

**FACTORS INFLUENCING THE UPTAKE OF  
BEEKEEPING AS AN ECONOMIC ACTIVITY IN  
KENYA: A CASE OF FARMERS IN MAKUENI COUNTY**

**BY**

**GEORGE MULINGA KATHILA**

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and Management of the University of Nairobi**

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## DECLARATION

This research project proposal is my own work and has not been submitted for any degree or examination in any other University.

Signature.....

Date.....

George Mulinga Kathila

L50/77804/2015

This project proposal has been submitted for examination with my approval as the university supervisor

Signature.....

Date.....

Dr. Angeline Mulwa, PhD.

Lecturer-Department of Open Learning

University of Nairobi

## **DEDICATION**

I dedicate this work to my beloved family for their support and encouragement.

This project aims at changing the perspective of bee keeping among Kenyans, create opportunities for employment and improve livelihoods.

I thus dedicate this thesis to all those who embrace beekeeping as an economic activity.

## **ACKNOWLEDGEMENTS**

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## LIST OF ABBREVIATIONS AND ACRONYMS

ASAL	-	Arid and Semi-Arid Land
BKAZ	-	Beekeepers Association of Zimbabwe
CIDA	-	Canadian International Development Agency
ICIPE	-	International Center of Insect Physiology and Ecology
KARLO	-	Kenya Agricultural Research and Livestock Organization
KES	-	Kenyan Shilling
KVDA	-	Kerio Valley Development Authority
SACDEP	-	Sustainable Agricultural Community Development Programme
USHS	-	Uganda Shillings

## ABSTRACT

This study focused on the factors that influence beekeeping in Makueni County. The specific objectives were to: establish how training influences farmers uptake of beekeeping as an economic activity in Makueni County; examine the influence of funding on the farmers uptake of beekeeping as an economic activity in Makueni county; establish the influence of institutional support on the farmers uptake of beekeeping as an economic activity in Makueni county; and to explore the influence of sustainable markets on the farmers uptake of beekeeping as an economic activity in Makueni county. The study adopted a descriptive survey study research design. The target population was 1440 persons consisting of farmers and Ministry of livestock officials, from Makueni County. Primary data collection instruments included structured questionnaires, interview guide and observation while secondary data was sourced from the Makueni county website, Ministry of agriculture records in Makueni county, and existing literature on beekeeping. The validity of the research instruments was ascertained through consulting and adopting recommendations of the University of Nairobi supervisors who are experts in research. The reliability of the research instruments was determined after the pilot study using test re test method. The data collected was analyzed through descriptive statistics by use of frequency tables, percentiles and range. Inferential data analysis techniques such as; Pearson correlation analysis to determine the nature and extend of relationships between each independent variable to the dependent variable, while regression model was drawn to determine the extent to which the influencing factors account for the uptake of beekeeping in Makueni county. The study found out that 73% of farmers in Makueni County considered beekeeping as a viable economic activity while only 30% practiced beekeeping. The influencing factors namely:- Training, funding, institutional support and sustainable markets were established to be the main factors influencing beekeeping in Makueni county. Each individual factor however influences beekeeping in different aspects and magnitudes. The demographic findings from the study confirm a common phenomenon in rural semi-arid regions- rural urban migration which depletes such areas of the energy and literacy required to boost sustainable development.

The research recommends that county governments in arid and semi-arid regions should partner with other development stake holders and allocate resources to boost beekeeping activities to a commercial scale. This would significantly uplift the standards of lives for their people. Other countries such as Uganda, Ethiopia, and India have successfully commercialized beekeeping employing thousands of its people, The Kenyan government should formulate a policy that empowers and puts beekeeping on the same level with other key Kenyan farm export products such as coffee and tea.

# CHAPTER ONE

## INTRODUCTION

### 1.1 Back ground to the study

The practice of beekeeping also referred to as apiculture dates back many years. According to Tew (2016) there is evidence of people collecting honey from wild bees as far back as 15,000 years ago. Beekeeping involves introducing artificial hives where bees are domesticated for purposes of producing honey. Human beings then find a way to extract the honey without attracting outrage in form of bee stings from the bees (Zacepins,2015). Besides production of honey, bees are also kept for sale to other beekeepers. Other bee products include beeswax, propolis, pollen, and royal jelly (Van Huis, 2013).

Beekeeping is different and unique compared to other farming activities. The role of human beings is to provide infrastructure and controlled management. Bees independently produce and process honey and other bee-products. Bee keeping therefore requires a proper training on handling and managing this controlled process. Bee hives, harvesting, processing and storage equipment require funds which the beekeeper has to source. Most financiers only avail funds to existing and predictable ventures (Mugendi, 2010).

More often processing of bee products require expensive and sophisticated equipment which the farmer cannot afford. In most cases and especially where beekeeping has been successful, institutions have played a major role in providing heavy equipment and long-term infrastructure support. The uptake of any economic activity is motivated by the existence of a sustainable market. A farmer will only engage in production of a commodity whose demand and prices are relatively predictable over a time. This takes care of the gestation period and cumulative production costs (Minsky& Kaufman, 2008).

Kenya's dry land areas otherwise referred to as ASAL; arid and semi- arid lands are estimated at 80% of the country (Kituyi, et al., 2001). Most of the people living in these regions are either pastoralist who depend on livestock for livelihood or small scale subsistence farmers. These areas experience perennial droughts which have increased in the recent past due to climate change.

Communities in ASAL regions are in constant threat of starvation due to drought related diseases (Affognon, et al., 2015).

Ethiopia, which share similar climatic conditions to the arid parts of Kenya, has been able to turn beekeeping to a commercial venture absorbing 30% of its work force (Wangalachi, 2011). Uganda recovering from a civil war of close to twenty years found herself with a huge population of former gorilla soldiers (veterans) who were unskilled in the normal economic activities. Through the Apac beekeeping programme these veterans were successfully integrated to the society, both socially and economically (Mujuni, Natukunda & Kugonza, 2012). County and national governments can break the vicious poverty in arid regions such as Makueni through supporting beekeeping projects.

### **1.1.1 Makueni County**

Makueni County lies in the eastern region of Kenya. It has an estimated population of 0.9 million people based on the 2009 national census (Kagio & Musembi, 2013). The County is largely arid and semi-arid and usually prone to frequent droughts. The lower side which is very dry receives little rainfall that cannot sustain the growth of staple food for the people and pasture for the animals (Kagio & Musembi, 2013).

The Kamba people who are the local community in Makueni County have traditionally been associated with beekeeping. Honey was used in important ceremonies and rituals such as dowry negotiations, settling of disputes. Other uses include making herbal medicine to cure coughs, cancerous wounds, colic pains in breastfeeding mothers and their children, hoof and mouth disease in cows among other diseases.

The dry climatic conditions favor the growth of acacia trees generally referred to as *muthiia* (acacia) in the local dialect. Honey from regions with these trees is usually of high quality. (Musimba & Mutungi, 2001).

Traditionally beekeeping was a male activity whose skills were passed on from one generation to another through fathers and Uncles (Carroll & Kinsella, 2013). The community tradition allowed people to keep beehives in their neighbor's land, a practice that encouraged free beekeeping across the county. Almost every homestead owned a bee-hive. Modern living has however changed the Kamba community culture. Formal learning takes place in schools, where beekeeping skills are not taught. Land ownership restricts people from perching beehives in their neighbor's farms.

This study concentrated on the lower side of Makueni County, Kenya referred to as Kibwezi. The region has organized beekeeper's groups who owe their existence to both government and other donor's support. A baseline survey conducted in April 2017 revealed that in the early 90's there were over ninety groups with a membership of over 2000, however the number has since reduced to 72 groups with a total of 1431 members. Among the 1431 members only about 850 are actively practicing beekeeping. The annual honey production has reduced to one ton from a high of 5 tons in the early 1990's.

## **1.2 Statement of the problem**

The practice of beekeeping in Kenya is common. Research has confirmed that honey has many health benefits both nutritional and medicinal (Affognon et al., 2015). There is abundant market for honey both locally and internationally. Beekeeping thrives very well in dry climatic conditions and has no direct competition to other farming activities. There is evidence of government initiative to develop beekeeping dating back to the 1950's during the colonial era. Despite these favourable factors, farmer's uptake of beekeeping and production of bee products has been declining in the last ten years (Affognon et al., 2015). Past research on beekeeping in Kenya mainly by I.C.I.P.E scientists has concentrated on biological and technical aspects of beekeeping. Research on factors that influence farmers' uptake of beekeeping as an economic activity is wanting.

This research focused on four factors namely training, funding, institutional support, and sustainable markets which are perceived to influence the farmers' uptake of beekeeping as an economic activity in Makueni County, Kenya.

### **1.3 Purpose of the study**

The purpose of this study is to explore factors that influence the farmers' uptake of beekeeping as an economic activity in Makueni County, Kenya.

### **1.4 Objectives of the study**

The study will be guided by the following objectives.

- i. To establish how training influences farmers' uptake of beekeeping as an economic activity in Makueni county
- ii. To examine the influence of funding on the farmers' uptake of beekeeping as an economic activity in Makueni county
- iii. To establish the influence of Institutional support on the farmers' uptake of beekeeping as an economic activity in Makueni county
- iv. To explore the influence of sustainable markets on the farmers' uptake of beekeeping as an economic activity projects in Makueni county

### **1.5 Research questions**

- i. How does training influence the farmers' uptake of beekeeping as an economic activity in Makueni County?
- ii. How does funding influence the farmers' uptake of beekeeping as an economic activity in Makueni County?
- iii. In which way has institutional support influenced the farmers' uptake of beekeeping as an economic activity in Makueni County?
- iv. How have sustainable markets influenced the farmers' uptake of beekeeping as an economic activity in Makueni County?

### **1.6 Significance of the study**

It is hoped that the success of this research will lead to an increase in uptake of beekeeping and increased production of bee products by farmers in Makueni County which in turn will lead to improving the livelihoods of the rural poor in Makueni County, Kenya. The study will provide a firm basis for county governments and other institutions to consider beekeeping as a sustainable business venture and hence allocate resources for beekeeping development. Training will shape

the focus on improving both production and raising hygiene standards necessary to attract big local and international markets. The report on funding can change financial institutions view on the viability of beekeeping consequently attracting the much needed financial support.

The success of this study can lead to people abandoning destructive activities such as charcoal burning which is common among communities living in arid and semi-arid regions and embracing the more environmentally friendly beekeeping venture.

To scholars and development practitioners, the findings will contribute significantly to the body of knowledge on adoption and development of beekeeping.

Finally the findings of this study are expected to broaden and diversify the perspective of beekeeping to incorporate the commercial dimension. The research though based on facts in Makueni County, Kenya will be of significant relevance to all other arid and semi-arid regions in Kenya.

### **1.7 Limitations of the study**

The research sought to approach a county with a history of drought and high levels of poverty. There is low literacy level and poor road infrastructure. These factors led to such challenges as:- difficulty in accessing respondent's farms due to poor infrastructure, wrong interpretation of content and context due to the low literacy levels, and accommodation and travel costs due to the sparsely distributed respondents. To mitigate these challenges, the researcher hired motorcycle transportation to reach farmers, with the cooperation of kibwezi beekeepers project officials prior arrangements to meet the respondents in groups were made drastically cutting on time and costs. These officials were very useful in explaining and interpreting to the respondent farmers the contents and context of the questionnaire distributed.

### **1.8 Delimitations of the study**

This research focused on respondents from lower part of Makueni County which is a semi-arid region; however beekeeping is also practiced in wet climatic conditions (Nafula, 2008). Findings of this research may therefore be biased towards communities living in arid and semi-arid regions. The factors under study namely Training, Funding, Institutional support and sustainable markets



are too broad. More time and resources is required for an intensive study analyzing each factor separately to bring out the real influence these factors have on the uptake of beekeeping.

