FACTORS INFLUENCING COFFEE PRODUCTION BY SMALL SCALE FARMERS: A CASE OF TETU CONSTITUENCY, KENYA.

BY

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DECLARATION

This Research Project Report is my original work and has not been presented for award of degree in any other university.

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This Research Project Report has been submitted for examination with my approval as the University Supervisor

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DEDICATION

This Research Project Report is dedicated to my husband John, children Kelvin and Victoria for their understanding and perseverance during the study period.

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TABLE OF CONTENTS

Page

LIST OF TABLES

Page

LIST OF FIGURES

Page

ABREVIATIONS AND ACRONYMS

ASN	Ammonium Sulphate Nitrates
CAN	Calcium Ammonium Nitrate
CBK	Coffee Board of Kenya
CDF	Constituency Development Fund
CDS	Central Depository System
CMC	Coffee Marketing Cooperative
CoDF	Coffee Development Fund
COTEPA	Coffee and Tea Parliamentary Group
CRF	Coffee Research Foundation
CWRD	Coffee Warehouse Receipt Programme
DF	Degree of Freedom
EAFCA	Eastern Africa Fine Coffee Association
ECART	European Consortium for Agricultural Research in the Tropics
FAO	Food and Agricultural Organization
FDRE	Federation Development of Republic of Ethiopia
FNC	Federation of Coffee Growers
GDP	Gross Domestic Product
GI	Geographical Indications
HA	Hectares
ICA	International Cooperative Alliance
ICO	International Coffee Organization
IFAD	International Fund for Agricultural Development
KCC	Kenya Cooperative Creameries
KCCE	Kenya Coffee Cooperative Exporters Limited
KCGA	Kenya Coffee Growers Association

KCGEA	Kenya Coffee Growers and Employers Association
KCPA	Kenya Coffee Producers Association
KIPPRA	Kenya Institute of Public Policy Research and Analysis
KMC	Kenya Meat Commission
KPCU	Kenya Planters Cooperative Union
KTB	Kenya Tourism Board
MCDM	Ministry of Cooperative Development and Marketing
KUSCCO	Kenya Union of Small Scale Cooperative Organizations
MINICOFIN	Ministry of Finance and Economic Planning
MOA	Ministry of Agriculture
MoLDM	Ministry of Livestock Production and Marketing
MT	Metric Tonnes
NCPB	National Cereals and Produce Board
NPK	Nitrogen, Phosphorus and Potassium
PAC	Parliamentary Agricultural Committee
PBK	Pyrethrum Board of Kenya
SACCO	Savings and Credit Cooperative Organizations
SNV	Dutch International Development Organization
USAID	United States Agency for International Developments
WTO	World Trade Organization

ABSTRACT

Coffee is an important crop globally due its contribution of National GDP, tax generation food security and inequality reduction role. Global trend of poor coffee production has seen increase in poverty and inequality in coffee production countries among small scale coffee producers. The purpose of study was to assess factors influencing small scale coffee production in Tetu constituency, Kenya. The objectives of the study were to assess the influence of: social factors, adoption of coffee production technologies, coffee Cooperative Societies management, coffee value addition and roles of key coffee players on small scale coffee production . Primary data was collected using both open and closed ended questionnaires from small scale farmers and interview schedules for Coffee Cooperative Society's Management and key stakeholders. The data was analyzed using Statistical Package for Social sciences version 21 for both descriptive and inferential statistics and presented in tables, inferential analysis done included Pearson correlation and Chi square analysis. The target population was 12,409 small scale farmers in Tetu Constituency in Nyeri County from which a sample size of 201 small scale farmers, 27 members of coffee Cooperative Society Management which comprised of manager, secretary and the treasurer and 12 key stakeholders which comprised of extension staff from Ministry of Agriculture, Ministry of Cooperative Development and Marketing and the Coffee Board of Kenya. Age of the household heads, marital status and gender did not influence coffee production. However education level of the household head attributed to 32.4% of coffee productivity. A total of 93% of the farmers attributed low yield to high preference of pests and diseases incidences and 71.7% incidences was attributed to low utilization of fertilizers. Low education level of the management staff was evident with 90% having maximum education of secondary school. Irrespective of this there was good financial and management of the societies. Low value addition opportunities which included limited domestic consumption, restricted marketing channels, low coffee prices could have influenced yield. The role of CBK which is a regulatory body had oppressed farmers but favoured roles of coffee Cooperative Societies Management. Roles of both Ministry of Agriculture and the Ministry of Cooperative Development and Marketing were motivating farmers and the management of Cooperative Societies. This study provided information which can be used to solve problems facing coffee sector, assist farmers, policy makers, staff in Ministry of Agriculture, Ministry of Cooperative development and Marketing, Management of coffee factory and Coffee Cooperative societies and other stakeholders in revitalizing coffee sector.

CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

Coffee is one of the most important cash crops across the world and a major source of export earnings. It is second only to crude oil as the most important internationally traded commodity in monetary value (FAO, 2004). In spite of high export earnings from coffee globally, coffee produced in most African countries fetch low prices compared to coffee from other continents due to relatively lower quality coffee (Bibangambah, 1989). As a result, most coffee farmers get lower incomes from coffee sales, which make very little difference in helping them out of poverty. Coffee is also the world's widely traded tropical agricultural commodity accounting for exports worth estimated US$ 15.4 billion in 2009/2010 when 93.4 bags were shipped (ICO, 2013).Coffee production by small scale farmers support about 25 million people around the world (Waston and Achineli, 2008).

Coffee is produced in more than 70 countries of the world and 97% of these countries are exporting members of International Coffee Organization. Most of these countries coffee export is not only vital contributor of foreign exchange but also accounts for a significant proportion of tax income and Gross Domestic Product (ICO, 2013). During the year 2010, it was estimated that about 26 million people in 52 producing countries were employed by the sector. The importance of the crop is diminishing as it was only in seven producing counties between 2000 – 2010 where average share of total export earnings exceeded 10% compared to 15% in the same category in the period 1996-2000 .Globally consumption of coffee is seen to grow at low rate but steady from 1980 to date(ICO, 2013),which is a good gesture towards sustainable coffee market.

Coffee sector in Kenya ranked fourth in contribution to GDP after tourism, tea and horticulture, accounting for 10% of the total export earnings in 2000 and 6% in 2001. Over 600,000- 700,000 smallholders are engaged in coffee production commanding a 48% share of the market. Coffee production has been on a declining trend since 1987/88 when a record 130,000 MT of clean coffee was produced compared to 1990s, country's

production of 77,514 MT on average of clean coffee which is 40% less than what was being produced in 1987/88 and the decline in production is more pronounced in smallholder farms where it declined by 47% during the same period. The industry now contributes about 3.2% of Kenya's foreign exchange earnings, a drop from the 40% contribution in the late 1980s, with the current production levels stand at 55,000 metric tonnes (Karanja and Nyoro, 2002). The dismal industry performance resulted in job losses and reduced incomes to families relying on coffee for their livelihood. Consequently, the coffee growing regions are now experiencing escalating poverty and insecurity. For example, the industry used to employ 400,000 permanent and 350,000 temporary staff but today the number of employees has reduced to 100,000 (Coffee Development Fund, 2014).

Coffee in Kenya is mainly grown for export with only 2.5% consumed local despite the high tourist potential; promotion of coffee utilization and coffee value addition has been low with farmers only limited participation at farm level. This has been due over regulation of the sector making opportunistic players exploit the farmer the like roasters. Low coffee production in Kenya despite of high quality and production potential is due to low prices, lack of promotion of domestic consumption, global massive overproduction crisis of 1990s, high cost of production, inaccessible credit facilities and strict rules prohibiting trading, expansion or uprooting of the crop (Kegonde 2005).

Table 1.1 Basic coffee statistics in Nyeri County

Sub county	**No. of societies**	**No. of factories**	**No. of growers**	**Area under Coffee (Ha)**	**Population**	**Households**	**Farm Families**
Mathira East	6	19	13,715	1,932	88,351	23,153	15,576
Mathira West	4	18	14,004	1,685	60,394	21,568	15,406
Nyeri Central	4	7	5,044	2,134	119,293	36,412	12,137
Mukurweini	4	28	19,007	2,381	83,932	23,153	15,576
Tetu	9	13	8,129	1,627	78,320	21,466	14,450
Nyeri south	1	19	15,081	2,160	87,375	24,017	21,368
County Total	**28**	**104**	**74980**	**11919**	**517665**	**149769**	**94513**

Source: Nyeri County profile , 2013

Basic coffee production statistics in Nyeri County is as shown in Table 1.1 above.

Table 1.1 indicates that about 80% of the farmers in six sub counties growing coffee in Nyeri County are coffee farmers. This shows the importance of the coffee farming amidst many challenges. Addressing the issue of low productivity will thus reduce poverty, unemployment and inequity.

1.2 Statement of the Problem

Coffee is an important crop globally. It contributes to National GDP, tax generations, job creation food security and inequality reduction. Globally, 25 million people in coffee growing countries are employed in the sector. Low coffee production resulting from world coffee prices of 1990s saw the production dwindling resulting to increase in poverty especially of small scale farmers due to low finances to support it's production. In Kenya for example 80% of coffee is produced by 700,000 small scale farmers currently the production dropped from 130,000 MT tones in 1987/88 to current 55,000 MT and contribution to national GDP dropped from 40% to currently 3.2% and hundreds of jobs were also lost(Karanja and Nyoro, 2002). Irrespective of poor coffee prices due to global crisis and inefficiencies throughout the coffee production value chain, farmers are still producing coffee which is of low quality despite of country's potential of producing specialty coffee due it's ecological positioning and unlikely to uplift them from poverty mainly because of lack of better paying alternatives, over regulation and high sunk cost associated with uprooting the crop (Kegonde, 2005).

Kenya in its quest to reduce poverty by addressing inequality issues in resource allocation and decentralization of government promulgated its new constitution on 27th August 2010 which created county governments where resources were to be devolved to the grassroot. For a county to spearhead growth and address inequality problems, it was necessary to look at means to achieve this objective. Kenya, being an agrarian country, revival of coffee was seen as the way out of poverty, which all coffee producing counties like Nyeri prioritized revival of coffee sector as the major boost to

economic development. Coffee in Nyeri County is produced by 80% farmers in it's six out of eight sub counties.

Although Kenya is renowned for its high coffee quality its production is dwindling due to various challenges which include price flactuatioan in the international market, high cost of inputs, competition from other enterprises and inefficiencies in management of cooperatives. Owning its importance it is thus inevitable to assess factors contributing to its dwindling value. The results of the study will be useful to farmers, cooperative society's management, scholars, policy makers and implementer to understand causes of low yield so that they can resolve them.

1.3 Purpose of the Study

The purpose of the study was to assess the factors influencing coffee production by small scale farmers in Tetu constituency, Kenya.

1.4 Objectives of the study

The objectives of the study were to:

1. Assess the influence of social factors on small scale coffee production in Tetu constituency.
2. Assess the influence of adoption of coffee production technologies on small scale coffee production in Tetu constituency.
3. Establish the influence of coffee cooperative societies management on small scale coffee production in Tetu constituency.
4. Examine influence of coffee value addition on small scale coffee production in Tetu constituency
5. To determine the influence of roles of key coffee sector players on small scale coffee production in Tetu constituency

1.5 Research Questions

The research questions of the study were:

1. To what extent do social factors of small coffee producers influence coffee production in Tetu constituency?

2. To what extent do adoption of coffee production technologies influence production of small scale coffee production in Tetu constituency?
3. How does management of coffee cooperative influence small scale coffee production in Tetu constituency?
4. To what extent do coffee value addition influence small scale coffee production in Tetu constituency?
5. How do roles of key coffee sector players influence small scale coffee production in Tetu constituency?

1.6 Significance of the Study

The study findings and recommendations are hoped to generate both practical and theoretical awareness important to other researchers, policy formulators, policy implementers, coffee Cooperative Societies, coffee factory Management and coffee stakeholders in revitalizing coffee sector. The study will also form the ground for replication by development practitioners while designing coffee revival projects. It is also hoped to provide basis for further studies and also documenting factors affecting low coffee production within the country and beyond which will hasten realization of Millennium Development Goals and vision 2030.

1.7 Delimitation of the Study

Tetu constituency is one of six constituencies of Nyeri County and among the five coffee producing constituencies. Coffee in Tetu is mostly produced by small scale farmers and marketed through its nine cooperative societies. It is also a major cash crop together with tea and dairy.

1.8 Limitations of the study

Time was a limiting factor as the study was carried out within a short period. Financial constraint was also a limiting factor as the study was self sponsored. Education level of the respondent affected the understanding of questions hence responses while coffee politics influenced responses given.

1.9 Basic assumptions of the study

The basic assumption of the study was that the sample was representative of the target population and the respondents were truthful.

1.10 Definitions of Significant Terms

Coffee	Brewed beverage prepared from the roasted seeds of several species of an evergreen shrub of the genus Coffea.
Cooperative Society	Firm owned, controlled, and operated by a group of users for their own benefit. Each member contributes equity capital, and shares in the control of the firm on the basis of one-member, one-vote principle.
Technology Adoption	Technology is also referred to as innovation. Which is anything new successfully applied into economic and or social processes. In coffee production would refer to management of coffee plantations including the management of nurseries, pruning and weeding procedures, use of fertilizers, pesticides, planting of new varieties and harvesting methods.
Strategic plan	It is setting goals, determining actions to achieve the goals, and mobilizing resources to execute the actions. A strategy describes how the ends (goals) will be achieved by the means (resources).
Value addition	To economically add value to a product and form characteristics more preferred in the market place. In Coffee value addition activities start at the very basic level of land preparation, fertilizer

application, pests and diseases control and management, irrigation, primary processing, secondary processing and facilities maintenance.

1.11 Organization of the study

The study is organized in five chapters where chapter one gives introduction and background of the study. Chapter two gives the literature review, conceptual frame work and theoretical framework while chapter three provides information on study research methodology, target population, sample size and sampling procedure, data collection methods, validity and reliability of the instrument, data collection procedures, data collection techniques ethical consideration and operational definition of variables. Chapter four gives data analysis, data presentation and interpretation and finally, chapter five gives a summary of findings, discussion, conclusions and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter gives an overview of coffee production in selected countries of the world, and Kenyan coffee production situation, challenges and mitigation measures. It has also given detailed literature on evolution of cooperative movement in Kenya, important of cooperative movement in Kenyan economy and the overview of Kenyan cooperative legislation. Detailed literature review on independent variables of study which includes influence of: social factors, technology adoption, management of cooperative societies, coffee value addition and roles of key coffee players on small scale coffee production has also been given together with dependent factors of study.

2.2 Coffee Growing in Selected Countries of the World

Coffee is produced in more than 70 countries of the world (ICO, 2013). Countries that dominate the world's coffee production are found in South America, Africa, and Southeast Asia (Indonesia Investment, 2014). Overview of sellected countries are as outlined below.

2.2.1 Coffee growing in Columbia

Coffee is the most important agricultural product in Colombia employing 29.5% of the rural population and generating 12.4% of the agricultural GDP (FNC, 2008). About 18% of rural households directly depend on coffee for income either through coffee harvesting or through wage labor (Giovanocci, 2002). Columbia is the biggest coffee producer and the biggest producer of Arabica coffee, which is considered the highest quality bean. Cultivation, processing, trading, transportation and marketing of coffee provide employment to many people in Colombia. There are 570,000 producers. The farmers in Colombia belong to and are controlled by the Colombian Coffee Federation (FNC) (FNC, 2008).This facilitates application of similar standard of production and price uniformity among producers. The federation manages coffee funds by levying producers, consumers and exporters to reinvest in coffee production which cushions the

farmers from price fluctuation and also reinvest in education, healthcare, electrification, telephone, drainage, and transportation in coffee growing areas for coffee growing farmers. The FNC searches for environmentally friendly coffee growing techniques and technologies such as soil conservation techniques, organic fertilization, safe pest management techniques, wet coffee processing for less water usage, reforestation, and preservation of birds and insects (FNC, 2008).

Just like Kenya, Colombian coffee is often regarded as some of the highest quality coffee in the world and has traditionally grown Arabica beans and its unique geography makes it perfectly suited for producing a delicious, high quality brew. Colombia's excellent growing conditions have paired with an aggressive marketing campaign by the National Federation of Coffee Growers (FNC), which has worked since the late 1950's to bring Colombia's coffee sector to the forefront of international attention. Colombia has traditionally been second in global coffee production only to Brazil, but has been set back to third by Vietnam's recent market entry and rapidly expanding production of Robusta coffees (Miura, 2001).

Colombia has the potential use its rich biodiversity to gain a premium on its shade-grown coffee and simultaneously protect the ecology and improve livelihoods for its producer families. The history of control over agriculture by elites and large organizations, the threat leveled at both human and ecological communities through the U.S. led war on drugs, and continued political violence remain a real challenge to creating a most just and sustainable agricultural system (Miura, 2001).

