

**SOCIO-ECONOMIC ATTRIBUTES HINDERING ADOPTION OF
ALTERNATIVE CROPS TO TOBACCO FARMING
IN KEHANCHA DIVISION, KURIA
WEST SUB-COUNTY, KENYA**

MARIBA JOHN MAROA

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DECLARATION

Student Declaration

This research project is my original work and has not been presented for any award in this or any other university.

Mariba John Maroa

N50/CE/24408/2012

SignDate

Supervisors' Declaration

This research project has been submitted for examination with our approval as university supervisors.

1. Dr. Joseph K. Muriithi

Sign.....Date.....

Department of Environmental Studies and Community Development

Kenyatta University

2. Dr. Felix M. Ming'ate

Sign.....Date.....

Department of Environmental Studies and Community Development

Kenyatta University

DEDICATION

I dedicate this work to my dear and beloved wife Neema Mangure and to our beloved children, Daphne, Sasha, Sifra and Laurene. I also dedicate this work to my dear parents, Charles Mariba and Anjeline Boke.

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First, I give glory to The Almighty God for His grace and blessings in terms of health, material needs and patience.

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ABSTRACT

Studies have documented many negative social, economic and environmental implications of tobacco farming. Tobacco farming puts an extra stress on ecosystems and causes specific health and socio-economic problems for poor populations engaged in the activity. Through research, environmentally friendly and sustainable alternative crops to tobacco farming such as soya beans, watermelons, sweet potatoes, groundnuts, cabbages, among others, have been identified. However, the rate and level of adoption of such crops is low in many regions, Kuria region being one of them. This study focused on examining the socio-economic attributes hindering adoption of alternative crops to tobacco farming in Kehancha Division, Kuria West Sub-County, Kenya. The objectives of the study were; to examine the influence of farmer attributes in the adoption of alternative crops, to explore the influence of farm characteristics in the adoption of alternative crops to tobacco farming, and to examine the contribution of extension, credit and market access in the adoption of alternative crops to tobacco farming in Kehancha Division. Descriptive survey design was used in the study since it was appropriate in capturing issues in their natural setting. The target population was tobacco and non-tobacco farmers in the division. Proportional stratified sampling and simple random sampling were used to select sub-locations and villages. Simple random sampling was also used to select adopters and non-adopters to get the required sample size, which was 108. Purposive sampling was used to get key informants. Primary quantitative and qualitative data were collected through household surveys using structured questionnaires and interviews using interview schedules with both closed and open-ended questions while secondary data were collected from relevant documented sources. Quantitative data were analyzed through simple descriptive statistics such as frequency distributions, totals and percentages. Relationships amongst variables were analyzed through correlation by regression analysis. Qualitative data were cleaned, organized, coded and analyzed through emerging themes. Based on objective one, the study found that age, education level and household size influenced adoption of alternative crops to tobacco farming with correlation coefficient of 0.444, 0.226 and -0.406 respectively. On objective two, it was found that input challenge influenced adoption of alternative crops negatively with a correlation coefficient of -0.554. Household land size and the level of production had no significant influence in the adoption of alternative crops to tobacco farming. In regard to objective three, the source of agricultural information, agricultural information challenge, credit and market access had significant influence in the adoption of alternative crops to tobacco farming with correlation coefficients of -0.281, -0.177, 0.176 and 0.162 respectively. The study, therefore, recommends that the national and county governments in collaboration with other key stakeholders including the local NGOs make efforts to encourage farmers to adopt alternative crops through awareness creation, provide inputs, adequate extension services, affordable credit facilities and enhance market structures for alternative crops especially for those farmers willing to adopt alternative crops to tobacco farming in the area. In addition, the farmers should be encouraged to form commodity-specific cooperative societies so as to aid their participation in marketing their produce.

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LIST OF ABBREVIATIONS

BAT (K)	British American Tobacco-Kenya
CAPA	Centro de Apoio Pequeno Agricultor (Brazil)
CPAR	Canadian Physician for Aid and Relief
CTCA	Center for Tobacco Control in Africa
GoK	Government of Kenya
IDRC	International Development Research Centre
KTCSAC	Kenya Tobacco Control Situational Analysis Consortium
LMICs	Low and Medium-Income Countries
MDA	Agrarian Development Ministry (Brazil)
MTK	Mastermind Tobacco Kenya
MASFA	Mchinji Area Smallholder Farmers Association
NASFAM	National Smallholder Farmers Association
NGO	Non-Governmental Organization
TTCF	Tanzania Tobacco Control Forum
UM	Upper Middle land
WHO	World Health Organization
WHO/FCTC	World Health Organization Framework Convention on Tobacco Control

CHAPTER ONE: INTRODUCTION

1.1 Background to the study

Varied studies have documented numerous negative social, economic and environmental implications of tobacco farming (Geist 2009; Kibwage *et al.*, 2008; Natacha *et al.*, 2011). In recent decades, a steady decrease in tobacco production has been experienced in High Income Countries (HICs) as an increase has been noted in Low and Middle Income Countries (LMICs) (Natacha *et al.*, 2011). As a result, assessing the socio-economic and environmental effects of tobacco production in LMICs now form an important aspect of environmental concern (Natacha *et al.*, 2011). Geist *et al.*, (2009) notes that though some negative environmental implications are brought by other agricultural cash crops, tobacco production puts an extra pressure on ecosystems and brings with it some health and socio-economic impacts for the poor populations engaged in tobacco farming.

The World Health Organization Framework Convention on Tobacco Control (WHO FCTC) Article 17, is in pursuit of the need to provide economically sustainable alternative livelihoods and Article 18, which is in pursuit of the need to protect the environment and the health of persons, thus recommending for the search for economically sustainable alternative livelihoods to tobacco farming (Kibwage *et al.*, 2008). From the global to regional perspectives, many tobacco growing countries have initiated programmes concerned with either crop diversification or adoption of alternative crops to tobacco farming (Sonja and Laure, 2012).

From adoption studies, authors have generally agreed that the major factors that influence adoption of an agricultural enterprise are farmer attributes such as age, education level, gender and household size; and farm characteristics such as land size, availability of the required labour and the household income (Adebiyi and Okunlola, 2013; Ayoola, 2012; Ghulam *et al.*, 2011; Tionenji, 2011; Kuntariningsih and Mariyono, 2013). Kuntariningsih and Mariyono (2013) found that farmer's income, education level, farm size, frequency of extension contacts were significant factors that influenced the farmers' decision to adopt hybrid seeds and silvery plastic mulch for chili farming in Java.

A number of adoption studies like Adebisi and Okunlola, (2013), Ayoola, (2012) and Tionenji, (2011) have shown that farm size, age, farming experience, amount of credit available and frequency of extension contacts with farmers are positively related to adoption of any agricultural technology or crop enterprise. Idrisa *et al.*, (2012) found that the farmer's level of education, access to extension, yield and access to credit determined the probability of adoption of improved maize seed variety in Borno State, Nigeria. In addition, Berg, (2013) found that the institutional factors such as market access, credit facilities and extension access, played greater role in determining adoption or non-adoption of improved agricultural practices by smallholder farmers in South Africa.

In Kenya, environmental implications associated with tobacco farming include widespread deforestation due to cutting down of indigenous trees for tobacco curing, soil erosion, change of local streams from permanent to seasonal, and water pollution from the spillage of fertilizers and other agrochemicals used in tobacco production (Ochola and Kosura 2007, KTCSAC, 2008, and Kibwage *et al.*, 2008). Mbaye *et al.*, (2014), observed that in Kenya, land under tobacco has been growing in acreage putting cultivation of food crops at risk. According to some studies (Ochola and Kosura, 2007, Kibwage *et al.*, 2008 and Natacha *et al.*, 2011), this trend of increasing tobacco farming has resulted in significant reduction of the indigenous or traditional crops such as cassava, millet and sweet potatoes and has indirectly brought about reduction in livestock production.

At the local level, Lwayo and Maritim (1999) found that age, education level and land size influenced farmer's decision to adopt farm forestry in Busia, Kenya. Mbaye *et al.*, (2014) found that extension, credit and market access influenced the choice of alternative crop enterprises among smallholder tobacco farmers in Teso District, Kenya.

Most adoption studies (Adebisi and Okunlola, 2013; Ayoola, 2012; Idrisa *et al.*, 2012) focused on one crop but regarding adoption of improved agricultural practices to improve the crop productivity or yields. In case of different crops (for example, cassava as an alternative to maize in Zambia), both are food and cash crops. All the crops in the studies are environmentally friendly as compared to tobacco which is a non-food cash crop. Little has been documented in regard to adoption of alternative crops to tobacco farming such as soya

beans, watermelons, sweet potatoes, groundnuts and cabbages in the study area in particular. This study sought to examine, specifically the socio-economic attributes hindering adoption of alternative crops to tobacco farming in Kehancha Division, Kuria West Sub-county. This was the gap that this study was intended to fill, given that a variable may have enterprise and region specificity.

1.2 Statement of the problem

Tobacco farming is a labour- intensive enterprise especially during harvesting and curing period to ensure minimal damage to the crop and associated losses from weather changes once the crop has matured (Kibwage *et al.*, 2006). The curing process of tobacco requires a lot of wood fuel and consequently, numerous indigenous trees are cut down for tobacco leaves curing, bringing about incidences of deforestation, acceleration of soil erosion and loss of some species of flora and fauna (Geist *et al.*, 2009; Chacha, 2000; Ochola and Kosura, 2007). There have been several cases reported on environmental pollution brought about by inappropriate disposal of tobacco related wastes including expired fertilizers, agro-chemicals and uncollected tobacco (Kibwage *et al.*, 2007). With all these tobacco-related issues, if not controlled, the already increased environmental degradation and poverty levels in the region will be accelerated.

There has been a marked increase of awareness creation initiatives, more so through campaigns on the negative implications of tobacco farming targeting tobacco farmers (Ochola and Kosura, 2007; Kibwage, 2011). Despite this, very few farmers have adopted alternative crops to tobacco farming such as sweet potatoes, soy beans, water melons, finger-millet, cabbage, groundnuts among others (Ochola and Kosura, 2007; Mbaye *et al.*, 2014). Adoption studies (adebiyi and okunlola, 2013; ayoola, 2012; Truong and Yamada, 2002; Tionenji, 2011, Jarico *et al.*, 2011; Mbaye *et al.*, 2014) have shown that this could be associated to the community's socio-economic attributes such as age, education level, household size, income, land size, credit, extension and market access, among others.

Little has been documented regarding the influence of such factors in this scenario in the study area, given that tobacco farming is a labour-intensive enterprise (Ochola and Kosura, 2007). This situation, if not addressed, will aggravate environmental degradation leading to negative

social and economic implications on the community's livelihoods (KTCSAC, 2008; Kibwage, 2011). It is on this basis that this study sought to examine the socio-economic attributes hindering adoption of alternative crops to tobacco farming in Kehancha Division, Kuria West Sub-county, Kenya.

1.3 Research objectives

The overall objective of the study was to explore the socio-economic attributes hindering adoption of alternative crops to tobacco farming in Kehancha Division, Kuria West Sub-county.

The specific objectives of the study were:

- i) To examine the influence of farmer attributes in the adoption of alternative crops to tobacco farming
- ii) To explore the influence of farm characteristics in the adoption of alternative crops to tobacco farming
- iii) To examine the contribution of extension, credit and market access in the adoption of alternative crops to tobacco farming

1.4 Research questions

The study was guided by the following research questions

- i) How do the farmer's attributes influence adoption of alternative crops to tobacco farming?
- ii) What are the farm characteristics and how do they influence the adoption of alternative crops to tobacco farming?
- iii) How do the extension, credit and market access contribute to the adoption of alternative crops to tobacco farming?

1.5 Significance of the study

The rationale for this study was to provide information that will be useful for further research in regard to crop adoption and diversification enterprises and improved sustainable livelihoods, more specifically in tobacco growing regions. The findings of the study will help encourage the target population to take necessary initiatives so as to participate in the adoption of alternative crops to tobacco farming. The study findings will also contribute towards filling the research gap concerning the influence of socio-economic attributes in the adoption of alternative crops to tobacco farming in the area of study in particular and other tobacco growing regions in general.

This information will also be useful to various policy stakeholders involved in various policy interventions geared towards encouraging crop diversification for sustainable livelihoods by improving some of the social and economic attributes of the smallholder farmers in the study area and Kenya in general.

1.6 Delimitations and Limitations of the study

This study was delimited to Kehancha Division in Kuria West Sub-county. This was due to constraints in financial resources and the related logistical issues. In terms of limitations, since the researcher was an employee and at the same time a student, the study was limited by time. As a result, sampling of the locations, sub-locations, villages and the farmers could not be avoided. This was attributed mostly by the fact that the respondents were required to dedicate their valuable time to participate in the study. On the same note, most of the respondents were assisted by the researcher to fill the questionnaires.

1.7 Conceptual framework

Adoption studies (Tionenji, 2011; Jarico *et al.*, 2011; Mbaye *et al.*, 2014) have shown that the socio-economic attributes of the farmer such as age, gender, household size, education level, land size, income, extension, credit and market access have influence in the rate and level of adoption of an innovation, technology or an agricultural enterprise.

In this regard, adoption of alternative crops (dependent variable) to tobacco farming could be influenced by the farmer's age, gender, education level, land size, income; extension, credit

and market access (independent variables). Decision making is the intervening variable as shown in the figure below.

Decision making as an intervening variable is likely to be influenced by some social attributes such as gender, household size and education level of the household head. It can also be influenced some of the economic attributes of the household like house land size, income, extension and market access. For instance, a household head with a higher education level, access to extension, credit and market, is likely to consider the benefits of environmental conservation with its associated improved livelihoods.

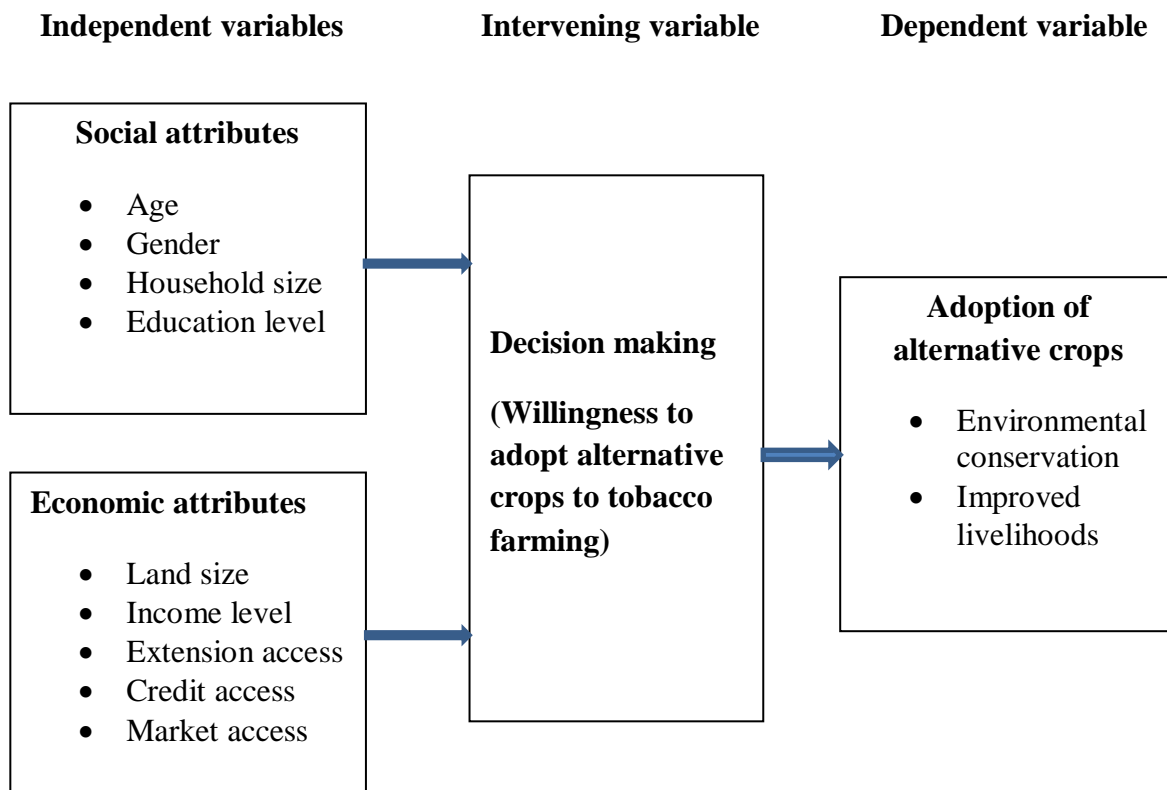


Figure 1.1: Conceptual Framework (Source: Modified from Magati, 2009.)

1.8 Definition of terms

Adoption: In this study, adoption has been defined as the decision to accept, start and continue to undertake an agricultural activity or use of an innovation as the best course of action available (Tionenji, 2011; Rogers, 2003).