### **1.9 Assumptions of the study**

This research relied on the competence of records kept by the beekeepers' groups, the respondent's interpretation of the questionnaire, confidence, and trust of the entire research exercise. It was therefore assumed that the Makueni beekeepers' group's records are reliable, and that the officials used to reach farmers enjoy the trust of the community, and that respondent's willingly gave honest responses.

## 1.10 Definition of Significant Terms

<b>Economic Activity:</b>	The practice of beekeeping by farmers in Makueni county Kenya for commercial purposes.
<b>Funding:</b>	The act of availing financial resources in form of money or other values to finance farmers undertaking beekeeping activities in Makueni county, Kenya.
<b>Institution support:</b>	Assistance given to individual farmers or group of farmers in Makueni county by government and non-governmental organizations to facilitate the practice of beekeeping
<b>Uptake of beekeeping:</b>	Willingness and actual practice of beekeeping as an economic activity by the farmers of Makueni county Kenya.
<b>Sustainable markets:</b>	The availability and reliability of markets for bee products as and when beekeepers take their products to the market.
<b>Training:</b>	The acquisition of relevant beekeeping skills that will enable farmers to carry out the technical and management activities in beekeeping.

### **1.11 Organization of the study**

This study is organized into five distinctive chapters. These include; the introduction, the literature review, the methodology, analysis of findings and a conclusions chapter. The first chapter gives background information on beekeeping. It evaluates the circumstances that justify the study as well as pointing out key research questions and objectives that guided the research work. The introduction chapter concludes with a definition of key terms as well as the organization of the study.

Chapter provides past literature on bee keeping. This related literature aim at addressing the research objectives. All the variables identified within the research questions are researched upon and the information documented. The literature also presents gaps in past studies on beekeeping. This is aimed at offering further justification for this study. The second chapter also offers a descriptive review of theories that relate to the study, as well as a diagrammatical representation of the concept of study.

Chapter three is the methodology section. It details how the research was done, research tools used, the site of the study (Kibwezi in Makueni County), as well as the sampling techniques applied. The third chapter details the ethical concerns in the research and how these concerns are addressed. A working definition of variables detailing how the independent variables are connected to the dependent variable, and the metric tools for evaluation are also provided. Chapter Four offers a detailed presentation and analysis of the research findings. The chapter then details how the different variables in the research were evaluated, offering the results gathered from the sample tested. The chapter presents a detailed insight on this study, giving research findings alongside implications. Data is presented using tables while both descriptive and inferential analysis tools are used to analyze and interpret the research findings. Analysis and presentation follow the approach suggested in the methodology section.

Chapter five is a summary of the results of the study. It ties the objectives of the study to the findings through a discussion backed up by the literature reviewed. The chapter then completes the study with a conclusion and recommendations.

At the appendage to the research is a list of references, research tools, permits as well as a plagiarism report. The appendices offer evidence on literature sources, research tools and originality of the research findings.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter reviews literature on beekeeping projects across various countries in Africa. The review explores diverse literature on the factors that influence the adoption of bee-keeping among the local people in Makueni County, Kenya. The broad factors discussed and investigated are: training, funding, institutional support, and sustainable bee products markets. The literature review provides the secondary material for the research.

#### **2.2 Farmers uptake of beekeeping as an economic activity**

Human adoption of any economic activity is dependent on the cost benefit rationale. Rationale is however a product of existing knowledge. People often find it easier and beneficial to engage in activities that they understand and are skilled in. Beekeeping is a delicate activity that requires keen skills. Traditional beekeeping methods interfere with bee ecosystems and destruction of bee colonies. The crude harvesting methods lead to significant loss of honey. Products thereof do not meet the hygiene levels required by the market. Training and use of modern technologies is therefore critical for profitable and sustainable beekeeping (Carroll & Kinsella, 2013).

Funding is required to start or adopt any new economic venture. Even where benefits are explicitly clear, the availability and access to resources is a major impediment. Adoption of a new activity will require a reliable source of finance. Institutional support often plays a critical role in setting up the baseline infrastructure whose payback may take a while. Left on their own small scale farmers may never be able to plough through the initial startup of long term viable projects. Beekeeping is a commercial economic activity which requires a ready market and good prices whenever the products reach the market. There is need for regulatory framework to protect local farmers from cheap imports and counterfeit honey products from dishonest middlemen (Smith, Ostwald & Seeley, 2015).

Beekeeping is practiced all over Africa (Gupta, 2014). Literature on a few projects in various countries in Africa has been reviewed. This includes Uganda, Zimbabwe, Ethiopia and Tanzania.

Various accounts of beekeeping activities indicate that Ugandan government has embraced beekeeping as a viable economic activity that can be pursued commercially (Zacepins, et al, 2015). The Apac programme that was intended to resettle and integrate former guerrilla soldiers to normal society through beekeeping is one such government initiative. A 2010 report by the integration manager based at the Ugandan prime minister's office indicated that the government had used USHS 536 million towards training of veterans and equipping them with skills (Yap, et al, 2015). The government of Uganda has been working with bee experts to start rearing queen bees at massive scale. This initiative would lead to massive production of honey making bee keeping a commercially viable activity capable of supporting livelihoods.

Prior to 2007, with the exception of three Kenyan top bar hives, all of the hives in the beekeeping projects were the traditional hollow tube type (Mujuni, Natukunda, &Kugonza, 2012). New technology is however catching up. The Kenya top bar hives which produce twice as much honey as the traditional type are in common use. Through the help of Apiary Club of Victoria, and other private donors, farmers have been equipped with full beekeeping suits, smokers and a number of other pieces of equipment. These tools, along with ongoing training, have ensured the successful expansion of beekeeping projects in Uganda. (Yap, et al., 2015).

In Zimbabwe the beekeepers association referred to as (BKAZ) project is one of the most successful civil society empowerment vehicle (Yap, et al., 2015). Started in 2002, the project is a forum for all small-scale producers to speak with one voice and increase collaboration across the country. It also provides a platform for information sharing about markets as well as influencing policy (Masara, 2010). Traditionally, beekeeping in Zimbabwe was regarded as a domestic activity producing honey for local consumption. Through the Association, communal farmers are now realizing the potential of beekeeping for income generation. By 2007, there were at least 5000 registered members of the Association (Chazovachii, et al., 2013).

Training of beekeepers was the major activity of the project, focusing on the use of modern hive technologies such as the Kenya Top Bar hives which are simple to manufacture and more environmentally friendly. These new types of hives have also enabled the participation of women in beekeeping (Mulenga, et al., 2014). Most beekeepers now appreciate the need to adopt modern

beekeeping hives resulting in increased yields. Currently Zimbabwe produces 500,000 liters of honey annually (Tew, 2016).

In Ethiopia, bee keeping and honey production has been practiced over centuries. Literature from history books assert that beekeeping in Ethiopia started between the periods of 3500-3000BC (Yirga & Ftwi, 2010). Ethiopia is the leading producer in Africa and tenth worldwide. It has approximately surpassed 12 million honey-bee colonies producing over 50,000 metric tons of honey annually. The country produces nearly 24% of Africa's honey and 2.2% of the total global honey production. (Yirga & Ftwi, 2010). Apiculture plays a major role in creation of jobs in Ethiopia, especially for the rural-poor farmers. Nearly 11% of the total production is for domestic use while the remaining 89% is for income generation. It is also estimated that nearly 69.8% of the honey produced is used for brewing (Haile, Kebede, & Dekebo, 2012).

Despite Ethiopia having a long historical background in Apiculture practice, the country still lacks technological advancements in this industry. The lack of modernization of apiculture is one of the major impediments to economic stability especially to peasant bee-keepers. The lack of modern equipment has led to production of low quality bee products that fetch low prices. Ineffective institutional set-up and lack of policy review on beekeeping is also to blame for the underproduction of honey in the country (Getahun, et al., 2015).

Tanzania is the 2<sup>nd</sup> largest producer of honey in Africa only second to Ethiopia. The annual production is estimated at 8,000 tons generating an income of about US\$ 1.7 million. The beekeeping industry employs about 2 million rural people (Prandin, Pedrazzini, & Mutinelli, 2000). Beekeeping in Tanzania plays a major role in socio-economic development and environmental conservation. It is a source of food (e.g. honey, pollen and brood), raw materials for various industries producing beeswax candles, lubricants, honey, propolis, and bee venom (Vyamana, 2009). Despite the significant economic contribution to the country, beekeeping in Tanzania is carried out using traditional methods. It is estimated that 95% of all hives are traditional log and bark; others are reeds, gourds and pots (Prandin, Pedrazzini, & Mutinelli, 2000). Beekeeping in Tanzania had a rapid growth during the colonial era compared to post independence period. Between 1906 and 1956 the production of beeswax from Tanzania increased from 320 to 905 tons. By 1958 honey production was estimated at an annual average of 10,000 tons, (Smith,

1958). Today the production has declined to slightly over 8,000 tons with an insignificant level of export despite the high potential (Meshack, et al., 2006).

Despite the decline in bee-production industry in Tanzania, beekeeping is a major source of foreign exchange earnings. During the year 1996/1997, Tanzania exported 359 tons of beeswax and 2.46 tons of honey worth US\$ 1,019,020 and US\$ 2,058 respectively (Minja & Nkumilwa, 2016). Meshack, et al. (2006) estimates that Tanzania has merely utilised 50% of its bee products full potential.

Many communities in Kenya are known to have practiced traditional beekeeping. Among the Bantu and highland Nilotic communities, honey was a major component in payment of dowry and in marriage negotiations. (Affognon et al., 2015). The Ongiek community of Kenya, who are mainly hunters, lived on honey and game meat as their staple food. They used honey to preserve hunted meat. Honey has played, and continues to play, an important role in nutrition and medicine: it is used for treating coughs, wound healing, and as an ingredient in many herbal remedies.

Kenya is estimated to host about two million hives in the country producing approximately 4000 metric tons of honey and contributing about 4.3 billion shillings annually. According to (Carroll & Kinsella, 2013) This is far too little compared to the potential there is in the country. There is evidence that this economic activity is fast declining among the original beekeeping communities. It is disturbing that most honey found in Kenyan supermarkets is imported from Tanzania and packed by vendors while the country has the potential to produce enough honey for consumption and export.

Commercial use of bee products in Kenya is widespread. Honey, the major product is used in the pharmaceutical industry (Gitimu, et al., 2015). In the food industry honey is used as a food additive. Beeswax and honey are vital components in making of cosmetic products. Soap production industries also use bee products such as beeswax and propolis as raw materials. Beeswax is the major component in making shoe polishes and other shoe shining products. Beeswax is also used in making candles. Propolis another bee product is used as a disinfectant and for healing skin diseases (Muli, Munguti, & Raina, 2007).

### **2.3. Training and farmers uptake of beekeeping as an economic activity**

Early forms of beekeeping entailed the destruction of the entire bee colony and its environment. The hive was crudely broken into using smoke to subdue bees. Honey combs were torn out along with the eggs, larvae and sometimes the queen bee which determines the existence of a hive. The liquid honey from the destroyed brood nest was strained through a sieve or basket. The honey produced thereof was unhygienic, and of low quality. Forests were in abundance, there were always more wild colonies to exploit. Beekeeping was a stop and start activity, there was no continuity of production since each bee colony was destroyed at harvest time along with the precious queen bee (Gebey, Berhe, & Hoekstra, 2010). These beekeeping methods were therefore destructive and unsustainable. There was therefore a need for a modern and sustainable approach to beekeeping.

Training and practice of modern beekeeping owes its origin to some European natural philosophers who in the 18<sup>th</sup> century deeply studied bee-colonies and the complex and hidden bee world (Thomas, 2015). Among the notable researchers was Huber who is universally regarded as "the father of modern bee-science" His book "Nouvelles Observations sur Les Abeilles" (or "New Observations on Bees") revealed all the basic scientific truths for the biology and ecology of honeybees (Thomas, 2015). In the 19th century many other researchers following Huber's discoveries developed a full range of innovations to manage beekeeping.

