucher use | Frequency | Percent |
|--------------------|------------------|----------------|
| Yes | 590 | 81.70 |
| No | 132 | 18.30 |
| Total | 722 | 100 |

Majority of the farmers felt that they were given credit vouchers on time, this can be explained by the fact that most of the farmers had children in public learning institutions and the credit vouchers were normally timed with opening of these public learning institutions. The few farmers who felt credit vouchers were not given on time had their children in private tertiary learning institutions which did not follow the calendar of learning similar to public learning institutions

4.5.4 Voucher credit use

Utilization of credit voucher was also examined in the study, out of the 722 farmers who responded only 552 farmers had access to credit vouchers the following are the results in Table 4.18

Table 4.18: Voucher credit use

| Voucher use | Frequency | Percent |
|--------------------|------------------|----------------|
| For farm inputs | 0 | 0 |
| For School fees | 552 | 100 |
| For household use | 0 | 0 |
| Total | 552 | 100 |

All farmers who accessed credit voucher used it to pay school fees for their dependants; this explains why credit voucher had no direct impact on increasing coffee production.

4.5.5 Correlation analysis between credit vouchers utilization and coffee production

The researcher sought to investigate the relationship between credit vouchers and coffee production and gave the following results in Table 4.19

Table 4.19 Correlation results for credit vouchers utilization and coffee production.

| | |
|-------------|---------|
| Correlation | 0.4009 |
| P value | 0.1618 |
| r^2 | -0.0366 |

the Correlation analysis presented in table 4.18, between credit vouchers and coffee production as the dependent variable was found to be 0.4009, the P value was found to be 0.1618 which is larger than 0.05 this implies that use of credit voucher doesn't help to increase coffee production.

4.6 Cash advances and coffee production

The researcher in this objective sought to investigate whether type of cash advances, type of collateral required for accessing the cash advances, and the use of the cash advances influenced coffee production

4.6.1 Type of cash advances credit

The study sought to know the views of the farmers on whether the cash advances they received were enough or not and gave the results in Table 4.20

Table 4.20 Type of cash advances credit

| Cash advance received | Frequency | Percent |
|------------------------------|------------------|----------------|
| Yes | 597 | 82.64 |
| No | 125 | 17.36 |
| Total | 722 | 100 |

From the results in Table 4.20, it was evident that 82.64% of the farmers had access to Cash advance payments while 17.36% of the farmers had no access.

4.6.2 Quantities of cash advances received by respondents

The researcher examined whether the quantities of cash advances given to the farmers were enough and the results are as shown in Table 4.21

Table 4.21 Quantities of cash advances

| Enough quantities | Frequency | Percent |
|--------------------------|------------------|----------------|
| Yes | 504 | 69.81 |
| No | 218 | 30.19 |
| Total | 722 | 100 |

Majority of the farmers who had access to the cash advances felt they were enough for the purpose of paying school fees. The main reason why they felt they were enough is because they only got what their credit limit allowed. The farmers who felt the cash advances were not enough cited the high cost of living as they were using their cash advances to settle immediate household needs.

4.6.3 Timing of receiving cash advances

The time when cash advances are given to the farmers is also critical and the researcher found out the following as shown in Table 4.22:

Table 4.22 Timing of receiving cash advances

| Timing | Frequency | Percent |
|---------------|------------------|----------------|
| Yes | 597 | 82.64 |
| No | 125 | 17.36 |
| Total | 722 | 100 |

Majority of the respondents (82.64) felt they were able to access cash advances when they needed the money. This can be explained by the fact that Karithathi Farmers Cooperative Society had arrangements with local financial institutions and had a revolving fund where farmers were able to access cash advances even before their produce was sold. The cash advances were mainly used for paying schools fees and for settling immediate household needs. Those who felt the cash advances were not available on time cited cases of emergencies like diseases or accident situations where the need was immediate but they still had to go through the full process of applying the cash advance.

4.6.4 Use of cash advances by respondents

How cash advances were used was very important to the study as it indicated the relationship of this credit with coffee production.

Table 4.23 Use of cash advances

| Use | Frequency | Percent |
|-----------------|------------------|----------------|
| School Fees | 373 | 51.60 |
| Household needs | 320 | 44.29 |
| Labour | 30 | 4.11 |
| Total | 722 | 100 |

Majority of the farmers (95.89%) used their cash advances to pay school fees and also settle immediate household needs. A very small percentage (4.11 %) used the cash advances to pay for labour during coffee harvesting. A good number of the farmers did not have access to the cash advances and this can explain why the revolving fund cash facility had not been exhausted. This can be attributed to the low kilograms of coffee by the farmers thus exhausting their credit limit with other sources of credit.

