CONSTRAINTS FACING ADOPTION OF BEE KEEPING IN BUNGOKHO SUB COUNTY, MBALE DISTRICT

BY

MAGAI PETER

BU/UP/2020/2525

A RESEARCH REPORT SUBMITTED TO THE DEPARTMENT OF AGRICULTURE, FACULTY OF SCIENCE AND EDUCATION IN PARTIAL FULFILLMENT OF THE AWARD OF DEGREE OF BACHELORS EDUCATION, BUSITEMA UNIVERSITY

JANUARY, 2024

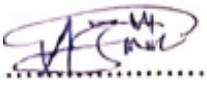
DECLARATION

I **MAGAI PETER,** declare that this research report is my own work and that to the best of my knowledge, it has never been submitted to any university or any higher learning institution for any professional award

signature ..... date 22.01.2024

APPROVAL

This research report entitled “CONSTRAINTS FACING BEEKEEPING KNOWLEDGE AND ADOPTION IN BUNGOKHO SUB COUNTY, MBALE DISTRICT, UGANDA” has been submitted to university examination board under my approval

Signed  .....Date 22. 01. 2024

Mr. Dramadri Gerald Afayo.

DEDICATION

This research project is dedicated to my parents Mr. Mulanyi Coroneli, Mrs. Sarah Mulanyi, and my daughter Aaliyah Waterfall for their constant encouragement and unceasing support, my course mates and relatives who have always inspired me. May God bless you.

ACKNOWLEDGEMENT

First, I want to thank the Almighty God for giving me life, His everlasting love, mercy and support towards me. He has been generous to me. Secondly, my special heartfelt appreciation to my supervisor, prof. ENGONYU JOSEPH, LECTURER BUSITEMA UNIVERSITY, for his incredible advice, guidance, constructive and critical comments and dedication all over this work. Particularly, I want to thank him for his well-timed comments which enabled me to move at the required pace.

Furthermore, I would also like to broaden my appreciation to all members of staff at the Department of Agriculture, Faculty of Science and Education, my course mates, my friends and my family for their support in the development of this research .In addition, my genuine gratitude goes to the local government of Mbale district for their support in data collection. Also, the people of Bungokho Sub County, I thank them for their support during interviews and fieldwork.

GOD BLESS YOU ALL

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

The study was conducted on the assessment of the constraints facing knowledge and adoption in Bungokho sub-county Mbale district. The study design was a cross sectional research design and a sample size of 32 respondents was adopted using purposive sampling technique. Data was collected using questionnaire that was designed for both farmers and stakeholders and presented in form of frequency tables and charts including pie charts. The findings revealed that there are clear constraints affecting beekeeping. However, factors that were affecting beekeeping production included; - gender, age, marital status and educational level. The findings further revealed that accessibility to inputs, the most costly input in beekeeping production, followed by availability of land. Also, most farmers do not have information about beekeeping and only a negligible percentage has access to credit. The national and county governments should avail inputs like subsidized beehives in good time and make it easily accessible. Proper sensitization should be done by agricultural extension officers to all farmers about the available extension services and county government should provide sufficient facilitation to agricultural extension officers to promote extension services. Farmers should be encouraged to form groups in order to access credit services, market their produce and acquire farm inputs collectively. Both national, county governments and financial institutions should make credit easily accessible and affordable to small scale farmers. The researcher recommends further research on causes of low level of accessing extension services in general to ascertain the underlying causes of low dissemination of extension

CHAPTER ONE

INTRODUCTION

1.0. Introduction

This chapter of the research proposal presents the background of the study, statement of the problem, objectives of the study, research questions, scope of the study, significance of the study, definition of operational terms and lastly the conceptual framework

1.1. Background

Apiculture is the process of keeping bees for the production of honey, propolis, bee wax and royal jelly .The idea of bee keeping started in a local way where the farmers had to begin the local ways of managing and keeping bees. Due to increased profitability of the enterprise in form of high demand for honey and other bee products, a lot of farmers in many parts of the world started adopting bee keeping as one of the enterprises that they started adapting to.