In Kenya there are a total of 14 institutions offering training and regulatory consultancy to beekeepers. The Kenya school of beekeeping, I.C.I.P.E and K.A.R.L.O, are the major Beekeeping training institutions which offer both technical and management expertise in beekeeping. The Kenya Bureau of Standards offer regulatory services. Other prominent training centers include Honey care in Nairobi, Genesis and SACDEP based in eastern region of Kenya, Africa Now- in western Kenya and Kerio valley development Authority (K.V.D.A) in the rift valley (Carroll, 2013).

Beekeeping training emphasizes the need to blend new technology with the old practices to achieve maximum yields. The training covers the use of modern equipment, beehive management, hygienic harvesting techniques, packaging and storage, marketing and book keeping (Affognon, et al., 2015). Bee farmers are trained on hive production, use of modern bee keeping equipment,



hygienic harvesting techniques and book keeping skills. All these skills are taught as separate modules. The trainees in the different apiculture training institutions are taught different beekeeping skills intermittently. Some of the farmers thus opt not to attend an entire course but instead, choose the most cost-effective module to study (Wodajo, 2011).

#### **2.4.Funding and farmers uptake of beekeeping as an economic activity**

Traditional beekeeping is not commercially viable. Modern beekeeping on the other hand requires modern hives, protective clothing and training. Finances are therefore required to start off. Honey standards need be ascertained before the beekeeper sells to the market, testing machines are expensive and out of reach to a rural farmer. The uncertainty of honey quality exposes farmers to poor prices by unscrupulous business men (Vyamana, 2009).

Many business start-ups elicit funding from personal savings, close relatives or supportive foundations. Often the criterion for such funding is the certainty that a similar venture in the past was successful. Beekeeping is a long term venture. Unlike crops whose gestation period can be ascertained, beekeeping depends on the behavior of bee species and the environmental conditions in a particular location.

Most successful modern beekeeping projects in Kenya have taken more than five years to achieve sustainability (Affognon, et al., 2015). The long gestation period is un-attractive to financiers who consider such a period risky. More often banks and financial institutions only allow short grace periods before borrowers start loan repayments.(Zacepins, 2015). This partly explains why most beekeeping projects are initiated or funded by donors.

The inflow of donor funds is subject to political, and policy regulations by both the donating and the recipient country. It is common for projects to stall due to these extraneous factors (Goldberger, 2008). County governments can provide a stable funding for beekeeping if it is prioritized in their development plans.

#### **2.5. Institutional support and uptake of beekeeping as an economic activity**

Governments and Non-governmental organizations which recognize beekeeping as a potential economic activity able to sustain livelihoods have made deliberate efforts to support their apiarists.

In India, the ministry of small and micro enterprises with the inspiration of Rastrapita Mahatma Gandhitook the task of developing the beekeeping Industry with a view to uplift the financial status of people living in extremely interior rural areas. The government established the Khadi& Village Industries Commission to popularize modern beekeeping. The commission formed in 1953, was able to streamline an otherwise disorganized beekeeping in the Indian subcontinent. In 1962 the commission established a Central Bee Research & Training Institute at Pune which was followed by establishment of regional field development and observation structures and personnel. Between 1953 and 1980 the number of modern beehives rose to over one million producing over 10,000 tons of honey valued at about Rs. 300 million compared to initial production of 1.2 tons. (Tej, et al., 2017).

The Ethiopian government has also taken deliberate steps towards supporting her beekeepers. Since 2011, in partnership with Czech Development Agency-Caritas, the Ethiopian government has been supporting beekeeping groups around the area of Walena. Farmers are aided to form cooperative unions with management committees constituted through their representatives. Group members are then aided with modern beehives and other apiary equipment such as honey extractors, protective suits, boots, helmets, wax foundations for honeybee frames, and sugar for feeding bee colonies in a dry season (Haile, Kebede, &Dekebo, 2012).

The government further provides the cooperatives with land to build their administrative and processing infrastructure. Besides beekeeping, farmers are encouraged to plant fruit trees, especially mangos, bananas, avocados and pineapples whose flowers are suitable for bees to extract nectar and make honey. In the process, the bees facilitate cross pollination for the trees.

The Kenyan government effort to support modern beekeeping dates back to 1950's in the pre-independence era. The colonial government attempted to introduce modern bee keeping to communities who were already practicing the art by initiating a training program for honey and beeswax inspectors, with the resultant establishment of beekeeping demonstration centers in various parts of the country (Kasina, et al., 2009).

Beekeeping development in Kenya has always been supported by donor funding. The first feasibility study on the viability of beekeeping between 1967 and 1969, was aided by Ox-Farm international. In 1971 Canadian International Development Agency (CIDA) sponsored a research

project that spearheaded the establishment of beekeeping co-operatives, honey refineries and equipment workshops that led to the popular Kenya top bar hives. A major milestone was the establishment of the National Beekeeping Station in 1982 (Carroll & Kinsella, 2013).

The functionality of the beekeeping sector is based on diverse legal statutes under different mandates. The livestock department within the ministry of Agriculture is tasked with policy review and implementation of beekeeping. (Rachlin, 2013). According to the World Bank and global forest research assessment forest coverage in Kenya constitutes about 4.4 million hectares of land mass. The World Bank report indicate that forest coverage has been gradually decreasing due to human interference, deforestation and demand for wood fuel. Reduced forest coverage and its associated biodiversity have adverse environmental consequences often resulting to reduced crop and livestock production beekeeping included.(Rachlin, 2013).

Despite recognizing the importance of honey as early as the 1950's, hosting an international research Centre on Insect physiology- I.C.I.P.E, and producing the most popular beehive in Africa- the Kenyan Top Bar hive, beekeeping in Kenya is largely unexploited. The institutional support to beekeepers is un-coordinated and in-adequate. Training of beekeepers is often expensive requiring the sponsorship by donors and institutions. Other than research work, the government is yet to directly support the training, provision of equipment or to support awareness campaigns to sensitize its citizenry on the viability of beekeeping as an economic activity. There is need for the government to deliberately popularize and support this potential economic activity (Musimba & Mutungi, 2001).

## **2.6 Sustainable markets and uptake of beekeeping as an economic activity**

Markets for beekeeping products are as varied as the products are. There are huge markets in Europe and the Middle East which Kenya could tap if its honey met the accepted standards.(Canale, Cosci, Canovai, Giannotti & Benelli, 2014). The value of global honey and other products is estimated as at over \$ 600 million annually. Africa consumes more than three times the amount of honey it produces. A part from Ethiopia, Tanzania and Uganda, the other countries either import or consume all of the honey they produce. Large markets like Nigeria and South Africa have a huge unmet demand for beekeeping products. Bee products have a wide use

in many industries among them:-pharmaceutical industries in making antibiotics, anti-venom, drugs for ulcers and burns, anti-inflammatory drugs, and cough syrups. In the food industry bee products are used in baking and other unique dietary preparations. China alone consumes 75 tons of royal jelly annually in making jelly chocolates, candy and wine. Hospitals all over the world prescribe the use of honey to most of their diabetic patients. In the cosmetic industries bee wax has over 100 industrial uses ranging from making of shoe polish to skin care products. Beekeeping products are also used in manufacturing of animal feeds and veterinary products.

Kenya has over 30 companies buying and processing honey for local and export market. Major companies are Honey care Africa, Africa beekeepers ltd, Arcadia enterprises, Christopher and sons, Acacia honey, and others. Kenyan demand for honey outstrips the total production. Although some companies export Kenyan honey to UAE, Saudi Arabia, China and Turkey, the Africa business magazine estimated that 80% of honey consumed in Kenya is imported from Tanzania, Sudan, Congo and Uganda (Affognon, et al., 2015).

## **2.7 Theoretical frame work**

A theoretical framework is a collection of interrelated concepts that guide the scope of a research. The framework introduces, describes and explains why the research problem under study exists. It helps in predicting and understanding a phenomenon and provides a basis to challenge and extend existing knowledge within the limits of critical assumptions.

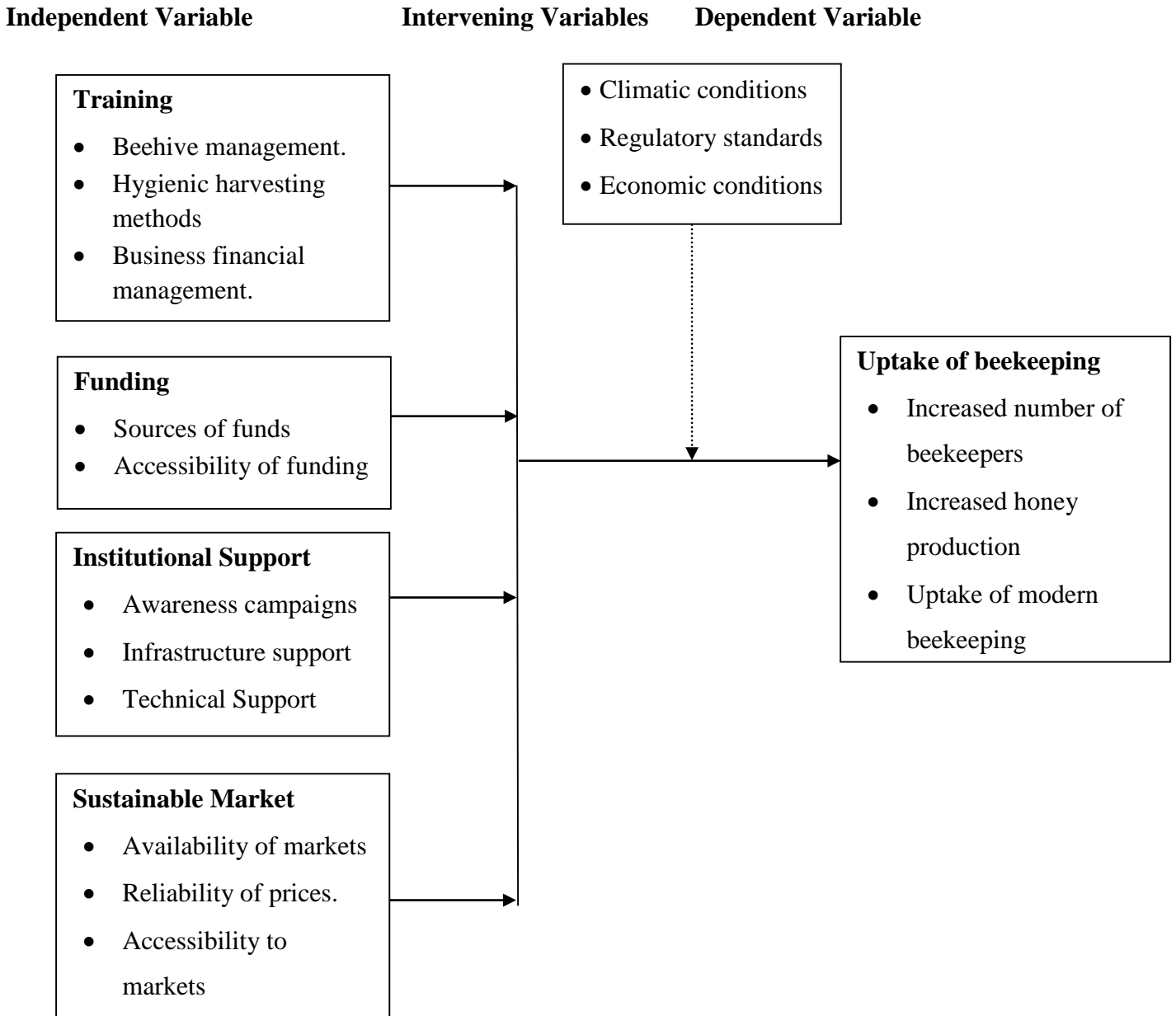
This research is based on the sustainable development theory defined as “the development that meets the needs of the present without compromising the ability of the future generations to meet their own needs”. The theory has its origin from 18<sup>th</sup> century economists Reverend Thomas Malthus. In his book; “An article on the Principles of population”, Malthus was concerned about the ever increasing and dynamic human needs that could easily outstrip the existing natural resources (Malthus, 1888). He foresaw a state of perpetual hunger, disease and struggle unless God intervened and curbed population explosion. Inspired by Malthus Charles Darwin another 18<sup>th</sup> century economist through a research concluded that the struggle between more and less fitness to survive was dependent on a natural selection process that filters and leaves the most appropriate and resilient specie to survive (Malthus, 1888).