2.2.2 Coffee growing in Yemen

Coffee is one of Yemen's most important agricultural commodities. It is the second commodity that the country exports from oil (www.yemencoffee.org). Yemen is the only country which produces coffee in climatic conditions not similar with other coffee producing countries with water scarcity being the most challenge in production (www.yemencoffee.org) Most of Yemen's nearly 100,000 coffee farming families have small coffee plots and live in mountainous regions where about 45% of the population is considered below the poverty line (USAID, 2005). Coffee is second only to the

mildly narcotic qat plant in providing one of the few reliable sources of cash income (Yemeni Coffee, 2008). Production inefficiencies, low productivity, and market distortions have elevated the domestic price to such an extent that it is apparently quite viable to illegally import coffees from lower-cost origins (Like; Brazil, Ethiopia, India) in order to fulfill a measure of the domestic demand. These imported coffees drive down the prices in the market. The country's ineffective regulation of imports serves to negatively affect the government's credibility and deprives it of potential tax revenue. Yemen domestic producers and traders are also so weak, in terms of their international counterparts and without some measure of protection many would be likely to stop producing (USAID, 2005).

Coffee in Yemen is produced by traditional methods without inorganic fertilizer application or any chemical and processes by direct drying the bean under the sun and milling it making it organic by default (www.yemencoffee.org).The current Yemeni market structure is neither well regulated nor transparent so that any newcomer wishing to trade faces serious risks. There is no coherent grading system and standards are loose and typically defined at the local level on an ad hoc basis. This increases transaction costs and distorts value throughout the supply chain. The result makes most foreign buyers wary of dealing with any but the few more established exporters. One of the obvious consequences is a reduced willingness to invest in the marketing of Yemeni coffee (USAID, 2005).

2.2.3 Coffee growing in Indonesia

Indonesia's coffee plantations cover approximately 1.3 million hectares in total. More than 90 percent of these plantations are cultivated by small-scale producers. Majority of Indonesia's coffee bean production consists of the lower-quality robusta type. Export of processed coffee is only a small fraction of total Indonesian coffee exports. Domestic consumption of coffee in Indonesia has always been relatively low. Data from 2012 indicate that per capita consumption of coffee is 0.95 kilogram in Indonesia, whereas Finland - where global per capita coffee consumption is highest - has an annual amount of 11.70 kilogram. However, in line with the global trend, the consumption of coffee is

increasing in Indonesia by around 20 percent per year. This development will cause a decline in Indonesian coffee bean exports if production of this commodity is not increased. Currently around 30 percent of national production is consumed domestically (Indonesia Investment, 2014).

Apart from the production of regular coffee, Indonesia also produces certain types of specialty coffee. Most famous of these specialties are luwak coffee *(*kopi luwak*)*, Toraja coffee, Aceh coffee and Mandailing coffee. The first one - luwak coffee - is possibly the most famous type of coffee as it is known as the world's most expensive coffee. It is brewed from beans that have passed through the digestive system of the Asian palm civet (catlike animal). Due to this special fermentation process inside the animal (and due to the fact that the civet is able to select the juiciest coffee cherries) this coffee is believed to have a richer taste. Its labor-intensive production process and its scarcity on the international market result in the expensive price (Indonesia Investment, 2014).

As both global and domestic demand is rising, the country is planning to expand production. Besides increasing quantity of the beans, quality is also expected to increase due to technological innovations. Coffee production per hectare is still low compared to other large coffee producing countries. In 2012, Indonesia produced 0.76 ton coffee per hectare, while in Vietnam the figure was 3.5 ton and in Brazil 6.5 ton per hectare. Government and other players in Indonesia's coffee industry aim to increase productivity per hectare to over 1 ton in the years ahead (Indonesia Investment, 2014). Creating local demand for coffee is a positive step towards sustainable coffee market which many African countries have not utilized like Kenya whose major contraints is lack of coffee value addition and limited marketing channels.

2.2.4 Coffee growing in Ethiopia

Ethiopia is the origin of coffee Arabica, and it grows wide variety of exemplary coffee, highly differentiated, most of which are shade-grown by small farmers without chemical inputs (Dempsey 2006). Ethiopia is the largest producer of coffee and ranks fifth in the world and first in Africa by annual coffee production. For the past three to

four decades, coffee has been and remains the leading cash crop and major export commodity of the country. Coffee accounts on average for about 10% of total agricultural production, 5% of Gross Domestic Product, and constitutes about 41% of total export earnings of the country (Worako 2008).

The number of coffee growers has been estimated in about one million smallholder farmers. Most of them hold less than half a hectare of land, and grow 95 per cent of the coffee output (Oxfam 2008). Total annual coffee production is of approximately 280,000 metric tons (Dempsey 2006). Less than 40% of total national production of coffee is directed to official export markets (Worako 2008). The same study (Worako 2008) indicated that, annual domestic coffee consumption per household in the country is 24.5 kg and the per capita consumption is 4.5 kg. In Ethiopia livelihoods of approximately one quarter of the population depend on the coffee sub-sector (Petit 2007). However, small holder coffee growers in Ethiopia face high transaction cost, lack of market information, poor infrastructure, and weak capital markets.

The coffee value chain in Ethiopia is composed of a large number of actors. It includes coffee farmers, collectors, different buyers, processors, primary cooperatives, cooperative unions, exporters and various government institutions (Gemech and Struthers, 2007). Ethiopian coffee is sold both at local level and at the international market, the latter mainly through the commodity exchange market and directly to international buyers through specialty market channels by coffee cooperative unions. Normally, all Ethiopia coffee should pass through commodity exchange market since 2001, however, cooperatives have been granted permission to by- pass auction opening ways for direct sales (Dempsey, 2006). Cooperative Societies are advocated by the government of Ethiopia as the main pillars of development and key market institutions in its Agricultural development led industrialization strategy. This plan aims to unlock Ethiopia's agricultural growth potential by providing a better institutional environment for integrating small scale farmers into international market (FDRE, 2001).

2.2.5 Coffee growing in Rwanda

Rwanda produces the prized Arabica Bourbon coffee, highly sought after in specialty coffee markets world over (SNV, 2012). It is grown by approximately 500,000 smallholder farmers on a total area of 33,000 ha (OCIR-Café, 2005). Despite the important role that the crop plays in the livelihoods of rural farmers, national coffee throughput has been declining since the early 1980s. National production reached a peak of 43,000 tons in the 1986/87 coffee season. Between 2000 and 2004, national coffee production hovered between 16,000 and 25,000 tons with an average yield of 2 tons/ha (OCIR-Café, 2005). The production is relatively low when compared with main coffee producers in Africa such as Ivory Coast and Uganda, which produce an annual average of 3.5 and 2.7 million tons respectively.

A number of low production constraints have been cited to include high production costs, pests and diseases, production and market risks, low inter-national prices and the small landholdings among farmers (MINICOFIN Report, 2003). Other factors affecting coffee quality in East and West African countries include poor agronomic practices, lack of access to agricultural credits, inadequate research and development linkages, processing methods, high cost of farm inputs, low international prices, high transportation costs, pests, diseases and inadequate infrastructure in rural areas (FAO, 2008). Problems related to international coffee marketing include stringent quality standards, costly standards for certification and enforcement systems, bulking difficulties which limit regular supply of economic volumes, increased variability in prices and limited opportunities to manage price risk (ECART, 2007).

A number of initiatives have been crafted by both public and private sectors which have focused on the technical or productivity constraints affecting coffee farmers at the expense of institutional marketing arrangements for the crop. Rwandese coffee is considered to be of high quality and is sold to conventional markets such as the US, Europe and other parts of the globe. Strides have been made to improve the quality of Rwanda's coffee following the promulgation of the new coffee sector strategy in 1998. How-ever, the country's export coffee remains largely obscured on the global market. (Mutandwa, Kanuma, Rusatira, Kwiringirimana,Mugenzi,Govere and Foti, 2009).

Challenges exist on how to effectively establish the country's coffee on the international market and also to ensure that the marketing system keeps up with changes in the dynamic global market for high quality coffee (Ntahontuye, 2008). Strategic management of the country's niche markets remains largely unexplored. This factor has also contributed to declining export earnings for coffee in the country (Mutandwa et al, 2009).

2.3 Overview of Coffee Production in Kenya

It is estimated that 170,000 HA of the country's high potential land area is planted with coffee. The sub-sector features a dual structure of production with smallholders, who are mainly organized in co-operatives, accounting for 75.5% of the total land under coffee, while 24.5% is under large estates plantations (Coffee Board of Kenya, 2009). However, despite this dominance of smallholders in coffee land acreage, they only account for 48% share of domestic production (Republic of Kenya 2009). Smallholder coffee is faced by the twin problems of declining output and low productivity the registered yield per hectare for the cooperative sector was only a third of the estates sector whose yields registered 532 Kgs/ha in 2008 (Ministry of Agriculture, 2009)

Coffee was the major foreign exchange earner for Kenya for a long time but the crop has continued to perform poorly with resultant rise in poverty in rural areas where coffee is the major crop. Irrespective low international coffee prices farmers are still producing coffee due to expectations of 'boom' periods, high exit costs and shortage of lucrative alternative enterprises or employment opportunities especially in coffee-dominated areas (Karanja and Nyoro, 2002). The falling state of national coffee tonnage creates uncertainty to the major coffee buyers who have in the recent past, found them competing amongst themselves for a meager coffee volume not enough to give each one sufficient supply (Kegonde, 2005). This is an opportunity farmers through their cooperative societies can utilize to counter the problem of low prices due to flooding of international markets with poor quality coffee and still make enterprise competitive.

2.3.1 Challenges Facing Kenya Coffee Producers

Limited access to credit, high cost of borrowing, high requirement by the commercial bank for security, high cost of irrigation and farm inputs including fertilizers, requirement for a license before establishment of coffee farm or approval by CBK before uprooting of coffee, bureaucracy in obtaining growing approval and restriction of production to gazetted areas are among factors discouraging coffee production in Kenya (Kegonde, 2005). The government of should look at ways of subsidizing all agricultural inputs unlike current policy of subsidizing fertilizer only.

The statutory deductions and taxes are estimated at 12.8% of the auction price and have not changed significantly even with the new legal legislation. Deductions by the Co-operative society's deductions continue to take the lion share. Coffee production costs have escalated in the recent past mainly due to major increases in the cost of purchased farm inputs. Currency devaluation, inflation and inefficient input markets have been some of factors behind the increase in costs. Poor road infrastructure also has significantly contributed to the costs of inputs due to high transport costs (Karanja and Njoro, 2002, Kegonde, 2005).

Global crisis facing the coffee industry has been characterized by massive over production, collapsing prices, deteriorating coffee quality, disease and above all the growing inequality in the coffee value-chain (United Nations Conference on Trade and Development (UNCTAD, 1999). The current "coffee crisis" has brought the economic situation of coffee producers to the forefront of media and policy discussions. Since the 1980s, oversupply on international markets has resulted in nearly a 50 % decline in nominal coffee prices (ICO, 1997).According to a rough calculation made by the United Nations Conference on Trade and Development (UNCTAD) secretariat, between 1999 and 2002, producing countries earned US$19 billion less in revenues than if prices had remained at their 1998 levels. The production and quality could increase if prices remain low. This could increase poverty and unemployment in coffee producing countries.

Domestic coffee consumption is very low estimated at 50,000 bags equivalent to 2-5% of the national production. This is attributed to consumer preferences based on the tea drinking culture introduced by the British in the colonial days. Nevertheless very little effort has been made to change this culture by promoting domestic coffee consumption. Some coffee lots continue to be sold at US$ 10 per bag (20 US cents per kg) at the Nairobi auction, a price that cannot even pay for milling charges leave alone the production and other processing costs. The same bag of coffee would definitely fetch more money if roasted and sold locally (Karanja and Nyoro, 2002). The government should probably invest in coffee value addition to make the beverage locally available and affordable.

There is evident misrepresentation of coffee producers in the governing boards of CBK, CRF and CDF (Danida, 2012). This is largely caused by inconsistencies between different relevant legislative documents. For example, The Finance Act 2005 provides for the President and the Ministry of Agriculture to appoint CBK directors yet the Coffee Act 2001 stipulates that coffee producers elect members to represent the on the CBK, CRF and CDF boards (Kegonde, 2005). The same report notes that the Coffee Act 2001 also prohibits coffee growers from roasting their coffee, selling to or purchasing coffee from any other person than licensed dealers. Therefore, growers cannot exploit local markets and are legislatively bound to smaller profits. This also means they miss an opportunity to receive more revenue for their product.

2.3.2 Mitigation Measures

In April, 2014 the price of top grade AA sold at USD 311.4 and AB at USD 261.3 for 50kg bag at Nairobi Coffee exchange. Production reduced by 18.8% to 39,800 Tonnes in 2013 from 49,000 Tonnes in 2012 due to rising cost of farm and processing inputs. Coffee earnings at the same time dropped from shillings 22 billion in 2012 to 17 billion in 2013, recently dry weather experienced in Brazil which produces Arabica coffee may lead to price improvement (Mwaniki, 2014). In view of this the government should consider subsidizing inputs by reviewing levies on inputs to cushion farmers earnings as the sector creates employment.

Coffee price has remained a source of tension between producers and their trading partners given the economic disparity between the two for this reason the governments have from time to time intervened on behalf of producers through various price stabilization mechanisms such as developing compensatory finance schemes-STABEX, creation of buffer stocks to counter price movements and offering producers a minimum price guarantee for their produce. Such mechanisms, though very noble have recorded limited success due to various reasons ranging from corruption, mismanagement and costly overheads (CoDF, 2014).

Review the coffee Act in order to introduce a Central Depository System to act as a clearing house and facilitate cash payment and settlement to coffee producers in the supply chain. The infrastructure for CDS system can be seen in operation at the Nairobi Stock Exchange which uses it to pay clients proceeds from the sale of shares. The Central Depository System will mitigates against brokers and agents who delayed in remitting coffee farmers proceeds (Kegonde, 2005). The delay in payment affects level of input application and other farm operations which further results in poor production and quality coffee production in many households due limited sources of income.

For the direct sales system to operate well and benefit the producers, the issue of coffee traceability along the supply chain will need to be addressed, alongside other certification programs as proven mechanisms and requirements for premium coffee sales. The direct Coffee Sales could also consider the possibility of using the Q-Contract (Quality Pricing Mechanisms) for pricing its coffees over the traditional New York-C Contract. The Centralized Coffee Auction System is still considered a very important and relevant Coffee Price Discovery Mechanism, as reported by Kegonde, (2005), The same also reports that experience from other countries, including Tanzania and Ethiopia has shown that, ideally such arrangements can only accommodate about 10%-15% of the coffees mainly Specialty, which will be traded through this system which should be mainly certified coffees, whose origin and quality can be easily traced along the supply chain by direct buyers. The rest of the coffees to still continue to be sold through the Central Auction System.

There is need to urgently reform operations of the auction system including the introduction of transparency in the communication of the auction activities to the entire industry, so as to instill confidence and integrity in the auction and also to reform the Operations, Management and Governance structures of the coffee cooperative Societies, to make them respond to their members concerns (Kegonde, 2005). Cooperative societies need to be transformed to corporate bodies with ownership remaining with farmers but management hired on a performance basis and Coffee Board of Kenya should continue to be the only licensing agent for millers and marketing agents (Mureithi, 2008). The same Mureithi, (2008) also recommend relevance of the Coffee Board to be revisited to support formation of effective membership organizations that self-regulate the coffee farmers in areas of compliance to standard specifications, environment preservation and integrity with respect to all allow greater dynamic role of the private sector in the coffee value chain. Individual farmers need to be allowed to sell directly to consumer markets and the government to act as stakeholders. This will help improve levels of productivity, efficient use of inputs, and uniform application of labour laws and enhanced quality of coffee (Mureithi, 2008).

Coffee Board of Kenya should give policy guidelines on two relevant ministries dealing with coffee policy and marketing, namely Ministries of Agriculture and Cooperatives to consolidate marketing functions and policy formulation into one ministry so as to mitigate conflicting policy directions currently subjected to the sub-sector (Kegonde, 2005). The same Kegonde, (2005) notes that linking coffee research to consumer demands is necessary as Coffee quality can only be ascertained through the cup by consumers. He also notes that Kenya need to embark on a very aggressive domestic consumption campaign in order to boost the local appreciation for quality coffee production including consumption to depart production for export for long term sustainability of the sector. There is also need to conduct legislative analysis of various bills affecting the agricultural sector in general and coffee sector in particular. Both the Parliamentary Agriculture Committee (PAC) and The Coffee and Tea parliamentary group (COTEPA) should be revamped, and sensitized on key issues affecting both the coffee and tea sectors (Karanja and Nyoro, 2002).

Coffee farmers should exploit value addition opportunities leading to exploitation of local markets through promotion of local coffee consumption. This will also create job opportunities for local youths who have been left out of the coffee industry (Danida, 2012). The same report notes that proper management of CESS deductions will ensure funding go back to farmers improving the infrastructure required for a prospering coffee sector and liberalization of the sector will allow farmers to establish direct relationships with international buyers and allow buyers to source coffee directly from producers cutting out the currently mandatory yet unnecessary middle men.