Alternative crop: According to Tionenji (2011), an alternative crop has been defined as a crop that can be cultivated so as to reduce overdependence on another crop. In this study, examples of such crops are sweet potatoes, soya beans, watermelons, groundnuts and cabbages.

Farmer: In this study, according to Adebisi and Okunlola (2013), a farmer has been defined as a household head who owns and manages farming activities within his or her farm.

Adopter: In this study, an adopter has been defined as a farmer who has decided and accepted to cultivate one or more of the following alternative crops to tobacco: sweet potatoes, soya beans, watermelons, groundnuts and cabbages (Tionenji, 2011).

Non-adopter: In this study, according to Tionenji (2011), a non-adopter has been defined as a farmer who is growing tobacco and other crops but none of the alternative crops to tobacco farming; in this case, sweet potatoes, soya beans, watermelons, groundnuts and cabbages.

CHAPTER TWO: LITERATURE REVIEW

This section entails the relevant literature reviewed. Literature related to the topic of study was reviewed from the existing sources such as text books, journals, conference papers, published and unpublished theses, District Development Plans, Integrated County Development Plan, internet sources, among others. Literature review was done in relation to the farmer and farm characteristics and their influence in the adoption of agricultural farm enterprises, farm technologies and alternative crops to tobacco farming. In addition, literature was reviewed on the contribution of extension, credit and market access in the adoption of such enterprises, technologies and alternative crops to tobacco farming. The literature review has been done from the global, regional and local perspectives.

2.1 A general overview of environmental, social and economic implications of tobacco cultivation

The tobacco plant grows and does well within the tropical and semi-tropical regions (Sauer and Abdallah, 2007). Tobacco grows on soils where vegetables grow and as such the crop requires close monitoring for an average period of nine months; from the time of planting to marketing (Kibwage *et al.*, 2008; Magati, 2009). Tobacco as a cash crop is widely grown in more than 120 countries of the world, more particularly the developing countries given that it has the potential to grow in varied climatic conditions and soil characteristics (Chavez *et al.*, 2010, in Mbaye *et al.*, 2014). Globally, Chavez *et al.*, (2010) found that such countries include Brazil, Taiwan, India, Malaysia, Indonesia, Bangladesh, Turkey, Philippines, Lebanon, Argentina, among others; while regionally such countries include Malawi, Zimbabwe, Tanzania, and Uganda; and locally in Kenya.

Natacha *et al.*, (2011) in their review on, “ Environmental health impacts of tobacco farming” explain that though other agricultural cash crops pose some negative environmental impacts, tobacco farming puts more pressure on ecosystems and is associated with particular health and socio-economic implications for those engaged in its cultivation. According to Geist *et al.*, (2009) and Natacha *et al.*, (2011), given that it cannot be mixed with any other crop, tobacco is vulnerable to various pests and diseases which periodically require application of a variety of agrochemicals. In USA for example, Natacha *et al.*, (2011) notes that a pesticide by the name

aldicarb, that is very poisonous, is used in tobacco farming and it has been found to bring about genetical distortions in human cells. Natacha *et al.*, (2011) add that *aldicarb* has been proved to be very poisonous to birds, fish, honeybees and earthworms and that it has cancer-causing chemicals. In addition, Natacha *et al.*, (2011) explain that other agrochemicals applied in tobacco farming like *chlorpyrifos* and *1,3-dichloropropene (1,3-D)* impairs the nervous system, pollutes air, groundwater, rivers, and that its remains can be found up to 25 kilometres from the area where it has been used. All these are an indication of some of the environmental and socio-economic implications of tobacco farming.

Natacha, *et al.*, (2011), explain that tobacco farming does not provide even a single incidence of soil enrichment to any part of the farm as other crops do. According to the authors, the tobacco remains left after harvesting cannot be used as livestock and poultry feeds compared to other crops. As a result, according to the authors, the stalks are cut and burnt immediately so as to reduce incidences of tobacco diseases and weeds before another planting season begins. They assert that in the long run, the limited animal resources leads to inadequate animal manure, which is significant in maintaining soil fertility in third world countries.

In Bangladesh, Sonja and Laure, (2012) in their study on, “Alternative livelihoods to tobacco” explain that tobacco growing was responsible for the neglect of food crops. For example, Sonja and Laure, (2012) found that Kushtia, that is currently the second largest tobacco-producing district in the country, used produce food in surplus. According to the authors (Sonja and Laure, 2012), currently, tobacco farming has been carried out in all the fertile areas of the district and consequently the initial areas of cultivation of vegetables, pulses, sugarcane, jute crops and traditional rice have reduced drastically. According to their study, in regions where wood fuel is already inadequate, tobacco farmers have turned into fodder, rice straw and fruit trees as wood fuel for curing tobacco. These practices if not controlled may consequently impact negatively the resources required to produce food particularly for livestock and generally food security in the entire area.

In India and Bangladesh, for many tobacco farmers, the income accruing from tobacco farming is inadequate to sustain their daily basic needs (Sonja and Laure, 2012). Contract farming system perpetuated by the tobacco companies creates a cycle of indebtedness for tobacco

farmers, as a result of increments in amounts of loans advanced to them in form of agricultural inputs by the companies each year (Sonja and Laure, 2012; Kibwage *et al.*, 2009; Ochola and Kosura, 2007). Mangora (2005), in his study on, “Ecological Impact of Tobacco Farming in Miombo Woodlands of Urambo District, Tanzania”, found that in Iringa Region, Tanzania, tobacco farming accelerates poverty, through incidences of bonded and child labour. He asserts that women and children are often employed because of the labour intensive nature of the crop, the small size of the farms and the fine skills required in the cultivation of the crop especially during sorting and grading of the tobacco leaves.

Clearing land for tobacco growing has impacted forest reserves negatively, particularly in LMICs (Sauer and Abdallah, 2007). In Tanzania, for example, Sauer and Abdallah (2007), and Mangora, (2005) found that tobacco growing is dominated by smallholder farmers who entirely dependent on family labour, simple implements and the locally available natural resources, making increase in yields only possible by clearing of additional forested areas. According to Mangora, (2005), majority of tobacco farmers in Urambo District, clear new woodland areas for tobacco cultivation every season, a scenario that has been found to be a threat to the existence of the woodlands.

In addition, Mangora, (2005) asserts that tobacco farming has been found to be associated with higher costs and is more labour-intensive than other crops. This, according to Mangora, (2005), is so because it needs deeper soil ploughing, the nerserybeds have to be sterilized properly so as to get rid of insects and weeds, and leaf by leaf checks are required and any signs requiring pesticides, herbicides or fertilizer application must be identified in time. After harvesting, careful curing (drying of leaves) is initiated under regulated temperatures that is ascertained by regulating the heat and ventilation in the barn – a structure used for curing tobacco (Mugadza, 2013). Curing tobacco leaves gives it the anticipated taste, aroma and colour and all these including sorting, grading, storage and transporting require substantial time and energy on the part of the family because the whole family has to be mobilized at all the stages (Kibwage *et al.*, 2008, Magati, 2009; Mugadza, 2013).

In Kenya, according to Kibwage *et al.*, (2009), tobacco farming takes place in four regions, that is, Nyanza (Migori, Kuria, Suba and Homa Bay Sub-counties), Western (Bungoma, Busia,

Teso and Mount Elgon Sub-counties), Central (Kirinyaga, Muranga and Thika Sub-counties) and Eastern (Meru, Kitui and Machakos Sub-counties). From all these regions, the largest percentage of the country's tobacco production takes place in South Nyanza region (mainly in Kuria Sub-counties, Migori and Homa Bay Counties (GoK, 2002a; 2002b; 2002c; 2002d), thereby being the leading growing region. Kibwage *et al.*, (2009) note that tobacco farming in Kenya has been under the management of British American Tobacco (BAT) since 1935 and later on other tobacco companies like the Mastermind Tobacco Kenya Ltd (MTK) and Alliance One International Ltd Company, joined the market.

The environmental implications associated with tobacco farming that were identified in African countries since 1990s are in existence more so in Kenya (Kenya Tobacco Control Situational Analysis Consortium, KTCSAC, 2008). Such environmental implications include but not limited to the enormous deforestation and the cutting down of indigenous trees to get wood for tobacco curing, soil erosion, change of local streams and rivers from their former permanent status to being seasonal, and water pollution that result from the agrochemicals applied in tobacco farming (KTCSAC, 2008). Environmental pollution as a result of inappropriate disposal of the tobacco-related wastes, for example, the expired fertilizers, agrochemicals, uncollected tobacco remains by the tobacco companies has also been of great concern (Kibwage *et al.*, 2007; Magati, 2009 and Chepkurui and Kinoti, 2014).

According to Ochola and Kosura, (2007) and Kenya Tobacco Control Situational Analysis Consortium (KTCSAC, 2008), tobacco farming has been found to be closely associated with degradation of ground water resources. Kibwage *et al.*, (2007) and Ochola and Kosura (2007) found that the ground water resources degradation has been evident through pollution from the applied fertilizers and other agro-chemicals which finally find their way into such water resources and continuous sedimentation of rivers and reservoirs. In addition, according to the authors, the evident climate variability and incidences of loss of some fauna and flora species as a result of habitat fragmentation and its consequent overexploitation, has affected human beings health wise and their livelihoods. Ochola and Kosura, (2007) explain that tobacco crop also utilizes a lot of nitrogen, phosphorus and potassium compared to the other crops regarded

as either food or cash crops, thereby contributing more to soil exhaustion compared to such other crops.

Kibwage *et al.*, (2011) note that tobacco requires flue curing which is performed in kilns by burning wood at constant temperatures for several days. According to Mangora (2005), tobacco farmers especially in LMICs have to look for a lot of wood fuel from the surrounding forests, their own farms or from public lands, of which eventually can lead to change of land cover from the initial woodlands to bushes, or permanent clearance of forests. As a result, according to Ochola and Kosura, (2007), nowadays rainfall patterns have exhibited changes and even rainfall amounts cannot be easily forecasted, and this has been partly due to enormous clearing of forests accelerated by the increasing demand on wood for tobacco curing.

According to Kibwage *et al.*, (2011), the number of smallholder farmers growing tobacco in Kenya has been increasing from about 35,000 in 1990s to 55,000 in 2011 in Eastern, Western, Central and Nyanza regions. In all the fore mentioned regions, the land under tobacco farming has been increasing exponentially from about 4,500 acres in 1990s to over 55,000 acres by 2011 leading to a steady reduction in indigenous food crops, consequently threatening the initial food security in the tobacco growing areas (Chacha, 2002; Ochola and Kosura, 2007; Kibwage *et al.*, 2011 and Mbaye *et al.*, 2014).

In Kenya, the amount land area dedicated tobacco farming has been increasing steadily, thereby reducing land availablbe for cultivation of food crops (Mbaye *et al.*, (2014). This trend towards tobacco farming has made indigenous crops such as cassava, millet and sweet potatoes inadequate, and has led indirectly to a decrease in livestock rearing in such areas (Ochola and Kosura, 2007, Kibwage *et al.*, 2008; Chepkurui and Kinoti, 2014). Chepkurui and Kinoti (2014) in their study on, “The social impacts of tobacco farming on farmers and food security in Angurai Division, Kenya” found that farmers who were growing tobacco made substantial losses and as a result they were forced to look for money from other avenues to repay back the loans advanced to them in form of inputs. They further revealed that those who failed to repay their loans within the scheduled time, their items amounting to the loans were forcefully confiscated by the lenders, thereby frustrating the farmers even more.

According to Kibwage *et al.*, (2009), for many years the tobacco industry has been encouraging the interested countries and families to grow tobacco on grounds that it would positively change their lives economically; the real situation has been the opposite. From their findings, they assert that tobacco farmers are hardly make a living, by growing a crop that is labour and input- intensive and at the same time brings with it socio-economic and environmental implications. Kibwage *et al.*, (2009) and Mugadza, (2013) note that in many instances, tobacco farmers find themselves heavily indebted to the tobacco companies and because the companies control the prices paid to them, they are unable to divert themselves from tobacco cultivation. These authors report that, for many tobacco growing households, they continue growing the crop because there has been little support for cultivation of alternative crops.

Ochola and Kosura (2007), KTCSAC (2008), and Kibwage *et al.*, (2008), report that tobacco farming demands a lot of labour and it is a very tedious enterprise compared to its returns or profits. The farmers indicated that the cost of cultivating tobacco is very high and when loans are deducted from the total sales, they were just left with inconsequential earnings as compared to the high labour and time inputs. Mugadza, (2013) in her work, “Can farmers diversify from growing tobacco in Zimbabwe?”, found that despite the above, tobacco farmers have no input when it comes to determining the price for their produce or the advanced inputs. More time is spent on tobacco farming and according to Magati (2009), this has led into further reduction in food crop cultivation, hence increased poverty levels in the area. The distance covered and time spent in firewood collection by women and children has been increasing from season to season and from year to year (Kibwage *et al.*, 2008 and Magati, 2009, p 7). Kibwage *et al.*, (2007) and Ochola and Kusura (2007), note that this scenario, not only increases poverty, but also reduces the time and energy which could have been used for other economic endeavors of the community.

The contractual arrangements that are synonymous with tobacco farming end up holding tobacco farmers in a continuous indebtedness to tobacco companies, leaving them with very inadequate resources, opportunities and little time for engaging in sustainable practices (Kibwage *et al.*, 2009). Despite this, the tobacco industry has not been keen to take full

responsibility in finding ways of curbing the resulting poverty and child labour among the tobacco farmers (WHO FCTC, 2008). Tobacco farming has been found to be associated with irreversible costs to farmers, which not only seriously interfere with their living standards but also impacts negatively on their long-term prospects (Natacha *et al.*, 2012). Of great concern are the tobacco associated health risks, contractual arrangements, use of child labour in tobacco farming and the environmental implications of tobacco farming on human capital and land, which have always been regarded as the two most important assets as far as rural livelihoods are concerned (WHO FCTC, 2008). Through studies, tobacco has been found to have socio-economic and environmental related implications, yet majority of the rural communities depend on the crop as a source of employment and crop income (Ochala and Kosura, 2007; Kibwage *et al.*, 2008; Natacha *et al.*, 2012). Kibwage *et al.*, (2009) found that in most cases women and children are the ones that mostly suffer as far as the socio-economic and environmental implications of tobacco farming are concerned, since they spend most of their time in the enterprise. It was on this regard that the study sought to explore the influence of the social and economic attributes in the adoption of alternative crops to tobacco farming. This was for getting a clear understanding on how to reduce tobacco-related environmental, social and economic implications.

2.2 A general overview of tobacco reduction strategies

The World Health Organization Framework Convention on Tobacco Control (WHO FCTC) Article 17 is focusing on the necessity to provide sustainable alternative livelihoods and Article 18 which is in pursuit of environmental protection and adhering to communities' health, thereby recommending initiatives to explore sustainable alternative livelihoods to tobacco farming (WHO, 2008). World Health Organization, WHO (2008), points out that this framework (WHO FCTC) targets all countries that are party to it to look for ways of reducing tobacco growing and its use. According to WHO (2008), WHO FCTC is in pursuit of other alternative livelihoods to tobacco farming so as to enhance tobacco reduction that would partly contribute to sustainable development (Magati, 2009 and Mbaye *et al.*, 2014).

From the world wide perspective, there have been attempts by most of the countries to reduce tobacco farming (Sonja and Laure, 2012). In such initiatives, sustainable alternative livelihoods

including but not limited to alternative crops to tobacco farming, have been identified through relevant studies in various regions of the world (Kibwage *et al.*, 2008; Mbaye *et al.*, 2014; Sonja and Laure, 2012; WHO FCTC, 2008). According to Sonja and Laure (2012), most of the tobacco growing countries have developed and started various initiatives pertaining either diversification of crops or adoption of alternative crops to tobacco farming. Most of these studies (Kibwage *et al.*, 2008; Magati, 2009; Mbaye *et al.*, 2014; Ochola and Kosura, 2007 and Sonja and Laure, 2012), have shown that such ventures have accrued substantial profits and the farmers are ready to take part in reducing tobacco farming, so long as they are assured of sustainable economic opportunities and the necessary agricultural support needed from time to time.

Sonja and Laure (2012) explain that in Brazil, which has been found to be the second largest country producing tobacco worldwide, such alternative livelihood initiatives consist of integrated approaches to diversification, a system that as a whole aim at exploring opportunities for the rural communities to achieve sustainable livelihoods and at the same time ensuring food security in the households. This, according to Sonja and Laure (2012), has been achieved, partly by providing relevant agricultural training and support in poultry rearing, aquaculture, beekeeping and dairy farming. In Taiwan, Sonja and Laure (2012) found that the government in combined efforts with other relevant stakeholders has been availing financial incentives for tobacco farmers so as to help them reduce tobacco farming by adopting alternative crops such as bananas, red beans and papaya. In addition, the government of Taiwan has been in forefront making the necessary arrangements to ensure a guaranteed market for such alternative crops (Sonja and Laure, 2012).