Darwin's theory challenges the survival of subsequent generations. The ever increasing population has few choices, they either act or the nature takes its course (Baker, 2012). The effects of climate change have left the human race scampering for survival; droughts, killer heat waves, and floods, have been a real threat to human existence in the recent past. There are fatal conflicts in many African nations fueled by a limitation perception. This is regrettable. A little innovation and deliberate efforts can uncover and increase resources to adequately sustain human survival.

The concept of sustainable development is hankered on the balance of different and often competing needs against an awareness of the underlying environmental, social, and economic limitations. It goes beyond taking care of the available resources to ensuring a strong, healthy and just society by meeting people's diverse needs, promoting well-being, social cohesion, inclusion, and creating equal opportunity among communities (Dasgupta, 2007).

Sustainable development is therefore a deliberate effort by all individuals to make good decisions, plan, and pursue viable alternatives that place resources in the best use to serve current and future human needs (Baker, 2012). Pursuing beekeeping is a deliberate sustainable development effort. Preservation of bees is critical for human survival. It is argued that without bees human beings would not last long. Bees are required to pollinate plants that provide food for human beings. Beekeeping meets the social environmental and economic needs of human beings. The art of beekeeping encourages preservation of forests. (Dasgupta, 2007). The preservation of forests increases the population of bees and consequently pollination of trees. This symbiotic co-existence leaves the human race as the utmost beneficiary now and the future.

## 2.8 Conceptual framework



**Figure 1: Conceptual Framework**

Figure 1 shows the factors that influence farmers uptake of beekeeping as an economic activity (Training, Financing, Institutional support, and Sustainable markets.)as they relate to uptake parameters namely: increased number of beekeepers, increased production of bee products and farmers practicing of modern beekeeping. This influence is also dependent on the intervening factors that include climatic conditions, industry regulatory standards, and the prevailing economic

conditions. In setting the national quality standards Kenya bureau of standards depend on international standards. Climatic conditions such as heat and amount of rain determine bee colonies and honey production. The prevailing economic conditions dictate people's disposable income. Honey is a premium commodity whose consumption is dependent on the standards of living.

## **2.9 Summary of research gaps**

While research has shown that beekeeping can be a viable economic activity especially in arid and semi-arid regions, the uptake of beekeeping is declining across Africa (Bodescu, et al., 2010). In Kenya and Makueni county in particular the production of honey in the last 10 years has declined from 5 tons to a low of 1 ton annually. This downward trend can be attributed to the declining uptake of beekeeping by farmers. Research on beekeeping has mainly focused on technical aspects such as ecology of bees, processing methods and bee products and ignored to address the concerns of a key player- the beekeeper. The four factors namely Training, Funding, Institutional support and sustainable markets are key factors in addressing the real farmer's concerns that influence the uptake of beekeeping as an economic activity. The research will widen beekeeping perspective and further open the inquiry on the farmers' uptake of beekeeping as an economic activity.

## **2.10 Summary of the Chapter**

Existing literature both locally and internationally postulate beekeeping as a viable economic activity especially in dry climatic conditions. Uganda has rehabilitated post guerilla soldiers (Veterans) and integrated them back to society through beekeeping. In Ethiopia beekeeping is a major foreign exchange earner providing a source of livelihood to many of her rural population. Kenya has made significant strides in research on bee products and beehives. The Kenyan Top bar bee hive is very popular in other African countries such as Ethiopia and Uganda. The practice of beekeeping has however been declining in the past two decades. The literature reviewed explored factors that contribute to farmers' uptake of beekeeping as an economic activity with a view to addressing this worrying trend.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter essentially focuses on the research design, population of the study, sampling and the sample size, data collection methods, reliability of the data collected and the proposed data analysis method. Each of these aspects is covered in details below.

#### **3.2 Research design**

This study adopted a descriptive survey research design. A descriptive survey research design concerns itself with the present phenomena in terms of conditions, practices beliefs, processes relationships or trends. This research goes beyond tabulating facts but also includes proper analysis, interpretation, comparisons, identification of trends and relationships ( Teddlie & Tashakkori, 2009). The phenomenon under study is the uptake of beekeeping in Makueni County an arid and semi-arid region in Kenya. Eighty (80%) of Kenya's land is classified as arid and semi-arid. Makueni county represents these arid and semi-arid regions. The choice of this research design will provide a basis for drawing inference on the factors influencing uptake of beekeeping in other dry regions in Kenya.

#### **3.3 Target population**

Population refers to set of elements, people, events or services from which information sought is to be derived (Poston & Micklin, 2010). The researcher conducted a baseline survey in April 2017 at ministry of agriculture and livestock Makueni County. Records held at the ministry revealed that there are 2 ministry officials, 7 officials and 1431 members of Kibwezi beekeeping project. The population target of this research is therefore all the 1440 individuals composed of farmers, ministry and project officials.

#### **3.4 Sample size and sampling procedure**

The study has categorized the population into three homogeneous groups namely; active beekeepers, passive beekeepers, and institution officials. Stratified random sampling and simple sampling procedures were employed. From each group simple random sampling technique was



employed to ensure that there is no bias in the sampling process. Sample size was determined using the formula by Yamane (1967).

### 3.4.1 Sample size

The sample size is obtained through a differentiated approach where each homogeneous group was considered separately. From the population size of 1440 possible respondents, the research scientifically selected the appropriate, and justifiable sample size. Determination of the sample size is based on the formula by Yamane (1967) which is represented as;

$$S=N/((1+(N(e)^2)))$$

Where;

s= sample size

N= Population size

e=Sample error.

The sample size for each subsequent homogeneous group will be determined using Taro Yamane (1967 formulae:- $n_i=N_i n/N$

Where;

$n_i$ = sample size of the stratum

$N_i$ = Population of the strata

n= sample size

N= total population.

**Table 3.1: The projected populations**

<b>CATEGORY</b>	<b>TARGET POPULATION</b>	<b>SAMPLE SIZE</b>
Active beekeepers	850 Farmers	161
Passive Beekeepers	581 farmers	96
Kibwezi project officials	7 officials	7
County ministry officials	2 officials	2
<b>TOTAL POPULATION</b>	<b>1440</b>	<b>266</b>

Source: Ministry of Agriculture and Livestock, Makueni County

### **3.4.2 Sample procedure**

Makueni farmers from the Kibwezi beekeeping project are categorized into two groups; active farmers, who consistently and directly participate in apiculture and the passive farmers, who indirectly participate in bee keeping by investing in the value chain. For purposes of the research, a third category of respondents is added; officials. These represent the institutional aspect of the research. The three categories form the homogenous groups in the research. Stratified random sampling is the technique of choice for homogenous groups. The formula by Yamane (1967) is applied to get a random sample of the representatives from each group for study. However, since the officials in the research are nine, their population is insignificant for sampling in this research. The two categories where sampling is done thus include; the active and the passive groups with a total population of 1431 farmers.

### **3.5 Data collection instruments**

Three data collection instruments will be utilized for purposes of this research. These are; questionnaires, interview guides and observation. The necessary tools for handling the research have been designed and are discussed as follows;

#### **3.5.1 Questionnaires**

A questionnaire is a finite set of queries about a research area, for the purpose of actualizing research objectives (Cohen, Manion & Morrison, 2013). These questionnaires are in two categories targeting the farmers and the officials separately. The questions included in the questionnaire seek to gather views concerning the four variables; training, institutional support, market availability and funding. The questions are both closed and open-ended with a view to link the influence of these variables to the uptake of bee keeping in Makueni County. To eliminate any bias, the questionnaires were distributed to all respondents and administered at a similar period of time.

#### **3.5.2 Interview Guides**

Interview guides are research tools that guide an interviewer to ask the appropriate questions thus dictating the flow of conversation in an interview (Williams, 1990). Interviews in this research targeted the smaller sample population of officials. A total of 9 officials were interviewed. The guides specified the line of questioning to approach so that each conversation consistently covers

the research objectives. The interview guides were used to record interview statements and distinguish the respondents as; County government officials and the Kibwezi project officials.

### **3.5.3 Observation**

Observation is the passive collection of data by noting observable aspects of a research objective within the research environment or population (Kothari, 2004). While conducting a research, it is often the case that one might stumble upon important information that may be of help to the research topic without consulting any respondent. In this research for instance, observable aspects of the research include; institutions set up to offer relevant training on bee keeping, farmers attitude towards beekeeping, general views on those who have abandoned beekeeping, number of traditional beehives in use and area under bee keeping over time, level of honey and by-products market in the region, as well as an increase in the number of institutions offering financing to bee keepers. Though observations may not be quantifiable without a reference, they form the basis for open-ended questions in both the interview guides and the questionnaires.

### **3.6 Validity and reliability of research instruments**

Validity and reliability is a major concern in research. The research instruments used to collect data must attain certain standards for the research to be acceptable. According to Thomas & Magilvy (2011) validity determines whether the research instruments are accurate and whether they truly measure that which they are intended to measure.

Reliability on the other hand refers to the extent to which results are consistent over a time and are representative of the total population under study (Joppe, 2000). It measures the degree to which a research instrument would yield the same result or data after repeated trials.

In order to ascertain the consistency of data in this research, a pilot study involving 27 respondents was conducted before formal data collection was done. According to Mugenda and Mugenda (2003), 10% of the sample size is recommended for pilot study. A test retest method was used to measure the consistency of the responses. The pilot respondents did not take part in the final study.

### **3.6.1 Validity**

The research questions and interview schedule used in the research are directly related to the dependent variables. Likert scale has been used to separate different levels of the same effects in measuring qualitative impacts. After construction of the questionnaires they were presented to the University of Nairobi supervisors' who are experts in research. Their recommendations were used to improve both the structure and content validity of the questionnaire and interview guide.

### **3.6.2 Reliability\***

Data reliability is the extent to which data collection techniques or analysis procedures will yield consistent findings (Saunders et al, 2009). The reliability of the instruments was estimated after a pilot study using test-retest method. Questionnaires were issued to 27 individuals in the population selected randomly from the three categories. After two weeks the same questionnaire was administered to the same group. In the second set of questionnaires, only 25 responded. Using Cronbach's Alpha reliability test, a coefficient of 0.853 was returned. According to Fraenkel and Wallen (2000), reliability of at least 0.7 or higher is recommended for Social Science Research. The research instrument was therefore deemed reliable.

The research instruments were analysed to eliminate any ubiquity bias or prejudice to the respondents. The study managed the return rate through a register for questionnaires.

### **3.7 Data collection procedures\***

The process of data collection commenced after the approval of the research proposal by the university panel of examiners. The university issued an introduction letter indicating the area and purpose of research to the respective correspondent entities. The researcher then sought a clearance letter from the National Commission for Research Science, Technology and Innovation authorizing the intended research to be conducted. The first step was to conduct a pilot study. Twenty seven farmers representing 10% of the sample size of 266 were randomly sampled and given questionnaires. A total of 25 farmers representing 92% of the piloting group successfully completed the questionnaire. A reliability test on the pilot questionnaire using test retest approach depicted the research instrument as reliable. A sample of 266 respondents was then drawn using stratified random sampling techniques. The researcher used drop and pick approach to distribute questionnaires to the sampled farmers through their honey collection centers, each center at a

different date. The researcher was assisted by the Kibwezi beekeepers project officials to reach far flung respondents and those who were not active in beekeeping passive beekeepers.