4.6.5 Correlation analysis between cash advances utilization and coffee production

The study sought to find out the relationship between cash advances credit and coffee production and gave the results as shown in Table 4.24

Table 4.24 Correlation between cash advances utilization and production

| | |
|-------------|---------|
| Correlation | 0.9799 |
| P value | 0.3143 |
| r^2 | -0.0011 |

the Correlation analysis presented in table 4.24, between cash advances and coffee production as the dependent variable was found to be 0.9799, the P value was found to be 0.3143 which is larger than 0.05, this implies that use of cash advances doesn't help to increase coffee production.

CHAPTER FIVE

SUMMARY OF FINDINGS, DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter contains a summary of findings, discusses the findings and provides conclusions based on the study findings. The recommendations focused on the thematic areas of study namely: The influence of farm inputs credit utilization on coffee production, influence of credit vouchers utilization on coffee production and influence of cash advances utilization on coffee production in Karithathi Farmers Cooperative Society.

5.2 Summary of the Findings

This section has a summary of summary and discussions of the findings of this study according to the objectives of the study. The purpose of the study was to investigate the influence of credit on coffee production. The objectives of the study were to assess the influence of utilization of farm inputs credit on coffee production to establish the influence credit vouchers have on coffee production and determine the influence of cash advances credit on coffee production in Karithathi Farmers' Cooperative Society in Kirinyaga County,

5.2.1 Influence of farm inputs credit on coffee production

The study revealed that farmers who received fertilizers and agrochemicals were 87.74 % of the correspondents, farmers who received fertilizer 9.06% of the respondents ,farmers who received agrochemicals 2.26% of the respondents and finally only 5 % of the farmers received foliar feeds comprising 0.94% of the respondents.

Most farmers revealed that fertilizer is considered a major farm input by farmers seeking to increase production through coffee tree productivity since land sizes are small. Fertilizer was also very popular because it could be used on almost any other crop that the farmers wanted to cultivate. Most farmers ignored other farm inputs like agrochemicals and foliar feeds which are very critical in intensive farming which can help increase productivity. This was due to ignorance caused by lack of information because extension services have almost collapsed. From the study it was clear that while some farmers applied all the farm inputs to coffee, a good

number diverted part or whole farm inputs to farming other crops thus reducing the effectiveness of the farm inputs contribution towards increasing coffee production.

5.2.2 Influence of credit vouchers on coffee production.

From the results obtained in the study, 76.42% of the farmers had access to credit vouchers in form of cheques. From the results, another 23.58% of the farmers did not receive any form of credit vouchers for Karithathi Farmers Cooperative Society. The study found out that all the farmers who received credit vouchers used it to pay school fees for their children with the cheques being payable directly to the institutions.

Most farmers have dependants who are still in school at various levels and this credit was very critical according to farmers as coffee takes time before it is fully sold and school fees cannot wait for coffee payments. This means that credit vouchers had no direct influence in increasing coffee production. Due to the low number of kilograms by the farmers, a good number of the farmers were unable to access this credit as they already exhausted their credit limit with farm inputs credit.

5.2.3 Influence of cash advances on coffee production.

The study found that 82.64 of the farmers had access to Cherry Advance Payments (CAPS), while 17.36% of the farmers had access to revolving fund, both facilities remained underutilized. This is because most farmers had low volumes of coffee thus exhausting their credit limit with either farm inputs credit and credit vouchers or with both.

The farmers who had access to the cash advances, (95.89%) used their cash advances to pay school fees and also settle immediate household needs. A very small percentage (4.11%) used the cash advances to pay for labour during coffee harvesting. This explains the reason why cash advances had no direct relationship with increasing coffee production.

5.3 Discussions

This section details the discussion of findings of this study according to the objectives of the study. The objectives of the study were to assess the influence of utilization of farm inputs credit on coffee production to establish the influence credit vouchers have on coffee production and determine the influence of cash advances credit on coffee production in Karithathi Farmers' Cooperative Society in Kirinyaga County.

5.3.1 Influence of farm inputs on coffee production

Majority of the farmers applied all the farm inputs to coffee farming (61.51%), other farmers diverted all the farm inputs credit to farming other crops (3.96%), others diverted part of the farm inputs credit to farming other crop (34.53%)s. While a good number of farmers utilized all farm inputs credit to coffee production, this was not enough to increase coffee production as only fertilizer was applied leaving out very important farm inputs like foliar feeds and agrochemicals.