Coffee seeds and seedlings must be of the best appropriate cultivar quality there is so as to start with a strong crop. Farm-level agronomic practices and methods need to improve. There is a dire need to rehabilitate neglected coffee bushes and replant areas uprooted over the years. Quality of pulpery management must be addressed. Farmer's organizations should use their evident bargaining power to get lower prices and better services from millers (Mureithi, 2008).

Given the importance of rapid transit of coffee, the Roads Board and local government authorities should open rural access roads all-weather by murraming, building bridges and culverting. After all, they earn 0.5 per cent and 2 per cent, respectively, from coffee revenue, presumably for maintaining road access. Consideration should be given to transferring these funds to the Coffee Development Fund to implement a specific project which would benefit the sector. Quality and productivity improvement must be addressed at all levels, including research. In this spirit, cooperatives must be managed as commercial businesses, with sanctions applied to failed management boards that do not practice proper corporate governance. Some pulperies could also be transformed into share-capital-based companies (Mureithi, 2008).

2.4 The concept of cooperatives

Cooperatives are user-owned, user-controlled and user-benefit organizations. They could be agricultural, non-agricultural, unions or Savings and Credit Cooperatives (SACCOs). They operate in different sectors of the Economy including agricultural,

handicraft, Jua Kali, transport, housing development, building and construction, consumer services, banking and insurance (Gamba and Komo, 2006). Cooperatives are member-owned businesses; they aggregate the market power of people who on their own could achieve little or nothing, and in so doing they provide ways out of poverty and powerlessness. The representative body for cooperatives, the International Cooperative Alliance (ICA), defines a cooperative as an autonomous association of persons united voluntarily to meet their common economic, social and cultural needs and aspirations, through a jointly owned and democratically controlled enterprise.

This definition and the ICA set out seven cooperative principles: voluntary and open membership; democratic member control; member economic participation; autonomy and independence; education, training and information; cooperation among cooperatives; and concern for community. The first four of these are core principles without which a cooperative would lose its identity; guarantee the conditions under which members own, control and benefit from the business. The education principle is really a commitment to make membership effective and so is a precondition for democratic control, while cooperation among cooperatives is a business strategy without which cooperatives remain economically vulnerable. The last principle, concern for community, is about corporate responsibility, and it leads into other concerns such as prevention of poverty and protection of the environment (ICA, 2002).

2.4.1 Evolution of the cooperative movement

According to Gamba and Komo (2006) and Wanyama (2009) cooperative movement in Kenya has three eras have namely pre independence era, post - independence but pre - liberalization era and liberalization era.

Pre- independence Era

Informal producer organizations have been in existence in Kenya even before colonial period. However, formal organizations particularly cooperatives started as early as 1908 and membership was limited to white settlers. The first cooperative was established at Lumbwa - Rift Valley, in present day Kipkelion area.(Wanyama, 2009). In 1944

colonial officers opened the door for Africans to form and join cooperatives. The Mau Mau rebellion of early 1950s had a negative effect on the cooperative members of staff who withdrew to join pro-independence forces. However cooperatives continued to grow. The reason for this growth was application of the Swynnerton plan of 1954 on Developing African Agriculture and Improving Land Tenure. By 1958 there were over 400 registered cooperatives (Gamba and Komo 2006).

Post- independence but Pre - liberalization Era

The post independence era saw the rapid rise in number of producer organizations and the consolidation of the ones that already existed. At this time, the government saw the cooperative movement as a vehicle to the introduction of African socialism, and for strengthening common ties between the people from different regions of Kenya (Karanja, 2002). Producer cooperatives were also directly linked to government parastatals. No individual private traders were allowed to compete with cooperatives. Cooperatives were linked to state run marketing corporations like National Cereals and Produce Board (NCPB), Cotton Board of Kenya (CBK), Pyrethrum Board of Kenya (PBK), Coffee Board of Kenya (CBK), Kenya Meat Commission (KMC), and Kenya Cooperative Creameries (KCC). Most of the cooperative members' produce was sold to these corporations and the latter then linked the cooperatives to the world market. These linkages excluded the participation of private traders in the marketing of the agricultural produce. (Wanyama, 2009). The direct intervention by the government in management of cooperatives compromised the principles of member owned and run organizations. Government involvement hindered the emergence of member-controlled cooperatives since members relied on government to safeguard their interests. As a result, equality, equity, solidarity, democratic principles, self-responsibility, and self- help that are important pillars of successful producer organizations were thus hindered. This caused the cooperatives to be run as if they were government owned instead of privately owned member organizations (Gamba and Komo 2006).

Era of liberalization, structural adjustment and privatization

The advent of economic and political liberalization in early 1990's heightened the need for liberating cooperatives from government control. A new policy was consequently formulated by 1997 to provide for a member based, autonomous and member controlled movement. The aim was to enable cooperatives make independent decisions concerning operations of their business and to have a level playing ground like the rest of the private sector. New legislation was also put in place to implement this policy the same year (Karanja, 2002). The liberalization period brought a wind of change in the structure and the running of the cooperatives. Having been fully dependent on the government for the control of markets and funding, it was difficult for them to suddenly start operating on their own. These institutions were not prepared to compete with private firms that brought in high levels of competition (Wanyama, 2009). The Sessional Paper no. 6 of 1997 outlined the government's role as facilitative in nature by creating an enabling environment for cooperatives to operate. The other role was regulatory particularly in the formulation of policies and legislation. This meant no direct involvement in the running of the cooperatives. Liberalization saw the mergers and splits of various cooperative societies. They split into small uneconomic units. High levels of mismanagement mainly fueled this, and other factors beyond management's control, like fluctuating market prices. Political influences could not be avoided and some individuals in management used their positions to gain political leverage (Gamba and Komo 2006).The Cooperative Societies Amendment Bill of 2004 sought to re-introduce some degree of government control. As much as the government would not completely leave the cooperative sector alone without any form of regulation, it explicitly defined a clear point of intervention without prejudicing its own efforts of embracing the principle of a free market economy.

2.4.2 Significance of cooperatives in Kenya's economy

Kenya has a long history of cooperative development that has been characterized by strong growth, thus making a significant contribution to the overall economy. Cooperatives are recognized by the government to be a major contributor to national development, as cooperatives are found in almost all sectors of the economy. With the

total population of Kenya at approximately 37.2 million (Republic of Kenya, 2008a), it is estimated that 63 per cent of Kenya's population participate directly or indirectly in cooperative-based enterprises (Ministry of Cooperative Development and Marketing, 2008). In the agricultural sector, cooperatives handle over 72 per cent of coffee sales, 95 per cent of cotton sales, 76 per cent of dairy produce sales, and 90 per cent of pyrethrum sales. The greatest contribution of cooperatives to Kenya's social and economic development is in the financial sector where financial cooperatives (savings and credit cooperatives, KUSCCO, Cooperative Bank and CIC) hold substantial savings portfolios (Wanyama, 2008). With the cooperative movement playing such a significant role in economic development, the Government has over the years maintained an institutional framework to develop the movement. The Ministry of Cooperative Development and Marketing is the current Government's official agency for coordinating cooperative development in Kenya. The main duties of the Ministry include registration and liquidation of all cooperatives register under the Act, enforcement of the Cooperative Societies Act, formulation of cooperative policy, supporting development of a conducive environment for cooperative growth, registration of cooperative audits, carrying out of inquiries, investigations and inspections. (Republic of Kenya, 1997).

2.4.3 Cooperative development policy in Kenya

Sessional Paper No. 6 of 1997 on "Cooperatives in a Liberalized Economic Environment provides the current policy framework for cooperative development in Kenya. The policy was formulated after the liberalization of the economy, which necessitated the withdrawal of state control over the cooperative movement. The aim of the policy was to make cooperatives autonomous, self-reliant, self-controlled and commercially viable institutions. The role of the government was redefined from one that sought to control cooperative development, to one that now seeks to regulate and facilitate their autonomy. (Republic of Kenya, 1997a) The monopoly of cooperatives in the agricultural sector, which had made them the sole marketers of cash crops in Kenya, was removed. The consequences of this meant that cooperatives now had to compete with other private enterprises in the marketing of agricultural produce. In response to the inadequacies of the 1997 policy, the Ministry formulated a revised policy

framework titled “Kenya Cooperative Development Policy 2008”. The main theme of the new policy is ‘expanding the economic space for sustainable cooperative growth in Kenya’. Its main focus is on restructuring, strengthening and transforming cooperatives into vibrant economic entities that can confront the challenges of wealth creation, employment creation and poverty reduction as private business ventures (Ministry of Cooperative Development and Marketing, 2008).

2.4.4 The Kenyan cooperative legislation

The Cooperative Societies Amendment Act of 2004 is the current basic legislation that guides the formation and management of cooperatives in Kenya. It has its origins in the Cooperative Societies Act, Cap. 490 of 1966, which was revised in 1997 into the Cooperative Societies Act Chapter 12 of 1997. The reforms contained in the revised Act sought to reduce the strict state supervision of cooperatives, in order to support the liberalization of cooperative enterprise. (Republic of Kenya, 1997b and 2004) The 1997 Act empowered the members to be responsible for the running of their own cooperatives, through elected management committees. To the detriment of many primary cooperatives, the newly acquired freedom was dangerously abused by elected leaders. This saw many cooperatives report cases of corruption and mismanagement, such as gross mismanagement by officials; theft of cooperative resources; split of viable cooperatives into smaller ineffectual units; failure of employers to surrender members’ deposits to cooperatives (Particularly SACCOs); failure to hold elections; nepotism in hiring and dismissal of staff; refusal of management committee members to vacate after members voted for this dismissal; conflict of interest among cooperative officials; endless litigations; unauthorized cooperative investments; illegal payments to the management committees (Manyara, 2003). In response to these circumstances, the 1997 Act was amended in 2004. The main content of the Cooperative Societies (Amendment) Act of 2004 re-enforces state regulation of the cooperative movement through the office of the Commissioner for Cooperative Development. The legislation stipulates that the roles to be undertaken by government include creating the policy and legal framework for development of cooperatives; improving the growth and development of cooperatives by providing the requisite services for their organization, registration,

operation, advancement and dissolution; developing partnerships with cooperatives through consultative processes that are focused on policy, legislation and regulation. The SACCO Societies Act of 2008 provides for the licensing, regulation, supervision and promotion of savings and credit cooperatives by the SACCO Societies Regulatory Authority (Republic of Kenya, 2004b and 2008b).

2.5 Literature Review on Independent Factors of the Study

This section reviews related literature on influence of social economic factors on small scale coffee production, technology adoption, management of coffee cooperatives, coffee value addition and influence of key players on coffee production.

2.5.1 Social factors affecting small scale coffee production

At both advanced and young age farmers rate of adoption of agricultural technology is low (Akudugu,Guo, and Dadzie, 2012) . At the younger age, the authors found farmers were not able to adopt modern agricultural production technologies, especially capital intensive ones because they did not have adequate resources to do so. At an older age they found that farmers' volumes of economic activities were reducing hence they were unable to pay for technologies. Older farmers have accumulated years of experience in farming through experimentation and observations and may find it difficult to leave such experiences for new technologies. In addition, farmers' perception that technology development and the subsequent benefits, require a lot of time to realize, can reduce their interest in the new technology because of farmers' advanced age, and the possibility of not living long enough to enjoy it (Caswell, Fuglie, Ingram, Jans and Kascak (2001), Khanna, (2001). Elderly farmers often have different goals other than income maximization, in which case, they will not be expected to adopt an income – enhancing technology (Tjornhom, 1995).

Maximum level of education within the farm household has a positive relationship with the probability of adoption Akudugu et al, (2012). The same author noted that farm households with well educated members are more likely to adopt modern agricultural production technologies than those without. This is because educated members even bring home modern agricultural production technologies, especially improved crop

varieties and livestock breeds for relatives to adopt. This is consistent with the literature that education creates a favourable mental attitude for the acceptance of new practices especially of information-intensive and management-intensive practices (Waller, Hoy, Henderson, Stinner and Welty (1998).; Caswell et al, 2001). Education involves impacting knowledge and skills to people which they use to generate income. The more educated people thus have income to invest in agriculture thereby likely to adopt production technologies.

Gender is positively related to the adoption of modern agricultural production technologies by farm households. This means that male farmers are more likely to adopt modern agricultural production technologies their female counterparts. The reason for this is that men are the people who make production decisions in the study area and also control productive resources such as land, labour and capital which are critical for the adoption of new technologies (Akudugu et al, 2011). This finding contradicts those of Doss and Morris (2001) who in their study on factors influencing improved maize technology adoption in Ghana, and Overfield and Fleming (2001) studying coffee production in Papua New Guinea show insignificant effects of gender on adoption.

Age was found not to influence coffee eco certification certified and non-certified farmers in Tekangu cooperative society, Karatina by Kirumba and Pinard, (2010). However,they found out that on average, certified farmers were slightly older than non-certified ones. The same trend was noted for household size, though certified households were slightly smaller than non-certified households. There was a highly significant relationship between the mean number of years spent in school for certified and non-certified farmers. The same Kirumba and Pinard, (2010) found no significant connection between mean number of household members on off-farm employment, farm size in hectares and the number of coffee bushes; for certified and non-certified farmers. The authors found that certified farms were larger in sizes, had more coffee bushes and more household members on off-farm employment than non-certified farms. They further observed Significant relationships between the mean area under coffee in hectares, annual

coffee production, number of adults working on farm, number of cattle owned, number of goats and sheep owned.

2.5.2 Adoption of production technology

Innovations are referred to as anything new successfully applied into economic and or social processes. In coffee production this would refer to the way farmers manage their coffee plantations including the management of nurseries, pruning and weeding procedures, the use of fertilizers and pesticides, the planting of new varieties and the harvesting methods. The value of an innovation must be measured with regard to it potential to generate benefits, like increase yields, stabilize incomes or and contribute to sustainable development. The value of the innovation is also a major factor determining its adoption. (Hartwich, and Scheidegger, 2010). Coffee requires good nutrition which results in vigorous growth of plant which reduces susceptibility to pests and diseases. Adequate supply of nitrogenous fertilizer is associated with larger bold beans which are of high quality thus price. Organic fertilizer in form of Ammonium Sulphate Nitrate (ASN), Calcium Ammonia Nitrate (CAN), Ammonia Sulphate(AS) or Urea are recommended in Central Kenya region during months of April and May at least 300grammes per tree per year while compound fertilizers in the same region is applied between October and November each year at a rate of 250 grammes and at least one debe composted Manure (CRF, 2008).

Increased productivity and reduced cost of production are the best strategies to enhance competitiveness of coffee farming in order to face international competitiveness and maintain the most important source of livelihood for the rural farming population in predominantly coffee production zones (Gicuru, 2011). The same report also indicates that problems of smallholder coffee farmers are compounded by the strict coffee management regulations that prohibited intercropping and emphasized on regular application of expensive inorganic fertilizers and pesticide sprays which increases the likelihood of failure given the high cost system is unsustainable or unprofitable due to falling output prices. Smallholder coffee production varies widely by the degree to which conventional technologies such as inorganic fertilizers and pesticides are

adopted, as well as the extent to which technologies like Ruiru II and Batian a new coffee cultivars, and agro forestry technologies are adopted. This variation means differentials in the productivity, profitability and competitiveness of coffee farming. Purely business-oriented farms are likely to adopt open-grown coffee and the other extreme will involve integration of coffee with food crops and/ or trees (Gicuru, 2011).

Integration of shade trees with coffee has continued to receive renewed policy and research attention due to increasing costs of inorganic inputs coupled with the high risk on the environment. Growing coffee under shade has the desirable effects of suppressing weeds and preventing build-up of certain pests, thereby cutting costs of production and preventing net losses of coffee berries from diseases and pests. The optimum shade conditions for pest suppression differ with climatic conditions, altitude and soils (Staver, Guharay, Monterroso, and Muschler, (2001). Selection of tree species and density, pruning regime and spatial arrangement are important decisions that a farmer must make. Farmers who do not interplant coffee with trees or food crops have a less integrated system of growing coffee generally referred to as open-grown coffee farming.

Some farmers adopt shade-grown coffee by growing trees, shrubs or food crops in or around the field. These different coffee management systems have cost and productivity implications and may be significant factors affecting the profitability and survival of the coffee farming operation. Apart from using shade trees in controlling weeds and pests, some coffee farmers adopt alternative low-cost technologies such as cover crops and mulching for weed control, cultural pest control as well as inter-planting food crops to hedge against risks. Other farmers continue to depend on high-cost systems that rely on external inputs. Overall, productivity of coffee is generally low but there is big farm-to-farm variability implying that some farms are more productive than other farms. The combination of different technologies and management techniques are likely to lead to differences in productivity and profitability (Gicuru, 2011).