### **3.8 Data analysis techniques**

The data collected was examined and checked for clarity and completeness. The numerical data collected using questionnaires was coded, entered and analysed using computer Statistical Package for Social Scientists (SPSS) software programme. Sample statistics were used to draw conclusions on the relationships between the independent variable (factors influencing uptake of beekeeping) and the dependent variable (the farmers uptake of beekeeping as an economic activity among the Makueni people). In order to establish the influence of the various factors on the uptake of beekeeping, the study used regression analysis model. Pearson Correlation analysis was used to measure the degree of association between the variables obtained. The analysis was done at 95% confidence level.

### **3.9 Ethical issues**

This research recognizes the importance of ethical issues. Despite the high value of knowledge anticipated from the research, knowledge cannot be pursued at the expense of human dignity. In conducting this research the respondents were informed of the purpose of study and allowed to freely make their decisions on when to participate and for how long. Privacy and confidentiality were observed on all the research inquiries. All participants were accorded a right to remain anonymous. Reference listed at the end of the research paper will guide the reader to locate the source of information stated in the research.

### **3. 10 Operational definition of variables**

The operational definition of variables ensures that the objectives of the study are met. The objectives are the factors influencing the farmer's uptake of beekeeping as an economic activity in Kibwezi, Makueni County, Kenya. These factors include; Training, Funding, Institutional support and Sustainable Markets. The factors influencing farmer's uptake of beekeeping were regarded as the independent variable while farmer's uptake of beekeeping as an economic activity was the dependent variable.

**Table 3.2: Operational definition of variables**

Objective	Variables	Indicator	measurement	Level of scale	Tool of analysis
<b>Dependent variable</b>	Farmers uptake of beekeeping as an economic activity in Makueni county.	-Increased no of beekeepers -Increased farmers uptake of modern beekeeping -Increased production of bee products	- No. of active beekeepers -No of beekeepers practicing modern beekeeping -Increased production (tons) of bee products	Ordinal	Descriptive statistics Regression Correlation analysis.
Establish how Training has influenced the farmers uptake on the farmers uptake of beekeeping as an economic activity in Makueni county	Training	Farmers trained in;  -Beehive management  -Hygienic bee product harvesting -  -Business financial management.	-No. of farmers capable of managing beehives from inception to harvesting. -No. of farmers conversant with hygienic harvesting procedures.  -No. of farmers skilled in business financial management	Ordinal scale  Interval Scale	Descriptive statistics. -Regression -Correlation analysis
Examine the influence of funding on the farmers uptake of beekeeping as an economic activity in Makueni county	Funding	Sources of funding for beekeepers  Accessibility of funding to beekeepers.	-No of financial institutions willing to fund beekeepers.  -No. of farmers capable of meeting financial institutions lending requirements.	Nominal Ordinal Interval Ratio	Descriptive statistics. -Regression -Correlation analysis
To evaluate the influence of Institutional support in the farmers uptake of beekeeping as	Institutional Support.	-Awareness campaigns on beekeeping.	-No of beekeeping Awareness seminars organized by institutions in last 2 years	Ordinal Interval Ratio	Descriptive statistics. -Regression -Correlation

<p>an economic activity in Makueni county</p>		<p>-Visits by institutional experts to offer technical support.</p> <p>Infrastructure support to beekeepers</p>	<p>-No of visits to farmers by institutional experts to advise on beekeeping activities in the last two years</p> <p>-Amount in (kshs) of Plants, land, buildings, and other facilities provided by institutions.</p>		
<p>To explore the influence of sustainable markets on the farmers uptake of beekeeping as an economic activity in Makueni.</p>	<p>Sustainable bee products Markets.</p>	<p>Availability of markets for bee products</p> <p>Accessibility to bee products markets</p> <p>-Reliability and stability of bee products prices</p>	<p>Annual demand(in tons) for Makueni bee products .</p> <p>-Volumes and values of bee products reaching the desired markets.</p> <p>-Frequency of bee products price variations in a year.</p>	<p>Nominal Ordinal Interval Ratio</p>	<p>Descriptive statistics.</p> <p>-Mean values</p> <p>-Percentages</p>

## CHAPTER FOUR

### ANALYSIS, PRESENTATION AND INTERPRETATION

#### 4.1 Introduction

This study investigated the factors that influence the uptake of beekeeping in Makueni county, Kenya. This chapter presents research findings obtained from field responses and data. The section includes demographic information, presentation of findings, and analysis based on the objectives of the study as explored by the study questionnaire and interview guide. Both descriptive and inferential statistics have been used.

#### 4.2 Questionnaire Return Rate

Questionnaires for this research were distributed to all respondents. Out of 266 set of questionnaires distributed 221 were responded to. This translates to 83% return rate. According to Mugenda and Mugenda (2003) a return rate of 50% is adequate. The return rate of 83% is therefore considered good.

**Table 4.1: Response Rate from Questionnaires**

Category	Frequency	Percent (%)
Questionnaires distributed	266	100
Responses given	221	83.1

Source: Primary data (2017).

#### 4.3 Summary of Demographics

The main demographic features considered important in this study were: -gender, age, education level and experience in beekeeping.

##### 4.3.1 Gender of the Respondents

All the questionnaires required that respondents indicate their gender. The information gathered from the questionnaires on gender is as represented in Table 4.2.



**Table 4.2: Gender Demographics**

<b>Gender</b>	<b>Frequency</b>	<b>Percent (%)</b>
Male respondents	81	36.7
Female respondents	140	63.3
<b>Total</b>	<b>221</b>	<b>100</b>

The findings indicated that majority of beekeepers were female representing 63.3% response rate compared to 36.7% of their male counterparts. This skewed representation shows the reality of rural gender demographics – most male adults seek employment in urban areas and leave their house wives in the rural areas. Like any other rural activity this imbalance has tilted the gender dynamics in the uptake of beekeeping in Makueni county.

#### **4.3.2 Age categories observed**

The study sought to determine the age of the respondents and therefore requested them to indicate their age category. The findings are illustrated in Table 4.3.

**Table 4.3: Age categories**

<b>Age (Years)</b>	<b>Frequency</b>	<b>Percent (%)</b>
Below 25	27	12.3
26-35	46	20.8
36-45 years	69	31.2
Above 45 years	79	35.7
<b>Total</b>	<b>221</b>	<b>100</b>

The findings revealed that a majority (35.7%) of those surveyed were above the age of over 45 years followed by those in the age bracket of 36-45 years representing 31.2 %. Respondents aged between 26-35 years represented 20.8 % while those below 25 years of age were a paltry 12.3 %. This distribution indicates that younger people are yet to embrace beekeeping. This trend is also indicative of the rural population age demographics where the young migrate to cities in search of formal employment leaving farming activities to the old.

### 4.3.3 Education Demographics

In order to gauge the education levels, the respondents were asked to indicate the highest levels of education attained. The data collected is summarized in table 4.4

**Table 4.4: Education Demographics**

Level of Education	Frequency	Percent (%)
Primary school	105	47.5
High School	70	31.7
College/Technical Level	36	16.3
University Degrees	10	4.5
<b>Total</b>	<b>221</b>	<b>100</b>

These statistics indicate that most of the respondents had only attained a primary of level education (47.5%) while 32 % of respondents were high school graduates. Few respondents' mainly current and retired civil servants had attained diploma level of education. Only three farmers had attained university degrees, the rest degree holder respondents were ministry and the project officials. These findings are a reflection of the low level of education among rural people in arid and semi-arid regions.

### 4.3.4 Beekeeping experience

The other demographic of relevance was the experience in the bee keeping industry. The study sought to establish the number of years these respondents had practiced beekeeping. The information was analyzed and tabulated as shown in table 4.5.

**Table 4.5: Beekeeping experience**

Years involved in beekeeping.	Frequency	Percentage (%)
Below 5 years	20	9
5-10 years	137	62
Above 10 years	64	28
<b>Totals</b>	<b>221</b>	<b>100</b>

To determine the experience in beekeeping, respondents were requested to state the number of years they had been involved in beekeeping activities. Out of the 221 respondents, 64 farmers (28%) had engaged in beekeeping for over 10 years. Those who had practiced beekeeping for between 5-10 years were 137 representing 62% of the total respondents. Only 20 farmers (9%) had practiced beekeeping for less than five years. The finding from this demographic affirms the research problem that the uptake of beekeeping is declining as fewer farmers are adopting the practice

#### 4.3.5 Categories of respondents

There were three major categories of respondents chosen for the research. Their roles in beekeeping were assessed using the questionnaires and analyzed. This is tabulated in Table 4.6

**Table 4.6: Categories of respondents**

<b>Category</b>	<b>Frequency</b>	<b>Percent (%)</b>
Institution officials	9	4
Active beekeepers	151	68
Passive beekeepers	61	28
<b>Total</b>	<b>221</b>	<b>100</b>

From the statistics Majority of the farmers (68%) were actively involved in beekeeping while 28% were passive beekeepers. Officials from both the ministry of livestock and Kibwezi beekeeping project constituted 4% of the respondents. This composition of respondents captured the full spectrum of the beekeeping practitioners in Makueni county.

#### 4.4 Uptake of beekeeping

The study sought to evaluate the current uptake of beekeeping in Makueni county as contrasted with the perceived potential. Respondents were requested to rate the viability of beekeeping as an economic activity. The responses are indicated in Table 4.7

**Table 4.7: Uptake of Beekeeping**

Significance of Institutional support	Highly significant (%)	Significant (%)	Moderately Significant (%)	Not significant (%)	Group Total (%)
	4	3	2	1	
Institutional Officials			45	55	100
Active farmers			30	70	100
Passive farmers			25	75	100
Weighted totals			30	70	100

From the study findings only 30% of the respondents polled rated the uptake of beekeeping as moderately significant while the majority of respondents 70% rated the level of beekeeping as insignificant. This resonates well with the existing information contained in the literature review which indicates that the level of beekeeping is quite low.

#### 4.4.1 Uptake of beekeeping as a viable economic activity.

The study requested respondents to indicate whether they considered beekeeping a viable economic activity. The responses are shown on table 4.8 below.

**Table 4.8 Uptake of Beekeeping as a Viable Economic Activity**

Beekeeping as a viable economic activity	Frequency	Percent (%)
Yes	161	73
No	60	27
<b>Total</b>	<b>221</b>	<b>100</b>

From the responses received 161 respondents (73%) consider beekeeping as a viable economic activity while 60 respondents representing 27% did not consider beekeeping a viable economic activity. Those who did not consider beekeeping as viable pointed at such factors as accessibility to markets, lack of honey processing infrastructure and availability of training facilities as the major impediments. The findings strengthen the positions held by previous studies that beekeeping is a viable economic activity capable of improving peoples livelihoods.

#### 4.5 Influence of Training on the uptake of Beekeeping

The research sought to establish how training influences the uptake of beekeeping in Makueni County. The research instruments interrogated the level of current training on beekeeping among the farmers, how relevant that training was to beekeeping activities, which specific skills the farmers had been trained on, and how farmers rated the influence of training to the uptake of beekeeping. The findings are tabulated in Table 4.9, 4.10, 4.11, and 4.12.

**Table 4.9: Farmers' Formal Training on Modern Beekeeping**

<b>Farmers training</b>	<b>Frequency</b>	<b>Percent (%)</b>
Yes	192	89
No	24	11
<b>Total</b>	<b>216</b>	<b>100</b>

From the findings, majority of the respondents (89%) indicated that they had been trained on at least one aspect of modern beekeeping while 11% had picked the skills informally from their relatives and fellow farmers. A majority of beekeepers were therefore capable informed responses on training.