In their work on, “Alternative Livelihoods to Tobacco”, Sonja and Laure (2012) found that in Bangladesh, the government through relevant research organizations has been the greatest proponent in agitating for sustainable agricultural livelihood initiatives. Through such initiatives, tobacco farmers have been encouraged through the necessary support to cultivate alternative crops such as French beans, chili and groundnuts, among others. In addition, these alternative crops are cultivated through the mixed cropping approach thereby ensuring sustainable soil nutrient enrichment and at the same time ensuring availability of adequate food

for the households (Sonja and Laure, 2012). The sustainable alternative crop enterprises were explored and identified with greater consideration in food requirements, household earnings together with sustainable soil enrichment, as well as improving livestock rearing (WHO FCTC, 2008). Kibwage *et al.*, (2009) in their study on, “Assessing of livelihood assets and strategies among tobacco and non-tobacco growing households in South Nyanza”, found that farmers’ awareness concerning implications of tobacco farming was important in regard to their socio-economic welfare. Availability of information about alternative livelihoods were of great concern. According to WHO FCTC (2008), it was reported that in Bangladesh, farmers’ access to information regarding alternative crops has helped in a greater part in increasing awareness on the environmental implications tobacco farming among the communities and as such, this has helped enhance their participation in the alternative crops enterprises.

Regionally, Sonja and Laure (2012) found that in Malawi, an initiative by the name ‘Putting Farmers First’ has partly helped in improving the rural communities’ food security status which has been achieved by, providing farmers training on diversification of crops, beekeeping and rabbit rearing. According to Sonja and Laure (2012), through availing of agricultural skills and knowledge in sustainable agricultural enterprises, the initiative has seen tobacco farmers achieve substantial output in terms of returns from alternative crops, thereby improving food security and the household income. In addition, such organizations in Malawi, have initiated reliable arrangements to ensure that farmers are supported financially so as to make it easier for them to buy inputs for the alternative crops (Sonja and Laure, 2012).

In Zimbabwe, Mugadza (2013) in her study, “Can farmers diversify from growing tobacco?” found that various alternative crops to tobacco farming have been explored and as such majority of tobacco farmers have adopted horticultural crops. According to Mugadza 2013, the market for the horticultural produce worldwide has higher chances of improving; and in case price stability and reliable financial support to aid in preserving the perishable horticultural produce, majority of tobacco farmers are likely to adopt alternative crops.

Locally, from the time of being party to the WHO FCTC, Kenya has shown support to the worldwide strategies explored to help achieve reducing tobacco farming and its use through national legal policies (KTCSAC, 2008). Such legal policies are aimed at helping reduce

tobacco farming, manufacturing of cigarette and its use in the community (Mbaye *et al.*, 2014). In order to help in achieving the above, the Kenyan government passed the tobacco bill of 2007 after instituting some amendments (KTCSAC, 2008). To that effect the bill was enacted by parliament and among some of its provisions are smoke-free legal policies and the consistent health warning messages related to tobacco use which are in accordance with the WHO Framework Convention on Tobacco Control (Magati, 2009). To help address the tobacco related implications in the country, the Kenyan government policy, through the relevant agricultural institutions, encourages crop diversification or adoption initiatives as a sustainable approach, especially among the rural communities (KTCSAC, 2008).

In Kenya, research has shown that, soy beans, groundnuts, sweet potatoes, watermelon and cabbages have been found to be sustainable alternative crops to tobacco farming in areas such as Kuria, Suba, Migori and Homa Bay, and that most tobacco farmers have shown interest to engage in the cultivation of such crops (Kibwage *et al.*, 2008; Ochola and Kosura, 2007). There has been enormous awareness creation and campaigns about the implications of tobacco farming targeting tobacco farming communities in Kenya (Ochola and Kosura, 2007; Kibwage, 2011). Despite this, very few farmers have adopted alternative crops to tobacco farming such as sweet potatoes, soy beans, water melons, groundnuts, cabbages among others (Ochola and Kosura, 2007; Mbaye *et al.*, 2014).

According to Jarico *et al.*, (2011) in their study on, “Socioeconomic factors affecting adoption of sunflower varieties in Sindh” found that the farmer’s decision on whether to adopt an enterprise or not partly depends on individual household characteristics and the available resources (Jarico *et al.*, 2011). Adoption studies (Truong and Yamada, 2002; Tionenji, 2011, Jarico *et al.*, 2011; Mbaye *et al.*, 2014) have shown that this could be associated to community’s socio-economic attributes such as age, education level, household size, income, land size, credit, extension and market access, among others. Little has been documented regarding the influence of such factors in the adoption of alternative crops to tobacco farming in the study area, given that tobacco farming is a labour-intensive enterprise (Ochola and Kosura, 2007). This situation, if not addressed, will aggravate environmental degradation leading to negative social and economic implications on the community’s livelihoods

(KTCSAC, 2008; Kibwage, 2011). It is on this basis that this study sought to examine the socio-economic attributes hindering adoption of alternative crops to tobacco farming in Kehancha Division, Kuria West Sub-county.

2.3 The influence of farmer attributes in the adoption of alternative crops to tobacco farming

Adoption has been defined as the degree of use of a new technology, innovation or idea after the farmer has all the required information regarding the technology, innovation or idea and its expected returns (Tionenji, 2011). Adoption studies may be categorized into two aspects, that is, the rate of adoption and the intensity of adoption (Rogers, 2003; Tionenji, 2011). According to Tionenji, (2011), the rate of adoption could be described as the relative speed by which farmers adopt an innovation within a specified period of time. According to Rogers (2003), the rate of adoption is ascertained by the time taken, for an intended range of members involved, to use the innovation in question. On the other hand, the intensity of adoption could be described as extent at which a given technology, innovation or idea, has been used within a scheduled period of time (Feder *et. al.*, 1985; Tionenji, 2011).

The rate of adoption of a new technology has been found to be subject to its accrued benefits and the level of uncertainty associated with it, a condition that is highly predetermined by the amount of capital available, existing agricultural policies and the socioeconomic characteristics of farmers (Ghulam *et al.*, 2011). Over time, the intensity of adoption has been the most aspect of great concern in the adoption initiatives (Ghulam *et al.*, 2011). According to Ghulam *et al.*, (2011) and Tionenji, (2011), the intensity of adoption of a given technology, innovation or idea can be evaluated at an individual farm level or a regional level, at a given time, by the amount or extent of the farm area putting the idea into application.

A variety of studies have been undertaken to identify the factors that influence adoption of various technologies, innovations or ideas including substitute or alternative crops to tobacco farming (Ghulam *et al.*, 2011; Mukarati, 2014; Mangasini and Mwanahawa, 2013 and Mbaye *et al.*, 2014). These factors, among others, include the personal characteristics of the farmers and those of the farm. Many adoption studies have confirmed the role of household head's characteristics such as age, gender, household size and education level on the adoption decision

(Ghulam *et al.*, 2011; Kuntariningsih and Mariyono, 2013; Adebisi and Okunlola, 2013 and Tionenji, 2011). These factors form the socio-economic attributes that can either promote or hinder the adoption of a technology, innovation or idea or an alternative crop enterprise.

From the global perspective, Kuntariningsih and Mariyono (2013) found that the farmer's age was an important factor that influenced chili farmers to adopt advanced chili related technologies in Java. According to Kuntariningsih and Mariyono (2013), increased age may influence the required physical ability for carrying out some farming activities. From empirical studies, it has also been found that older farmers tend to be more risk averse, a factor that could influence their decision-making on adoption of a new technology, idea or an agricultural enterprise (Grazhdani, 2013). In a study on "Analysis of factors affecting the adoption of resource conserving agricultural technologies in Al-Prespa Park, Albania, Grazhdani (2013) found that social attributes including level of education and farmers experience had significant influence on the probability of adopting a resource conserving agricultural technology in the area.

According to Grazhdani (2013), education, being an indicator of human capital development, enables a farmer to access information and make informed decisions about resource use and management. Education has been found to be related not only to the ability to acquire and process information, but also vital for implanting knowledge-intensive conservation and sustainable agricultural technologies or enterprises (Ghulam *et al.*, 2011). For example, on education parameter, Ghulam *et al.*, (2011) found that adoption of a new technology increased with increase in the education level of the farmer. In that perspective, the likelihood of farmers with higher education level to adopt the best management practices is higher compared to those with less education level (Grazhdani 2013, pp 437-438). Kuntariningsih and Mariyono (2013) found that older farmers with higher levels of education were more likely to adopt plastic mulching and grow hybrid varieties of chili in central Java. These results conform to those of Truong and Yamada (2002), who found that younger farmers with higher education levels were showed interest in the adoption of technologies in farming systems in Vietnam.

Large household size has been found to influence the level and rate of adoption of technologies because the larger the household size, the more the farm labour available to carry out the tasks

involved in various agricultural technologies (Adebiyi and Okunlola, 2013). Availability of labour influences the farmer's decisions relating to adoption of new agricultural practices or associated inputs (Ghulam, *et al.*, 2011). According to Adebiyi and Okunlola (2013), high-yielding agricultural practices require higher labour input hence labour availability may determine its adoption. It is generally been found that farmers would tend to adopt labour-saving agricultural enterprises as opposed to the labour-intensive ones, so long as they are assured of substantial returns from such enterprises (Tionenji, 2011). According to Kuntariningsih and Mariyono (2013), farmers with greater household size were more likely to adopt hybrid seeds and silvery plastic mulch in chili farming in Central Java, since such technologies were more labour-intensive. They observed that as the wage for labour was relatively high and the labour was scarce in the area, the availability of family members was the only source of labour. Tobacco farming is a labour intensive enterprise compared to alternative crops (Kibwage *et al.*, 2009; Ochola and Kosura, 2007). Despite this, majority of the farmers opt for tobacco farming.

Regionally, Adebiyi and Okunlola (2013) found that older farmers were economically inactive and as such were unproductive, hence low prospect for adoption of various cocoa farm rehabilitation techniques in Oyo State, Nigeria. These findings conform to those of Ayoola (2012), who found that the age of the farmers and farming experience were positively related to adoption of Yam Miniset Technology in the Middle Belt Region of Nigeria.

Age was found to positively influence the adoption of soya beans in Nigeria, hybrid cocoa in Ghana and cassava in Zambia (Mustapha *et al.*, 2012; Adebiyi and Okunlola, 2013; Tionenji, 2011). Young farmers have been found to be more knowledgeable about new practices and have been found to be ready to bear risks, as a result of their longer planning perspectives (Tionenji, 2011). However, Berg (2013) found that there was no significant relationship between the farmer's age and adoption of technology at the irrigation scheme in South Africa, a scenario that is different from what has been reported in other adoption-related studies.

In every society, gender has been found to influence prescription of the various roles and tasks played and performed by a member of the society in question by virtue of being male or female (Ayoola, 2012). In terms of gender, Adebiyi and Okunlola (2013) found that majority of the

cocoa farmers were men and this was an advantage to cocoa farm rehabilitation techniques as men could cope with strenuous and labour-intensive management practices compared to women. Some studies have shown relationships between gender and adoption of agricultural technologies, while others have shown no relationship (Adebiyi and Okunlola, 2013; Fungo *et al.*, 2013, and Mbaye *et al.*, 2014). For example, Tionenji, (2011) in her study, “Factors affecting cassava adoption in Southern Province of Zambia”, reported that the lower adoption rates by women were because women farmers are not traditionally targeted by extension agents, research and development initiatives.

Farmers with a higher level of education were better placed in terms of adoption of cocoa rehabilitation techniques in Oyo State, Nigeria, since they could easily understand the ideas and skills being propagated by the concerned agents (Adebiyi and Okunlola, 2013). Ayoola (2012) found low literacy levels among majority of the farmers influenced negatively the adoption of Yam Minisset Technology. Mungisha *et al.*, (2004) as cited by Mangasini *et al.*, (2013) in their study, “ Adoption of Integrated Pest Management groundnuts production technologies in Eastern Uganda”, revealed that adoption was significantly influenced by education level, family size, association membership, extension visit, access to credit and household income.

It has been found that higher education level gives farmers the ability to synthesize, interpret and respond to a new idea more effectively, than their counterparts with lower education level (Adebiyi and Okunlola, 2013). Kuboga *et al.*, (2011) noted that high literacy levels could be a determining factor for adoption of a new technology, idea or agricultural enterprise that requires frequent reading of different publications. Makauki (1999, p 10), in Kuboga *et al.*, (2011) reported that the farmer’s ability to read and write positively influenced adoption of new technologies whose dissemination comprised of simple leaflets, pamphlets, posters, newspapers and other related simple written materials. A number of empirical studies (Ayoola, 2012; Adebiyi and Okunlola, 2013 and Tionenji, 2011) found that farmer’s education level was a vital determinant for the adoption of technologies that require specific skills, but for some simple technologies or alternative crops, it may not be important as such.

Large household size have been found to have an influence in the level and rate of adoption of some technologies because the larger the household size, the more the farm is assured of cheaper labour required to carry out various agricultural technologies in question (Adebiyi and Okunlola, 2013; Tionenji, 2011). Availability of labour plays a role in the farmer's decisions relating to adoption of new agricultural practices or inputs (Berg, 2013). According to Tionenji, (2011), high-yielding agricultural practices generally require higher labour input and as such availability of labour would determine its adoption. She asserts that farmers would tend to adopt labour-saving agricultural enterprises as opposed to the labour-intensive ones, so long as they are assured of substantial returns from the enterprises.

In regard to national and local level, the age of the household head has been found to be playing a major role in determining the capacity to work and as a result influences one's ability to adopt some innovations or ideas (Lwayo and Maritim, 1999). A study on, "Socio-economic factors affecting farmers' decision to adopt farm forestry in Busia District, Kenya by Lwayo and Maritim, (1999) found that there was a positive relationship between age of the farmer and the decision to adopt farm forestry; thereby a determinant factor in the farmer's decision to adopt an agricultural enterprise. According to Lwayo and Maritim, (1999), the age of the farmer influenced the farmer's knowledge and the awareness of the activities in the surroundings among other factors. Their study was on adoption of farm forestry, a non-food enterprise but this study was on adoption of alternative crops to tobacco farming, both cash and food crops. However, Mbaye *et al.*, (2014) results contradict the above findings that demographic factors such as age, education, household size and gender had no role in influencing the tobacco farmers' decision to shift to alternative crops.

Men and women may have different roles in agricultural activities, possibly because crop choice differs by gender as a result of cultural norms or by other factors that come into play such as the amount of required resources to cultivate specific crops and the culturally-determined division of labour (Fungo *et al.*, 2013). Lwayo and Maritim (1999) found that gender was not a critical issue in a farmer's decision to adopt farm forestry. According to the results of their study, there was no significant relationship between gender and the decision to adopt farm forestry, with an indication that males were not necessarily better adopters than

females. The insight of this study was derived from the fact that tobacco farming is labour intensive activity compared to farm forestry, and therefore, gender could have an influence on the farmers' decision to adopt alternative crops to tobacco farming in the study area.

Lwayo and Maritim (1999) found that there was a positive significant relationship between adoption of farm forestry and education level of the farmer. According to their results, formal education was a vital aspect in the farmers' decision to adopt farm forestry and the fact that literate farmers would be adopters, since a farmer with a higher education level could readily access information on the value of farm forestry and how it could be effectively implemented. In this study, this would be an area of interest because synthesis, interpretation and understanding of the negative environmental, social and economic implications of tobacco farming could be determined by the farmer's level of education.

2.4 The influence of farm characteristics in the adoption of alternative crops to tobacco farming

Various studies on adoption of agricultural technologies and crop varieties have shown that the characteristics of the farm influence adoption of such technologies or crop varieties (Adebiyi and Okunlola, 2013; Ayoola, 2012 and Kuntariningsih and Mariyono, 2013). According to Arnold, (1990) in Lwayo and Maritim, (1999), land size being an indicator of the available economic resources, the household head's decision to adopt a new technology, puts into consideration aspects like risks, availability of capital, labour requirement and the arrangements of tenure. Kuntariningsih and Mariyono (2013) found that farmers income, education level, farm size, frequency of contacts with extension staff were significant factors influencing the farmers' decision to adopt hybrid seeds and silvery plastic mulch for chili farming in Central Java.

Studies have shown that farmers with large farms have higher chances of adopting technologies compared to smallholder farmers depending on the type and extent of the technology involved (Ayoola, 2012; Ghulam *et al.*, 2011; Kuntariningsih and Mariyono, 2013; Truong and Yamada, 2002). In a study by Ghulam *et al.*, (2011) on "Socio-economic Factors Affecting Adoption of Sunflower varieties in Sindh", it was that farmers with larger land sizes were more likely to adopt sunflower varieties among other new crops in Sindh and could

diversify since their large sizes enabled partitioning a farm into varied cropping systems, to enable them cultivate both the new crop and other crops. In terms of income level, Kuntariningsih and Mariyono (2013) found that income level significantly influenced the adoption of hybrid technology by chili farmers in Central Java. This could be attributed to the fact that being a farm technology, it required massive capital compared to alternative crops to tobacco farming.