In response to declining coffee prices, farmers have followed four distinct routes, namely, to uproot coffee, continue farming as before, or neglect the crop or practice

coffee agro forestry. Agriculture is not only an important source of income in developing countries, but it is also responsible for serious environmental damage. (Isik, 2004; Sterner, 2003, World Bank, 2008a). A promising alternative to control the negative effects of agriculture on the environment and to increase the income of rural poor is ECO-labels. Awarded by a third party who controls that the production meets specific environmental criteria, ECO-labels allow consumers to compensate producers who use environmentally friendly and socially responsible practices. Though the different labels privilege different environmental aspects of production, the non use of chemical fertilizers, the protection of the forest and the conservation of wildlife has been the focus of organic certificates. Certified organic cultivation generates positive impact to the community in the form of improvements in the environment. In addition, farmers benefit from improved market access and reduced health problems like intoxication due to misused of agrochemical (IFAD, 2003 ;Parrot, Olesen and Høgh-Jensen, 2007).

2.5.3 Cooperative governance

Cooperative governance can be viewed in terms of the management committee who are elected members of the cooperative society and the cooperative manager who is an employee of the cooperative society and not necessarily a member of the cooperative society. The Management Committee is the highest elected executive institution in a cooperative enterprise. Members of the cooperative society are eligible for election into the management committee which acts on behalf of the members. These factory farmers' representatives form the cooperative society management committee which manages the affairs of the society on behalf of the members. Everything done in the cooperative must be approved by the management committee (Koopmans, 2006). The management committee ensures that decisions taken can in fact be executed. The Management committee must guarantee a close correlation between theory and practice, between decision and execution. It is always good management policy to view every decision action in the context of the total activities of the enterprise, present and future. In this case, the management committee must seek to discover the correlation between

current actions and their future consequences (Hussi, Murphy, Lindberg and Brenneman (1993).

The cooperative Manager is the chairperson of the management committee, and the only paid officer in the enterprise. The cooperative manager initiates and presides over the meetings of the management committee, and prepares the agenda for those meetings. It is this officer who is most directly involved in the personal problems of members of the cooperative and of its employees. The manager represents the cooperative in other forums, institutions and government bodies; and it is this person who is in charge of the operation of the different departments of the organization as well as for the preparation and execution of the socioeconomic policy of the cooperative. It is the manager who proposes plans, executes and evaluates (Kegonde, 2005). Most farmers have become more business-minded as their own farm operations grow. They give more attention to their cooperative's management. They employ managers with more training and expect them to improve their knowledge and skills. Also, a growing number of cooperative managers seek to become more proficient in managing the affairs of their cooperatives (Porvali, 1993). Public concern about food safety, pollution control, health and the environment, monopoly, standardization procedures and related issues focuses attention on the competence, integrity, and behavior of cooperative managers. As a result, cooperatives are becoming more aware of the need to indemnify cooperative managers who are subject to increased legal exposure. The growing impact of world markets, even on the individual family operation, is changing the management perspective from the local cooperative level. The local is being viewed less and less as an independent entity and more and more as part of a system (Lindberg, 1993).

Poor governance and inefficiencies in cooperatives result in delays in supplying inputs to farmers, credit processing and payment to farmers for their produce. High costs of fertilizer and pesticides has, in some cases, forced the farmers to reduce application of these inputs, resulting in delivery of low quality cherries and substantial loss of small cherries during pulping stage in processing. The farmers get their earnings once a year,

making it difficult for them to meet periodic expenses they incur both at the farm and at personal levels. In addition, there is still tight regulation in today's Kenyan coffee sector. The regulations not only all require smallholders to process their coffee through a cooperative, but prohibit direct purchase from farmers. Farmers also have limited information on the coffee market and existing member associations are structurally weak to act as feedback mechanism to farmers (Chege, 2012).

2.5.4 Coffee value addition

Value-addition for coffee range from very intricately processed and packaged, to simple additions or processes that can add to the worth of the final product. The Coffee Value addition activities start at the very basic level yet very crucial in determining the final quality of the end product. Such activities include essentials such as appropriate land preparation, fertilizer application, pests and diseases control and management, irrigation, primary processing, secondary processing and facilities maintenance (EPZ, 2014). Value additions along the coffee value chain have been dismally low and skewed against the farmer who gets seven percent of the market value, which is hardly a tenth of what accrues at the milling and marketing stage in the value chain. The bulk of value added accrues at the roasting stage of the value chain (Chege, 2012).

Kenya has the added advantage of having a well-developed tourist sector that can be used as a ready market for Kenyan coffee. It is therefore apparent that Kenya will need a comprehensive strategy to promote domestic coffee consumption. The high level of consumption has been achieved though a promotion strategy that offers various brands made available in social places. Increasing local coffee consumption can enhance local processing capacity that can be utilized for value addition and eventually the country should be able to export finished coffee products (Karanja and Nyoro, 2002).

For purposes of coordinating and promoting the domestic coffee consumption campaign, the coffee industry should pursue strategic linkages with the tourism sector through Kenya Tourism Board (KTB) to promote Kenya as coffee tourist destination. The potential to market domestic coffee consumption should not be underestimated and the new coffee policy on value addition concepts should incorporate

the tourism sector. The Kenya coffee consumers have very little understanding of specialty and fine coffee drinking culture. The exposure to soluble coffees is their point of entry in coffee knowledge a factor that needs to be urgently addressed (Kegonde, 2005).

Different ways of adding value to coffee includes: Grow organic Coffee which many buyers in the export market will happily pay 30 -60% more for better taste and health, inline with the emerging trends and lifestyle in the major target export markets, Sell something unusual or hard to find, have a special farm or estate label, or a recognizable brand, Sell direct and deliver to high-end consumers such as restaurants and hotels who put a premium on freshness and focusing on Coffee as product with unique or special qualities due to the soil in which it is grown, or altitude or special climatic niche (EPZ 2014).

Sustainable coffee is increasingly becoming an important segment of the market offering a lot of new opportunities with a lot of support from European supermarkets and roasters. The four major European certifications for coffee production standards are Fair-trade, Organic, Rainforest Alliance and UTZ certified. Value added coffee by-products include: as a Source of dietary fibre; Coffee spirit; Charcoal production; Mushroom cultivation; Production of citric acid and gibberellic acid; Antioxidant compounds; Source of natural food colour; Production of aroma compounds; Biogas production and Sources of phenolic compounds (EPZ, 2014).

Coffee branding Coffee branding through the Geographical Indication for single-origin coffee is a relatively new concept that could improve value addition along the supply chain. Coffee branding according to the zones of origin widens the market through segmentation. The farmers could use coffee branding to strategically position themselves, through partnerships, and reduce price spread between producer and retail level. This may be achieved through joint ventures in investment that allows local roasting and packaging of the product before exportation. Further, the partnership can take the form of contract farming. Contract farming has ancillary benefits in the form of credit

arrangement for critical inputs and may also embrace insurance schemes. For such developments to be useful to farmers, the government may need to play a role in mediating and establishing the ground rules for these arrangements. The government also should pursue aggressive marketing of Kenyan coffee and offer fiscal incentives to encourage foreign investors to engage in contract partnership with coffee farmers (Chege, 2012).

Kenya should go full throttle for value addition through branding, certification, total quality management, attractive packaging, niche positioning and other creative marketing strategies, taking into consideration that the paradox of the coffee global market is the oversupply of low-quality coffee and shortage of high-quality coffee. There is a need to demarcate clearly the roles of the different players in the market so as to create firewalls which preclude conflict of interest; e.g. a coffee marketing agent should not be licensed to be a buyer or be related to a buyer; otherwise the agent could sell to it as a buyer at depressed prices. Such measures would minimize self-dealing (Mureithi, 2008).

2.6.5 Roles of Coffee key players

The sector is overregulated with many players with key ones as follows:

Ministry of Ccooperative Development and Marketing

The Ministry was re-established in 2003 to promote the sector's development. It had the onerous task of resuscitating a once-vibrant network of co-operative societies and unions facing virtual collapse due to neglect and mismanagement. This scenario was attributed to the inadequacies of the Co-operative Societies Act No.12 of 1997.The mandate of the ministry which include: Co-operative Policy Formulation and Implementation, Co-operative Legislation and Registration, Provision of Co-operatives Extension Services, co-operative Education and Training, Co-operative Financing Policy, Co-operative Savings, Credit and Banking Services Policy, Co-operative Governance, Co-operative Tribunal, New Kenya Cooperative Creameries (New KCC) ,The Co-operative College, Co-operative Marketing, including value addition processing and Promotion of Co-operative Ventures (Ministry of cooperative Development and marketing, 2014).

Roles of the Ministry of Agriculture

The core functions of the Ministry of Agriculture includes formulating, implementing and monitoring agricultural legislations, regulations and Policies, providing agricultural extension services, Support agricultural research and promote technology delivery to end users. It is also mandated to facilitate and represent agricultural state corporations in the government developing implementing and coordinating programmes in the agricultural sector. It is also mandated to regulate and ensure quality control of inputs, produce and products from the agricultural sector, Management and control of pests and diseases in crops, Promotion, management and conservation of the natural resource base for Agriculture and collecting, maintaining and managing information on the agricultural sector (Ministry of Agriculture, 2009).

Cooperative movement in the coffee subsector

The coffee subsector in Kenya is organized into coffee factories, farmers' cooperative societies, District Cooperative Unions and the Kenya Planters Cooperative Union. The coffee Board of Kenya (CBK) is a regulating agency in the coffee subsector (Nyangito 2001).

Coffee factories

Almost all existing coffee factories serving smallholder farmers belong to cooperative societies. A few private factories have started since coffee processing and milling has been liberalized, but they are still rare. Nyangito, 2001 notes that factory management is burdened with nepotism, which has led to mismanagement and run-down facilities—a factor that may contribute to cooperative break-up. In general, factory payout to farmers is largely determined by the charges for the services of coffee processing, storage, bulking and transportation and for overheads. High deductions and lower-quality coffee result in low producer price, which discourages production.

Cooperative societies

Cooperative societies are wholly formed by a group of factories, but in some cases one factory may make up a society. Main society functions are to keep books, provide credit, market, repair and maintain factories, and employ factory staff. Most societies

are poorly managed. This has led to a widespread break-up of large societies into smaller ones. The problem is made worse by huge deductions taken from farmers' returns to cover expenses incurred by the many factories a society may own. The payout from society to factory varies from about 46% to 93% depending on the performance of the cooperative and the services it offers to factories and individual factory expenses. Over 95% of the expenses for factories are factory related, but much of these expenses are inflated because of corrupt practices, such as exaggerated deductions for both factory and the society services (Kegonde, 2005 and Lindberg, 1993).

District cooperative unions

The District Cooperative Unions draw membership from coffee cooperative societies and in some cases from other farming enterprises such as dairying. District unions help coffee farmers produce; process and market coffee, but they do not physically handle it. The unions are allowed by the Cooperative Societies Act to take up to 17.05% of the farmers' proceeds to finance their operations. However, recently unions have reduced what they provide farmers by not involving themselves directly in employing society staff. They have instead diversified into other functions such as banking. However, the fact that unions are no longer active in arbitrating society disputes has increased the wrangling (Mude, 2006).

Coffee Milling

Coffee milling before the coffee subsector was liberalized was a reserve of the Kenya Planters Cooperative Union (KPCU). Although more milling companies are now registered, KPCU dominates as a result of the monopoly it once had. With easy access to coffee factories through the district unions, KPCU is credited for the services it provides to farmers directly, such as extension and financing. Recovery of loans to farmers is, however, poor and has affected KPCU cash flow and financing ability. Milling charges vary from miller to miller but deductions on the farmers' proceeds should not exceed 4% of the export price according to CBK rules. This has restricted the range of services millers can provide. As a result, conflicts have arisen over unfulfilled promises millers have made to farmers (Karanja, 2002).

Coffee Board of Kenya

In addition to regulating and controlling the industry, CBK functions include production services, monitoring of processing, marketing, production research and publicity. Despite the policy reforms in coffee processing and milling, CBK remains the regulatory agency in the coffee industry and controls export marketing at the auction market by appointing coffee brokers and regulating the activities of the coffee brokers and buyers. The CBK also receives all the proceeds of exported coffee which it later remits to farmers. The board further provides extension services to farmers, research and promotion of coffee in export markets. It charges about 8% of the export price on marketed coffee to cover its expenses and government levies. Board control over coffee marketing and regulatory functions in the industry has been a bone of contention with other stakeholders (Lindberg, 1993).

Kenya Coffee Cooperatives Exporters Limited

Kenya Co-operative Coffee Exporters (KCCE) is a coffee exporting organization established by the cooperative movement in Kenya to create linkages between the smallholder Kenyan coffee producers and the world market through a consistent, shorter and transparent supply chain. In year 2009, small scale coffee farmers put their synergies together through their cooperative societies and established KCCE to explore end-to-end farming, processing and marketing of their produce and to maximize their returns.Smallholder coffee farmers in Kenya had, for a long time, wanted to market their coffee directly to buyers overseas, and to create a business relationships with their buyers, but lacked the necessary linkages to do so. Most of their coffee has been handled by intermediaries or traders (mostly global multinational companies), a situation that lengthens the value chain and erodes value for farmers. To address this KCCE was formedas the farmers' vehicle to the international market through the direct sales approach also referred to as the "second window" introduced in Kenya in 2005. The second window operates alongside Kenya's traditional coffee auction system. (KCCE, 2014).

Kenya Planters Cooperative Union

Kenya Planters Cooperative Union (KPCU) has a membership of 700,000 small scale farmers, 300 cooperatives and 2,000 private estates (FAO, 2004) KPCU has four Coffee Mills. ; One at the head office, Sagana, Dandora and Meru. KPCU has a unique role of mobilizing the small scale coffee farmers countrywide though it has been undergoing a financial crisis which has resulted from a number of factors namely;-Lack of training and preparedness by cooperative staff, wrangles in leadership in some coffee factories have affected the output, poor sequencing of reform policy by government, loss of government protection, political interference, inadequate legal reforms, slow decision making process, international prices, infrastructure and weather conditions, competition from other players such as hawkers and private processors and high cost of farm inputs. KPCU of late has seen serious governance issues caused by Board of Directors (Sirken, 2008).

Kenya Coffee Producers Association

The Kenya Coffee Producers Association (KCPA) is a national membership organization of coffee farmers formed to forge a united front in the coffee industry in Kenya. The objects of the association are non-political, and are to have fair representation in an organization of all the key players lawfully dealing in and or involved in the Kenyan coffee industry. KCPA came in place after a merger between Kenya Coffee Growers Association (KCGA) and Kenya Coffee Growers and Employers Association (KCGEA) in March 2009. The membership of the association comprise small, medium and large scale coffee producers, all drawn from the coffee growing districts across the country (Danida, 2012).

2.7 Theoretical Framework

The study is based on Fredrick Taylor theory of management which led the development of a theory of management that analysed work flows. Its main objective was improving economic efficiency especially labour productivity. He attempted to apply science to the engineering of processes and management. Taylor believed in standardization of best practices and wreathed traditions preserved merely for its own sake or to protect the social status of particular workers with particular skills sets. He

advocated for transformation of craft production into mass production and knowledge transfer between workers and from workers into tools, processes and documentation. Taylor noticed that natural differences in productivity between workers were driven by various causes including differences in talent, intelligence or motivation. He applied science in understanding why and how these differences existed and how best practices could be analyzed, synthesized and then propagated to other workers through standardization of process steps. He believed that decisions based upon rule of thumb and tradition should be replaced by practical procedures developed after careful study of an individual at work, including via time and motion slides which would synthesis the "one best way to do any given task. The goal and promise was both an increase in productivity and reduction of effort. Taylor observed that some workers were more talented than others and that even smart ones were often unmotivated. He observed those workers who were forced to perform repetitive tasks tended to work at the slowest rate that goes unpunished. Taylor observed that, when paid the same amount, workers tend to do the amount of work that the slowest among them does. This reflected the idea that workers had vested interest on their own well-being and don't benefit from working above the defined rate of work when it will not increase their remuneration. He proposed that time and motion studies combined with rational analysis and synthesis could uncover one best method of performing any particular task and that prevailing methods were seldom equal to these best methods. Taylor acknowledged that if each employee's compensation was linked to their output, their productivity could go up. His compensation plans included piece rates. He rejected the idea that the trades including manufacturing were black art that couldn't be analyzed. In his empirical studies he examined various kind of manual labour and discovered many concepts. He decided that labour should include rest breaks so that workers could get time to recover from mental and physical fatigue. As a result productivity increased (Kidombo, Ndiritu and Gakuu, 2013).

2.8 Conceptual Framework of the study

The independent factors of the study included influence of: social factors, coffee production technology adoption, management of coffee Cooperative Societies, value

addition and roles of key coffee players on coffee production, while the dependent variables included coffee productivity per tree and the number of tree per farmer. Other factors affecting coffee production were government policies, weather, politics and culture.

The Conceptual Framework of the study is shown in Figure 1.