##### 4.5.1 Relevance of training to beekeeping activities.

The various categories of respondents were asked whether they found formal training relevant to uptake of beekeeping. The results are shown on table 4.10

**Table 4.10: Relevance of training to the uptake of beekeeping**

Category	No. of Respondents	Frequency (Relevant response)	Percentage (Relevant response)(%)
Institutions officials	9	9	100
Active beekeepers	151	143	95
Passive beekeepers	61	48	78
Weighted Total.	221	200	91

The results indicated that all institutional officials considered training absolutely relevant to adoption of beekeeping (100%), followed by active farmers at 95%. Passive farmers however had a lower rating of 78% affirmation. The overall weighted average among the groups of those who considered training relevant was 91%. This shows that all stake holders in beekeeping considered training as very relevant to adoption of beekeeping in Makueni County.

#### **4.5.2 Training on Specific Skills**

The study sought to gather from the respondents; the specific skills they had been trained on. The results are as shown in Table 4.11

**Table 4.11: Training on Specific Skills in Beekeeping**

Category	No. of Respondents	Frequency Trained	Percentage Trained (%)
Beehive Management	216	156	72
Hygienic bee products harvesting methods	216	181	84
Financial management	216	65	30
<b>Weighted Average.</b>	<b>216</b>	<b>134</b>	<b>62</b>

Findings presented on Table 4.11 indicate that 72% percent of the Bee farmers had been trained on how to manage bee hives, 84% of farmers had been trained on hygienic bee harvesting methods while only 30% were trained on financial management. The findings indicate a bias towards technical training on beekeeping while the commercial aspect is majorly ignored.

#### **4.5.3 Extend of influence of training on uptake of beekeeping.**

The study sought to evaluate the extent of influence of training on beekeeping. A four-point Likert scale was used to rate the responses where 4- Very important, 3- Important, 2- Some how important, 4- Not so important. The findings in form of mean and standard deviations are indicated in Table 4.12

**Table 4.12: Influence of Training on Uptake of Beekeeping**

Influence of training on uptake of beekeeping	Frequency	Percent (%)
Very important	91	41.1
Important	116	52.6
Not sure	9	4.2
Not important	5	2.1
<b>Total</b>	<b>221</b>	<b>100</b>

From the responses adduced 91 respondents (41.1%) considered training very important in influencing the uptake of beekeeping while 116 respondents (52.6%) rated training as important.

Nine farmers (4.2%) were not so sure whether training had an influence on uptake of beekeeping while only 5 respondents(2.1%) did not consider training as a factor in influencing beekeeping. The combined approval rating of (93.7%) – very important and important responses confirm the relevance farmers in Makueni County accord training. These responses explain why most of the respondents had attended training on beekeeping.

#### **4.6 Influence of Funding on the uptake of Beekeeping**

The study sought to establish from the respondents; the influence of funding on the uptake of beekeeping in Makueni County. The questionnaires and interviews represented categorical questions that were geared towards establishing a relationship between funding and the uptake of beekeeping in Makueni County. Several Key aspects of funding namely:-relevance of funding, sources of funding, availability of funding and access to funding were assessed. The findings are presented in Tables 4:13-4:15.

##### **4.6.1 Relevance of funding to adoption of beekeeping.**

The study sought to establish whether funding was relevant in adoption of beekeeping. The results of the findings are shown on Table 4.13

**Table 4.13: Relevance of Funding on Uptake of Beekeeping**

Category	No. of Respondents	Frequency (Relevant response)	Percentage (Relevant response)(%)
Institutions officials	9	5	60
Active beekeepers	151	92	61
Passive beekeepers	61	46	75
Weighted Total.	221	143	64.7

Responses elicited from the varied categories indicated that Passive beekeepers considered funding very relevant for adoption of beekeeping (75%). The results from other groups of respondents however gave funding a moderate rating. Institutional officials rated relevance of funding at 60% while active beekeepers rated the relevance at 61%. The overall weighted average stood at 64.7%.



Most beekeepers felt that starting beekeeping did not require much funding however expansion and adoption of modern methods called for funding which could partly be sourced from their initial savings. The high rating by passive beekeepers is an indication that lack of funding has contributed to their in-active status in the practice of beekeeping.

#### **4.6.2 Sources of funding for beekeepers**

The study sought to establish the likely sources of funding for farmers adopting beekeeping.

From the study, sources of funds are distributed as shown on Table 4.14

**Table 4.14: Distribution of Financial Institutions in Makueni County**

Category	Frequency	Percentage (Likely hood to lent to beekeepers) (%)
Banks	18	24
Micro-Finance Institutions	52	69
Government/Donor funding	5	7
Totals	75	100

The study indicated that there were 18 banks, 52 micro finance institutions and 5 government and non-government institutions offering credit to farmers in Makueni county represented as 24% (banks), 69% (microfinance institutions) and 7% government and donor funding agencies.

The study indicated that banks were located in the County town centers. The county has 15 major administrative centers (towns) and these centers have a distribution of the 24 banks, with some having more than one bank. The microfinance institutions were available in village market centers as well as the town centers. The government lending institutions on the other hand were only available at the county headquarters. The distribution of financial institutions gives a clear indication on the availability of sources of funding in Makueni County.

#### **4.5.3 Beekeepers accessibility to funding**

The study sought to establish the accessibility of funding from the existing financial sources in Makueni county. Results from the study, are shown on Table 4.15

**Table 4.15: Financiers likely to lend to Beekeepers**

Category	Respondents	Frequency (likely to lend to beekeepers)	Percentage (Likely to lend to beekeepers)
Banks	221	23	10
Micro-Finance Institutions	221	85	38
Government/Donor funding	221	5	2
Weighted Totals	221	113	17

The results indicate that farmers consider funding from financial lenders in-accessible. From the findings, the most likely avenue to access loans was micro finance organizations at 38% while banks and donor were ranked 10% and 2 % respectively.

#### **4.7 Influence of Institutional support on the Uptake of Beekeeping**

This section covers the influence of institutional support on the uptake of beekeeping. The research sought to assess the importance and significance of institutional support in the following specific dimensions; Awareness campaigns, technical support to farmers, beekeeping facilities set up by institutions. The responses elicited are illustrated on Tables 4:16- 4:18

##### **4.7.1 Importance of Institutional support to uptake of beekeeping**

Respondents were asked to rate the importance of institutional support towards the adoption of beekeeping. Table 4.16 illustrates the results:

**Table 4.16: Importance of institutional support**

Category	Respondents	Frequency (important)	Percentage (Important)
Institutional officials	9	9	100
Active farmers	151	132	87
Passive farmers	61	41	67
Weighted Totals	221	183	83

The weighted average of 83% by respondents across the various categories clearly indicates that farmers feel that institutional support is important towards adoption of beekeeping. Institutional officials returned the highest affirmation rating at 100%, followed by Active farmers at 87%, while passive farmers returned a favorable response at 67%. These findings indicate that all respondents appreciate the role institutional support play in the uptake of beekeeping.

#### 4.7.2 Significance of Institutional support to uptake of beekeeping

The research sought to establish to what extent institutional support was important in the uptake of beekeeping. The responses elicited are shown on table 4.17

**Table 4.17: Influence of institutional support to uptake of beekeeping**

Significance of Institutional support	Highly significant (%)	Significant (%)	Moderately significance (%)	Insignificant (%)	Group Total (%)
Institutional Officials	25	60	15		100
Active farmers	53	26	13	8	100
Passive farmers	50	32	18		100
Weighted totals	42	40	15	3	

The results indicate that 42% of respondents across the various categories consider institutional support as highly significant while 40% consider the institutional support as significant. Those who felt that institutional support was moderately significant or not significant at all represented 15% and 3 % respectively. These findings especially among the farmers category is critical in

assessing the uptake of beekeeping. Where farmers are able to access the required support, they are likely to undertake new ventures.

#### 4.7.3 Influence of institutional support in various aspects.

The research sought to establish the extent of institutional support in various aspects namely; Awareness campaigns, Technical support, and Infrastructure support. Table 4.18 shows the results from respondents.

**Table 4.18: Significance of institutional support to uptake of beekeeping**

Extent of Institutional support	Very important (%)	Important (%)	Not sure (%)	Not important (%)	Total (%)	Overall Rating (%)
Awareness campaigns	31	51	14	5	100	
Technical support	36	20	13	31	100	
Infrastructure Support	49	34	9	7	100	
Weighted totals						Good

The findings show that all the parameters for institutional support namely awareness campaigns, technical support, and Infrastructure support are rated good. Farmers have however positively rated infrastructure support (83%) and Awareness campaigns (82%), slightly higher than technical support 56%. This could be explained by the fact that technical support can only be useful if farmers' awareness and the requisite production, processing and delivery infrastructure are in place.

#### 4.8 Influence of Sustainable Markets on the Uptake of Beekeeping

The study sought to gather from the respondents; the influence of sustainable markets on the farmers' uptake of beekeeping. The research tried to establish the availability, accessibility, and the reliability of bee products markets, and how farmers rated the significance of these factors in regard to uptake of beekeeping in Makueni county. The results are tabulated in Table 4:18-4:21

#### 4.8.1 Availability of bee products markets

The respondents were required to indicate their rating on availability of ready markets for their honey products. The response is tabulated on table 4.19

**Table 4.19: Availability of bee products markets**

<b>Availability of Markets</b>	<b>Frequency</b>	<b>Percent (%)</b>
Readily available	153	69
Available most times	42	19
Market is seasonal	21	9.5
Market is unpredictable	5	2.5
<b>Total</b>	<b>221</b>	<b>100</b>

From the responses received, 153 respondents (69%) indicated that the market was readily available while 42 respondents (19%) indicated that the market was available most of the time. Only 12% of the respondents mainly the passive farmers felt that the market was unpredictable. A total of 195 respondents representing 88 % considered the market as either readily available or available most of the times. This affirms that there is adequate demand for bee products in Makueni County.

#### 4.8.2 Accessibility of bee products markets

The research sought to establish the ability and ease of a farmer to reach the market for bee products. The responses were put on a Likert scale as follows; - Very easy-4, Easy-3, Not so easy-2, Hard- 1. The results are shown on Table 4.20.

**Table 4.20: Accessibility of Bee Products Markets**

<b>Accessibility to Markets</b>	<b>Frequency</b>	<b>Percent (%)</b>
Very easy	28	13.2
Easy	61	28.7
Not so easy	54	25.5
Hard	67	31.6
<b>Total</b>	<b>212</b>	<b>100</b>

Accessibility to markets is key to farmers. The distance and cost of reaching the honey collection centers was a major concern for the respondents, they indicated that due to this handicap most farmers ended up selling their products cheaply to middle men. The responses received indicate that 57.1% were not able to access the market with ease. The remaining 42.9% mainly with bee-farms near local markets found it easy to access markets.

#### **4.8.3 Price stability of bee products**

The research sought to establish the fluctuations of prices of bee products. The fluctuations were put on a Likert scale where (5%) annual fluctuation is rated – Very Predictable, (6-15 %) annual fluctuation- Predictable, (15-35 %)annual fluctuation unpredictable, over 35% annual fluctuation- Erratic. The responses are outlined in Table 4.21.

**Table 4.21: Price Stability of Bee Products**

<b>Fluctuation of bee products prices</b>	<b>Frequency</b>	<b>Percent (%)</b>
Very predictable	179	84.4
Predictable	29	13.7
Unpredictable	4	1.9
Erratic	0	0
<b>Total</b>	<b>212</b>	<b>100</b>

A vast number of the respondents 179 (84.4%) indicated that bee product prices were very predictable. Another 29 respondents (13.7%) considered bee product prices predictable. Only 4 respondents (1.9%) rated bee products as unpredictable. From these findings prices on bee products were found to be stable. It therefore follows that bee product price stability is not a significant factor in the uptake of beekeeping in Makueni County.

#### 4.8.4 Influence of various market factors on the uptake of beekeeping

The research sought to establish the contribution of each market factor on the uptake of beekeeping. Respondents were asked to rate the significance of availability of bee product markets, accessibility of bee product markets and the stability of bee product prices on the uptake of beekeeping. Table 4.22 shows the responses adduced.