At the regional level, empirical studies (Adebiyi and Okunlola, 2013; Ayoola, 2012; Fungo *et al.*, 2013) indicate that land-size, and land tenure indicate the available economic resources and the farmer's decision to adopt a technology. Ayoola (2012) found that more than 88% of the farmers in the Middle Belt region of Nigeria cultivated less than 2 hectares of yam farm. From the findings, he explains that this relatively small farm sizes influenced negatively the adoption of Yam Minisset Technology. Tionenji (2011) found that apart from the features of the technology, the characteristics of the farm like farm size, availability of labour and land tenure system influenced the adoption of cassava in Southern Province of Zambia.

Agriculture remains the main economic activity of farmers and thereby their major source of income, more so smallholder farmers (Ghulam *et al.*, 2011). Tionenji, (2011) explains that farmers with high levels of income have been found to be less risk averse since they are in a position to counter losses from some of their less successful enterprises compared to farmers with inadequate income who would find it easier and convenient to adopt capital saving technologies. As such, the latter would not be in a position to adopt capital intensive agricultural enterprises (Tionenji, 2011). According to Ayoola (2012) and Tionenji (2011), the source of farmer's capital influences the rate and level of adoption of an agricultural enterprise. Adebiyi and Okunlola (2013) found that majority of cocoa farmers relied on their personal savings as their most important source of finance. They found that some farmers accessed their capital from cooperative societies, others from friends and neighbours while very few accessed loans from banks, non- governmental organizations and other credit agencies for their agricultural enterprises. This could be as a result of the farmers' low prospects to meet the required collateral arrangements put in place by the banks and other credit organizations.

Tionenji (2011) found that farmers would make a decision on whether to adopt an alternative crop or not by comparing its merits or demerits with the existing crops grown. Farmers in Zambia, according to Tionenji (2011), compared the features and benefits of maize which was an existing crop with those of cassava, a substitute crop. She asserts that smallholder farmers in southern province of Zambia relied on crops not only as a reliable food sources for the household, but also as a source of income thereby evaluating all new crops in terms of the above dual characteristics. However, cassava was considered to have a relative advantage over maize since it required less input and it was less likely to be affected during droughts.

Locally, Mbaye *et al.*, (2014) found that large farm sizes influenced positively the uptake of more alternative agricultural practices but through provision of other factors of production. For example, in their study, “The choice of alternative crop enterprises among smallholder tobacco farmers in Teso District, Kenya”, they explain that large household farms were found to have been enabling households to allocate their land to different cereal crops compared to smallholder farmers. Farm size positively influences the type of crop, variety or agricultural enterprise that farmers are likely to engage in (Rahman, 2008, in Mbaye *et al.*, 2014). For small household land sizes, however, the land available for other crops may be inadequate, once the new crop is adopted (Tionenji, 2011). Contrasting results have shown that small household land sizes farms are also likely to adopt specific technologies, especially the input-intensive ones or land saving technologies that would otherwise increase the expected output per hectare (Tionenji, 2011). Tionenji (2011) indicates that a study in Kenya, found that large commercial farmers were adopting new high-yielding maize seed varieties, while small-holder farmers were faced with difficulties buying such seed varieties, after the government withdrawing the subsidies.

In the study area, Ochola and Kosura (2007) found that the net returns from tobacco farming were low leading to the vicious cycle of poverty and the numerous environmental, health and other socio-economic implications associated with its cultivation. They found that tobacco companies operating in the area (Alliance One Tobacco and Mastermind Tobacco Kenya Limited) provided both credit facilities and technical support to farmers. The companies argued that the loans attracted low interest while tobacco farmers on the other hand indicated that the

inputs were supplied at higher costs compared to the prevailing market price (Ochola and Kosura, 2007). In that study carried out in Migori and Kuria Districts, majority of the farmers indicated that they were not able to fully pay the loans after deductions at the end of each crop season. In case of failure to pay back the loans, farmers were even forced to forfeit their assets.

Tobacco is a non-food cash crop that takes a longer period of time, approximately eight months to realize its returns (Kibwage *et al.*, 2008). The alternative crops such as sweet potatoes, soy beans, watermelon, groundnuts and cabbages are food and cash crops, thereby exhibiting higher utility and it takes approximately three to four months to realize their returns (Ochola and Kosura, 2007 and Kibwage *et al.*, 2009). However, in their study, they focused on the analysis of tobacco cultivation and viable alternative crops in the two districts. Due to regional specificity and given that the region has a diverse mix of crop and livestock enterprises, and the farmers are small-scale holders, this study was partly intended to examine the influence of farm characteristics in the adoption of alternative crops among the tobacco farmers in Kehancha Division, Kuria West Sub-county.

2.5 The contribution of extension, credit and market access in the adoption of alternative crops to tobacco farming

It has been shown that the level of awareness of the new agricultural technology or enterprise introduced in any region influences its rate and level of adoption (Kuntariningsih and Mariyono, 2013). According to Ghulam *et al.*, (2011), awareness level is preconditioned by access to extension services since the rate at which extension contacts are made by extension agents to the farmers would determine the rate and level of adoption. Marinyo and Bhattarai, (2009) in Kuntariningsih and Mariyono, (2013) found that in Indonesia, some of the institutional constraints in the adoption of chili farming by smallholder farmers are include inaccessibility to credit, limited access to technological and market information, smaller household farm size, inappropriate supply of the relevant inputs together with inappropriate transport-related issues.

Credit access has been found to be influencing adoption of agricultural enterprises and it has been ascertained that availability of credit for small-scale farmers is one of the main vital preconditions necessary for spurring rural development (Tionenji, 2011). Credit not only helps

in lessening farmers' financial challenges, but also provides incentives to the targeted farmers for adopting new techniques and practices with greater prospects, provided it is easily accessible (Ghulam *et al.*, 2011; Idrisa *et al.*, 2012). The more farmers are assured of easy access to finance, the more they are likely to adopt agricultural technologies or enterprises (Ghulam *et al.*, 2011; Tionenji, 2011). A study by Kuntariningsih and Mariyono (2013) in Central Java indicated that chili farmers, who accessed credit easily, adopted the chili farming technologies since such technologies were capital-intensive. According to their findings, farmers reported that credit was easily accessible hence its availability. In relation to market access, according to Kuntariningsih and Mariyono (2013), farmers reported that although chili farming had substantial net returns, sometimes it was associated with risks of price fluctuations and low yields due to pests and diseases.

From the regional perspective, Adebisi and Kunlola (2013) found that farmers who accessed agricultural extension services through the relevant extension agents were ready to adopt the cocoa farm rehabilitation techniques available to them in Oyo State, Nigeria. These authors assert that access to extension is often used as an indicator to access to relevant technical information. According to Adebisi and Okunlola (2012), the farmers' low awareness level of some cocoa farm rehabilitation techniques in the area was attributed to low extension visit. According to Mustapha *et al.*, (2012), the institutional factors that positively influenced the adoption of soya bean production technology in Taraba State, Nigeria, were sources and access of information to respondents. Mustapha *et al.*, (2012) found that the level of education, access to extension services, yield and access to credit influenced positively the adoption of improved maize seed variety in Borno State, Nigeria.

It has been found that the probability of adopting cassava in most African countries, including Ghana and Zambia, has been increasing with increase in contact with extension agents (Tionenji, 2011). A study by Kuboga *et al.*, (2011) on "Tobacco production Baseline survey in Mara Region, Tanzania", revealed that majority of farmers in the study area reported to have been advised to engage in tobacco farming by other farmers and relative tobacco farmers from Kenya.

Credit access increased adoption of Yam Minisset Technology in South East Nigeria (Ayoola, 2012). Mustapha *et al.*, (2012) found that poor extension services, inaccessibility of credit facilities and high cost of fertilizer were among the major institutional factors that influenced negatively the adoption of soya bean production technologies in Taraba State, Nigeria. According to a study on “Socio-economic factors limiting smallholder groundnut production in Tabora Region Tanzania”, Mungasini *et al.*, 2013 found that access to credit was very crucial for smallholder farmers since it helped them reduce the financial limitations thereby enabling them access the relevant inputs for improved production that they could otherwise not afford.

A farmer’s access to market has been found to determine the net benefits accrued from a new agricultural enterprise thereby influencing its adoption (Tionenji, 2011). Studies on adoption of cassava production in African countries, according to Tionenji (2011), found that distance to a nearby market was had influence in the adoption of cassava technology. This could be the case due to the fact that the nearby market reduced transport costs when taking the produce to the market, thereby encouraging them to adopt cassava production (Tionenji, 2011). Berg (2013) found that inadequate farmer participation in the markets was a common characteristic of smallholder farming systems in South Africa. The study reported that small-scale farmers generally were found to have low income and consequently inadequate capital for their agricultural practices, and marketing of their products, was adversely affected by poor modes of transport and communication. Mustapha *et al.*, (2012) found that majority of the farmers had a readily available market for their soya bean produce. This could be due to the fact that market for soya bean was readily available in Taraba State, Nigeria.

Tionenji (2011) found that in Zambia, limited market and inadequate processing infrastructure availed by the government could be attributed by the fact that cassava was considered by the government as a food crop only; without considering the aspect of income. From the findings, the farmers grew maize initially and cassava was being promoted as an alternative crop, with a ready and well-developed market for the maize produce. As a result, according to Tionenji (2011), the farmers were not willing to grow cassava, since its market was limited. The market was inadequate because they could only sell cassava at the local market (Tionenji, 2011). Fungo *et al.*, (2013) found that the level of education of household head, access to extension

and training, easier access to inputs and membership to farmer groups influenced farmers' decisions to adopt rice intercrops in the Lake Victoria Crescent Agro-ecological Zone of Uganda.

Studies at the local level focused on the viability of alternative crops to tobacco farming (Ochola and Kosura, 2007 and Mbaye *et al.*, 2014). Very little has been documented on the contribution of extension, credit and market access in the adoption of alternative crops to tobacco farming in the area. This was the gap that partly, this study sought to fill.

2.6 Summary of literature review and identification of research gap

Literature review has revealed that adoption of new or improved agricultural technologies and enterprises is determined by among others the social and economic factors. From the literature, the authors have generally agreed that the critical factors influencing adoption of an agricultural enterprise are farmer attributes such as age, education level, gender, income and household size; and farm characteristics such as land size and the net returns (Adebisi and Okunlola, 2013; Ayoola, 2012; Tionenji, 2011; Kuntariningsih and Mariyono, 2013).

Kuntariningsih and Mariyono (2013) observe that farmer's income, education level, and farm size, frequency of contacts with extension staff are significant factors affecting the farmer's decision to adopt or not to adopt a particular agricultural technology or practice. Farm size, age of farmer, farming experience, amount of credit available and frequency of extension contacts with farmers have been found to have greater influence in the rate and level of adoption of agricultural technologies or crop enterprises (Ayoola, 2012). Idrisa *et al.*, (2012) found that level of education, access to extension services; yield and access to credit influenced adoption of improved maize seed variety in Borno State, Nigeria. In addition, the institutional factors such as market and credit facilities, and extension access, play greater role in determining adoption or non-adoption of agricultural enterprises (Berg, 2013).

From the literature, however, in most cases the adoption is on the same crop but targeting adoption of improved agricultural practices to improve crop productivity. In case of different crops (for example, cassava as an alternative to maize in Zambia), both are food and cash crops. All the crops in the literature are environmentally friendly as compared to tobacco which

is a non-food cash crop. Little has been documented in regard to alternative crops to tobacco in the study area in particular. This study sought to examine specifically the socio-economic attributes hindering adoption of alternative crops to tobacco farming in Kehancha Division, Kuria West Sub-county. This was the gap that this study was intended to fill, given that a variable may have enterprise and region specificity.

CHAPTER THREE: METHODOLOGY

3.1 Study area

The study area was Kehancha Division in Kuria West Sub-County, Kenya. Kuria West Sub-County is one of the eight sub-counties forming Migori County. It borders Suna West to the North, Transmara and Kuria East Sub-counties to the East, and the Republic of Tanzania to the South. Kuria West Sub-county is located between latitudes $0^{\circ} 15'$ and $0^{\circ} 30'$ South and longitudes $34^{\circ} 15'$ and $34^{\circ} 30'$ East (refer to figure 3.1). It has a total area of 332.5 square kilometers (GOK, 2008).

Kehancha Division is the largest amongst the 5 divisions, namely; Ikerege, Isebania, Mabera and Masaba. Its total area is 34.2 square kilometers. Administratively, it has 3 locations and 6 Sub-locations. According to 2009 census, it has a population of 19,476 projected to 21,830 in 2012 (GOK, 2008).

The area has an inland-modified tropical equatorial type of climate. It receives between 1,500-2,300mm of rainfall, with annual temperatures ranging between 27°C and 30°C , and rarely falls below 18°C . Its ecological zone is Upper Middleland (UM2-3). Crops grown in the area include maize, beans, tobacco, cassava, sweet potatoes, fruits and vegetables. Livestock animals kept include cattle, goats, sheep and poultry (GOK, 2008). The choice of the area was on grounds that it is the largest division and producer of tobacco amongst the five, and where fire-curing of tobacco using wood is intensive.

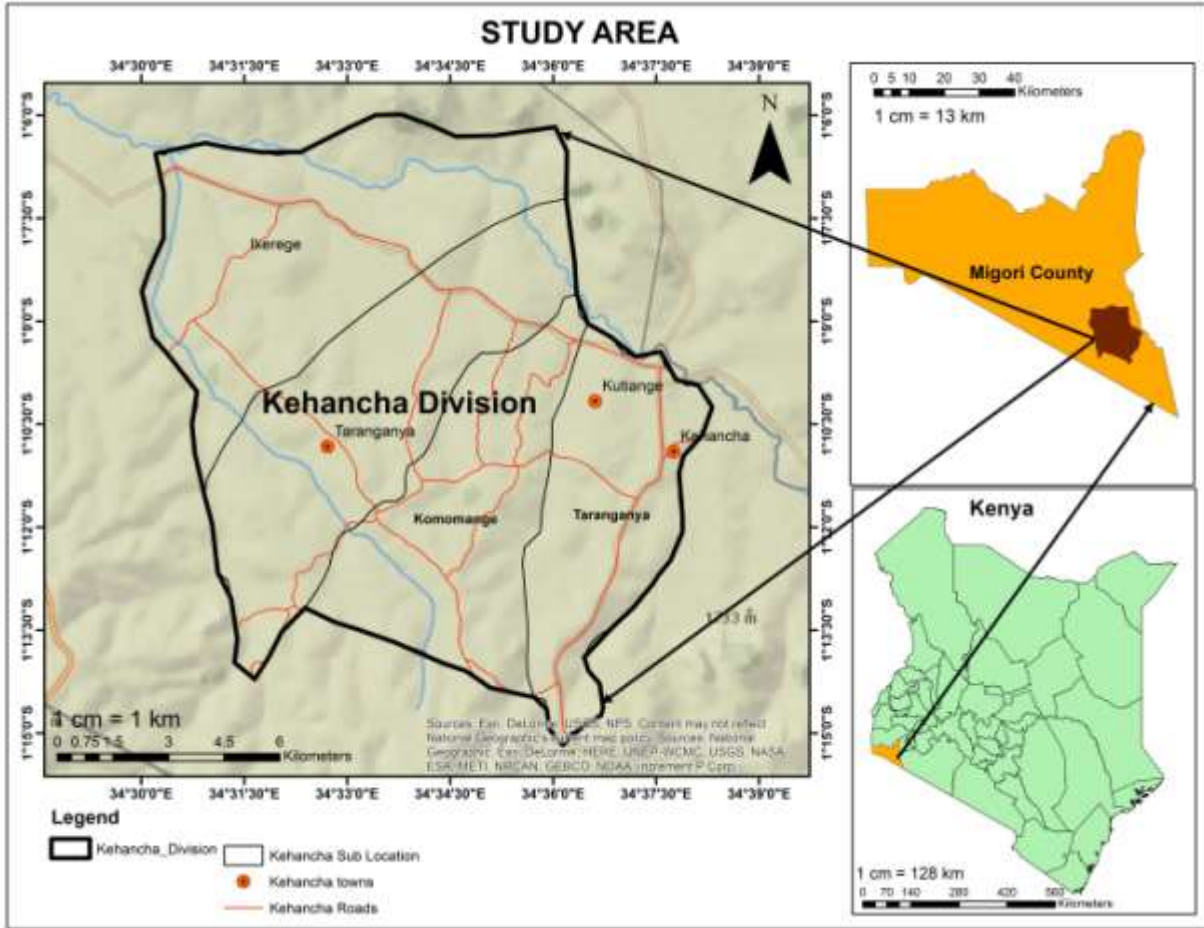


Figure 3.1: Study area map

3.2 Research design

The research design that was used in this study is descriptive survey design. Descriptive survey design was used since it is most appropriate in a study where information is collected without changing the environment, that is, nothing is manipulated. This research design was employed because the study intended to collect information in regard to the present phenomenon in terms of conditions, practices, beliefs, processes, relationships or trends (Neeru, 2012). In addition, descriptive survey design was employed since it is the most appropriate method devoted to the gathering of information about the prevailing conditions or situations for the purpose description and interpretation (Kerlinger and Howard, 2000; Mugenda and Mugenda, 1999). According to Kerlinger and Howard (2000), a descriptive research study is used to describe a

phenomenon, to explore factors that influence and interact with it (phenomenon). It documents conditions, attitudes or characteristics of individuals or groups of individuals and is normally used when the researcher is interested in gaining a rich and deeper understanding of a research problem (Kerlinger and Howard, 2000).