2.9 Conceptual framework

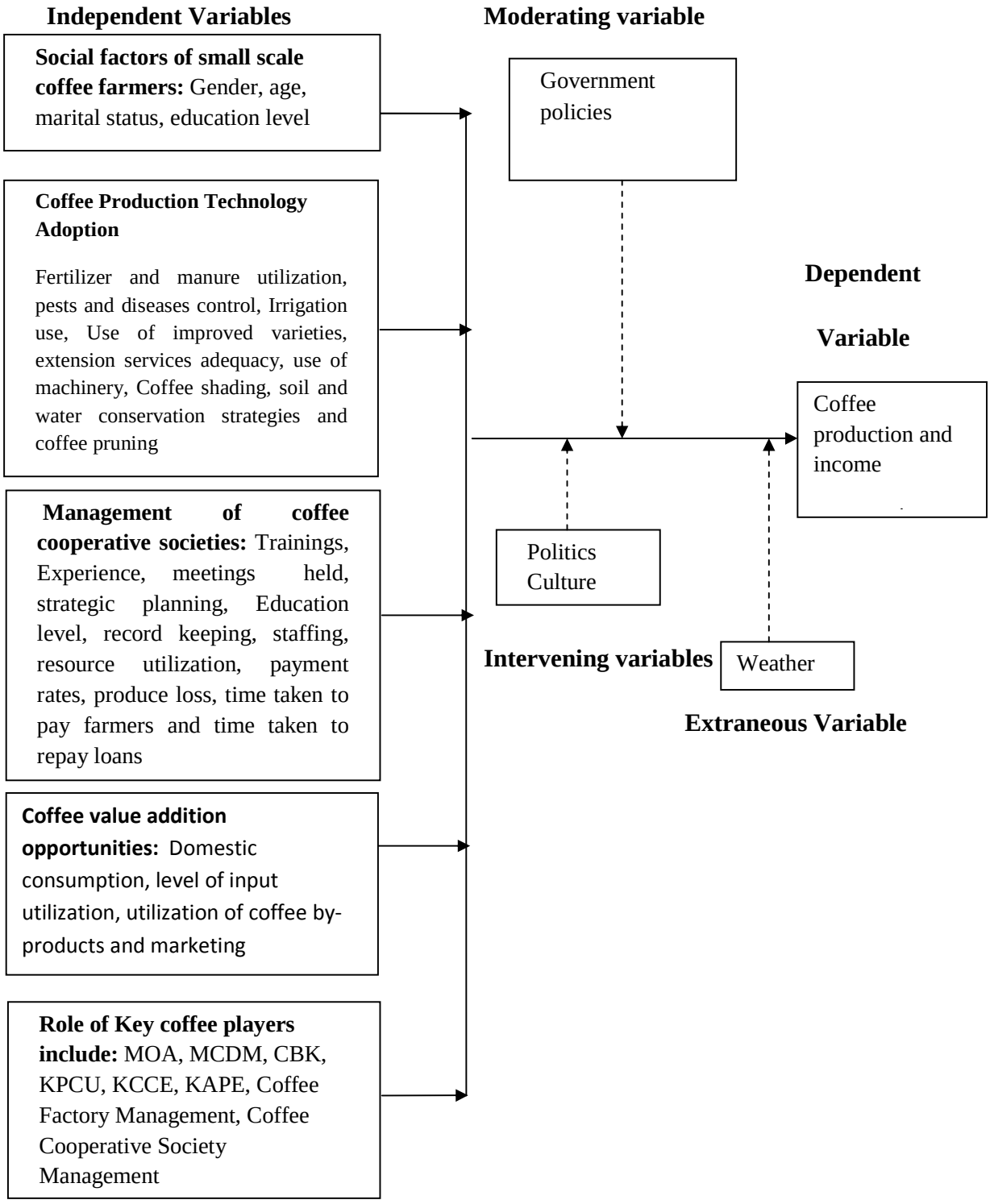

Figure 1: Conceptual Framework

2.10 Gaps in Literature Reviewed

According to Karanja and Nyoro (2002), low coffee production in Kenya results from international price fluctuation which saw Kenya reduce annual production of 130,000MT of clean cherry in 1987/88 to current 50,000MT. The authors reported that increased cost of production has reduced profitability of the enterprise making it less competitive. He cited low profit of Kshs 14,000 per ton has resulted farmers uprooting the crop and farming other better paying crops and converting coffee farms to prime residential houses where such farms are around big towns like Kiambu, Nyeri town and Nyanza regions. This is also in agreement with Kegonde, (2005) coffee production is on decline. He attributed low production to high cost of coffee production he says is contributed by inadequate credit facilities, high cost of credit and other inputs like fertilizers and irrigation, and strict laws by Coffee Board of Kenya of restricting production to gazetted area and laws prohibiting uprooting crop which discourage farmers going in coffee farming. UNCTAD, (1999) cites massive overproduction, collapsing of international prices, deteriorating quality, diseases and climate change as the main causes of low coffee production.

Akudugu et al, (2012) found both young and advanced age, gender and education level within household influenced modern agricultural technology adoption in Nigeria, while Overfield and Fleming (2001), Doss and Morris, (2001) study contradicts gender influences technology adoption in coffee in Papua New Guinea, Maize in Ghana. Kirumba and Pinard (2010) noted that age did not influence coffee eco certification in Tekangu – Karatina, Kenya.

Both Gicuru (2011) and Staver et al (200l) agrees that adoption in technology like cultural practices will minimize cost of production but productivity will be low and adoption of more expensive technologies will improve profitability and advocates for higher payment for organic produced coffee. Both Parrot et al (2007) and IFAD, (2003) agree that organic cultivation will benefit farmers from market access and reduced health problems.

Chege, (2012) cites poor governance and inefficiencies of cooperatives to cause delay in supplying inputs and processing credits. He also cites high cost of inputs, lack of information dissemination, poor leadership, strict regulations, delayed payment and lack of farmers' ownership of societies, over regulation of the industry, coffee value chain organization structure to contribute to low production.

The researcher addressed the knowledge gap of influence of social factors, influence of extent of technology adoption, influence of management of coffee cooperative societies, influence of coffee value addition and influence of roles of key players in small scale coffee production to both bridge the knowledge gap and also check whether the findings of study done elsewhere holds with the small scale coffee production in Tetu constituency.

2.11 Summary of the literature review

The importance of coffee growing globally is reviewed by looking at importance of coffee in various producing countries of the world and also looking at the importance of small scale coffee productions, challenges and mitigation measures in Kenya. Overview of Cooperative concept, review of history of evolution of cooperatives societies in Kenya together with significance of the cooperatives in Kenya economy and overview of Kenya Cooperative legist ration has also being given. A review of related work done on independent variables of the study which includes influence of social factors, coffee production technology adoption, management of cooperatives, coffee value addition and roles of key players in small scale coffee production in Tetu Constituency has also being given. The section has concluded by giving both theoretical and Conceptual framework of the study.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter provides an overview of the research methodology which was employed in the study. It gives a description of the research design used, the target population, sample size and sampling procedure and data collection methods and instruments. Measures used to ensure validity and reliability of the instruments is also given in the chapter together with data analysis, presentation, procedures and ethical considerations.

3.2 Research Design

The research study employed a descriptive survey design. According to Best (2004), a survey is a means of gathering information about the characteristics, actions or opinions of a group of people, referred to as population. It describes data and characteristics about a population and phenomenon being studied. The descriptive survey design helps answer the questions like who, what, where and how on describing the phenomenon on study. This design is appropriate for the study because it will enable data collection from a large population.

3.3 Target Population

Target population is that population that the researcher wants to generalize the results of the study. Mugenda and Mugenda (2003) defines target population as the entire group a researcher is interested in or the group about which the researcher wishes to draw conclusions. The target population of the study was the 12,409 small scale coffee produces in Tetu constituency, Nyeri county, 27 members of the coffee cooperative societies management staff and 12 coffee stakeholders who included Ministry of Agriculture Coffee Officer, Agricultural Extension Officers, Cooperative Development Officer and Coffee Board of Kenya representative. Sampling frames for stakeholders and small scale coffee farmers are shown in Tables 3.1 and 3.2 respectively.

3.4 Sample size and sampling procedures

The sample of three strata namely; Coffee Cooperative Management, coffee farmers who are members of the fore mentioned cooperative societies and coffee stakeholders were used. In the cooperative management stratum, the researcher interviewed the manager, secretary and treasurer of each of the nine coffee cooperative society's management committees totaling to 27 respondents drawn by purposive sampling. Stakeholders were also sampled using same method who included all extension staff in coffee growing Zones of the constituency, Sub County Coffee Officer, Sub County Cooperative Development and Marketing Officer and a representative of Coffee Board of Kenya. According to Mugenda and Mugenda, (2003) non probability purposive sampling method is adopted where a group has the required information with respect to the objectives of the study and offer in depth information about the study. Sampling and sample size for Coffee stakeholder strata is as shown in Table 3.1.

Table 3.1: Sample size for Small scale coffee stakeholders

Stakeholder Type	No. of stakeholders	Sample size
Coffee Officers	1	1
Coffee Board of Kenya representatives	1	1
Cooperative Development Officers	1	1
Extension Agricultural Officers	12	9
Total	**15**	**12**

In the coffee farmers' strata, the researcher used the following formula adopted from Cochran, (1963) in order to determine the sample size.

$n = N/ [1 + N (e)^2]$

Where; n = sample size N = Population size, e =Level of significance

$n = 12,409/ [1+ 12,409(0.07)^2 = 201$

The sample of 201 was allocated proportionately to each cooperative society according to the proportionate number of growers as shown in Table 3.2. The respondents were then selected using simple random sampling method.

Table 3.2 Sample size of coffee farmer

Name of the society	No. of factories	No. of growers	Sample size
Aguthi	4	2423	40
Giakanja	1	1722	28
Gachatha	1	609	10
Kiandu	1	1130	18
Gathaithi	1	1002	16
Thiriku	1	1239	20
Wachuri	1	953	15
Mung'aria	1	800	13
Mutheka	3	2531	41
Total=9 Societies	**14**	**12,409**	**201**

3.5 Data collection Methods

The study used primary data, which was collected using questionnaires and interview guides. The researcher administered the questionnaires to respondents via personal interviews. The questionnaires comprised a variety of questions which were structured into different sections with each of the sections addressing a specific objective. Both open and closed questions were included in the data collection tool. Questionnaires for all strata were structured in five parts. The first part captured the demographic information of the respondent while the second, third, fourth and fifth parts were designed to collect data on technology adoption, cooperative management, value addition and roles of key coffee players.

3.6 Validity of instruments

According to Mugenda and Mugenda (2003), validity is a measure of relevance and correctness. It is the accuracy and meaningfulness of inferences which are based on the research results. Data collection techniques must yield information which is not only relevant to the research questions but also correct. For the purpose of this study, the researcher consulted the supervisor and class colleagues. She also visited the Sub County Cooperative officer and the Sub County Agricultural Extension Officer, Tetu before conducting the study in order to ascertain the validity of the research instruments. The specialists confirmed that the issues were pertinent to the topic of study. Construct validity was also used which according to Mugenda and Mugenda (2003), is appropriate where no criteria or domain of content is accepted as an adequate measure of content. This was determined by measuring correlation between concepts with theoretical framework. High Correlation of factors with theoretical framework means that the instrument is valid.

3.7 Reliability of the instruments

According to Mugenda and Mugenda (2003), reliability is a measure of the degree to which a research instrument yields consistent results or data after repeated trials. Methods used to test for reliability included pilot testing and split half method.

3.7.1 Pilot testing

Pilot testing as a smaller version of a larger study that is conducted to prepare for the study or to field test the survey to provide a rationale for the design (Orodho 2004). It involves pre-testing of the instruments to determine their validity and reliability. The researcher pilot-tests the instruments by using a different but a similar group from a different division and then made necessary adjustments. A pilot study was conducted in order to test the reliability and validity of the questionnaires. The aim of the pilot survey was to test whether the design of questions was logical, if questions were clear and easily understood whether the stated responses were exhaustive and how long it would take to complete the questionnaire. The pre-test also allowed the researcher to check whether the variables collected could be easily processed and analyzed. The pre-testing was carried out on a sample consisting of 10% of the respondents. Any question found

to be interpreted differently during the pre-testing was rephrased so that could have same meaning to all respondents. Views given by the respondents during pre-testing were analyzed and used to improve the questionnaires before actual collection of data. The study was carried out on 20 households of neighbouring Githiru Coffee society in Nyeri municipality Constituency.

3.7.2 Split Half method

The research instruments were subjected to half split method by applying it to a small sample of twenty (20) respondents from Githiru cooperative societies. Sample items from domain of indicators that measure the variable were taken, and then the tools administered to the group. By randomly dividing the variables, the sum of subjects from two groups were correlated using spearman- Brown prophecy formula and a split half correlation of 0.97 was obtained. A correlation of above 0.8 according to Mugenda and Mugenda (2003) indicates high reliability. In addition, before the administration checked for any ambiguities and unclear questions to ensure that the questions were understood by the respondents.

3.8 Data collection procedures

Three research instruments were used in the study for data collection: Interview schedules for Coffee Cooperative Societies Management staff and stakeholders and questionnaires for coffee farmers. The researcher formulated the instruments and administered them to the respondents whereby relevant questions concerning the study were asked through face to face to face interviews to capture their feedback. The researcher sought approval for this study from the University of Nairobi, Ministry of Cooperative Development and Marketing Tetu, and the Ministry of Agriculture Tetu Sub County. As soon as permission was granted, the study proceeded in the following chronology: Recruitment of five research assistants; Conducting briefing for the assistants on the study objectives, data collection process and study instrument administration; Pilot testing; Revision of the data collection instruments after the pilot study; Reproduction of required copies for data collection upon approval by supervisor; Administration of data collection instruments to respondents; Collection of duly

completed research instruments, assessment of filled questionnaires through serialization and coding for analysis; Data analysis and discussion; preparation of conclusions and recommendations.

3.9 Data analysis techniques

Once all the data was collected from the field, it was cleaned and coded then the variables were entered and analyzed using Statistical Package for Social Sciences version 21. The data was first summarized using descriptive statistics then analyzed for relationship and inferential statistics using Pearson correlation and chi- Square. Content analysis for open ended questions was also done in order to check for patterns and themes.

3.10 Ethical considerations

The researcher relied on ethical issues as identified by Mugenda and Mugenda (2003), while undertaking this study. The research followed the three principles of ethics which include respect, beneficence and justice. The participants were informed of the purpose of the study before information was sought from them thus conforming to the principle of voluntary and informed consent. The researcher also sought approval from the University of Nairobi, Ministry of Cooperative Development and Marketing, Ministry and the Ministry of Agriculture Tetu Sub County, before fieldwork. Honesty, integrity and confidentiality were highly maintained throughout the study.

3.11 Operational definition of variables

The operational definition of variables is presented in Table 3.3.

Table 3.3 Operational definition of Variables

Objective	Variables	Indicators	Measure-ment scale	Tools of analysis	Type of analysis
	Independent				
Assess the influence of social factors on small scale coffee production in Tetu constituency, Nyeri county	Social factors	Gender of household head	Nominal	Percentage	Descriptive, Inferential
		Age of the household head	Interval	Percentage	Descriptive, Inferential
		Marital status of household head	Nominal	Percentage	Descriptive, Inferential
		Education level of household head	Ordinal	Percentage	Descriptive, Inferential
Assess the influence of adoption of coffee production technologies on small scale coffee production in Tetu constituency, Nyeri county	Coffee production technology adoption	Fertilizer and organic manure utilization	Interval	Percentage	Descriptive, Inferential
		Adequacy of soil and water conservation strategies	Ordinal	Percentage	Descriptive
		Pests and diseases incidences	Nominal	Percentage	Descriptive, Inferential

		Coffee pruning	Nominal	Percentage	Descriptive, Inferential
		Use of irrigation	Nominal	Percentage	Descriptive, content
		Number of improved varieties	Ratio	Percentage, mean	Descriptive, Inferential
		Types of improved varieties	Ordinal	Percentage	Descriptive
		Adequacy of extension visits	Nominal	Percentage	Descriptive
		Use of machinery	Nominal	Percentage	Descriptive
		Adequacy of coffee shading	Nominal	Percentage	Descriptive
Establish the influence of coffee cooperative societies management on small scale coffee production in Tetu constituency, Nyeri county	Management of coffee Cooperative Societies	Meetings held	Nominal	Percentage mean	Descriptive
		Strategic planning	Nominal	Percentage	Descriptive
		Coffee marketing	Nominal	Percentage	Descriptive, Content
		Staffing	Nominal	Percentage mean	Descriptive

		Education level of the management	Ordinal	Percentage , mean	Descriptive
		Experience level of management staff	Ordinal	Percentage mean	Descriptive
		Record Keeping	Nominal	Percentage	Descriptive
		Produce loss	Ratio	Percentage	Descriptive
		Payment duration	Ratio	Percentage	Descriptive
		Debts owned	Ratio	Percentage	Descriptive
		Loan repayment duration	Ratio	Percentage	Descriptive
		Trainings held	Nominal	Percentage	Descriptive
Examine the influence of coffee value addition on small scale coffee production in Tetu constituency in Nyeri county	Coffee value addition	Domestic coffee consumption	Ratio	Percentage , mean	Descriptive
		Utilization of coffee- by products	Ratio	Percentage , mean	Descriptive

		Amount of fertilizer applied per tree	Ratio	Percentage, mean	Descriptive
		Amount of manure applied per tree	Ratio	Percentage, mean	Descriptive
		Adoption level of crop protection	Interval	Percentage	Descriptive
		Adoption level of coffee irrigation	Interval	Percentage	Descriptive
		Coffee marketing	Nominal	Percentage	Descriptive, Content analysis
To determine the influence of roles of key coffee sector players on small scale coffee production in Tetu constituency, Nyeri county	Roles of key coffee players	Satisfaction level of the farmers and Society Management staff	Nominal	Percentage, mean	Descriptive
	Dependent Improved coffee production	Coffee yield in Kilograms	Ratio	Mean, percentage	Descriptive Inferential
		Number of coffee trees	Ratio	Mean, percentage	Descriptive Inferential

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

This chapter provides analysis, presentation, interpretation and discussion of the data collected from the study on factors influencing small scale coffee producers in Tetu Constituency.