**Table 4.22: Relative Significance of Individual Factors**

Significance of sustainable markets.	Highly significant (%)	Significant (%)	Lowly significant (%)	Insignificant (%)	Total (%)
Availability of Markets	18	21	37	24	100
Accessibility to Markets	38	25	16	21	100
Stable and reliable prices.	2	7	22	69	100
Weighted totals					

From the table, respondents considered access to markets the biggest challenge in the uptake of beekeeping. Availability of bee product markets was not considered a significant factor towards the uptake beekeeping since the market was there anyway. Stability of bee product prices was considered insignificant as the prices had remained stable for a long time. Most farmers were comfortable with the current prices.

#### 4.9 Inferential Statistics

Pearson correlation analysis was used in the study access the influence of Training, Funding, Institutional support and Sustainable markets had on the uptake of beekeeping.

**Table 4.2: Pearson Correlation Analysis  
Correlations**

				Uptake of Bee Keeping	Training	Funding	Institutional support	Sustainable market
Pearson Correlation	Uptake of Bee Keeping			1.000	.916	.595	.827	.403
	Training			.916	1.000	.374	.662	.250
	Funding			.595	.374	1.000	.462	.254
	Institutional support			.827	.662	.462	1.000	.368
	Sustainable market			.403	.250	.254	.368	1.000

From the findings in Table 4.20, a strong positive correlation was found between Training and uptake of beekeeping as indicated by a correlation of 0.916, followed by Institutional support at 0.827. This infers that training and institutional support are the strongest and key factors in determining the uptake of beekeeping.

The findings also found a strong positive correlation between funding and uptake of beekeeping with a correlation of 0.595. This suggests that Funding is also a key determinant of uptake of beekeeping in Makueni county. At 0.403 correlation, Sustainable markets is also a factor in determining the uptake of beekeeping. From this analysis it is indicative that all the factors investigated (Training, Funding, Institutional support, and sustainable markets) had a profound influence on the uptake of beekeeping though at different levels.

**4.9.1 Regression Analysis**

Regression analysis was used in this study to determine of relationship between Training, Funding, Institutional support, Sustainable markets and uptake of beekeeping. Table 4.23 presents the findings.



**Table 4.3: Model Summary**

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.984 <sup>a</sup>	.969	.968	.155	.969	1681.460	4	216	.000

a. Predictors: (Constant), Sustainable market, Training, Funding, Institutional support

According to the findings in the Table 4.23, the R square is given as 0.969 which is an indication that predictor variables (Training, Funding, institutional support and Sustainable markets) account for 96.9% of uptake of beekeeping.

## **CHAPTER FIVE: SUMMARY OF FINDINGS, DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS**

### **5.1 Introduction**

In this chapter presents summary of findings of the research generated from data analysis. The conclusion is drawn in regard to the objective of the study. It then gives recommendations and suggestions for further studies.

### **5.2 Summary of Findings**

Summary of findings are presented in relation to the objectives of the study. The study established that the uptake of beekeeping was on a downward trend among farmers in Makueni county. Only about 30% of the potential farmers had taken up this economic activity. Most farmers 73% however considered beekeeping a viable economic activity capable of sustaining livelihoods. From the analysis elicited there were few new farmers taking to beekeeping while some of the older farmers were abandoning the practice of beekeeping altogether. Another worrying trend was that young people were not keen on taking up beekeeping posing the danger of this viable activity becoming extinct in the future. Findings of the study depicted the influencing factors namely training, funding, institutions support and sustainable markets to be the major factors affecting the uptake of beekeeping in Makueni County. Other minor factors are ail linked and related to these four factors.

Training was rated as the major influencing factor (89%). Farmers felt that without adequate training beekeeping could not be practiced at a commercial level and was likely to be abandoned altogether. Through proper training educated youth and other farmers would acquire skills, develop interest and change their perception on the viability of beekeeping as an economic activity. Training further brings about standardization and output of hygienic products acceptable to all markets.

Funding plays a major role in the development of beekeeping. Farmers knowledge on funding was however limited. Banks and other financial institutions are concentrated on market centers far from the reach of common farmers. From the interviews and observations, it was established that most

financial institutions were not willing to lend to beekeepers. Most farmers interviewed confessed that they had never considered taking a loan to further their beekeeping activities. There was however a general consensus that funding was required to help acquire modern equipment and to set up a viable beekeeping ventures.

Institutional support as an influencing factor elicited a high rating (82%). The study findings indicate that beekeeping requires a strong infrastructure support and massive awareness campaigns. These inputs cannot be provided by the poor farmers in rural areas. Governments in other countries such as Ethiopia, Uganda and India have supported the uptake of beekeeping with very successful results. In Kenya the national and county government's intervention can significantly boost uptake and therefore growth of beekeeping.

Sustainable markets are a recipe for growth of any economic activity. The study consider availability of markets, access to markets, and the stability of prices as the main supporting blocks. The findings of the study indicated that there was ready market for bee products and the prices were relatively stable. This favorable market condition was however weighed down by the inability of farmers to access bee products markets due to distance and infrastructure challenges.

### **5.3 Discussion of the Findings**

The study was able to bring on, the specific issues within the broad spectrum of influencing factors. Demographics reflecting the migration of the active and young to urban centers leaving the aged, women, and children in the rural areas was highlighted. This resonates with Barret, Reardon & Webb (2001) that without a viable economic activity most young people will migrate to the urban centers in such of better livelihoods. According to Jacka (2014) there is high rate of failure of donor funded projects due to the depleted energy and low literacy levels found in rural areas as a result of rural youth urban migration.

From the study the current uptake of beekeeping in Makueni county stands at 30% far below the potential rating of 73%. There was high indication that beekeeping is a viable economic activity. These facts reinforces the statement of the problem to the study that though beekeeping is economically viable and capable of being practiced in arid regions like Makueni county, the uptake

has been declining in the recent past. There is a strong correlation between the influencing factors, namely: - training, funding, institutional support, and bee products market and the uptake of beekeeping and hence the study of these factors would lead to the desired solution- increased uptake of beekeeping. The influencing factors are interrelated and intertwined. Training needs funding or the support of an institution. Access to markets requires institutional support to provide infrastructure and training to create awareness. According to Rueschemeyer & Stephens (1997) where the influencing factors have a strong correlation, addressing the causal effect is more profound and able to bring a lasting solution.

The research findings, consider training a basic ingredient to the uptake of beekeeping. A majority of the farmers interviewed (89%) revealed that they had at least attended one training According to Carroll & Kinsella (2013), training and use of modern technologies is critical for sustainable beekeeping. The quality of training is crucial. Emphasis should be on hygienic harvesting methods and beehive management as this directly affects the sustainability of bee colonies and quality of bee products reaching the market. Sanford (1986) argues that commercial aspects of beekeeping such as record keeping and book-keeping should not be ignored.

Research findings indicate that funding is important to beekeeping and especially for expansion. Financial institutions are however concentrated on the major market centers, often far from the reach of beekeepers. Access to funding is further complicated by the fact that few financial institutions were willing to lend to beekeepers. Most banks and financial institutions only allow a short grace period lending, which is often not suitable for beekeepers (Zacepins, 2015). To sustain beekeeping as economically viable venture, farmers need to acquire modern resources which are costly. The growth of beekeeping needs the existence of an available and accessible credit support.

Where beekeeping has succeeded, there has been an input from institutions; whether government or donor-related. In Ethiopia, the government has aided beekeepers in forming cooperative unions and providing them with beekeeping equipment and infrastructure (Haile, Kebede. & Dekebo, 2012). The findings of the research indicate that such activities as; awareness campaigns, infrastructure and other long term investments are an integral part in initiating beekeeping projects. Without the financial and expertise muscle by institutions, beekeepers are unlikely to boost uptake

of beekeeping on their own. County and national governments in Kenya need to fully embrace beekeeping as a viable economic activity.

Research findings from this study portray bee products^ market as reliable and predictable. Prices for bee products are fairly stable. Markets that are predictable in nature attract the requisite products the related activities (Pleshko & Helens, 2008). This position is however contradicted by the reality on the ground. Only 30% of potential beekeepers practice beekeeping. This can be attributed to difficulties in accessing the markets for their products. The national and county governments need to improve road infrastructure and build collecting centers accessible to the farmers.

#### 5.4 Conclusion of the Study

The study concludes that increased uptake of beekeeping in Makueni county is feasible and realizable as most farmers considered this economic activity viable and capable of improving their standards of living. Bee products have a guaranteed and stable market and the challenges in beekeeping are mainly on production and accessing the market. The findings concurred with the study premise that training, funding, institutional support and sustainable markets were the major factors that influence the uptake of beekeeping. Addressing these factors would result to increased uptake of beekeeping in Makueni county and other arid regions in Kenya.

#### **5.5 Recommendations of the Study**

Many county governments are struggling with high levels of poverty and unemployment among the youth. This problem is more compounded in arid and semi-arid regions where rain-fed farming has been unreliable. To attract young people to farming there is need to emphasize on agri-business whose model involves funding and return on investment.

The study recommends that the Makueni county government and all other county governments in arid and semi- arid regions to consider beekeeping as an alternative economic activity capable of improving the livelihoods of their citizen. Government involvement through a policy direction or public private partnership arrangements would address all the factors influencing the uptake of beekeeping conclusively thereby impacting positively on the lives of a majority of Kenyans living

in rural areas.

Specifically the study recommends that the county government in partnership with other stake holders to provide institutional support on awareness campaigns, and improving infrastructure for the beekeepers. The county government can also support training initiatives by offering free training to beekeepers through its agricultural experts and or partnering with other trainers. On the part of funding the county government should partner with donors and financial institutions and guarantee beekeepers loans especially on the initial stages. Finally through construction of collecting centers, the government can ease the farmers' access to markets and free them from the exploitation by middlemen. Other countries such as Uganda and India have created jobs for the youth and wealth through allocating resources to beekeeping programs.

#### **5.6 Suggestions for Further Research**

1. The study focused on the beekeepers of the dry southern part of Makueni referred to as Kibwezi. Research on a wider scale covering other beekeepers in the region would be important to generate an action plan towards enhancing beekeeping in the region.
2. The emphasis of the study was the arid and semi-arid regions in Kenya. Beekeeping is known to thrive in wet climatic regions. The research recommends a further research on the influencing factors in wet regions.
3. The study found that the various influencing factors had sub components which carry different weights. The research recommends a detailed research on these specific components to enhance the search for ways of increasing the uptake of beekeeping not only in Makueni County but also in the other arid and semi-arid regions in Kenya.

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## APPENDICES

### Appendix I: Introduction letter



**UNIVERSITY OF NAIROBI**  
COLLEGE OF EDUCATION AND EXTERNAL STUDIES  
SCHOOL OF CONTINUING AND DISTANCE EDUCATION  
DEPARTMENT OF EXTRA-MURAL STUDIES  
NAIROBI EXTRA-MURAL CENTRE

Your Ref:

Our Ref:

Main Campus  
Gandhi Wing, Ground Floor  
P.O. Box 30197  
NAIROBI

Telephone: 318262 Ext. 120

REF: UON/CEES/NEMC/26/240

20<sup>th</sup> July, 2017


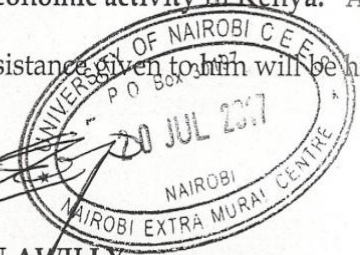
### TO WHOM IT MAY CONCERN

RE: GEORGE MULINGA KATHILA - REG NO L50/77804/2015

This is to confirm that the above named is a student at the University of Nairobi College of Education and External Studies, School of Continuing and Distance Education, Department of Extra- Mural Studies pursuing Masters of Art in Project Planning and Management.