In this case, descriptive survey design was most appropriate because the study aimed at collecting information from respondents in their natural setting on their views, opinions, attitudes and experiences in relation to adoption of alternative crops to tobacco farming so as to capture the situation as it exists (Orodho and Kombo, 2002).

Sample size and Sampling procedure

The target population for the study was farmers; both adopters and non-adopters. The household was used as the unit of analysis, whereby heads of households within adopters and non-adopters were included. The sample size for this study was determined based on the formula by Fischer *et al.*, (1988). The following formula was used in determination of the sample size (Fischer *et al.*, 1998, in Mugenda and Mugenda, 1999).

$$n = \frac{z^2 pq}{d^2}$$

Where:

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

z= the standard normal deviate at the required confidence level which is 1.96 at 99 % confidence level.

p= the proportion in the target population estimated to have characteristics being measured (households).

q= the level of statistical significance set.

If there is no estimate available of the proportion in the target population assumed to have the characteristics of interest, 50% should be used as recommended by Fisher *et al.*, (1998)

For example, if the proportion of a target population with a certain characteristic is 50, the z-statistic is 1.96, and we desire accuracy at the .05 level, then the sample size is:

$$n = \frac{(1.96)^2 (.05) (.05)}{(.05)^2} = 384$$

The sample size was determined using Fisher *et al.* (1998) method used for population less than 10,000. In such cases, final sample was calculated as an estimate (nf) using the following formula.

$$nf = \frac{n}{1 + (n/N)}$$

Where;

nf – is desired sample size (when the population is less than 10,000).

N – Desired sample size for population more than 10,000 which is 384

n – Estimated size, which is 150 households

$$\text{Substituting; } nf = \frac{384}{1 + (384/150)}$$

$$nf = 107.86517$$

Therefore, the desired sample size for this study was determined to be 108 respondents (both adopters and non-adopters).

A sample size of 108 farmers was appropriate and its characteristics were representative of the target population; because the larger the sample, the more consistent the outcome to the estimated parameters in question. Likewise, the larger the sample, the more likely it is representative of the target population from which the sample is taken (Saunders *et al.*, 2007).

The sampling procedure adopted a combination of different approaches, that is, proportional stratified random sampling, simple random sampling and purposive sampling. Proportional stratified random sampling was used to identify areas of survey, that is, sub-locations and villages. The method was also used to get the non-adopters and adopters in their proportions, from the areas of survey. Purposive sampling was used to get key informants, for example, agricultural extension officers, Non-Governmental Organizations' (NGOs) staff and the local leaders (chiefs) in the area. Proportional stratified random sampling was used to get the sample size comprising of both adopters and non-adopters. Badia and Runyon, (1982); Mugenda and Mugenda, (1999) and Kerlinger and Howard, (2000), assert that random sampling is the most effective way of assuring that the sample is composed of subjects similar to the population on all variables and is important for generalization of the results to the general population.

Three-staged random sampling was applied. First, three sub-locations were randomly selected from the total of six sub-locations in the division. Second, two villages were randomly selected from each of the three sub-locations forming a total of six villages. Finally, tobacco farmers' households (non-adopters) and non-tobacco farmers' households (adopters) were randomly selected in their proportions from each village to make a total of 108 households (comprising of 70 non-adopters; and 38 adopters).

3.4 Data collection procedures

This study anticipated to generate both quantitative and qualitative data since it was based on mixed-method research approach. A survey was conducted using structured questionnaires comprising of both closed and open-ended questions. The questionnaires were administered to farmers through interviews to get both quantitative and qualitative data. Primary quantitative data collected included age of the household head, education level, household size, source of farm labour, type of producer, land acreage, source of income among others. Secondary quantitative data involved number of inhabitants in each sub-location and village as well as the population size of the division and its growth rate which was obtained from the Kuria West District Development Plan 2008-2012 and the Migori County First Integrated Development Plan 2013-2017. Primary quantitative data were collected using survey method through structured questionnaires with both closed and open-ended questions while qualitative data

were collected through use of open-ended questions, focus group discussions and key informant interview schedules. Data pertaining farmers' personal characteristics (objective one) farm characteristics (objective two) and access to agricultural extension, credit and market (objective three) were collected through interviewing to get a detailed understanding or deeper insights from farmers, for example on reasons for not adopting alternative crops respectively. Focus Group Discussions and key informant interviews were conducted for purposes of triangulation. The key responses in themes were jotted down in a note book.

To ascertain the validity and reliability of the data collection tools, prior to the actual data collection, the data collection tools (questionnaires) were pre-tested by administering them to a few farmers but in a different sub-location (Igenaitambe Sub-location) in Ntitaru Division, Kuria East Sub-county. The questions that captured inconsistent responses were revised so as to capture consistent answers from different respondents.

Data pertaining farmers' personal characteristics, farm characteristics and access to agricultural extension, credit and market were collected through interviewing to get a detailed understanding or deeper insights from farmers, for example on reasons for not adopting alternative crops respectively.

The survey was conducted from April to May, 2016. A sample of 108 household heads, 70 non-adopters and 38 adopters of mixed gender were involved in the survey. The respondents were met at their homes and were asked for their consent to participate. The researcher explained to each respondent before the interview, about the aim of the study. Kuria (local language of the people) was used during interviews in order to minimize misunderstandings and to gain farmer confidence. Luckily, no single potential respondent who was approached by the researcher refused to participate in the study.

Focus Group Discussions were conducted whereby the respondents were selected through stratified proportional random sampling. This type of sampling was used so as to representatively cater for the two categories of farmers, that is, adopters and non-adopters. Through this type of sampling, three adopters and four non-adopters were selected for FGD. The strategy was also employed so as to enhance statistical efficiency during data analysis.

Purposive sampling was used to get representatives from the local NGOs, who were also included in the FGDs. Each Focus Group Discussion consisted of eight members (three adopters, four non-adopters and 1 representative from a local NGO with at least three female participants).

The selected respondents were asked for their consent to participate, after which they were explained to about the study and its objectives and there after notified on the appropriate place, date and time we were to meet for the discussions. On the date of discussions, the interview guide was used to ask respondents questions in kuria (local language) as they were guided by one facilitator, whose duty was to moderate and guide the discussions. The Focus Group Discussion interview guide comprised of general questions tackling important aspects of the study based on the specific objectives. The guide comprised of open ended question interviews, for the respondents to enhance get their attributes, motivations, challenges and environmental concerns regarding adoption of alternative crops to tobacco farming.

Two focus group discussions were conducted. The first Focus Group Discussion was conducted at Ikerege village in Ikerege sub-location. The second Focus Group discussion was conducted at Komomange village in Komomange sub-location. After the discussions, the researcher would harmonize the collected views and take note of the key emerging themes. The aim of using FGDs was to collect data that were to be used to triangulate data obtained from interview schedules and questionnaires.

Key informant interviews were conducted by the researcher through in-depth interviews using interview guides with more open ended and few closed questions to gather information from key informants on their experiences, contributions and challenges in relation to the adoption of alternative crops to tobacco farming. This method was used in order to gain in-depth understanding of adoption of alternative crops to tobacco farming in the area (Kerlinger and Howard, 2000). The key informants were selected from different areas based on their personal experience and training in relation to adoption of alternative crops or diversification of livelihoods in the area. They included a sub-county agricultural extension officer, Actionaid Kenya (NGO) officer (the NGO spearheads alternative livelihood initiatives in the area), Nuru Interanational (NGO) officer (the NGO helps promote cereals farming in the area) and a farmer

who had grown tobacco for over twelve years at the time the study. Notes were taken from each interview; from which the researcher jotted down the key emerging themes.

3.5 Data analysis

The study generated both quantitative and qualitative data. After data collection the questionnaires were checked for completeness, cleaned, coded to represent responses to specific questions and keyed into the computer's Statistical Package for Social Sciences (SPSS) for analysis. Quantitative data were analyzed through simple descriptive analysis through statistics such as, frequency distributions, percentages and totals. The reason for using the descriptive analysis was to describe the distribution of the respondents according to their socio-economic and farm characteristics. This was applied for data obtained through objective (i) and (ii).

The relationships among the variables were analyzed by use of correlation by regression analysis so as to show direction and magnitude of the relationship between given variables (Mugenda and Mugenda, 1999). Regression analysis was adopted because the independent variables were many. This was applied for data obtained through objective (i), (ii) and (iii). Qualitative data from farmers and key informants in form of themes were cleaned, read, organized, coded and then content analysis was done through the emerging themes. This was applied for data obtained through objective (i), (ii) and (iii).

3.6 Ethical considerations during the study

The researcher, upon approval of the research proposal by the University, sought for a research permit from the National Council for Science and Technology. Permission was also sought from the local administrators (chiefs) in charge of the locations in the study area. The main objective of the study was vividly explained to the respondents. The respondents were informed of consent to participate or refuse to participate in the study. The respondents were assured that the study was for academic purposes and that their personal information was to be treated with utmost confidentiality. No respondent (s) was forcefully involved in the study. In the entire process, during and after, the ethical considerations were observed to the later.

CHAPTER FOUR: RESULTS AND DISCUSSION

This chapter presents the findings obtained from the study using descriptive statistics and correlation analysis. Findings of the research regarding attributes hindering adoption of alternative crops to tobacco farming are highlighted. The descriptive analysis of the socio-economic attributes hindering adoption of alternative crops to tobacco farming was done using frequencies, totals and percentages. The correlation results are later explained in trying to identify the significant socio-economic attributes hindering adoption of alternative crops to tobacco farming in the study area. Then, the significant variables are explained.

4.1 The influence of farmer attributes in the adoption of alternative crops to tobacco farming

4.1.1 Gender of the household head

The results, as indicated in Table 1, show that among the non-adopters, 51.85% of the household heads were male while 12.96 were female. In the case of adopters, 28.7% of the respondents were male while 6.48% were female. This was evident that majority of the household heads both adopters and non-adopters in the area were male. According to Ghulam *et al.*, (2011), the household head is the one who makes decisions at the household level pertaining issues on resource use, farming enterprises among other household activities.

Table 1: Gender of Household head

Household head	Male		Female		Total	
	Freq	%	Freq	%	Freq	%
Non-adopter	56	51.85	14	12.96	70	64.81
Adopter	31	28.70	7	6.48	38	35.19
TOTAL	87	80.56	21	19.44	108	100.00

4.1.2 Age of the household head

From the findings, as indicated in Table 2, 3.7% of the respondents (n=108) had less than 25 years of age, 31.48% had between 25 to 35 years, 37.04% had between 36 to 45 years, 18.52% had between 46 to 55 years, 8.33% had between 56 to 65 years and only 0.93% had over 65 years of age. Overall, the dominant age range of the respondents was between 36 to 45 years (37.04%). This is an implication that majority of the farmers were in their agriculturally productive age that the labour-intensive tobacco cultivation requires.

Among the non-adopters, 1.85% were less than 25 years old, 21.3% were between 25 to 35 years, 25.93% were 36 to 45 years, 10.19% were 46 to 55 years, 5.56% were 56 to 65 years and non was above 65 years old. This indicates that majority of the non-adopters (49.08%) were in their prime and productive age. Among the adopters, 1.85% were less than 25 years old, 10.19 were between 25 to 35 years, 11.11% were between 36 to 45 years, 8.33% were between 46 to 55 years, 2.78% were between 56 to 65 years and 0.93% had above 65 years. Non-adopters of above 55 years of age were 8.58% (5.56% of 64.81%) compared to adopters 10.54% (3.71% of 35.19%) in the same age bracket. This could be due to the fact that older farmers no longer have the strength and energy required for the laborious tobacco farming activities. From the FGDs, younger farmers were more likely to be non-adopters of alternative crops to tobacco farming. Reason given, as per the FGDs, was that they had the energy required by the labour-intensive tobacco farming enterprise.

Table 2: Age of the household head

Farmer	< 25yrs		25-35yrs		36-45yrs		46-55yrs		56-65yrs		> 65yrs		Total	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Non-adopter	2	1.85	23	21.30	28	25.93	11	10.19	6	5.56	0	0.00	70	64.81
Adopter	2	1.85	11	10.19	12	11.11	9	8.33	3	2.78	1	0.93	38	35.19
TOTAL	4	3.70	34	31.48	40	37.04	20	18.52	9	8.33	1	0.93	108	100.00

4.1.3 Highest education level of the household head

From the results, as indicated in Table 3, about 11.11% of the respondents (n=108) had informal education, 54.63% had primary education, 30.56% had secondary education and only 3.7% of the respondents had tertiary/university education as their highest level of education.

Among the non-adopters, 10.19% had informal education, 35.19% had primary education, 18.52% had secondary education and 0.93% had tertiary/university education as their highest level of education. On the other hand, among the adopters, about 0.1% had informal education, 19.44% had primary education, 12.04% had secondary education and 2.78% had tertiary/university education as their highest level of education. From the findings, the lower education level among the non-adopters (45% with primary education level) could be influencing their understanding of the social, economic and environmental implications of tobacco farming, and consequently, adoption of alternative crops to tobacco farming. Although the percentage of non-adopters with secondary education was higher than that of adopters, it was found from the FGDs that majority of the non-adopters did not complete secondary education due to lack of fees. As such the only viable economic activity that was available to them was tobacco farming. In addition, such farmers were likely to be influenced by their peers.

Table 3: Highest education level of household head

Farmer	Informal		Primary		Secondary		Tertiary		Total	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Non-adopter	11	10.19	38	35.19	20	18.52	1	0.93	70	64.81
Adopter	1	0.9	21	19.44	13	12.04	3	2.78	38	35.19
Total	12	11.11	59	54.63	33	30.56	4	3.70	108	100.00

4.1.4 Size of household

From the results, about 27.8% of the respondents (n=108) had less than a household size of 5 members, about 40.7% had 5 to 8 members, about 20.4% had 9 to 12 members, 5.6% had 13 to 16 and about 5.6% had over 16 members as their household size. As per the results, majority of the respondents (40.74%) had a household size of 5 to 8 members.

Among the non-adopters, about 14.81% had a household size of less than 5 members, 24.07% had 5 to 8 members, 16.67% had 9 to 12 members, 4.63% had 13 to 16 members and about 4.63% had more than 16 members as their household size. In the case of adopters, about 12.96% had less than 5 members, about 16.67% had 5 to 8 members, 3.7% had 9 to 12 members, 0.93% had 13 to 16 members and another 0.93% had over 16 members as their household size. Generally, from the results, non-adopters had larger household sizes compared to adopters. From the FGDs, the larger household sizes for the non-adopters, could sometimes be depended upon as a reliable source of labour. From the FGDs responses, even the school going children could forgo schooling for some days, as directed by their parents, depending on the stage of tobacco production.

Table 4: Size of Household

size	<5		5-8		9-12		13-16		>16		Total	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Non-adopters	16	14.81	26	24.07	18	16.67	5	4.63	5	4.63	70	64.81
Adopters	14	12.96	18	16.67	4	3.70	1	0.93	1	0.93	38	35.19
Total	30	27.78	44	40.74	22	20.37	6	5.56	6	5.56	108	100.00

4.2 The influence of farm characteristics in the adoption of alternative crops to tobacco farming

4.2.1 Source of farm labour

From the results, as indicated in Table 5, about 74.1% of the respondents (n=108) indicated that they relied on family as their source of farm labour while 25.9% indicated that they used hired labour on their farms. This is a clear indication that majority of the farmers in the area (74.1%) operate on small scale basis. Among non-adopters, about 50.93% relied on family labour while 13.89% relied on hired labour. This was supported by the findings that majority of the non-adopters (about 50%) had a household size of over 5 members of 10 and above years of age. As supported FGDs findings, even the school going members of the household could be directed by their parents to forgo schooling for some days. This was to help prepare tobacco depending on its stage of production and the required labour at that stage. Among the adopters, about 23.15% and 12.04% relied on family and hired labour respectively.