4.2 Questionnaire Return Rate

A total of 240 questionnaires which included 201 from small scale coffee farmers 27 from coffee cooperative management staff and 12 from key coffee stakeholders were used in the study. A total of 239 questionnaires; 200 from farmers, 27 from management staff and 12 from stakeholders were returned making a return rate of 99.5% which was good for analysis and report writing.

4.3 Social Composition of the Respondent

The researcher sought to investigate influence of social factors on small scale coffee production. The social factors studied included age, gender, marital status and education level of small scale coffee farmers. The results are shown in Table 4.1, Table 4.2, Table 4.3 and Table 4.4.

Table 4.1 Social Composition of the Respondent by Gender and Age

Age group	N	Males Percentage	Females Percentage	Total Percentage
Less than 30 years	4	2	0	2
30-45 years	36	13	5	18
45-60 years	106	37	16	53
Over 60 years	54	22	5	27
Total	**200**	**74**	**26**	**100**

Table 4.1 shows that, there was inequality in small scale coffee farming of both gender and age. Most farmers, (53%) were aged between 45 and 60 years. It was also a male dominated enterprise with majority, (74%) men against 26% women. Young people of less than 30 years were fewer, (2%) and especially women.

Table 4.2 Respondents Marital Status

Marital Status	N	Percentage
Married	158	79
Single	14	7
Widowed	26	13
Separated	2	1
Total	**200**	**100**

Table 4.2 shows that majority, (79%) of the respondents were married, 7% were single and 13% were widowed while 1% were separated

Table 4.3 Composition of Respondents by Level of Education

Education level	N	Percentage
Pre primary	70	35
Primary	6	3
Secondary	104	52
Tertiary	14	7
University	6	3
Total	**200**	**100**

Table 4.3 shows that majority, (52%) of small scale coffee farmers had secondary education, a total of 35% had pre primary education and 7% had tertiary education while 3% had university education.

4.3.1 Correlation of Social Factors and Coffee Production

The researcher sought to investigate whether social factors of gender, age, marital status and education level of the small scale coffee farmer influenced small scale coffee production by measuring extent of correlation between factors and average yield production per coffee tree. The results are shown in Table 4.4

Table 4.4: Correlation Coefficients among Social Factors Influencing Coffee Production

		Factor Score
Influence of Gender on the small scale coffee production	Pearson Correlation	0.046
	Sig. (2 tailed)	0.601
		N=200
Influence of age of farmer on small scale coffee production	Pearson Correlation	0.000
	Sig. (2 tailed)	0.998
		N=200
Influence of marital status of farmer on small scale coffee production	Pearson Correlation	0.028
	Sig. (2 tailed)	0.752
		N= 200
Influence of education level of farmer on small scale coffee production	Pearson Correlation	0.324
	Sig. (2 tailed)	0.000
		N=200

N.B Correlation is significant at 0.01 level (2-tailed).

Out of four factors evaluated; influence of gender of the farmer, influence of the age of the farmers, influence of marital status and influence of education level of the small scale coffee production, it is only influence of education level of the small scale farmers which showed strong relationship with the average coffee production per tree at 0.01 level of significance. This interprets that the level of education of the small scale farmer was associated with 32.4% increase in yield per tree. No correlation was established

between social factors and average number of coffee trees per farmer and average yield per tree though both at young and advanced age farmers had fewer number of trees and lower yield per tree.

4.4 Coffee Production Technology Adoption

The researcher sought to assess influence of coffee production technology adoption on yield. The results are shown in Tables 4.5, 4.6, 4.7, 4.8, 4.9, 4.10 and 4.11.

4.4.1 Coffee Production Management Practices

The researcher sought to investigate extent to which adoption or lack of adoption of agricultural technologies influenced coffee yield by assessing whether: pests and diseases, manure application, fertilizer application, coffee pruning practices, use of irrigation, extension services, mechanization, coffee shading and soil and water conservation strategies influenced yield in a 'Yes' response for attribution and 'No' for not attributing to yield loss. Results of analysis are shown in Table 4.5

Table 4.5 Influence of Coffee Production Technology on Coffee Yield

Issue	Influence of low coffee yield		
	N	Yes Percentage	No Percentage
Pests and diseases	200	93	7
Manure utilization	200	56	44
Fertilizer Utilization	200	70	30
Pruning practices	200	56	44
Use of irrigation	200	26	74
Extension services	200	29	71
Mechanization	200	44	56
Coffee shading	200	59	41
Soil conservation strategies	200	71	29
Mean		**63**	**37**

Table 4.5 shows majority, (63%) of the respondent were losing crop due to low technology adoption while 37% were due to other factors. Majority, (93%) reported high incidences of pests and diseases as the major cause of low yield.

4.4.1.1 Ranking influence of Coffee Production Technologies

The researcher sought to investigate the extent to which various coffee technology adoptions practices influenced production. This was achieved by asking the farmers to rank the importance of: use of inorganic fertilizer, manure use, pruning practice, adoption of improved cultivar and pests and diseases incidence in influencing coffee yield. A category of 1 not important, 2 important, 3 fairly important, 4 very important and 5 extremely important was used. The results are shown in Table 4.6

Table 4.6 Ranking of technological factors affecting coffee production

Type of Technology	N	Mean rank on 1 to 5 point likert scale	Percentage Rank
Fertilizer application	200	4.24	84.8
Manure application	200	3.76	75.6
Pruning practices	200	3.63	72.6
Improved Cultivars	200	3.89	77.8
Pests and diseases	200	4.28	85.6
Mean		**3.96**	**79.2**

Table 4.6 shows that all the factors were ranked highly with a mean of 79.2%. Pests and diseases were ranked highest with a mean of 85.6% while manure application ranked lowest with a mean of 75.6%.

4.4.1.2 Test of Relationship among technological factors influencing yield

The researcher sought to find the extent of relationship among fertilizer application, manure application, pruning practices, improved cultivars and pests and diseases menace, through Chi- square test which is a strong measure of relationship. The results are shown in Table 4.7

Table 4.7 Relationship among coffee management technology adoptions practices

Technology	N	Chi-Square	df	Asymptotic Sig. (2-side test)
Fertilizer application	200	179.35	4	0.00
Manure application	200	98	4	0.00
Pruning practices	200	57.35	4	0.00
Improved Cultivars	200	137.6	4	0.00
Pests and diseases	200	222.7	4	0.00

N.B Asymptotic level 0.05 – Null hypothesis is rejected if asymptotic Significance is less than 0.05

Table 4.7 shows Chi – Square is significant at 4 degree of freedom in all the cases, this interprets that the influence among above factors on small scale coffee production in Tetu Constituency, differed significantly.

4.4.1.3 Analysis of correlation between factors

The researcher correlated above factors to establish the relationship between then and measure the extent of relationship using Pearson Correlation. The results are shown in Table 4.8

Table 4.8: Correlation Matrix between technology adoption factors

		Fertilizer application	Manure application	Pruning practices	Improved Varieties	Pests and diseases
Correlation	Fertilizer application	1.000	0.417	0.259	-0.115	0.717
	Manure application	0.417	1.000	0.244	0.321	0.122
	Pruning practices	0.259	0.244	1.000	0.213	0.197
	Improved Varieties	-0.115	0.321	0.213	1.000	-0.430
	Pests and diseases	0.717	0.122	0.197	-0.430	1.000
Sig. (1-tailed)	Fertilizer application		0.000	0.00	0.095	0.000
	Manure application	0.000		0.002	0.000	0.182
	Pruning practices	0.001	0.00		0.007	0.012
	Improved Varieties	0.095	0.00	0.007		0.000
	Pests and diseases	0.000	0.182	0.012	0.000	

N.B Correlation is significant at 0.01 level

There was high correlation between most of the factors apart from correlation between fertilizer application and improved variety and pests and diseases and manure application. Pearson correlation was highest between influence of pests and diseases and fertilizer use at 0.717. This interprets that 71.7% pests and diseases incidences were contributed by low adoption of fertilizer while 29.3% of pests and diseases incidences were due to other factors. A negative correlation between pests and diseases and improved variety adoption

of -0.430 interprets that pests and diseases reduced by 43% where improved coffee varieties were adopted.

4.4.5 Adoption of Improved Cultivars

The researcher investigated the level of adoption of coffee improved cultivars which are higher yielding and resistant to diseases as an indicator of low cost production, quality and yield. The results are shown in Table 4.9

Table 4.9: Adoption of improved cultivars

Variety Name	No. of coffee trees	Percentage
SL 28	33,448	74
SL 34	9,040	20
RUIRU 11	1,808	4
BATIAN	904	2
TOTAL	**45,200**	**100**

Table 4.9 shows that a total of 74% of coffee trees were traditional SL 28 and 20% were SL 34 varieties of coffee which are not resistant to major coffee diseases of leaf rust and Coffee Berry Disease. It was only 6% of coffee trees which are improved cultivars of Ruiru 11 and Batian with 4% and 2% respectively.

4.4.6 Inorganic Fertilizer Adoption Rate

The researcher sought to investigate the level of input application by farmers which influence yield and quality by assessing inorganic fertilizer adoption rate. The results are shown in Table 4.10

Table 4.10: Inorganic fertilizer adoption rate

Application of fertilizer to coffee trees		
	N	**Percentage**
Yes	156	78
No	44	22
Total	**200**	**100**

The results show that 78% of the sampled farmers were applying fertilizer to coffee against 22% who did not apply.

4.4.7 Inorganic Fertilizer Usage

The researcher sought to find out whether the farmers were using the recommended fertilizers for coffee production. Use of proper type of fertilizer ensures nutrients are available for use of the crop when needed. Improper use of inputs is wasteful as the nutrients are not available to the plant when needed. Usage of fertilizer by the small scale farmers is indicated in Table 4.11

Table 4.11 Inorganic fertilizer usage

Type of fertilizer	**N**	**Percentage**
CAN	142	71
NPK (17:17:17)	10	5
NPK (23:23:23)	4	2
I do not apply	44	22
	200	**100**

NB: CAN= Calcium Ammonium Nitrate (CAN), ASN=Ammonium Sulphate Nitrate (ASN), NPK= Nitrogen Phosphorus and Potassium

Table 4.11 shows that 71% of the farmers used correct fertilizer recommended by Coffee Research Foundation, 7% were not utilizing correct fertilizer while 22 % did not apply fertilizer at all.

4.5 Influence of Cooperative Society Management on Coffee yield

Good governance of organizations influences performance by motivating employees and other stakeholders. The researcher sought to investigate whether management of coffee cooperative societies in Tetu constituency was satisfactory to the members which influence commitment in increasing productivity.

4.5.1 Satisfaction of farmers with governance of coffee cooperative societies

The researcher measured the level of satisfaction of the farmers coffee yield by asking the farmers to rate their satisfaction with governance of their societies compared to those of their competitors in 1 strongly disagree, 2 disagree, 3 neutral, 4 agree and 5 strongly agree point Likert scale. The governance issues included satisfaction with: Farmers meetings, strategic planning, payment rates, efficiency of resource management, staff hiring process and farmer's trainings. The results shown in Table 4.12

Table 4.12 Farmers Satisfaction Level with the Cooperative Society Management

Management Issue	N	Mean agreement on 1 to 5 point Likert Scale	Percentage Agreement
Management call us for meetings more frequently	200	3.18	63.6
Our Cooperative society has the best strategic plan	200	2.37	47.4
Our cooperative society offer us the best payment rates	200	2.04	40.8
Our Cooperative society manages resources more efficiently	200	2.72	54.4
Our cooperative society is more Robust in hiring staff	200	2.89	57.8
Extension officers from our Cooperative Society train us on best method of managing coffee	200	3.17	63.4
Mean	**200**	**2.73**	**54.6**

Table 4.12 shows that small scale farmers in Tetu constituency had 54.6% affirmation that their respective cooperative societies provided them with best governance services and 45.4% contrary opinion. They were contended with the way management was involving them through meetings (63.6% satisfaction) and crop management trainings offered (63.6% satisfaction). However, majority were dissatisfied with payment rates offered (40.8 satisfaction) and society strategic planning strategies (47.4 satisfaction).

4.5.2 Financial Management indications

The researcher wanted to find out whether the society resources were being utilized efficiently by looking at whether records were being kept, indications of produce loss,

time taken to pay farmers after delivering produce and debts owned. Results are shown in Tables: 4.13, 4.14, 4.15 and Table 4.16.

4.5.2.1 Records keeping indication

The researcher sought to find whether records were kept by coffee cooperative societies for transparency and accountability. Results are shown in Table 4.13

Table 4.13: Indication of record keeping

	Record keeping	
	N	**Percentage**
Yes	9	100
No	0	0
	9	**100**

Table 4.13 shows that all Cooperative Societies in in Tetu Constituency were keeping records for accountability and transparency.

4.5.2.2 Produce Loss Incidences

The researcher sought to find out the extent of coffee resources management by the society management by assessing whether they had incidences of coffee theft during their tenure. The results are indicated in Table 4.14.

Table 4.14 Incidences of Produce Loss

	Incidences of coffee theft	
	N	**Percentage**
Yes	3	33.3
No	6	66.7
Total	**9**	**100.0**

The results show that majority, (66.6%) of the cooperative societies in Tetu had put measure to guard produce loss to theft against 33.3%. Incidences of produce loss per society for the last one year are shown in Table 4.11.

Table 4.15: Number of coffee bags Coffee lost through coffee theft

Name of the society	Number of bags lost	Percentage
Aguthi	40	47
Kiandu	15	16.7
Mutheka	30	35.3
Total	**85**	**100**

Table 4.15 shows that Cooperative societies in Tetu Constituency had lost 85 50kg bags in the last one year in three societies namely Aguthi, Kiandu and Mutheka. Aguthi had lost most of the bags, (47%) while Kiandu had lost least, 16.7%.

4.5.2.3 Coffee payment Duration

The researcher sought to find out the duration coffee farmers were waiting to be paid after delivering produce to their cooperative society which determines the adoption of technologies. like chemicals and fertilizer applications. Delay in payment make farmers to forfeit input application or farm operations which in turn influence yield and quality hence income. The results are shown in Table 4.16

Table 4.16: Time taken to pay farmers after delivering produce

Payment Duration	N	Percentage
Less than six months	7	78
6-12 Months	1	11
1 year	1	11
Total	**9**	**100**

The study shows that Majority, (78%) of cooperative societies in Tetu constituency, were paying their farmers promptly after delivering produce. The maximum waiting period was established to be one year.

4.5.2.4 Credit Provision Indications

One of the core functions of cooperative movement is to provide credit to its members. The researcher sought to find out if this service is provided and efficiency of credit management. Tables 4.17, 4.18 and 4.19 shows credit provision by the management, debts owed and time taken to clear debt respectively as a measure of financial management.

Table 4.17: Credit Provision by Cooperative Societies

	Credit services provision	
	N	**Percentage**
Yes	8	88.9
No	1	11.1
Total	**9**	**100**

The study reveal that majority, 88.9 %(n=8), of the cooperative societies in Tetu were sourcing credit facilities from financial institutions to advance the farmers.

Table 4.18 Debts owned by Coffee Cooperative Society

Society Name	**Debts owed in Kenya Shillings**
Mutheka	12,000,000
Aguthi	2,000,000
Wachuri	0
Mung'aria	1,000,000
Gathaithi	0
Giakanja	3,000,000
Kiandu	0
Thiriku	3,000,000
Total	**21,000,000**

Table 4.18 shows outstanding debts by Cooperative societies in Tetu Constituency. According to the Table 4.18, five cooperative societies had outstanding debts which accounts for 62.5% against 47.5% which had no accumulated debts.