The study found that the utilization of farm inputs in coffee farming had a positive correlation with coffee production, those farmers who used either farm inputs fully or partially in coffee production had more Kilograms of coffee. Those farmers who used all their farm inputs to farm other crops had less kilograms. The correlation between farm inputs credit utilization and coffee production was found to be 0.8242, the P value was found to be 0.0000 which is less than 0.05 this implies that use of farm inputs in coffee production increases coffee production. The coefficient of determination r^2 was found to be 0.1870 this means farm inputs credit use explains 18.70% variance in coffee production to the extent of 18.70%.

This evidence confirmed a study in Malawi by (E. W. Chirwa, A. Dorward and J. Kydd, 2007). Who found that the application of fertilizers among smallholder farmers is quite high, with 97.9 percent of farmers interviewed revealing that they had applied fertilizers. Their study also reveals that 89 percent of farmers had access to credit facilities and 85.5 percent obtained agricultural credit.

5.3.2 Influence of credit vouchers on Coffee production.

The study found that 100% of farmers who had access to credit vouchers used them for paying school fees meaning the credit vouchers did not have any direct influence on coffee production.

This means that the credit received in form of vouchers is not directed towards production which explains the reduction in coffee production. Also 23.58% of the farmers did not have access to the credit voucher because they had already either exhausted their credit limit with farm inputs credit or with cash advances. The correlation analysis between cash advances and coffee production as the dependent variable was found to be 0.9799, the P value was found to be 0.3143 which is larger than 0.05, this implies that use of cash advances doesn't help to increase coffee production.

The limited option for credit voucher to paying school fees only explains the reduction in coffee production leading to low kilograms which is used as security for accessing credit vouchers. This confirms a study done by the government of Kenya. Before market reforms, farmers were assured of a minimum return on their coffee produce. The coffee Board of Kenya which is the regulator in the coffee industry gives the deadline for payment of farmer dues to not more than 14 days after the coffee auction, many of the farmers however have reported payment delays exceeding up to four months (Republic of Kenya, 2002). (Republic of Kenya, 2002).

5.3.3 Influence of cash advances on coffee production.

The study found that the farmers had access to Coffee Advance Payments at a rate of 5% and another revolving fund in excess of Khs 3 Million. Majority of the farmers (95.89%) used their cash advances to pay school fees and also settle immediate household needs. A very small percentage (4.11%) used the cash advances to pay for labour during coffee harvesting. The two facilities remain underutilized because of low production and credit access is based on number of Kilograms. The correlation between cash advances and coffee production as the dependent variable was found to be 0.9799, the P value was found to be 0.3143 which is larger than 0.05, this implies that use of cash advances doesn't help to increase coffee production.

The findings confirmed a study by Nyoro, (2004) which found that farmers have many needs and payments are always delayed A farmer may deliver coffee beans in March and may not receive payment until September. In the meantime, the farmer has to spend his meager income from his own sources, hiring labour to grow and harvest the coffee and buying expensive farm inputs. Even without access to credit or any other funds, the farmer is also burdened with other

household needs like school fees, daily subsistence needs and a lack of additional farm inputs to grow more coffee and food crops.

5.4 Conclusion

Based on the findings, the study concludes that farm inputs affect coffee production in Karithathi Farmers Cooperative Society. Fertilizer was found to be very critical to farmers and while most farmers were taking fertilizer from the cooperative, some were diverting the fertilizer for use in farming other crops thus affecting coffee production. The study concluded that lack of a proper monitoring system for the use of farm inputs credit had led to diversion of the use of the farm inputs. The study also found that most of the farmers were not taking agrochemicals and foliar feeds which are also very key ingredients for coffee production thus also affecting production.

The study found that Credit vouchers were available to farmers for payment of school fees directly to the learning institutions. This credit did not help in increasing coffee production directly however, it was a good incentive for farmers because payment to farmers in most cases is not ready when schools reopen. The study also found that cash advances were available to farmers in form of Cherry Advance Payments (CAPS) and a revolving fund established by Karithathi Farmers Cooperative Society. It was clear that most of the cash advances taken by farmers were used for paying school fees and for catering for household needs and only few farmers used it for coffee production thus affecting coffee production.