Table 5: Source of farm labour

Household head	Family labour		Hired labour		Total	
	Freq	%	Freq	%	Freq	%
Non-adopters	55	50.93	15	13.89	70	64.81
Adopters	25	23.15	13	12.04	38	35.19
Total	80	74.08	28	25.93	108	100.00

4.2.2 Land size of household

From the findings, as shown in Table 6, about 0.9% of the respondents (n=108) had less than 1 acre of land, about 26.9% had 1 to 2 acres, 38.9% had 3 to 4 acres and 33.3% had over 4 acres of land. Majority of the respondents (about 38.9%) had 3 to 4 acres of land. Among non-adopters, none had less than 1 acre of land, 12.96 had 1 to 2 acres, 27.78% had 3 to 4 acres and 24.07% had more than 4 acres of land. In the case of adopters, about 0.93% of the respondents had less than 1 acre of land, 13.89% had 1 to 2 acres, 11.11% had 3 to 4 acres and 9.26% had more than 4 acres of land. About 12.96% of non-adopters had 1 to 2 acres of land compared to 13.89% of adopters with the same household land size. This could affirm to the belief by the farmers that small household land sizes can only be profitable in tobacco cultivation since it's regarded to give maximum returns as found by Rahman, (2008), in Mbaye *et al.*, (2014).

Table 6: Land Size of household

Land size	Non-adopters		Adopters		Total	
	Freq	%	Freq	%	Freq	%
<1 Acre	0	0.00	1	0.93	1	0.93
1-2 Acres	14	12.96	15	13.89	29	26.85
3-4 Acres	30	27.78	12	11.11	42	38.89
>4 Acres	26	24.07	10	9.26	36	33.33
Total	70	64.81	38	35.19	108	100.00

4.2.3 Source of Income

From the results, as shown in Table 7, it was found that about 46.3% (n=108) ranked income from employment as their least source, 30.55% ranked it as medium source and 23.15% ranked it as major source. Among non-adopters, about 28.7% ranked income from employment as their least source of income, 22.22% ranked it as medium source and 13.89% ranked it as major source. In the case of adopters, 17.59% ranked income from employment as least source, 8.33% ranked it as medium source and 9.26% ranked it as major source.

From the field interviews and FGDs, majority of the farmers reported that off-farm employment was at times available but short-lived and on casual basis. According to them, it was not readily available and therefore, could not rely on it. Those who ranked off-farm employment as major source had attained secondary education and above as their highest level of education. This could be an indication that those with higher levels of education partly relied on off-farm employment as a source of household income.

Table 7: Income from employment

Farmer	Least source		Medium source		Major source		Total	
	Freq	%	Freq	%	Freq	%	Freq	%
Non-adopter	31	28.70	24	22.22	15	13.89	70	64.81
Adopter	19	17.59	9	8.33	10	9.26	38	35.19
TOTAL	50	46.30	33	30.55	25	23.15	108	100.00

As shown in Table 8, it was found that about 4.63% (n=108) ranked income from crops as their least source of income, 24.07% ranked it as medium and 71.30% ranked it as their major source of household income. Among non-adopters, out of 64.81%, about 3.70% ranked their income from crops as least source, 14.81% ranked it as medium and 46.30% ranked it as their major source of household income. In the case of adopters, out of the 35.19%, 0.93% ranked income from crops as least source, 9.26% ranked it as medium and 25.00% ranked it as major source of their household income. From the interviews, majority of the farmers relied on crops as their main source of household income, as was reported in one the focus group discussions; *“We rely on the crops we grow both as food and for money when we sell them. For example, apart from consuming vegetables like cabbage and sukuma wiki, we take most of them to the market for selling. The money we get from the sales can be used to buy other commodities. In fact to us farming is our employer”*

This could be an indication that the farmers in the area, being small-scale holders, relied on agriculture, specifically crop cultivation as their major source of income.

Table 8: Income from crops

Farmer	Least source		Medium source		Major source		Total	
	Freq	%	Freq	%	Freq	%	Freq	%
Non-adopter	4	3.70	16	14.81	50	46.30	70	64.81
Adopter	1	0.93	10	9.26	27	25.00	38	35.19
TOTAL	5	4.63	26	24.07	77	71.30	108	100.00

From the results, as indicated in Table 9, it was found that 49.07% (n=108) of the respondents ranked their household income from livestock as their least source, 46.30% ranked it as medium source and 4.63% ranked it as major source. Among non-adopters, out of 64.81%, 32.41% ranked income from livestock as their least source, 28.70% ranked it as medium source and 3.70% ranked it as their major source of household income. In the case of adopters, 16.67% ranked income from livestock as their least source, 17.59% ranked it as their medium source and 0.93% ranked it as their major source of household income.

From the interviews and FGDs, majority of the farmers ranked income from livestock as their least source of income because some had very few livestock animals while some did not have any. Those who had some livestock animals like cattle and goats reported that returns from such animals could take long before being realized compared to crops. They reported that returns from some crops such as vegetables could be realized even after one month from the date of sowing or planting.

Table 9: Income from livestock

Farmer	Least source		Medium source		Major		Total	
	Freq	%	Freq	%	Freq	%	Freq	%
Non-adopter	35	32.41	31	28.70	4	3.70	70	64.81
Adopter	18	16.67	19	17.59	1	0.93	38	35.19
TOTAL	53	49.07	50	46.30	5	4.63	108	100.00

4.2.4 Level of producer

From the results, as shown in Table 10, it was found that 8.33% of the farmers (n=108) were medium-scale farmers while 91.67% operated their farms on small-scale basis. Among non-adopters, 5.56% were found to be medium-scale farmers and 59.26% were small-scale holders. In the case of adopters, 2.78% were medium-scale farmers and 32.41% were small-scale holders. This implied that majority of the farmers in the area carried out farming on small-scale basis. From the interviews, they used simple farm implements and relied on family members as their main source of farm labour.

Table 10: Level of production

Household head	Medium		Small-scale		Total	
	Freq	%	Freq	%	Freq	%
Non-adopters	6	5.55	64	59.26	70	64.81
Adopters	3	2.78	35	32.41	38	35.19
Total	9	8.33	99	91.67	108	100.00

4.3 Contribution of extension, credit and market access in the adoption of alternative crops to tobacco farming

4.3.1 Extension Access

From the results, as indicated in Table 11, 43.52% (n=108) accessed extension services from their farmer organizations, a company or NGO; 28.70% got agricultural information from other farmers and 14.81% obtained agricultural information from agricultural extension officers. Among non-adopters, about 5.56% accessed agricultural information from agricultural extension officers, 1.85% accessed it from radio and television, 14.81% accessed it from other farmers and 40.74% indicated that they accessed extension services that were provided by the tobacco companies (farmer organization) through their staff (field officers). From the interviews, majority of non-adopters accessed agricultural information from the tobacco companies through their field staffs.

In the case of adopters, 0.93% obtained agricultural information from radio and other sources, 2.78% obtained it from farmer organization and television, 4.63% got it from pamphlets, 9.26% from agricultural extension officers and 13.89% got it from other farmers. Majority of adopters (13.89%) received their agricultural information from other farmers followed by (9.26%) who got it from agricultural extension officers. From the interviews, it was found that some of the extension officers were from the NGOs. For example, field staff from Nuru International that is advocating for adoption of alternative crops to tobacco farming in the area. In addition, from the interviews, other farmers; though not the main model of extension used by the NGOs, were the major source of agricultural information as one of the adopters put it:

“I learnt about watermelon farming from another farmer. He encouraged me to try it and as I did it, he used to come, and up to now he comes and we share a lot concerning the enterprise. He told me that he also learnt about the enterprise from a friend.”

From these results, this could be an indication of inadequate access to agricultural extension services among the adopters and the prospective ones. This could be, partly, a factor influencing adoption of alternative crops to tobacco farming as one of the key informants reported:

“Practically, our work is supposed to be in the field. We are not adequately facilitated to go to the field and therefore we don’t reach our clients (farmers) as expected of us. With devolution of our work, the situation is worse.”

From the interviews, majority of the non-adopters kept on growing tobacco since there was adequate access to agricultural information on tobacco farming provided by the tobacco companies’ field officers. Responses from FGDs revealed that the tobacco companies, through their field officers (*monitors*) provided adequate agricultural information on tobacco farming all the way from nursery preparation to grading of the cured leaves, thus a motivation for tobacco farming.

Table 11: Source of agricultural information

Source	Non-adopters		Adopters		Total	
	Freq	%	Freq	%	Freq	%
Agric. Officers	6	5.56	10	9.26	16	14.81
TV	2	1.85	3	2.78	5	4.63
Radio	2	1.85	1	0.93	3	2.78
Pamphlets	0	0.00	5	4.63	5	4.63
Other Farmers	16	14.81	15	13.89	31	28.70
Farmer Org	44	40.74	3	2.78	47	43.52
Others	0	0.00	1	0.93	1	0.93
Total	70	64.81	38	35.19	108	100.00

4.3.2 Credit access

It was found that, as shown in Table 12, about 56.48% of the respondents (n=108) had access to credit while 43.52% did not access credit. For non-adopters, 43.52% accessed credit while 21.30% did not access credit. From the interviews, non-adopters accessed credit in form of inputs such as fertilizers, agro-chemicals and seeds; which were provided by the tobacco companies. They reported that they repay the loans provided by the tobacco companies when selling tobacco to the companies. For them (non-adopters), the arrangement was easier because the tobacco companies provided a ready market for their produce, as one of non-adopters reported:

“For me, I find it easier to grow tobacco because Alliance One Tobacco Company gives me a loan in form of fertilizers, agro-chemicals, seeds and a sprayer pump which they deduct when I am selling the tobacco to them. Imagine this is after about seven months, a duration that a bank cannot give you.”

However, some non-adopters did not access credit for tobacco farming. To them, some were not in need of such credit while others used their own means to buy the tobacco inputs.

In the case of adopters, 12.96% had access to credit while 22.22% had no access to credit. From the interviews, majority of those who accessed credit were members to an organization or NGO, for example Nuru International that provided credit in form of seeds and fertilizers. The loan (credit) was to be repaid by the farmers after looking for their own market and selling their produce. From the findings during the study and the responses from FGDs, it was revealed that majority of the adopters cited high interest rates, lack of collateral and unfavourable repayment terms as the reasons for the inaccessibility to credit. From their views, these hindered their prospects towards adoption of alternative crops to tobacco farming. These findings conform those of Adebisi and Okunlola, (2013) and Oyoola that access to credit by Cocoa farmers and the Yam Mininsett Technology adoption farmers influenced positively the adoption of the agricultural enterprises in Nigeria respectively.

Table 12 : Credit access

Credit access	Non-adopters		Adopters		Total	
	Freq	%	Freq	%	Freq	%
Yes	47	43.52	14	12.96	61	56.48
No	23	21.30	24	22.22	47	43.52
Total	70	64.82	38	35.18	108	100.00

4.3.3 Market Access

It was found that, as indicated in Table 13, 41.67% (n=108) of the respondents indicated that unavailability or inadequate access to market for the alternative crops to tobacco farming was a big challenge, 36.11% indicated it as a challenge and 22.22% as not a challenge. Among non-adopters, out of the 64.81% of farmers, 29.63% ranked unavailability or inadequate access to market for the alternative crops to tobacco farming as a big challenge, 19.44% as a challenge and 15.74% as not a challenge.

For non-adopters, from the interviews, it was convenient for them to grow tobacco than the alternative crops since tobacco had a ready and accessible market. This was attributed to the fact that the tobacco companies (Alliance One Tobacco Kenya and Mastermind Tobacco Kenya) provided a readily available market for their produce. According to them, this was enhanced by the fact that the tobacco companies have constructed buying centres (sheds) that are less than 3 kilometres away from the tobacco farmers. This was an indication that the readily available market for tobacco encourages farmers in the area to cultivate the crop. Responses from FGDs showed that the market for tobacco was readily available and easily accessible. This was because the tobacco companies buy tobacco from the farmers directly and their buying centres (sheds) have been established nearby the farmers.

In the case of adopters, it was found that out of the 35.19% interviewed, 12.04% ranked unavailability or inadequate access to market for the alternative crops to tobacco as a big challenge, 16.67% ranked it as a challenge and 6.48% not a challenge. This was supported by both non-adopters and adopters who, from the interviews and FGDs, indicated that the market for the alternative crops to tobacco was not readily available and when available, the prices per unit were low hence low returns from the alternative crops such as watermelons, cabbages, groundnuts, millet, soya beans and potatoes compared to tobacco of the same unit. One adopter reported:

“It is now four years since I abandoned tobacco farming for sweet potatoes. I realized that I could not cope up with its demand for firewood. It had reached a time I could buy and transport firewood from the neighbouring Trans Mara. It was expensive. The sweet potatoes are friendly to the environment. However, the market is inadequate locally and as such a sell

them at low prices to middlemen from Nairobi. The price of potatoes per unit is lower compared to that of tobacco.”

Table 13: Market access as a challenge

Household head	Non-adopter		Adopter		Total	
	Freq.	%	Freq.	%	Freq.	%
Big challenge	32	29.63	13	12.04	45	41.67
A challenge	21	19.44	18	16.67	39	36.11
Not a challenge	17	15.74	7	6.48	24	22.22
Total	70	64.81	38	35.19	108	100.00

4.4 Results from Regression Analysis

Regression analysis is a type of analysis used when a researcher is interested in finding out whether an independent variable predicts a given dependent variable (Mugenda and Mugenda, 1999). Since this study was interested in determining whether a group of variables (socio-economic attributes) together predict the dependent variable (adoption of alternative crops), a multiple regression model was used. Regression analysis was done as per the objective.

4.4.1 The influence of farmer attributes in the adoption of alternative crops to tobacco farming

Table 14: Regression Analysis on objective one

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		Beta	Std. Error	Beta		
1	(Constant)	.606	.339		1.789	.077
	Gender of Respondent	.078	.119	.065	.659	.511
	Age of respondent	.205	.056	.444	3.633	.000
	Highest education level of household head	.133	.064	.226	2.071	.041
	Household size	-.180	.054	-.406	-3.314	.001
	Source of farm labour	.101	.104	.093	.975	.332

a. Dependent Variable: Adoption

Results from regression analysis done on objective one, as indicated in Table 14, showed that gender of the household head has no influence in the adoption of alternative crops to tobacco farming. Though it had a positive coefficient of 0.065, it was not significant. This indicates that there was no relationship between gender of the farmer and adoption of alternative crops to tobacco farming. This could imply that a farmer would or would not adopt alternative crops to tobacco farming regardless of being male or female.

There was a positive relationship between age of the respondent and adoption of alternative crops to tobacco farming with a correlation coefficient of 0.444 significant at 10% (Table 14). This implies that an increase in the age of the farmer (but from the age of 45 years and above) is likely to result into the probability of the farmer adopting alternative crops increase by 4.44%. This means as farmers grew old; they tended to adopt alternative crops to tobacco farming since partly, they could not match the labour requirements in place by the labour-intensive tobacco enterprise. This was also revealed from the field interviews and the FGDs responses.

The results indicate that adoption of alternative crops to tobacco farming was positively influenced by the education level of the farmer, others factors like extension, credit and market access being constant. There was a positive significant relationship between the farmer's education level and adoption of alternative crops to tobacco farming as indicated by a coefficient of 0.226 (Table 14) and it was significant at 10%. This means that as education level of the farmer increased by 1%, the probability of him or her adopting alternative crops to tobacco increased by 22.6%, as longer as other factors like extension, credit and market access are guaranteed. This implies that the higher the farmer's level of education, the more the farmer was aware of the socio-economic and environmental implications of tobacco farming. This awareness would contribute making him or her to adopt alternative crops to tobacco farming as the crops have minimal socio-economic and environmental implications compared to tobacco. Responses from the key informants (agricultural extension officers and local NGOs area coordinators) showed that low education level among majority of the farmers in the area was a challenge. According to them it hindered information dissemination on diversification of livelihoods including adoption of alternative crops to tobacco farming, as supported by one key informant:

“One of the major challenges that we face is the low literacy levels of the farmers. This hinders their understanding about sustainable livelihoods. It becomes hard for them to conceptualize some negative environmental and socio-economic implications of some enterprises; especially in regard to long term implications of such agricultural practices like tobacco farming.”

From the analysis, household size influenced adoption of alternative crops to tobacco farming. However, the coefficient was negative (-0.406) significant at 10% (Table 14). This means that an increase in the household size (10 years and above, the age at which at least the member can help tend the farm) would lead to a decline in the adoption of alternative crops to tobacco. The results indicated that there was a negative correlation between household size and adoption of alternative crops to tobacco farming. The implication here could be, a bigger household size would provide the farm labour required in tobacco farming given that it is a labour-intensive enterprise.

The results show that source of farm labour had no influence in the adoption of alternative crops to tobacco farming. There was no significant relationship between source of farm labour and adoption of alternative crops to tobacco farming. This could imply that whether the source of farm labour was the family members or hired, a farmer would or would not adopt alternative crops to tobacco, other factors being constant.