He is proceeding for research entitled "**factors influencing the uptake of beekeeping as an economic activity in Kenya.**" A Case Study of Farmers in Makueni County.

Any assistance given to him will be highly appreciated.

  
  
**CAREN AWILLY**  
CENTRE ORGANIZER  
NAIROBI EXTRA-MURAL CENTRE

**Appendix II: Questionnaires**

**NOTE:** The information provided in this questionnaire shall be treated as confidential. No detail or information about the respondent shall be used for any other purpose other than the aim of the research objectives. Respondents are free to abandon the research at any time but are highly encouraged to answer all questions if they consent to the research.

**Part A (1): Background Information ( Institutional correspondent’s questionnaires)**

**Respondent background Information**

INSTITUTION NAME: \_\_\_\_\_

RESPONDENTS POSITION: \_\_\_\_\_

1. Kindly indicate your gender

Male [ ]                      Female [ ]

2. Please indicate your age from the choices below

Below 25 years [ ]

26-35 years [ ]

36-45 years [ ]

Above 45 years [ ]

3. Kindly indicate your highest academic qualification

Primary school level [ ]

Secondary school [ ]

College [ ]

University level [ ]

Any other (please specify).....

4. For how long have you worked in the organization

Below 5 years [ ]

5 - 10 years [ ]

Over 10 years [ ]

**A (1) Influence of Training on farmers uptake of beekeeping as an economic activity in**

**Makueni County**

5. Comment on the level of farmers training on beekeeping

Farmers uptake of beekeeping as an economic activity indicators	Below 40%	40-60 %	60-80%	Over 80%
	1	2	3	4

% of Farmers trained on beehive management

% of Farmers trained on hygienic bee products harvesting:

% of farmers trained on business financial management:

6. Do you believe training contributes to farmer's uptake of beekeeping activities in Makueni County?

Yes [ ]

No [ ]

6 (a). If yes, comment

how \_\_\_\_\_  
\_\_\_\_\_

6 (b) I no, comment \_\_\_\_\_  
\_\_\_\_\_

**A(2)Influence of Funding on farmers uptake of beekeeping as an economic activity in Makueni County**

7. How do you rate the significance of funding on the farmers uptake of beekeeping as an economic activity among farmers in Makueni county

	% contribution	% contribution	% contribution	% contribution
Farmer's uptake of beekeeping as an economic activity- funding indicators.	Below 40%	40-60 %	60-80%	Over 80%
	1	2	3	4

% of financial institutions willing to lend to beekeepers.

% of Beekeepers able to access credit facilities

Availability of institutions willing to lend to beekeepers.

**A(3)Influence of Institutional support on farmers uptake of beekeeping as an economic activity in Makueni County**

8. Are there institutions that support beekeeping activities in Makueni county?

8(a).If yes , how ? comment. \_\_\_\_\_

\_\_\_\_\_

---

9. Do you believe that institutional support is important in influencing uptake of beekeeping in Makueni County?

Yes [ ]

No [ ]

9(a).If yes, how do you rate the influence of institutional support to the uptake of beekeeping by farmers in Makueni county, Kenya?

Low [ ]

Average [ ]

High [ ]

Very High [ ]

9 (b) If No, comment \_\_\_\_\_

\_\_\_\_\_

10 How do you rate the role of institutional support to beekeepers in the following aspects?

Farmers uptake of beekeeping as an economic activity indicators	Below 3 Poor	4-6 Average	7-10 Good	Over 10 Excellent
---	-----------------	----------------	--------------	----------------------

Organised Beekeeping awareness campaigns in the last two years :

Institutions visits to farmers groups in the last two years.

No of infrastructure facilities by institutions to support beekeepers in the last two years.

**A(4) Influence of sustainable Markets on farmers uptake of beekeeping as an economic activity in Makueni**

11. (a) Is there market for beekeeping products in Makueni County?

Yes      [   ]

No        [   ]

11(b) If yes, where is the market. Elaborate \_\_\_\_\_

\_\_\_\_\_

11(c) If no how has this impacted on the farmers uptake of beekeeping as an economic activity in Makueni county? \_\_\_\_\_

\_\_\_\_\_

13. How do you rate the influence of sustainable bee markets in the following areas:

	%	%	%	%
	contribution	contribution	contribution	contribution
	Below 40%	40-60 %	60-80%	Over 80%
Rating	1	2	3	4
Ability of farmers to access bee products markets.				
Availability of markets for bee products.				
Stable and reliable prices for bee products.				

**Thank You for your cooperation**



**Part B: Beekeeper's Individual questionnaire**

**Respondent background Information**

1. Kindly indicate the name of the farmers group you belong to.

---

2. Kindly indicate your gender

Male

Female

3. Please indicate your age from the choices below

Below 25 years

26-35 years

36-45 years

Above 45 years

4. Kindly indicate your highest academic qualification

Primary school level

Secondary school

College

University level

Any other (please specify).....

5. Are you actively involved in beekeeping

Yes

No

6. For how long have you been a beekeeper?

Below 5 years

5 - 10 years

Over 10 years

7. Kindly tick the statements you agree with.

- a) Out of ten (10) farmers at least eight (8) practice beekeeping ( )
- b) Out of ten (10) farmers only 6-7 practice beekeeping ( )
- c) Out of ten ( 10) farmers only 3-5 practice beekeeping ( )
- d) Out of ten ( 10) farmers only 2 or less practice beekeeping ( )

8a. Do you consider beekeeping a profitable venture ? Yes ( ) No ( )

8b. If your response is no, comment. \_\_\_\_\_

**B (1)Influence of Training on farmers uptake of beekeeping as an economic activity in Makueni County**

8. Do you consider training on beekeeping relevant to uptake of beekeeping ?

Yes ( )                      No ( )

10. (a)Have you been trained on bee keeping?

Yes                      [ ]                      No                      [ ]

(b) If yes in what areas? Comment \_\_\_\_\_

If No, why ? comment \_\_\_\_\_

11. Kindly tick the beekeeping skills you possess from the table below

Training activity	Skill	Skill	Skill	Skill	Tally
Hive management	Making Hives	Placing/ Perching Hives	Monitoring Hives	Cleaning of Hives	
Hygienic harvesting	Removal of honey combs	Separation of Honey and combs	Refining honey	Packing for honey	

Business financial management	Keeping financial records	of	Calculating profits	commercial use	Cash flow management	Making a simple business plan.
-------------------------------	---------------------------	----	---------------------	----------------	----------------------	--------------------------------

12. How would you rate the role training plays in uptake of beekeeping

Very important [ ]

Important [ ]

Not sure [ ]

Not important [ ]

**B (2) Influence of Funding on farmers uptake of beekeeping as an economic activity in Makueni County**

13. Do you consider funding relevant in the uptake of beekeeping?

Yes [ ] No [ ]

If yes, what are the likely sources of funding ? \_\_\_\_\_

14 a). Do you know of any financial institutions willing to lend to beekeepers in Makueni county?

Yes [ ] No [ ]

b). If yes, Name any three such institutions.

\_\_\_\_\_

14. Which of the following lenders are beekeepers likely to access funding from

Banks [ ]

Micro finance institutions [ ]

Government/Donors [ ]

None of the above

[ ]

**B(3) Influence of Institutional support on farmers uptake of beekeeping as an economic activity in Makueni County**

16a. Do you consider institutional support important to the uptake of beekeeping in Makueni county

Yes

[ ]

No

[ ]

16b.If yes, kindly indicate the extent to which institutional support influences the uptake of beekeeping.

Highly significant

( )

Significant

( )

Moderately Significant

( )

Not Significant

( )

17. How do you rate the following institutional support activities in regard to uptake of beekeeping? Tick appropriately.

Extent of Institutional support	Very important	Important	Not sure	Not important
Awareness campaigns				
Technical support				
Infrastructure Support				
Weighted totals				

**B (4) Influence of Sustainable Markets on the farmers uptake of beekeeping as an economic activity in Makueni**

18. (a) How do you rate the demand of bee product in the markets? Tick appropriately

- |                                  |   |
|----------------------------------|---|
| There is always a demand         | 4 |
| There is demand most of the time | 3 |
| Demand is seasonal               | 2 |
| Demand is mostly unpredictable   | 1 |

19. As a farmer comment on your ability to reach the market

- |             |   |     |
|-------------|---|-----|
| Very easy   | 4 | [ ] |
| Easy        | 3 | [ ] |
| Not so easy | 2 | [ ] |
| Hard        | 1 | [ ] |

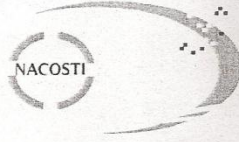
20. How do you rate bee product market prices?

- |                            |          |          |     |
|----------------------------|----------|----------|-----|
| Predictable fluctuations   | below 5% | annually | [ ] |
| Fluctuates mildly between  | 6-15%    | annually | [ ] |
| Fluctuates oftenly between | 15-35%   | annually | [ ] |
| Erratic fluctuations       | Over 35% | annually | [ ] |

**Thank you for your cooperation**



**Appendix IV: Research Authorization Letter**



**NATIONAL COMMISSION FOR SCIENCE,  
TECHNOLOGY AND INNOVATION**

Telephone: +254-20-2213471,  
2241349, 3310571, 2219420  
Fax: +254-20-318245, 318249  
Email: dg@nacosti.go.ke  
Website: www.nacosti.go.ke  
When replying please quote

9<sup>th</sup> Floor, Utalii House  
Uhuru Highway  
P.O. Box 30623-00100  
NAIROBI-KENYA

Ref. No **NACOSTI/P/17/49440/18773**

Date: **23<sup>rd</sup> August, 2017**

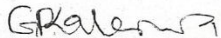
George Mulinga Kathila  
University of Nairobi  
P.O. Box 30197-00100  
**NAIROBI.**

**RE: RESEARCH AUTHORIZATION**

Following your application for authority to carry out research on *“Factors influencing the uptake of beekeeping in Makueni County, Kenya,”* I am pleased to inform you that you have been authorized to undertake research in **Makueni County** for the period ending **22<sup>nd</sup> August, 2018.**

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

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit a **copy** of the final research report to the Commission within **one year** of completion. The soft copy of the same should be submitted through the Online Research Information System.

  
**GODFREY P. KALERWA MSc., MBA, MKIM**  
**FOR: DIRECTOR-GENERAL/CEO**

Copy to:

The County Commissioner  
Makueni County.

The County Director of Education  
Makueni County.



## Appendix VI: Research Permit

**THIS IS TO CERTIFY THAT:  
MR. GEORGE MULINGA KATHILA  
of UNIVERSITY OF NAIROBI, 18898-500  
NAIROBI, has been permitted to conduct  
research in Makueni County**

**on the topic: FACTORS INFLUENCING  
THE UPTAKE OF BEEKEEPING IN  
MAKUENI COUNTY, KENYA**

**for the period ending:  
22nd August, 2018**

**Applicant's  
Signature**

**Permit No : NACOSTI/P/17/49440/18773  
Date Of Issue : 23rd August, 2017  
Fee Received :Ksh 1000**



**Director General  
National Commission for Science,  
Technology & Innovation**

### CONDITIONS

- License is valid for the proposed research, research site specified period.
- The License and any rights thereunder are transferable.
- At the request of the Commission, the Licensee shall submit a progress report.
- Licensee shall report to the County Director of Education and County Governor in the area of research before commencement of the research.
- Photography, filming and collection of specimens are subject to further permissions from relevant government agencies.
- License does not give authority to transfer research materials.
- Licensee shall submit two (2) hard copies and a soft copy of their final report.
- Commission reserves the right to modify the conditions of this Licence including its cancellation out prior notice.



**REPUBLIC OF KENYA**



**National Commission for Science,  
Technology and Innovation**

**RESEARCH CLEARANCE  
PERMIT**

**Serial No.A 15456**

**CONDITIONS: see back page**