Beekeeping is simple and relatively cheap to start as it requires a very low level of inputs such as labor, capital and knowledge. Beekeeping does not depend directly on soil and can be a single means of living for families with limited land. The beekeeping sub-sector has a lot of uses for improvement of livelihood of communities as it creates jobs for many people who engage in production, trading and processing of bee products at different levels of market linkage. Beekeeping has contributions in sustainability and balancing the natural resources by assisting plants in pollination and in turn, the activity of beekeeping is environmental friendly hence it is important in utilizing barren lands and increasing biodiversity

Beekeeping is emerging as a very successful agricultural practice for rural area based people in less developed countries mainly due to its economic benefits from the products of this practice (Kugonza 2009). In Uganda, honey, beeswax, propolis, royal jelly and bee venom are the major financial products (Kamatara 2006), with pollination as the major biodiversity benefit (Delaplane 2008). Since food security cannot be achieved without income security, beekeeping could be a useful tool for improving rural economy; however, people are reluctant on taking up this enterprise

Managed bees are the most important commercial pollinators of those crops which depend on animal pollination for reproduction .Hence bee are vital for an economic, sustainable agriculture and for food security.

In addition, honey bees also pollinate a variety of wild flowers and, therefore, contribute to the biodiversity of many ecosystems. Honey and other hive products are, at least economically and ecologically rather, by-products of beekeeping. Due to this outstanding role of honey, which have been reported recently to be steadily increasing, have attracted much attention and stimulated many research activities

1.2. Problem statement

Apiculture is one of the upcoming agricultural enterprises in Uganda of current. It has grown in so many regions of the country by many farmers. This is because of the profitability of the enterprise in that it conveys in a lot of income through its many sections of interest by many farmers .Many of the products of apiculture among which include honey and wax are of a great use by people and many other sectors of the economy. Beekeeping has been there for years. History shows that beekeeping has been practiced as early as 1300 BC.D despite this milestone of beekeeping existence in the world, farmers in Bungokho sub county have not taken up beekeeping, they have been involved in many other agricultural enterprise for example crop growing and livestock where they incur in a lot of losses. A few of these farmers do practice beekeeping which could be of a great income generating because of a few expenses required compared to most of the other agricultural enterprises.

This therefore serves as a basis of this research to assess the constraints to information, knowledge and adoption of beekeeping in Bungokho Sub-County and formulate the possible strategies that can be employed to help to see that apiculture becomes one of the great agricultural enterprises that farmers in the sub county can start practicing.

1.3. Objectives

1.3.1. Main objective

The study established the constraints facing adoption of bee keeping in Bungokho Sub-County, Mbale District.

1.3.2. Specific objectives

i. To assess the current state of beekeeping practices in Bungokho subcounty, Mbale District.
ii. To determine the benefits of beekeeping for the local community and the economy in Bungokho subcounty, Mbale District.
iii. To identify the constraints faced by beekeepers in the adoption of beekeeping practices in Bungokho subcounty, Mbale District.

1.4. Research questions

During research, the following questions will be answered.

i. What is the current state of beekeeping practices in Bungokho Sub-County, Mbale District?
ii. What are the benefits of beekeeping for the local community and the economy in Bungokho Sub-County, Mbale District?
iii. What are the constraints faced by beekeepers in the adoption of beekeeping practices in Bungokho Sub-County, Mbale District?

1.4 Justification of the study

Apiculture is one of the important sectors that have existed in the world. It has proven to be among one of the outstanding enterprises that yield in a lot of profits when practiced. Though amidst all the beneficial outcomes of the enterprise, very many farmers in so many parts of this country Uganda still have not yet accessed clear information about bee keeping. Many farmers have not realized that beekeeping can be done as one of the agricultural enterprises.

Considerable research has been done on apiculture as one of the agricultural enterprises but a few works have been specific on the constraints facing beekeeping knowledge, information and adoption. With the changing agricultural world "agriculture as a business", there is need to determine the constraints facing beekeeping knowledge, information and adoption and identify the possible agricultural management practices, methods and ideas for proper adoption of apiculture by farmers.

1.5 Scope of the study

This study was carried out in Mbale district, Bungokho sub county in Eastern Uganda and it lies approximately 5 Km east of Mbale

This research was conducted in Bungokho Sub-County. This research take place between

November 20, 2023 to January 20, 2024.