4.4.2 The influence of farm characteristics in the adoption of alternative crops to tobacco farming

Table 15: Regression analysis on Objective two

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.122	.409		5.191	.000
	Household Land size	-.036	.050	-.061	-.734	.464
	Level of production	-.018	.141	-.010	-.125	.901
	Input challenge	-.332	.048	-.554	-6.854	.000
	Labour challenge	.078	.049	.136	1.613	.110

A regression analysis done on objective two indicated that household land size had no significant influence in the adoption of alternative crops to tobacco farming in the area. Though statistically non-significant, the negative coefficient of -0.06 (as indicated in Table 15) implied that an increase in household land size would lead to a decline in the adoption of alternative crops to tobacco farming. However, it was anticipated to have a significant influence because from the interviews, majority of the adopters, 13.89% out of the total 35.19% had smaller household land sizes (1 to 2 acres). This could be an implication that they adopted alternative crops to tobacco by the fact that the crops were also food crops and therefore given first priority as tobacco is a non-food crop as was also noted by Mangasini *et al.*, 2013. This was also revealed from the FGDs responses that majority of the adopters' preferred alternative crops to tobacco being food crops due to their smaller household land sizes. Despite the non-statistically significant results, as was also found by Mbaye *et al.*, 2014, that the land size of household determines the type of crops to grow and its viability if split for cultivation of various crops.

The results show that adoption of alternative crops was negatively influenced by input challenge. This was indicated by the negative coefficient -0.554 (Table 15) and it was significant at 10%. This means that an increase in input challenge by 1% would lead to a decline in the adoption of alternative crops to tobacco farming by 55.4%. From the results, there was a negative relationship between input challenge and adoption of alternative crops to tobacco farming. This could be because, from the interviews, farmers bought inputs for the alternative crops to tobacco from the public shops and agro-vets, a condition that was predetermined by the purchasing power of the farmer. This was also revealed from the FGDs responses that adopters bought inputs for alternative crops to tobacco from the public shops and agro-vets. On the other hand, farmers who were interested in tobacco farming could easily get the inputs from the tobacco companies mostly in form of credit that was repaid during the selling of tobacco to the same companies since they provided the market for the produce.

It was found that, the level of production had no significant influence in the adoption of alternative crops to tobacco farming. This means that this variable did not have a significant effect in the adoption of alternative crops to tobacco farming. There was a weak positive

correlation between labour challenge and adoption of alternative crops to tobacco farming. From the interviews, those who were not assured of adequate labour force were likely to adopt alternative crops to tobacco farming since such crops are not as labour-intensive as tobacco farming.

4.4.3 The contribution of Extension, Credit and Market Access in the adoption of alternative crops to tobacco farming

Table 16: Regression Analysis on objective three

Model		Coefficients ^a				
		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.668	.338		4.929	.000
	Source of agricultural information	-.074	.023	-.281	-3.234	.002
	Information challenge	-.112	.057	-.177	-1.961	.053
	Market challenge	.002	.056	.003	.035	.972
	Farmer organisation/cooperative challenge	-.114	.073	-.147	-1.551	.124
	Credit access past 5 years	.169	.087	.176	1.956	.053
	State of market for produce	.117	.066	.162	1.775	.079
	Distance to market	.029	.068	.036	.422	.674
	Member of a cooperative/ farmer's association	.002	.090	.002	.025	.980
	Received formal training	-.059	.089	-.061	-.664	.509
a. Dependent Variable: adoption						

There was a significant relationship between the source of agricultural information and adoption of alternative crops to tobacco farming. Results from regression analysis done for objective three, indicated that the source of agricultural information determined whether a farmer adopts alternative crops to tobacco or not. This was shown by a negative coefficient of -0.281 (Table 16) and was significant at 10%. This means that an increase in contact with the reliable source of agricultural information, for example the agricultural extension officers by 1% would lead to an increase in the adoption of alternative crops to tobacco farming by 28.1%. However, the relationship was negative. The negative coefficient of -0.281 could be explained by the fact that majority of the adopters got their agricultural information from other farmers as the non-adopters got the same from the readily available extension staff (field officers) from the tobacco companies. Responses from key informants revealed that extension contact with the farmers was a challenge because the agricultural extension officers were not adequately facilitated to go to the field and meet their clients.

It was found that, adoption of alternative crops to tobacco farming was negatively related to agricultural information challenge as shown by a negative coefficient of -0.177 (Table 16) and was significant at 10%. This means as the challenge of getting agricultural information on alternative crops increased by 1%, it resulted into a decline in the adoption of alternative crops to tobacco farming by 17.7%. This could be because information on alternative crops would be lacking or inadequate and therefore farmers would not be aware of the existence of such crops. For those who have started adopting, it would be a challenge to them on the management practices as the crops grow.

Results from regression analysis indicate that there was a positive relationship between credit access and adoption of alternative crops to tobacco farming. This was shown by a positive coefficient of 0.176 (Table 16) and was significant at 10%. This means that an increase in the credit access by 1% would lead to an increase in the adoption of alternative crops to tobacco farming by 17.6%. This was because easy access to credit by farmers would enable them buy the required inputs for the alternative crops thereby increasing the number of farmers engaging in the enterprise hence increased adoption.

There was a positive correlation between market access and adoption of alternative crops to tobacco farming. As shown in Table 16, a positive coefficient of 0.162 state of market indicated that it had a positive influence in the adoption of alternative crops to tobacco farming. This means that if farmers were assured of a ready market for their alternative crops by 1%, adoption of the crops would increase by 16.2%. From the interviews, farmers indicated that one of the constraints facing adoption of alternative crops was inadequate market for their produce and when the market was available, the prices per unit were low as opposed to tobacco that has a ready market provided by the nearby tobacco companies (Alliance One Tobacco Kenya and Mastermind Tobacco Kenya Limited).

From the results, being a member of farmers' organization or cooperative society and formal training had no significant influence in the adoption of alternative crops to tobacco farming. This means that these variables did not have a significant effect in the adoption of alternative crops to tobacco farming. From the interviews, this could be attributed to the fact that very few farmers were members to the very few farmer organizations. Formal trainings for farmers were conducted once in a while by the tobacco companies for the non-adopters. For the adopters, formal trainings were also conducted once in a while though few farmers benefited during such trainings.

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

The overall objective of this study was to examine the socio-economic attributes hindering adoption of alternative crops to tobacco farming in Kehancha Division, Kuria West Sub-county, Kenya. The specific objectives of the study were: to examine the influence of farmer attributes in the adoption of alternative crops to tobacco farming, to explore the influence of farm characteristics in the adoption of alternative crops to tobacco farming and to examine the contribution of extension, credit and market access in the adoption of alternative crops among the respondents in the area of study. The study reviewed literature on the socio-economic factors influencing adoption of agricultural crop enterprises and related farm technologies.

The methodology used to answer the study objectives were: sampling that involved proportional sampling to identify the areas of survey and to get both adopters and non-adopters; and purposive sampling to get the relevant key informants. Data collection was done through surveying, using structured questionnaires with both open and closed-ended questions for farmers and interviewing through use of interview guides for focused group discussions and key informants. Quantitative data were analyzed through simple descriptive statistics such as frequency distributions, percentages and totals. Relationships were analyzed through correlation by regression analysis. Qualitative data were analyzed through content analysis and presented through key messages or emerging themes.

Based on the objective one, it can be summarized that majority of the households are male headed. The dominant age of the farmers was between 36 to 45 years. Majority of the farmers had attained primary education as their highest level of education. This was more prevalent among the non-adopters. On household size, majority of the farmers had a household size of 5 to 8 members. However, non-adopters had larger household sizes compared to adopters. The larger household sizes were partly to be encouraging farmers to engage in labour-intensive tobacco farming enterprise. This could happen as even the schooling members could be directed not to go to school and help in tobacco production at some stages in some days.

On objective two, most farmers relied on family as their source of farm labour. In terms of land size, majority of the farmers had 3 to 4 acres of land as their household land size, majority being non-adopters. In relation to main source of household income, majority of the farmers ranked crops as their major source of income, followed by off-farm income and then income from livestock.

On objective three, in regard to extension access, non-adopters had reliable access of extension services provided by the tobacco companies through their field extension officers (*monitors*). On the other hand, majority of the adopters relied on other farmers for agricultural information on alternative crops to tobacco. Most non-adopters accessed credit from the tobacco companies in form of inputs such as fertilizers, agrochemicals and tobacco seeds. Adopters who accessed credit were members linked to Nuru International (NGO) that provided credit in form of fertilizers and cereal seeds. However, they cited high interest rates, lack of collateral and unfavourable repayment terms as the reasons for inaccessibility of credit facilities. In regard to market access, inadequate availability and access of markets for alternative crops was a big challenge to majority of the farmers. Adopters indicated inadequate market for alternative crops to tobacco as their main concern. The NGOs advocating for alternative crops did not provide market for the produce. It was the farmers who were to look for the market for their produce, sell and repay the credit. According to them, when there was market, the price per unit was low hence low returns. On the other hand, non-adopters had a readily available and easily accessible market provided by the tobacco companies, which have established buying centres (sheds) near the farmers.

5.2 Conclusion

The main objective of this study was to examine socio-economic attributes hindering adoption of alternative crops to tobacco farming in Kehancha Division, Kuria West Sub-county, Kenya. The study was based on the three specific objectives as indicated in section 5.1. Based on the key findings of objective one, it can be concluded the dominant age of the farmers was between 36 to 45 years, an indication that majority of the farmers were in their agriculturally productive age that the labour-intensive tobacco cultivation requires. Age of the household head (45 years and above), education level (other factors like extension, credit and market access being constant) and partly household size influence adoption of alternative crops to tobacco farming. The agriculturally productive age implies the tobacco farming is likely to dominate in the area, hence an increase in environmental, social and economic implications. The low education levels among the farmers influenced negatively their understanding of the social, economic and environmental implications of tobacco farming and consequently, non-adoption of alternative crops to tobacco farming. This is a threat to environmental conservation and its associated livelihoods in the long run. Larger household sizes, to some extent, encouraged tobacco farming since the intensive farm labour that tobacco farming enterprise required could be provided for by the family members. Gender of the household head had no influence in the adoption of alternative crops to tobacco farming.

In the case of objective two, it can be concluded that farm characteristics such as source of farm labour, household land size and source of household income did not have significant influence in the adoption of alternative crops to tobacco farming. In the case of objective three, it can be concluded that extension, credit and market access influenced adoption of alternative crops to tobacco farming. Inadequate credit facilities discouraged farmers from adopting alternative crops. Inadequate market access for alternative crops discouraged farmers from adopting such crops. When there was market for such crops, the price per unit was low, hence low returns. For non-adopters, there was readily available and easily accessible market for tobacco, which was provided by the tobacco companies. This encouraged tobacco farming, and therefore, its associated environmental, social and economic implications are likely to increase.

5.3 Recommendations

The study was based on the three objectives as indicated in section 5.1. Based on the key findings and conclusion in relation to the study objectives, the study recommends as follows:

- i) In regard to objective one, farmers should be encouraged to adopt alternative crops to tobacco farming irrespective of their ages. This can be done through incentives (sort of rewarding), especially those who are willing to adopt or have adopted alternative crops. Sensitization programmes should be enhanced by the national and county governments in collaboration with other stakeholders including the local NGOs. This will help increase awareness creation among the farmers on the social, economic and environmental implications of tobacco farming and their reduction strategies including adoption of alternative crops. This will help towards improvement in environmental conservation and its associated livelihoods in the community.
- ii) In regard to objective three, now that agriculture and environment are devolved functions, the study recommends that the county government should adequately provide agricultural extension services to farmers. This can be done through employment of more extension officers. The officers should be motivated through facilitation and provision of adequate resources so as to enable them go to the field and reach more farmers requiring information on alternative livelihoods including adoption of alternative crops to tobacco farming. The national and county governments together with other stakeholders including the local NGOs should find ways of providing credit facilities with low interest rates, as this will make them easily accessible by farmers. The inputs related to alternative crops such as seeds, fertilizers and agrochemicals can be provided free or at subsidized prices so as to support those farmers who have adopted alternative crops and those who are willing to adopt them. This will contribute towards tobacco reduction, hence reducing the environmental implications associated with tobacco farming.
- iii) In regard to market access, the study recommends that marketing structures should be enhanced by the stakeholders. This can be done through networking so as to expand the market for the alternative crops and also lobby for improved prices. Through the county government and other stakeholders, farmers should be encouraged to form commodity-specific cooperative societies. This will help farmers take advantages of government

policies and programmes regarding the same. The cooperative societies will help farmers have a bargaining power during marketing of their produce. The cooperatives societies can also provide credit to members at low interest rates, hence availing the required capital for adoption of alternative crops to tobacco farming. Farmers should also be encouraged to form groups and seek credit facilities from the other financial institutions like micro-finance banks. Adoption of alternative crops to tobacco farming will help in reduction of tobacco farming, a scenario that will contribute greatly towards environmental conservation in the area.

5.4 Suggestions for Further Research

The study focused on examining socio-economic attributes hindering adoption of alternative crops to tobacco farming in Kehancha Division, Kuria West Sub-county. Areas for further research have been suggested as follows:

- i) There is need for research to fill the gap on the role of the tobacco companies' Corporate Social Responsibility (CSR) in relation to adoption of alternative crops to tobacco farming in the area.
- ii) The study was conducted in Kehancha Division and only 108 farmers were interviewed. However, further research can be conducted to cover the entire sub-county or county so as to capture socio-economic attributes that were not captured due to a smaller sample.
- iii) The study can also be conducted in other tobacco farming regions so as to get the differences in challenges facing farmers willing to adopt alternative crops to tobacco farming.

REFERENCES

- Adebiyi, S. and Okunlola, J. O. (2013). Factors Affecting Adoption of Cocoa farm Rehabilitation Techniques in Oyo State of Nigeria. *World Journal of Agricultural Sciences*; vol. 9(3), 258-265. Retrieved February 12, 2015, from DOI: [10.5829/idosi.wajs.2013.9.3.1736](https://doi.org/10.5829/idosi.wajs.2013.9.3.1736).
- Ayoola, B. J. (2012). Socio-economic Determinants of the Adoption of Yam Mininsett Technology in the Middle Belt Region of Nigeria. *Journal of Agricultural Science*; vol. 4, No. 6; 215-222. Retrieved January 25, 2015, from URL: <http://dx.doi.org/10.5539/jas.v4n6p215-222>.
- Badia, P. and Runyon, R. (1982). *Fundamentals of Behavioural Research*. London. Addison-Wisley Publishing Company.
- Berg, J. V. (2013). Socio-economic Factors Affecting Adoption of Improved Agricultural Practices by Small scale farmers in South Africa. *African Journal of Agricultural Research*; vol. 8 (35), 4490-4500. Retrieved January 20, 2015, from <http://www.academicjournals.org/AJAR>.
- Center for Tobacco Control in Africa (CTCA). (2012). *Alternative livelihoods to tobacco growing and environmental conservation. Centre for Tobacco Control in Africa Meeting Proceedings*. Kampala, Uganda, February 6, 2012.
- Chacha, B. K. (2002). From Pastoralists to Tobacco Peasants: The British American Tobacco (B.A.T) and Socio-Ecological Change in Kuria District, Kenya, 1969-1999.
- Chavez, M. (2010). Creating a typology of tobacco farms according to determinants of diversification in Valle De Lerma (Salta-argentina). *Spanish Journal Agricultural Research*. Vol. 8(2): 406-471. Accessed on September, 15th 2016, from <http://dx.doi.org/10.5424.sjar/2010082-1201>.
- Chepkurui, A, and Kinoti, J. (2014). The social impacts of tobacco farming on farmers and household food security in Ang'urai Division, Kenya. *Research Journal of Sociology*, vol. 2(4): 1-20.

- Feder, G., Just, R., and Zilberman, D. (1985). Adoption of Agricultural Innovations in Developing Countries: A Survey. *Economic development and cultural change*, vol. 33 (2), 255-298.
- Fungo, B., Kabanyoro, R., Kabiri, S., Mugisa, I., Nkyagaba, W., Kituuka, G., Kyampeire, P. and Nampera, M. (2013). Willingness of Farmers to Adopt Rice Intercrops in the Lake Victoria Crescent Agro-ecological Zone of Uganda. *Journal of biology, agriculture and healthcare*; vol. 3 (6), 121-130. Retrieved January 26, 2015, from <http://www.iiste.org>.
- Geist, H. (2009). *Tobacco growers at crossroads: Towards a comparison of diversification and the ecosystem impacts in relation to land use*. *Land use policy*, 26:1066-1079. <http://dx.doi.org/10.1016/j.landusepol.2009.01.003>.
- Government of Kenya (GOK), (2008). *Kuria West District Development Plan 2008-2012*. Nairobi. Government printer.
- Government of Kenya (GOK) (2013). *Migori County First Integrated Development Plan 2013-2017*.
- Grazhdani, D. (2013). An Analysis of Factors Affecting the Adoption of Resource Conserving Agricultural Technologies in Al-prespa Park. *Natura montenegrina*; vol. 12 (2), 431-443. Retrieved January 20, 2015, from <http://www.academicjournals.org/AJAR>.
- Ghulam, A. J., Mumtaz, A. J., Muhammad, S., Maqsood. Z.,(2011). Socio-economic Factors Affecting Adoption of Sunflower varieties in Sindh. *Journal of commerce and social sciences*; vol. 5 (1), 192-201. Retrieved January 19, 2015, from <http://www.academicjournals.org/JAR>.
- Idrsa, Y., Shehu, H. and Ngamdu, M. (2012). Effects of Adoption of Improved Maize Seed on Household Food Security in Gwoza Local Government Area of Borno State, Nigeria. *Global Journal of Science Frontier Research in Agriculture and Biology*; vol. 12 (5) 7-11. Global Journals Inc. (USA).