5.5 Recommendations

The study came up with the following recommendations to the government, Karithathi Farmers Cooperative Society and service providers in the coffee sector

- 1) The coffee cooperative needs to have a monitoring system in place for use of farm inputs credit to ensure that it is used for the intended purpose, this may be done in form of group monitoring. This will ensure increase in productivity leading to more demand for inputs credit since last season produce is used as collateral for credit.
- 2) The coffee cooperative in collaboration with the ministry of agriculture extension officers and agrochemical companies need to sensitize farmers on the need to take other farm inputs apart from fertilizers like agrochemicals and foliar feeds as they are equally

important in enhancing crop productivity especially during this era of climate change. Training on effective use of agrochemicals and safe use of agrochemicals should be emphasized to ensure value for money and also safety of the environment.

- 3) The cooperative and ministry of agriculture extension officers needs to sensitize farmers on the need to apply farm inputs every season without fail as this will stabilize and increase production. Since access to farm inputs credit is pegged on the number of Kilograms in the last season, it then means those who do not use farm inputs do not qualify for enough farm inputs credit since they have few Kilograms.
- 4) For those farmers who have been faithfully been delivering coffee consecutively to the cooperative for the last three years and above, there is need to review their credit access model and base it on the number of trees. This should be tied to group guarantees and will help increase coffee production. The revolving fund is underutilized and there is need to invest the idle cash in farm inputs and use it for this purpose. This will help increase coffee production.
- 5) There is need to work with farm inputs providers to work on ways of accessing farm inputs for their other crops in order to prevent them from diverting farm inputs to farming those crops.

5.6 Suggestions for Research

The researcher makes the following suggestions for further research based on the findings of the study:

- 1) The extent to which land subdivision of land and urbanization has affected coffee production
- 2) The extent to which climate change has affected coffee production.

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APPENDICES

Appendix I: Letter of Introduction.

James Gitonga Kamakia
Embu Extra Mural Studies
University of Nairobi
P.O Box 30197,
Nairobi.

Dear Respondents

I am a student at the University of Nairobi pursuing a Masters Degree in Project Planning and Management. I am conducting research on Credit and Coffee Production in Karithathi Farmers Cooperative Society. The research will involve administering questionnaires, conducting interviews and document analysis. I wish to request you to assist me in the exercise by volunteering information requested. All information will be treated with utmost confidentiality and used for academic purpose only

Thank you,

Kind Regards
James Kamakia

Appendix II: Research Permit



NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

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Ref. No. **NACOSTI/P/16/96487/14969**

Date:

24th November, 2016

James Gitonga Kamakia
University of Nairobi
P.O. Box 30197-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on *“Influence of credit utilization by smallholder farmers on coffee production: A case of Karithathi Farmers Cooperative Society,”* I am pleased to inform you that you have been authorized to undertake research in **Kirinyaga County** for the period ending **24th November, 2017.**

You are advised to report to **the County Commissioner and the County Director of Education, Kirinyaga County** before embarking on the research project.

On completion of the research, you are expected to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.


DR. M. K. RUGUTT, PhD, FSC.
DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Kirinyaga County.

The County Director of Education
Kirinyaga County.

National Commission for Science, Technology and Innovation is ISO 9001:2008 Certified

Appendix III: Questionnaire Guide for Farmers.

Dear Respondent.

The purpose of this questionnaire is to collect information about the relationship between credit utilization and coffee production. This will help in identifying possible solutions to the problems faced. Kindly try to answer all the questions to the best of your knowledge, the answers you give will be important to the study. The information you will disclose will be used for academic purposes only and will be treated with utmost confidentiality. Thank you for your cooperation.

Part A: Demographic Information of the Respondent.

1. Questionnaire Serial Number.....
2. What is your gender?
 - a) Male
 - b) Female
3. What is your age?
 - a)
4. What is your level of education?
 - a) No Formal education
 - b) Secondary
 - c) Primary
 - d) Tertiary
4. How many dependants do you have?.....
6. Main Occupation of the respondent.
 - a) Farmer
 - b) Employed
7. How many coffee trees do you have?
8. Do you keep any records for your coffee farming activities?
 - a) Yes
 - b) No
9. How many Kilograms did you harvest last season?
10. How much money did you earn from the sale of coffee in 2015?.

Part B: Farm inputs.