1.6. Significance of the study

Farmers through this study will be able to be informed and adopt beekeeping

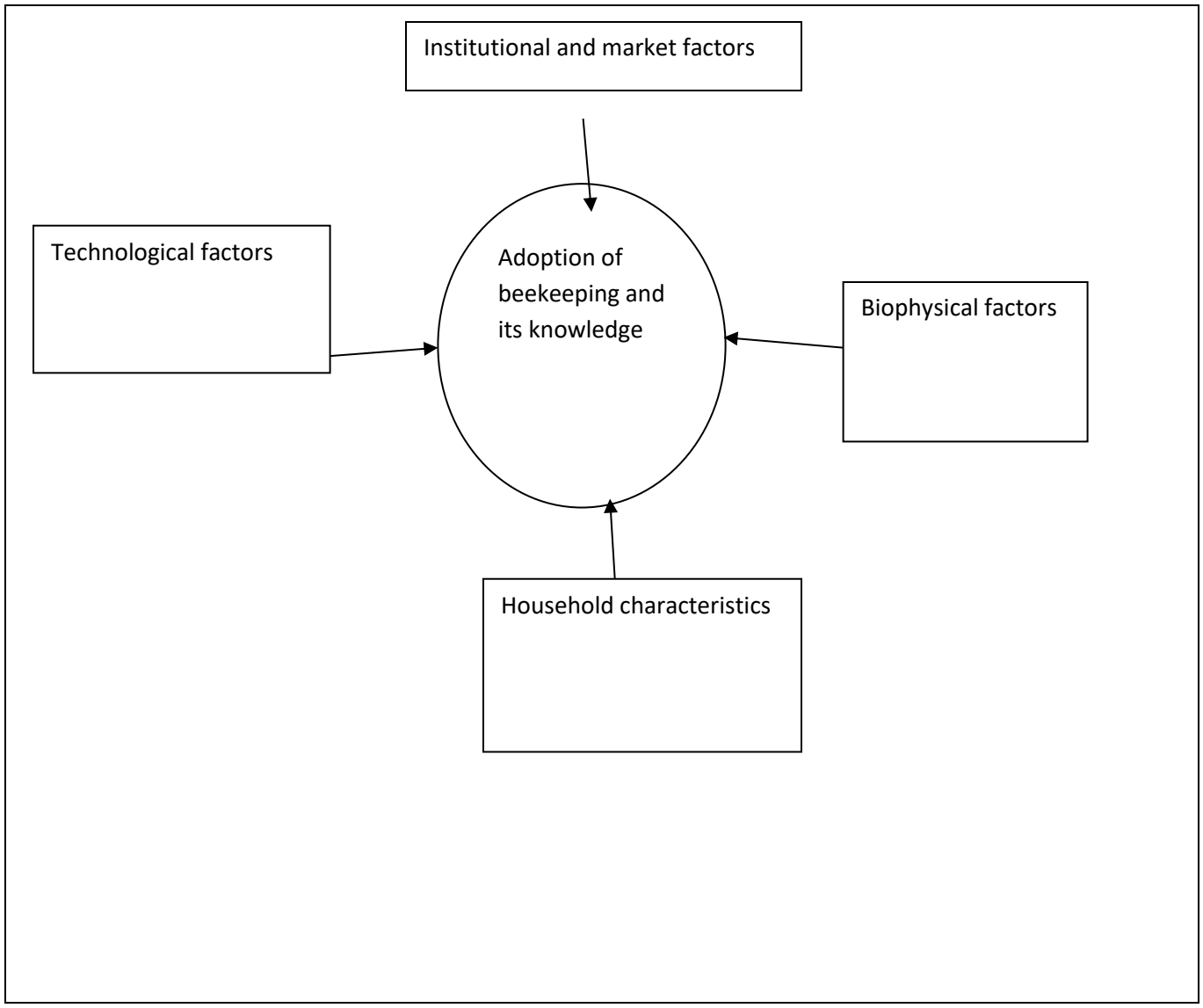
The findings from this study will also inform agricultural officers at the sub county about the value of implementing beekeeping.