Table 4.19: Time taken by the Cooperative Societies to repay the loan

Duration	N	Percentage
Less than six Months	1	12.5
1 year	6	75
More than one year	1	12.5
Total	**8**	**100**

Table 4.19 shows that 87.5% of Cooperative Societies in Tetu Constituency were paying debts promptly against 12.5%(n=1) which had debts accumulated for over one year.

4.5.3 Management staff trainings

Staff training raises performance level of employees through motivation as they enlighten them on their roles. The researcher sought to find out the level of skills and intellectual development of Coffee Cooperative Societies Management staff by assessing level of education, experience and trainings held. The results are shown in Table 4.20, Table 4.21 and Table 4.22 respectively.

Table 4.20: Education Level of Cooperative Society Management Staff

Education level	N	Percentage
Secondary	18	90
Tertiary	2	10
Total	**20**	**100**

Table 4.20 shows that 90% of the Cooperative Society Management staff had secondary education while 10% had tertiary education.

Table 4.21: Experience of the Cooperative Society Management Staff

Duration	N	Percentage
Less than 3 years	10	37
3-5 Years	11	40.7
5-10 Years	5	18.5
Over 10 years	1	3.7
Total	**27**	**100.0**

Table 4.21 indicates that 40.7% of the Coffee cooperative society management had 3-5 years of experience while 37 % had less than 3 years, 18.5 % had experience of 5-10 years while 3.7% had over 10 years experience.

Table 4.22: Indication of staff training

Trainings attendance for the last one Year		
	N	**Percentage**
Yes	20	74
No	7	26
Total	**27**	**100**

The study showed that majority, (74%) of management staff had attended trainings for the past one year against 26% who did not.

4.5.4 Indication of Farmers Meeting

The researcher sought to find out whether there was participation of farmers in society decision making and also whether communication of standards of performance of the society prevailed through farmers meetings. Frequency of meetings held are shown in Table 4.23

Table 4.23: Farmers Meetings held in the last one year

Number of meetings	N	Percentage
1-3 Times	6	66.7
3-5 Times	2	22.1
Over 5 times	1	11.1
Total	**9**	**100**

Table 4.23 shows that all Coffee Cooperative Societies in Tetu Constituency held farmers meetings in the last one year. Majority, 66.7 %(n=6) held at least 1-3 meetings while 11.1 % held meetings over 5 times.

4.6 Coffee Value Addition

The researcher sought to find the extent of coffee value addition by assessing level of management of coffee trees through input utilization, domestic coffee consumption and utilization of coffee by- products which influences coffee production. Results are shown in Table 4.24, Table 4.25, Table 4.26, Table 4.27 and Table 4.28.

4.6.1Coffee trees management level

The researcher sought to find the level of coffee tree management which determines yield and quality by assessing adoption level of fertilizer application, manure application, pests and diseases control and use of irrigation. Results are in Table 4.24

Table 4.24: Coffee trees management level

Technology Type	N	Percentage of Adoption
Fertilizer application	12	78
Manure Application	12	55
Pests and diseases control	12	60
Use of irrigation	12	<1

Table 4.24 indicates that 78% of farmers were applying fertilizer to their crop, 55% were applying manure while pests and diseases control was practiced by 60% of the farmers and less than1% was doing coffee irrigation.

4.6.2 Input Utilization Rate

The researcher sought to find the extent of input utilization in coffee by assessing inorganic fertilizer and manure utilization per tree. Results are shown in Table 4.25

Table 4.25 Manure and fertilizer application per coffee tree

	N	Mean per unit
Manure application	110	0.8 Debes
Fertilizer application	156	320 grams

Table 4.25 shows there was low level of utilization of both inorganic fertilizer and manure of 320grams and 0.8 debes respectively, against Coffee Research Foundation recommendations of atleast one debe composted manure and 550grammes inorganic fertilizer application per coffee tree per year.

4.6.3 Domestic coffee consumption

The researcher sought to find extent of domestic coffee consumption which influences level of coffee management hence quality, price and income. Results are in Table 4.26

Table 4.26: Domestic coffee consumption

Coffee consumption at rural homes		
	N	**Percentage Consuming Coffee**
Yes	0	0
No	200	100
Total	**200**	**100**

The study showed that farmers were producing coffee mainly for export market and rarely buying processed coffee for home consumption in their rural homes.

Table 4.27: Reasons for low coffee consumption at rural homes

Reason	N	Percentage
I don't like it	5	2.5
It is unavailable	56	28
I cannot afford it	104	52
Unavailable and unaffordable	35	17.5
Total	**200**	**100**

The study showed that majority, (52%) of farmers were not consuming coffee due to high cost of processed coffee and 28% were not consuming due to unavailability in rural areas. However, 2.5 % of farmers do not like the coffee taste. Utilization of coffee by-products by farmers is shown in Table 4.28.

Table 4.28: Utilization of coffee by- products

Utilization	N	Percentage
Charcoal	6	3
Agro forestry	4	2
Manure	72	36
Firewood	50	25
Manure, firewood and agro forestry	50	25
None	18	9
Total	**200**	**100**

The study showed that major utilization of coffee by products was use of pulp manure by 36% of the respondents. Other uses included firewood, manure agro forestry and coffee wood charcoal. However, 9% (n=18) did not have any other use for the coffee tree apart for cherry and Mbuni production for export marketing.

4.7 Influence of Roles of Key Players in Coffee Sector

The researcher sought to investigate whether small scale coffee production was influenced by the roles of key players in the sector by asking both coffee farmers and Cooperative society Management to rank their satisfaction in 1 strongly dissatisfied, 2 dissatisfied, 3 neutral, 4 satisfied and 5 strongly satisfied likert scale with roles of: coffee factory management, coffee Cooperative Societies Management, Ministry of Cooperative Development and Marketing, Ministry of Agriculture, KPCU, KCCE and KAPE. Results are in Table 4.29 and Table 4.30.

Table 4.29: Satisfaction Level of farmers with key coffee players

Key coffee Players	N	Mean Satisfaction on 1 to 5 point Likert scale	Percentage Satisfaction
Factory Management	200	2.93	58.2
Cooperative Society Management	200	2.77	55.4
Ministry of Cooperative	200	2.81	56.2
Ministry of Agriculture	200	3.50	70
CBK	200	2.45	49
KPCU	200	2.25	45
KCCE	200	2.49	49.8
KCPA	200	2.40	48
Mean		**2.7**	**54**

NB: CBK= Coffee Board of Kenya, KPCU = Kenya Planters Cooperative Union KCCE = Kenya Coffee Cooperative Exporters Limited, KCPA= Kenya Coffee Producers Association

Table 4.29 shows that small scale coffee farmers in Tetu Constituency were 54% satisfied with roles of key players in coffee sectors which is low. A total of 70% farmers were satisfied with the roles of Ministry of Agriculture, 56.2 % were satisfied with the role of coffee Cooperative Society Management while 58.2 % were satisfied with the roles of factory management. However, they were least satisfied with roles of KPCU and KCPA.

Table 4.30: Satisfaction Level of Cooperative Society Management with Key Coffee Players

Key coffee Players	N	Mean Satisfaction on 1 to 5 point Likert scale	Percentage Satisfaction
Ministry of Cooperative	27	3.74	74.8
Ministry of Agriculture	27	3.81	76.2
CBK	27	3.96	79.2
KPCU	27	3.07	61.4
KCCE	27	2.89	57.1
KCPA	27	2.51	50.2
Mean		**3.33**	**66.6**

NB: CBK= Coffee Board of Kenya, KPCU = Kenya Planters Cooperative Union KCCE = Kenya Coffee Cooperative Exporters Limited, KCPA= Kenya Coffee Producers Association

Management of Cooperative Societies in Tetu Constituency were 66.6% satisfied with roles of key players in coffee sector. They registered more satisfaction by the roles played by the CBK at 79.2%, Ministry of Agriculture and Ministry of Cooperative at 76.2% and 74.8% respectively and dissatisfied with the roles played by KCCE at 57.1% satisfaction and KAPE at 50.2 satisfaction level.

CHAPTER FIVE

SUMMARY OF FINDINGS, DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of the key findings, a comparative discussion and conclusions based on research findings. The chapter ends with recommendations for coffee revival, policy action and further research.

5.2 Summary of Findings

The first objective of study was to assess the influence of social factors on coffee production. The study established that coffee farming in Tetu constituency was a male dominated enterprise with 74% male ownership against 26% women. Age of majority of farmers (53%) ranged between 45 to 60 years. Majority, (78.9%) of coffee farmers were married people. There was high correlation of 0.324 between education level of coffee farmer and yield achieved per coffee tree.

The second objective of the study was to assess the influence of coffee production technologies on yield. The study established that 63% of respondent attributed low yield to low technology adoption. There was low, (6%) adoption of improved pests and diseases coffee cultivars. There was high correlation of 71.7% of crop loss to pests and diseases and inorganic fertilizer utilization, though majority of farmers, 78% had adopted inorganic fertilizer.

The third objective of the study was to establish the influence of coffee cooperative societies management influence on small scale coffee production. The study established that small scale coffee farmers had 54.6% affirmation that their respective cooperative societies provided them with best governance services. They were more satisfied with involvement in decision making through frequency of meeting held (63.6% satisfaction). However, they were most dissatisfied with prices offered for their produce (40.8% satisfaction) and strategic planning strategies (47.4%

satisfaction). Majority, (90%) of the management staff had secondary education. Also majority (40.7) had 3-5 years experience.

The fourth objective of the study was to examine the influence of coffee value addition on small scale coffee production. The study established that there was limited coffee consumption by the coffee farmers. Majority, (97.5%) of farmers attributed low coffee consumption due to high cost of processed coffee (52%) and unavailability (28%) while 2.5% was due to lack of value addition. The study also established that low productivity was due to underutilization of inputs like 320 grammes fertilizer per year against recommendation of minimum 550gramme and 0.8 debes manure against recommendation of 1 debe per plant per year. The study also established there was low adoption of irrigation by less than one percent and 60% adoption of chemical spray against pests and diseases. The study also established that there was low pricing of coffee where farmers were earning 35-40 Kenyan shillings per kilogramme of cherry sold and 65-70 kenyan shillings for mbuni. The study also established existence of limited channels of coffee marketing where 90% of coffee produced in the constituency was marketed through cooperative society as a requirement by the CBK.

The final objective of the study was to determine the influence of key coffee players on small scale coffee production. The study established that farmers were 54% satisfied with the roles of key coffee players. They were most satisfied (70% satisfaction level) by the roles of the ministry of Agriculture and dissatisfied with role of CBK. On the other hand coffee Cooperative society management was most satisfied by the role of CBK.

5.3 Discussion

This section presents discussion of findings on factors affecting coffee production in Tetu constituency. They include; influence of social factors, agricultural technology adoption, management of coffee cooperative societies, coffee value addition and roles of key coffee players.

5.3.1 Influence of Social Factors

The study revealed that coffee is a male dominated enterprise with 74% ownership for male gender against 26% of female gender. According to the study, small scale coffee farmers was likely to be married people of age between 45 and 60 years. Gender, age or marital status of their farmer was found to have insignificant influence on either the number of coffee tree or yield per coffee tree thus do not influence production. However, Education level of the household head showed a high correlation of 32.4% with coffee productivity per tree. This could be due to better exposure and understanding to technology or higher level or income for investment in coffee farming. This agrees with Akudugu et al, (2012) findings that technology adoption was higher with maximum education level within a household. At both young and advanced age farmers had less number of trees and average yield per tree that those of average aged farmers of age group between 30 and 60 years. These findings also agree with Akudugu et al (2012) that at both young and advanced age farmers were financially constrained to invest in high cost technology. Both Caswell et al (2001) and Tjornhom, (1995) found that at advance age farmers have different goals rather than income maximization. The study contradicts Akudugu et al (2012) findings that gender of farmer influence technology adoption hence production but agrees with Doss and Morris (2001) and Overfield and Flemimg (2001) findings that gender insignificantly influence technology adoption hence production.

5.3.2 Influence of Technology Adoption

The study revealed that low adoption of technology was attributed to low production. Most of farmers (93%) were losing their crop to pests and diseases and few, (6%) adopted improved cultivars of Ruiru 11 and Batian which are resistant to major coffee diseases of Coffee Berry Disease and Leaf Rust. Most farmers (78%) had adopted use of inorganic fertilizers against 21% who did not. Majority, (63%) attributed low yield to low adoption of production technologies which included fertilizer at 70%, low soil and water conservation strategies attributed by 71% of farmers low, (less than 1%) use of irrigation, poor canopy management attributed by a total of 56% of farmers to Ineffective shading which included over shading and under shading attributed by 59%

of farmers. The study agrees with both Kegonde, (2005), Karanja and Nyoro (2002) findings that low coffee yield is due to low technology adoption. Both authors attributes low technology adoption to high cost of inputs, poor infrastructure, strict regulation by CBK on cultural pests and diseases management of intercropping. Hartwich, and Scheidegger, (2010) attributes technology adoption to it's value.

5.3.3 Influence of Cooperative Society Management

There were nine Cooperative coffee cooperative societies in Tetu constituency Majority, (seven) of Societies were composed of single coffee factory. The study revealed Small scale farmers in Tetu Constituency had 54.6% affirmation that their cooperative societies were properly managed against 45.6 % contrary opinion. Majority farmers were contented with the way cooperatives societies were involving them in decision making and information sharing through meeting (63.6% satisfaction) and provision of crop management trainings(63.4% satisfaction) .Majority farmers were also satisfied with staff recruitment process(57.8% satisfaction). On strategic planning, majority were not contented with the society strategic planning (47.4% satisfaction). This could have been due to lack of information on the plan.

There was good financial management where majority (78%) of Cooperative Societies were paying their farmers promptly and 88.9% were providing credits to their members and promptly and repaying the loans to avoid accumulation of interest and other financial implications. Duration of payment determine whether the farmer has capital to invest in purchase of inputs and payment for other farm operations. There were few incidences of produce theft which was reported as 33.3% in all societies. Many (59.2%) farmers were not contented with prices offered through cooperative societies. Dissatisfaction of farmers with running of Cooperative societies due to mismanagement, politics and fluctuation in prices fueled splitting of Societies (Manyara (2003) and Gamba and Komo (2006) in late 1990s.

The study revealed that there was low human resource development strategy where workers were not retained on the job after acquiring experience due to the fact that most of the posts are elective and also could be due to politics and nepotism in hiring and

dismissal of staff as noted by Manyara, (2003). A total of 22.2 % of the management staff had stayed on the job for over 5 years while majority, (40.7%) of management staff had 3-5 years experience. Low intellectual development of the staff was also evident with majority, (90%) of workers having secondary education while 26% did also not have any other training for the past one year this could have influenced productivity of coffee Cooperative societies as noted by Oakland, (1993) that the fundamental of performance of organization is good supply of educated people. This can be achieved through on job trainings and scholarships among other strategies .Kidombo et al (2013) notes that organizations need to hire right people, who are competitive and innovative, maintain the workforce and develop the human resource through trainings, education, instruction and planned experience. The same Kidombo et al (2013) notes that proper communication through trainings, workshops and meetings acts as a basis for coordination, decision making, direction , leadership and build molare of employees.

5.3.4 Influence of Coffee Value Addition

The study revealed that there was high,(78%) adoption rate of inorganic fertilizer, low 55% adoption rate of manure, low, 60% spraying against pests and diseases and low, (less than 1%) adoption of irrigation. There was low fertilizer utilization of 320 grammes per tree per year and 0.8 debes of manure per year. CRF, (2008) recommends a utilization of atleast one debe composted manure and 550 grammes fertilizer per coffee tree per year in addition to other nutrition requirements. Proper management of the coffee trees determines the final product (EPZ, 2012) and eventually price. Poor quality could have been attributes also to high, (93%) pests and diseases incidences, (Table 4.5) and low, (6%) adoption of improved cultivars (Table 4.9). FAO (2008), Kegonde, (2005) and Karanja and Nyoro, (2002) attributes low input utilization to high cost of inputs and low international coffee price.

The study revealed that farmers were earning Kenyan shillings 35-40 per kilogram of cherry sold and 65-70 per kilo of Mbuni sold which was low. For the farmers to earn more they need to produce quality which is lacking in the global market. Mureithi,

(2008) noted that there is flooding of low quality coffee in the world market and low supply of quality coffee. The study also revealed that 90% coffee produced in Tetu Constituency is marketed through coffee cooperative societies as a requirement of coffee act 2001.This could have also contributed to poor price hence production Kegonde, (2005) recommends that quality of coffee could increase if farmers are allowed to sell direct to consumers hence price and production. Chege, (2012) reports that, denying farmers branding and marketing of their produce disillusions Total Quality Management (Chege, 2012).