1. What type of farm inputs for coffee farming have you received?
a) Fertilizers c) Fertilizers and agrochemicals
b) Agrochemicals d) Any other (Explain).....
2. How often do you normally receive this farm inputs?
a) Every Season c) After two seasons
b) After more than two seasons d) Received none
3. How often do you take farm inputs credit?.....
4. Was it enough.
a) Yes b) No
5. Explain your answer
6. Was it given on time?
a) Yes b) No
7. Explain your answer.....
8. How did you use the farm inputs?.....
9. Did this subsidy help you increase coffee production?
a) Yes b) No

Part C: Credit Vouchers

1. What type of credit voucher have you received?.....
2. Was it given on time?.....
a) Yes b) No
3. Explain your answer.....
4. How often do you take credit vouchers?.....
5. How did you use the credit voucher?.....
6. Was it enough?
a) Yes b) No
7. Explain your answer.....
8. How did you use the credit voucher?.....
9. Did this voucher help you increase coffee production?
a) Yes b) No

10. Explain your answer.....

Part D: Cash Advances

1. What type of cash advance have you received?.....

2. Was it given on time?

a) Yes

b) No

3. How often do you receive cash advances?.....

4. Is it given on time?

a) Yes

b) No

5. Explain your answer.....

6. How did you use the cash advance for?.....

7. Was it enough?

a) Yes

b) No

8. Explain your answer.....

Appendix IV: Interview Guide for Farmers.

Part A: Demographic Information of the respondent.

- 1. Serial Number of the Interview guide.....
- 2. What is your gender
 - a) Male
 - b) Female
- 3. Explain your answer.....
- 4. What is your Age
- 5. What is your level of Education.....
- 6. How many of dependants do you have.....
- 7. What is your main occupation.....
- 8. How many coffee trees do you have.....
- 9. Do you keep any records for your coffee farming activities?
 - b) Yes
 - b) No
- 10. Explain your answer.....
- 11. How many Kilograms did you harvest last season.....
- 12. How much money did you earn from the sale of coffee in 2015?.....

Part B: Farm inputs credit.

- 1. What type of farm inputs for coffee farming have you received?.....
- 2. How often do you normally receive this farm inputs?.....
- 3. Was the farm inputs credit given enough?.....
 - Yes
 - b) No
- 4. Explain your answer.....
- 5. Was the credit given on time?
 - a) Yes
 - b) No
- 6. Explain your answer
.....
- 7. How did you use the farm inputs.....
- 8. Did this subsidy help you increase coffee production?
 - c) Yes
 - b) No
- 9. Explain your answer.....

Appendix V: Krejcie and Morgan table

| Table 3.1 | | | | | | | | | |
|--|----|-----|-----|-----|-----|------|-----|---------|-----|
| <i>Table for Determining Sample Size of a Known Population</i> | | | | | | | | | |
| N | S | N | S | N | S | N | S | N | S |
| 10 | 10 | 100 | 80 | 280 | 162 | 800 | 260 | 2800 | 338 |
| 15 | 14 | 110 | 86 | 290 | 165 | 850 | 265 | 3000 | 341 |
| 20 | 19 | 120 | 92 | 300 | 169 | 900 | 269 | 3500 | 346 |
| 25 | 24 | 130 | 97 | 320 | 175 | 950 | 274 | 4000 | 351 |
| 30 | 28 | 140 | 103 | 340 | 181 | 1000 | 278 | 4500 | 354 |
| 35 | 32 | 150 | 108 | 360 | 186 | 1100 | 285 | 5000 | 357 |
| 40 | 36 | 160 | 113 | 380 | 191 | 1200 | 291 | 6000 | 361 |
| 45 | 40 | 170 | 118 | 400 | 196 | 1300 | 297 | 7000 | 364 |
| 50 | 44 | 180 | 123 | 420 | 201 | 1400 | 302 | 8000 | 367 |
| 55 | 48 | 190 | 127 | 440 | 205 | 1500 | 306 | 9000 | 368 |
| 60 | 52 | 200 | 132 | 460 | 210 | 1600 | 310 | 10000 | 370 |
| 65 | 56 | 210 | 136 | 480 | 214 | 1700 | 313 | 15000 | 375 |
| 70 | 59 | 220 | 140 | 500 | 217 | 1800 | 317 | 20000 | 377 |
| 75 | 63 | 230 | 144 | 550 | 226 | 1900 | 320 | 30000 | 379 |
| 80 | 66 | 240 | 148 | 600 | 234 | 2000 | 322 | 40000 | 380 |
| 85 | 70 | 250 | 152 | 650 | 242 | 2200 | 327 | 50000 | 381 |
| 90 | 73 | 260 | 155 | 700 | 248 | 2400 | 331 | 75000 | 382 |
| 95 | 76 | 270 | 159 | 750 | 254 | 2600 | 335 | 1000000 | 384 |

Note: N is Population Size; S is Sample Size *Source: Krejcie & Morgan, 1970*