- Jarico, A.G., Junezo, M. A., Rahpoto, M. S. and Shah, M. Z. (2011). Socioeconomic factors affecting adoption of sunflower varieties in Sindh. *Journal of commerce and social sciences*; vol. 5 (1), 192-201. Retrieved January 19, 2015, from <http://www.academicjournals.org/JAR>.
- Kenya Tobacco Control Situational Analysis Consortium (2008). *Situational analysis of tobacco control in Kenya: Baseline Assessment Report*. Nairobi. KTCSAC.
- Kerlinger, F. N., and Howard, B. L. (2000). *Foundations of Behavioural Research*. 4th ed. USA. Cengage Learning.
- Kibwage, J. K, Momanyi, G. M. and Odondo, A. (2007). *Occupational health and safety concerns of smallholder tobacco farmers. A paper in the African newsletter on occupational health and safety*. vol. 17(2). Finland. Finish institute of occupational health.
- Kibwage, J. K, Netodo, G. W, Kapiyo, R. A, Nyantika, D, Momanyi, G. M, Odondo, A. (2006). *Diversification of household livelihood strategies for tobacco smallholder farmers in South Nyanza region, Kenya: Final technical workshop proceedings report*. Canada. IDRC.
- Kibwage, J. K, Netodo, G. W, Odondo, A, Momanyi, G. M, Kapiyo, R. A, Nyantika, D. (2008). *Diversification of household livelihood strategies for tobacco smallholder farmers: a case study of introducing bamboo in South Nyanza region, Kenya. Third technical project progress report*. Canada. IDRC/Maseno University.
- Kibwage, J. K, Odondo, A, and Momanyi, G. M. (2009). *Assessment of livelihood assets and strategies among tobacco and non-tobacco growing households in South Nyanza region, Kenya*. *African journal of agricultural research*, vol. 4(4), 294-304. Retrieved October 28th, 2014, from online at <http://www.academicjournals.org/AJAR>.

- Kibwage, J. K. (2009). *South Nyanza regional community action plan for shifting from tobacco smallholder farming to tobacco production (draft)*.
- Kibwage, J. K. (2011). *Environmental, health and social impacts of tobacco farming in Kenya*. Nairobi. IDRC/INBAR.
- Kuboga, N., Kalala, A., and Mrutu, M. (2011). Tobacco Production Baseline Survey in Serengeti, Tarime and Rorya Districts, Mara Region, Tanzania. A Research Report. Tobacco Research Institute.
- Kuntaniringsih, A. and Mariyono, J. (2013). Socio-economic Factors Affecting Adoption of Hybrid Seeds and Silvery Plastic Mulch for Chili Farming in Central Java. *SEPA; VOL.9, No.2, 297-308*.
- Lwayo, M. K. and Maritim, H. K. (1999). Socio-economic Factors Affecting Farmers' Decision to Adopt Farm Forestry: An application of multivariate logistic analysis in Busia District Kenya. *Journal of agricultural economics; vol. 46, No. 3, 361-370*. Retrieved January 25, 2015, from <http://jae.org>.
- Mangasini, A. and Mwanahawa, L. (2013). *Socio-Economic Factors Limiting Smallholder Groundnut Production in Tabora Region, Tanzania*. Report presented at REPOA's 18th Annual Research Workshop; Dar-es-salaam, Tanzania.
- Magati, P. O. (2009). A Cost-benefit Analysis of Substituting Bamboo for Tobacco: A case Study of South Nyanza, Kenya. A Research paper. University of Nairobi.
- Mangora, M. (2005). Ecological Impact of Tobacco Farming in Miombo Woodlands of Urambo District, Tanzania. *African Journal of Ecology; vol. 43, 385-91*. Retrieved June 12, 2015, from <http://www.tobaccocontrol.bmj.org>.
- Mbaye, D. K., Lagat, J. K. and Mulungu, H, K. (2014). Choice of alternative crop enterprises among smallholder tobacco farmers in Teso District, Kenya: A multinomial Logit Analysis. *African Journal of Agricultural Research, vol. 9(22)*, pp. 1721-1728. Accessed in October 21, 2014, from <http://www.academicjournals.org/AJAR>.

- Mugadza, C. C. (2013). Can Farmers Diversify from Growing Tobacco in Zimbabwe? A thesis in Rural Development and Natural Resource Management. Uppsala. Retrieved October 18, from <http://stud.epsilon.slu.se>.
- Mugenda, O. M, and Mugenda, A. G. (1999). Research methods: *Quantitative and qualitative approaches*. Nairobi. Acts press.
- Mukarati, J. (2014). Analysis of Socio-Economic Factors Affecting Wheat Production in Zimbabwe. A case of Nyabira, Zvimba District.
- Mungisha, J., Ogwal, R., Ekere, O. and Ekiyar, V. (2014). Adoption of IPM groundnuts production technologies in Eastern Uganda. African Crop Science Journal. Vol. 12(4): 383-391. Accessed on July 12, 2016, from <http://www.academicjournals.org/AJR>.
- Mustapha, S. B., Makinta, A. A., Zongoma, B. A., and Iwan, A. S. (2012). Socio-economic Factors Affecting Adoption of Soya bean Production Technologies in Takum Local Government Area of Taraba State, Nigeria. *Asian journal of agriculture and rural development*, vol. 2, No. 2, 271-276.
- Natacha, L., Guilherme, E., Jumanne, A. and Novotny, T. (2011). Environmental health impacts of tobacco farming: A review of literature. Canada. International Development Research Centre (IDRC). Accessed on May 23, 2015, from tobacco control, 21:191-197. [Doi.10.1136/tobaccocontrol-2011-050318](https://doi.org/10.1136/tobaccocontrol-2011-050318).
- Neeru, S (2012) Meaning of the term Descriptive Survey Research Method. *International Journal of Transformations in Business Management*. Vol. 1, Issue No. 6 Apr-Jun. Retrieved January 26, 2016, from <http://www.ijtbm.com/>
- Ochola, S. and Kosura, W. (2007). *Tobacco Cultivation and Possible Alternative Crops, Kenya: A Case Study* conducted as a technical document for the first meeting of the ad hoc study group on alternative crops established by the conference of the parties to the WHO Framework convention on tobacco control; February, 2007.

- Orodho, A.J, and Kombo, D. K. (2002). *Research methods*. Nairobi. Kenyatta University, Institute of Open Learning.
- Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). New York. The Free Press.
- Sauer, J. and Abdallah, J. (2007). *Forest Diversity, Tobacco Production and Resource Management in Tanzania*. *Forest policy economics*, vol. 9: 421-39; Dar-es-salaam.
- Saunders, M. P. (2007). *Research Methods for Business Students*. Fourth Edition. London. Prentice Hall.
- Sonja, V. E, and Laure, N. (Eds.). (2012). *Alternative livelihoods to tobacco: Approaches and experiences*. Berlin. Unfairtobacco org.
- Tionenji, P. (2011). *Factors affecting cassava adoption in Southern Province of Zambia: A Case study of Mazabuka District*. Unpublished Master's Thesis, Massey University, New Zealand.
- Truong, T. N. and Yamada, R. (2002). *Factors affecting farmers' adoption of technologies in farming system: A case study in Omon District, Can Tho Province, Mekong Delta, Vietnam*, vol. 10, 94-100. Retrieved January 19, 2015, from <http://www.academicjournals.org/JAR>.
- World Health Organization (WHO). (2005). *World Health Organization Framework Convention on Tobacco Control*. Geneva. World Health Organization.
- World Health Organization, (WHO). (2008). *Framework Convention on Tobacco Control: Study group on economically sustainable alternatives to tobacco growing in relation to articles 17 and 18 of the convention*. Conference Proceedings of the 3rd Session of parties to the WHO Framework Convention on Tobacco Control held in Durban, South Africa.

Appendices

Appendix 1: RESEARCH TOOLS

Annex 1: Farmer's Household Questionnaire

Name of interviewer Date

Name of respondent / case number

Location Sub-location

This survey is being carried out for academic purposes in order to obtain information on the socio-economic factors hindering adoption of alternative crops to tobacco farming in Kehancha Division by Mariba John Maroa, a student at Kenyatta University. The information will be important to the researchers, policy intervention stakeholders and smallholder farmers towards improving the farmers' social, economic and environmental welfare. The project would be grateful if you spare part of your time to answer the following questions. The information you give will be treated with a lot of confidentiality and mainly for academic purposes and will not be used for any other purposes.

A: household head details

1. Gender of the household head: Male [] Female []

2. Age of the household head: Less than 25 yrs [] 25-35 yrs [] 36-45 yrs [] 46-55yrs [] 56-65 yrs [] over 65yrs

3. Highest education level of the household head: Informal [] Primary []
Secondary [] Tertiary [] University []

4. Size of the household (over 12 yrs old): Less than 5 [] 5-8 [] 9-12 [] 13-16
[] over 16 []

5. Source of farm labour: Family [] Hired []

6. Household land size: Less than 1 acre [] 1-2 acres [] 3-4 acres [] over 4 acres []

7. Source of household income: (rank in order of importance: 1-least important, 2-important, 3-most important)

Livestock	
Off farm employment	
Crop cultivation	

8. Level of production: Medium [] Small-scale []

9. Are you a tobacco farmer? Yes [] No []

10. If NO, which crops do you grow?

Cash crops: i)ii)iii)iv).....

Food/cash crops: i).....ii)..... iii).....iv).....

B: ADOPTERS OF ALTERNATIVE CROPS (those growing alternative crops)

11. Tobacco farming contributes to environmental degradation: Strongly agree [] Agree [] Disagree [] Strongly disagree [] Don't know []

12. Reducing tobacco production/adopting alternative crops in your area is beneficial to you and your community at large: Strongly agree [] Agree [] Disagree [] Strongly disagree [] Don't know

13. Where do you normally get your agricultural/environmental information? (tick all that apply) Agricultural officers [] TV [] Radio [] Pamphlets [] Other farmers [] Produce buyers [] Farmer org./cooperatives [] others (specify).....

14. Where do you normally get your farm inputs (such as seeds, fertilizers, pesticides)?
Produce buyers [] Public shops []
15. What factors (have) contributed towards your adoption of alternative crops to tobacco farming? (rank as appropriate: 1-Least important, 2-Important, 3-Most important)
- i) Access to credit []
 - ii) Access to seeds and other inputs []
 - iii) Availability and access to market []
 - iv) Easier access to information and training []
 - v) Membership to a farmers' org./cooperative society []
 - vi) Less labour-intensive than tobacco []
 - vii) Perceived social and environmental friendliness []
 - viii) Others (specify)
16. For the past 5 years, did you have access to credit? Yes [] No []
17. If NO, what were the reasons? Did not seek [] Unavailability of credit [] No collateral [] High interest rate [] Unfavourable repayment terms [] Did not need [] Other (specify)
18. What is the state of the market for your produce? Readily available [] Available [] Not readily available []
19. What is the distance in kilometres (km) to the nearest market? Less than 3km [] 3-5 km [] over 5km []
20. Are you currently a member of any farmers' association/cooperative? Yes [] No []
21. If YES, what association (group) do you belong to? (tick all that apply) Extension group [] NGO group (indicate name of NGO) [] Women group []

Savings club [] Farmer field school [] Cooperative [] Other (specify).....

22. Have you ever received any type of formal training? Yes [] No []

23. If YES, by which organization?

C: NON ADOPTERS (those involved in tobacco farming)

24. Tobacco farming contributes to environmental degradation: Strongly agree [] Agree [] Disagree [] Strongly disagree [] Don't know []

25. Reducing tobacco production/adopting alternative crops in your area is beneficial to you and your community at large: Strongly agree [] Agree [] Disagree [] Strongly disagree [] Don't know

26. Where do you normally get your agricultural/environmental information? Agricultural officers [] TV [] Radio [] Pamphlets [] Other farmers [] Produce buyers [] Farmer org./cooperatives [] Others (specify).....

27. Where do you normally get your farm inputs (such as seeds, fertilizers, pesticides)? Produce buyers [] Public shops []

28. To what extent is each of the following a problem to you towards adoption of alternative crops to tobacco? (rank as appropriate: 1-Very Big problem 2-Big problem 3-Average problem 4-Fair problem 5-Least problem)

- i) Inaccessibility of seeds and other inputs []
- ii) Inadequate information and extension contact []
- iii) Inadequate access and availability of markets []
- iv) Inaccessibility of credit facilities []
- v) Low returns (income) from alternative crops []

29. What other problems prevent you from adopting alternative crops to tobacco farming?.....

30. For the past 5 years, did you have access to credit? Yes [] No []
31. If NO, what were the reasons? Did not seek [] Unavailability of credit [] No collateral [] High interest rate [] Unfavourable repayment terms [] Did not need [] Other (specify)
32. What is the state of the market for your produce? Readily available[] Available [] Not readily available []
33. What is the distance in kilometres (km) to the nearest market? Less than 3km [] 3-5 km [] over 5km []
34. Are you currently a member of any farmers' association/cooperative? Yes [] No []
35. If YES, what association (group) do you belong to? (tick all that apply) Extension group [] NGO group (indicate name of NGO) [] Women group [] Savings club [] Farmer field school [] Cooperative [] Other (specify).....
36. Have you ever received any type of formal training? Yes [] No []
37. If YES, by which organization?

END

THANK YOU FOR YOUR EFFORT & COOPERATION

Annex 2: Interview Guide for Key Informants

A: Ministry of agriculture officers and extension workers

1. Name of respondentdate
2. Highest level of education: Primary [] Secondary [] Tertiary [] University []
3. For how long have you been involved in extension? Less than 5yrs [] 5-10yrs [] 10-15yrs [] over 15yrs []
4. What has been your role in the community as far as adoption of alternative crops to tobacco farming is concerned?
.....
.....
5. Which extension approach do you use when offering your services to farmers?.....Has the approach been effective? (briefly explain)
.....
.....
.....
6. What factors are affecting your effectiveness in extension service delivery in regard to:
 - i) Resources availability (e.g in training, transport etc).....
 - ii) Frequency of meeting with farmers
 - iii) Distance to farmers.....
 - iv) Number of farmers covered.....

7. In your opinion, what reasons have led to the adoption of alternative crops to tobacco farming by some farmers?.....

.....
.....
.....

8. Most farmers have NOT adopted alternative crops to tobacco farming. What could be the reasons?

.....
.....

B: Non-Governmental Organizations (NGOs)

9. What is your role in the community as far as adoption of alternative to tobacco farming is concerned?

.....
.....

10. For how long have your been promoting adoption of alternative crops to tobacco?

11. What reasons have led to the adoption of alternative to tobacco farming by some farmers?.....

.....
.....

12. Most farmers have NOT adopted alternative crops to tobacco farming. What are the reasons?.....

.....
.....

END

THANK YOU FOR YOUR EFFORT & COOPERATION

Annex 3: Interview Guide for Focused Group Discussions (FDGs)

1. Do you experience any problems (such as social, economic, environmental) associated with tobacco farming?.....
2. Mention those problems
 - a) Social problems.....
 - b) Economic problems.....
 - c) Environmental problems.....
3. How do you solve the above problems.....

4. Which are some of the crops grown instead of tobacco?.....

5. Compared to tobacco, is there a ready market for the crops grown instead of tobacco?.....
6. Which organizations operating in your area provide support for alternative crops to tobacco farming?.....

Organization	Role
1.	
2.	
3.	

7. Are there enough agricultural extension officers? Yes [] No []

8. Are the extension services provided by extension officers sufficient? Yes [] No []

9. If NO, why?.....

.....
.....

10. What reasons have led to adoption of alternative crops to tobacco farming by some farmers?.....

.....
.....
.....

11. Most farmers have NOT adopted alternative crops to tobacco farming. What are the reasons?.....

.....
.....
.....

END

THANK YOU FOR YOUR EFFORT & COOPERATIO

Appendix 2: WORK PLAN

Activity/ Duration	Oct-Dec 14	Jan-Feb	March	Apr-May	Jun-Jul	Aug- Sept	October
Literature search							
First draft proposal							
Second draft proposal							
Final proposal writing							
Field work							
Compilation, analysis and report writing							
Submission of final project report							