The study also revealed that there was limited domestic coffee consumption. Majority, (97.5%) of respondents attributed it to unavailability and cost while 2.5 attributed it to lack of value addition thus they did not like it as beverage, but maybe could like it in another form. This finding agreed with study done by Karanja and Nyoro, (2002) who found that the national domestic coffee consumption was low 2.5% of the national production which is low. Low Domestic coffee consumption according to the authors is attributed to tea consumption culture from the colonial days, lack of promotion of coffee drinking culture and unavailability of local roasters which make processed coffee unaffordable. Kegonde, (2005) attributed low domestic consumption to prohibition by Coffee ACT 2001 against farmer's roasting or selling through any other channel apart from Cooperative Societies.

5.3.5 Influence of Roles of Key Players

Majority of farmers were satisfied with the roles of Ministry of Agriculture, Ministry of Cooperative Development and Marketing, roles of coffee factories and Cooperative Societies Management. However they were dissatisfied with the roles of CBK, KCCE, KPCU and KAPE. Both farmers and society management were least satisfied with the role of KAPE and KCCE. On average small scale coffee farmers were 54% satisfied with roles of key players. Farmers were more satisfied with the role of Ministry of Agriculture and Ministry of Cooperative Development and Marketing at 70% and 58.2% respectively, while the Cooperative Society management was more satisfied with the roles of CBK and Ministry of Agriculture at 79.2% and 76.2% respectively. Coffee

farmers were 58.2% and 55.4% satisfied with roles of Coffee factories and coffee cooperative societies respectively.

Low rating by the of 49% of CBK by the coffee farmers could have being due to its roles of legistration and regulations of laws which are unpopular to farmers which includes regulation against uprooting coffee and growing coffee in ungazetted area, regulation of coffee marketing and misrepresentation of farmer in it's organization (Kegonde ,2005, lindberg, 1993). The same roles favored operations of coffee factories and societies thus rating CBK high (79.2%). High rating (70% and 76.2%) of ministry of Agriculture by both farmers and cooperative society management respectively could have been due to its role of providing agricultural extension services, research, technology development and linkage (Ministry of Agriculture, 2009).

5.4 Conclusions

The conclusions made from the study are given below:

1. The study revealed that education level of the farmers was highly correlated to productivity of coffee per tree. This could have been due to better understanding and application of technology as a result of better exposure and higher income levels which determines affordability of inputs.

2. Low yield was due to low utilization of inputs, low adoption of improved cultivars, poor agronomic practices and high incidences of pests and diseases. High pests and diseases irrespective of high adoption of fertilizer was due to underutilization.

3. Low productivity of Coffee Cooperative societies was due to low level of management education, inadequate trainings, lack of strategic planning, poor communication strategies and political influence in management of coffee Cooperative Societies.

4. Low quality hence price and production was due to low level of management like underutilization of inputs, high preference of pests and diseases, poor

agronomic practices and poor quality coffee cultivars. Low price hence production was also due to limited domestic coffee consumption, lack of value addition, prohibitive laws restricting farmers participate in marketing and value addition and lack of direct marketing opportunities.

5. Farmers were less satisfied with roles of key coffee sector players which could have reduced their molare thus production. However, they were motivated with roles of Ministry of Agriculture and Ministry of Cooperative Development and Marketing. Low satisfaction level of farmers with roles of key players was due to misrepresentation of farmers in such organizations like CBK and KAPE.

5.5 Recommendations

The following recommendations were made from the study;

1. The National Government needs to develop law on minimum education requirement for farmers just like any other career academic skills requirement. This will ensure increased output as the better educated farmers are able to understand technology and apply them and also promote education
2. The Ministry of Agriculture should promote adoption of improved cultivars which are more yielding than the traditional varieties and pests and diseases resistant. This includes Ruiru 11 and Batian cultivars. This will improve yield and quality and make the enterprise more profitable. This could be achieved by putting up factory managed nurseries.
3. Government should increase manpower by hiring more agricultural extension workers and agronomists. Coffee cooperative societies should introduce a capacity building programme in which farmers are taken through seminars on good coffee agricultural practices. In turn, the graduates should become trainers of their colleagues on best practices.
4. The Ministry of Cooperative Development should ensure there are basic academic and experience profiles that management committees must meet before allowing them to vie for any leadership position in coffee cooperatives. Also coffee theft incidences need to be stopped. Staff recruitment mechanism

need to adhere to guidelines of integrity and results oriented productivity. Cooperative societies need to be restructured and run like corporate bodies with competent management structure to ensure profitability of the enterprise and efficient service delivery.

5. To guarantee sustained interest in coffee farming, it is important for the government and stakeholders to seek alternative sources for market that offer better coffee prices. This can help to oversee challenges of coffee price fluctuations due to reliance on traditional markets. To ensure coffee market sustainability, the government need increase local consumption through campaigns and also promotion of coffee value addition through investing in agro processing to ensure it is available to the locals and in many forms. This can address inequality problems by creating jobs for the women and youths who are left out in coffee value chain.
6. To ensure high return for the produce the county Government come up with farm input subsidy programme and also ensures the inputs are supplied to farmers timely. This will be through improving of transport and communication infrastructure. To ensure proper utilization of inputs, the ministry of Agriculture staff should sensitize farmers through trainings. To ensure adherence to the standard the factory management should put up surveillance systems on crop management
7. The cooperative societies need invest in mechanization of operations to ensure efficiency and also put improve factory infrastructure like dying tables and automation of services.
8. Government should formulate laws which will ensure more farmers participation in coffee value chain to make them understand market requirement for coffee and updated market price. Roles of key players need to be revisited

5.6 Suggestions for Further Research

The following are suggested areas for further research

1. The study looked at influence of social factors affecting coffee production in Tetu constituency but did not look at economic factors. Another study on influence of economic factors on coffee production in the same area need to be done. Secondly,
2. A study to ascertain the economic factors influencing adoption of improved coffee cultivars need to be done. Thirdly,
3. A study to ascertain influence of soil PH on coffee yield need to be done in various coffee growing zones in order to come up with coffee fertilizer recommendation for farmers.

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APPENDICES

APPENDIX 1: LETTER OF TRANSMITTAL

Joyce Watheri Mugwe

P.O BOX 29-10100,

Nyeri

Email address: joycemugwe@yahoo.com

Telephone No. 0720580168

Dear Respondent,

I am a student of the University of Nairobi pursuing a Masters of Arts Degree in Project Planning and Management. I am conducting academic research on the assessment of factors influencing coffee production in Tetu Constituency. This questionnaire has been prepared to obtain information on factors affecting coffee production for individual farmers. Please note that all the information provided for this study will be treated with utmost confidentiality. Your ability to answer all the questions comprehensively and to the best of you knowledge will be highly appreciated. Thank you for your co-operation and precious time.

Yours faithfully,

Joyce Watheri Mugwe

L50/65507/2013

APPENDIX 2: HOUSEHOLD QUESTIONNAIRE FOR SMALL SCALE COFFEE FARMERS

Instructions

Please tick in the appropriate box and also fill in the blank spaces provided for those questions where elaborate answers are required. You are requested to complete this questionnaire as honestly and objectively as possible. Use the space at the back of this questionnaire if you need more space for your responses.

Enumerator Name…….....Code…….Society name……

Respondent Name…….Code…….Date……

Demographic Data

1. Indicate your gender
   1= Male [ ] 2. Female [ ]
2. Indicate your age

   1=Less than 30 years [ ] 2=30-45 years [ ]

   3=45 – 60 years [ ] 4=Over 60 years [ ]

3. Indicate your marital status

   1=Married [ ] 2=Single [ ] 3= widowed [ ]

   4= Separated [ ] 5= any other specify……..

4. Indicate your highest level of education
   1= Pre primary [ ] 2= Secondary [ ] 3= Tertiary [ ]
   4= University [ ] 5= any other specify…….

Part B Technology Adoption

Please tick the number that best describe causes of low coffee yield in your farm

5. Pests and diseases infestation 1= Yes [ ] 2= No [ ]

3= any other specify [ ]……

6. Manure use 1= Yes [ ] 2= No [ ]

3= any other specify [ ]……

7. Fertilizer use 1= Yes [ ] 2= No [ ]

3= any other specify [ ]……

8. Coffee pruning practices 1= Yes [ ] 2= No [ ]

3= any other specify [ ]

9. Use of irrigation 1= Yes [ ] 2= No [ ]

3= any other specify [ ]……

10. Water and soil conservation strategies

1= Adequate [ ] 2= Inadequate [ ]

3= any other specify [ ]……

11. Extension services

1= Yes [ ] 2= No [ ]

3= any other specify [ ]……

12. Mechanization of farm operations 1= Yes [ ] 2= No [ ]

3= any other specify [ ]……

13. Shading of coffee trees 1= Adequate [ ] 2=Inadequate [ ] 3 = any other specify……

14. In a scale of 1-5, please rank below factors as influencing low coffee yields

Fertilizer Application	[1]	[2]	[3]	[4]	[5]
Manure Application	[1]	[2]	[3]	[4]	[5]
Poor Pruning practices	[1]	[2]	[3]	[4]	[5]
Use of improved Varieties	[1]	[2]	[3]	[4]	[5]
Pests and diseases	[1]	[2]	[3]	[4]	[5]

1= Not Important 2= Important 3= Fairly Important 4=Very important 5= extremely Important

15. How many coffee trees do you have in your farm?.....

16. How many of these varieties do you have?

S.No	Variety	Number of trees
1	SL.28	
2	SL 32	
3	Ruiru 11	
4	Batian	
5	Any other specify	

17. Do you apply fertilizer to your coffee trees? 1= Yes [ ] 2= No [ ]

18. If no. 18 above is answer is yes, which fertilizer do you apply to coffee during long rain season? (April – May)

1= CAN [ ] 2 = Urea [ ] 3 = NPK [ ] 4= ASN [ ]

5= any other specify……. [ ] 6= I do not apply [ ]

Part C. Cooperative Management

Please tick the number that best describe your feeling about the management of your coffee cooperative society compared to your competitor

19. The manager calls for farmer's meetings more frequently

1= strongly disagree [ ] 2= Disagree [ ] 3=Neutral [ ] 4= Agree [ ] 5=strongly agree

20. The cooperative society has the best strategic plan

1= strongly disagree [ ] 2= Disagree [ ] 3=Neutral [ ] 4= Agree [ ] 5=strongly agree

21. The cooperative society gives us better payment rates than any other channel of marketing

1= strongly disagree [ ] 2= Disagree [ ] 3=Neutral [ ] 4= Agree [ ] 5=strongly agree

22. The cooperative society manages the resources efficiently

1= strongly disagree [ ] 2= Disagree [ ] 3=Neutral [ ] 4= Agree [ ] 5=strongly agree

23. The cooperative society is more robust in hiring staff

1= strongly disagree [ ] 2= Disagree [ ] 3=Neutral [ ] 4= Agree [ ] 5=strongly agree

24. The cooperative society officers trains us on best method of managing coffee

1= strongly disagree [ ] 2= Disagree [ ] 3=Neutral [ ] 4= Agree [ ] 5=strongly agree

Part D Coffee value addition

25. How much fertilizer do you apply per tree in one year?.....

26. Do you apply manure to your coffee trees? 1= Yes [ ]2= No [ ]

27. If answer to question number 26 is yes, how much manure do you apply per tree per year in debes?……

28. Do you consume coffee at home? 1= Yes [ ] 2= No [ ]

29. If no, why?

1= I don't like it [ ]

2= It is not available [ ]

3= I cannot afford [ ]

4= Others specify……..

30. In what other ways do you utilize coffee and it's by products?

1= Charcoal [ ]

2=Agro forestry [ ]

3=Manure [ ]

4= None [ ]

5= Others specify……..

31. How much do you sell per below products in Kshs on average?

Cherry…….

Mbuni……..

Charcoal……..

Others specify…….

32. What is your average coffee production in the last three years in Kilograms?……..

Part E Key coffee Players

33. How satisfied are you with the services provided by below players in the coffee industry?

Player	**1= Strongly dissatisfied**	**2= Dissatisfied**	**3= Neutral**	**4= Satisfied**	**5= Strongly satisfied**
Coffee factory management					
Coffee society Management					
Ministry of cooperatives					
Ministry of Agriculture					
Coffee Board of Kenya					
KPCU					
KCCE					
KAPE					

APPENDIX 3: COOPERATIVE SOCIETY MANAGEMENT STAFF QUESTIONAIRE

Please tick in the appropriate box and also fill in the blank spaces provided for those questions where elaborate answers are required. You are requested to complete this questionnaire as honestly and objectively as possible. Use the space at the back of this questionnaire if you need more space for your responses.

Factory Name…….....Society Name…….

Enumerator Name……Code…….

Respondent Name……Code……...

Part A: Respondent bio data

1. Indicate your gender
   1= Male [ ] 2. Female [ ]
2. Indicate your age

   1=Less than 30 years [ ] 2=30-45 years [ ]

   3=45 – 60 years [ ] 4=Over 60 years [ ]

3. Indicate your marital status

   1=Married [ ] 2=Single [ ] 3= widowed [ ]

   4= Separated [ ] 5= any other specify……..

4. Indicate your highest level of education
   1= Pre primary [ ] 2= Secondary [ ] 3= Tertiary [ ]
   4= University [ ] 5= any other specify…….

Part B: Technology adoption

5. On average, how much cherry do you society handle in one year in Kgs?.....

6. Are you satisfied with above production level? 1= Yes [ ] 2= No [ ] 3= any other specify……..

7. What are the major causes of low production? Pleases list them

i. ……
ii. ……
iii. ……
iv. ……

8. What do you think can be done to improve productivity of your society?

……
……
……

Part C: Cooperative Society Management

9**.** Which post do you hold in the society?

1=Manager [ ]

2=Secretary [ ]

3=Treasurer [ ]

4= any other specify……

10. For how long have you been in that post?

1= Less than 3 years [ ]

2= 3-5 years [ ]

3= 5-10 years [ ]

4= others specify……

11. Do you keep records in your society? 1= Yes [ ] 2=No [ ]

3. Any other specify…….

12. Have you had any training for the last one year? 1= Yes [ ] 2= No [ ]
13. How times have you held farmers meeting in the last one year?

    1= 1-3 times [ ] 2= 3-5 times [ ] 3= Over 5 times [ ] 4= Other specify…….

14. During your tenure have you experienced any coffee theft in your society?

    1= Yes [ ] 2= No [ ] 3. Any other specify……

15. If yes, how much in total bags in the last one year?.....
16. Do you sometimes take credit from financial institutions or any other lending institutions?

    1= Yes [ ] 2= No [ ]

17. If yes, how many months does it take to clear the loan?.....
18. Currently, how much do you owe them in Kshs…….
19. How long do your members take to be paid after delivering the produce to your society?.....

Part D: Coffee value addition

20. On Average, how much produce do you handle in one year?

    Cherry……..Kgs

    Partchment……..Kgs

    Mbuni……..kgs

21. How much of cherry do you sell per as grade AA per year?.....
22. In what other ways do you utilize coffee and its' by products?

23. How has investing or lack of investing in coffee value addition in your society influenced coffee production?

..……

……

Part E Key coffee Players

24. How satisfied are you with the services provided by below players in the coffee industry?

Player	**1= Strongly dissatisfied**	**2= Dissatisfied**	**3= Neutral**	**4= Satisfied**	**5= Strongly satisfied**
Coffee factory management					
Coffee society Management					
Ministry of cooperatives					
Ministry of Agriculture					
Coffee Board of Kenya					
KPCU					
KCCE					
KAPE					

Please explain your rating…….

Thank you

APPENDIX 4: INTERVIEW SCHEDULE FOR COFFEE STAKEHOLDERS

You are requested to complete this questionnaire as honestly and objectively as possible. Use the space at the back of this questionnaire if you need more space for your responses.

Respondent Name (optional)……Code……. Date…….

A. Bio Data

5. Indicate your gender

   1= Male [ ] 2. Female [ ]

6. Indicate your age

   1=Less than 30 years [ ] 2=30-45 years [ ]

   3=45 – 60 years [ ] 4=Over 60 years [ ]

7. Indicate your highest level of education

   1= Pre primary [ ] 2= Secondary [ ] 3= Tertiary [ ]

   4= University [ ] 5= any other specify……

8. Indicate your institution 1 = MoA [ ] 2= Cooperatives [ ] 3= CBK [ ]

   4= any other specify……

Part B. Technology adoption

9. What is the average coffee production per farmer per tree?.....
10. What is the potential production in kgs per tree?…….
11. What are the major causes of farmers not achieving the potential production?

    ……

    ……

Part C. Cooperative society Management

12. What percentage of small scale coffee is sold though cooperative society?.....
13. What is the gross payment per Kilo?.....
14. Are there differential in payment among factories or coffee societies?.....

15. If there are, what practical measures can management take to improve their efficiency? Please list them

……

……

Part D: Coffee value addition

16. What is the level of usage of the following inputs by small scale coffee farmers?
    i. Fertilizer…….
    ii. Manure……..
    iii. Diseases control chemicals……..
    iv. Pest control chemicals……..
    v. Irrigation……
17. What various ways do farmers utilize coffee and it's by products?. Please list them

……

……

18. As a key coffee stakeholder, what practical measures do you think can be taken to revive the sectors?

……

……

……

Thank you