The government and other interest groups will use this study to advocate for increased strategies aimed at improving apiculture.

1.7. Theoretical framework

Available evidence indicate that the technological changes, regional changes in climate particularly increase in temperature ,institutional and market factor changes, increased household characteristics, biophysical factors do greatly affect and influence apiculture .These effects include reduced reproduction of bees, high mortality rate of bee conies and limited markets for bee products which all the put on halt beekeeping enterprise

1.8. Conceptual framework



CHAPTER TWO

LITERATURE REVIEW

2.0. Introduction

This chapter represents literature in regard to adoption of beekeeping and constraints facing beekeeping by different authors.

This chapter reviews previous work relevant to the study. The review provides a conceptual understanding of the main issues that are relevant to the research. It looks at the state of beekeeping in developed and developing countries.

2.1. The current state of beekeeping practices

Adoption is taken as a variable representing behavioral changes that farmers undergo when accepting new ideas and innovations in agriculture .Behavioral changes refers to the desirable in knowledge ,understanding and ability to apply technological information ,changes in feeling behavior such as changes in interest, attitudes, aspirations ,values and changes in overt abilities and skills.

According to Feder, adoption is classified into two types namely; individual and aggregate adoption based on coverage.

Individual adoption refers to the farmer's decision to integrate anew technology into the production process.

Aggregate adoption is the process of diffusion of a new technology within a region or population.

Based on the adoption cycle, most farmers do not adopt agricultural activities immediately as they get to know about them. Different farmers adopt agricultural technologies at different times and adopters can be grouped into three categories according to Diederen, Van Meijl.

1) Innovators; are the first farmers in their area to use a certain technology. In case of beekeeping these are farmers that adopted the activity before anyone else.

2) Early adopters, refers to the farmers who indicate to belong to the first quarter of adopters of a certain innovation, relative to the full range of potential adopters.

3) Late adopters are those farmers who adopted an innovation, but did not belong to the first quarter of potential users

Beekeeping adoption at household level like any other adoption process is determined by several factors that do not influence the process individually but these factors tend to interact with each other

First, Mujuni Natukunda reported phobia to bees as the main factor affecting beekeeping business in Western Uganda.

African honeybees have high levels of defensive behavior hence tend sting everything that crosses their boundaries as their defensive mechanism.

Capital endowment such as human, social, natural, and financial capitals have been reported to drive agricultural technology. Beekeeping as an on farm enterprise is also driven by the same capital endowment although there are limited studies on the drivers of beekeeping adoption particularly in the geographical region of study. Available literature suggests that human capital influencing adoption of beekeeping includes access to related knowledge, education levels of farmers, labor availability on the farm, farmer trainings and age of the farmer.

In the study of Mujuni Natukunda, most the bee keepers had attained formal education with 43% having achieved secondary and 18% tertiary education. This showed that educated farmers were more likely to adopt beekeeping since education stimulates their acceptance of knowledge of new technologies. Education level of farmers was found relevant and positively influenced adoption of beekeeping too. This was attributed to increased knowledge, access to related information such as the right time for harvesting and improved understanding of the related best management technologies.

Social capital that influences adoption of beekeeping encompasses access to extension services, formation of associations and cooperatives. All these increase farmers bargaining power and

their access to markets. Additionally, availability of information and knowledge about the related skills required for bee farming are vital in the beekeeping adoption process. The sources of information that positively influenced adoption process comprised of fellow farmers, media and extension officers. However the appropriateness, accuracy and effective dissemination of this information must be highly considered. Edillon found that organizational membership and extension service coverage also significantly and positively influenced adoption of beekeeping. Though social capital plays a crucial role in beekeeping adoption, it was reported to be highly influenced by programs and policies in place.

The main natural capital influencing adoption is land where the amount of land owned, quality of land and presence of land investments are considered during adoption process. Farm size was found to have ambiguous relationship with adoption rates of most agricultural technologies depending on the characteristics of the technology and institutional setting. However, farm size was not yet found to be significantly related with adoption of apiculture.

According to other studies, financial assets that significantly influence adoption of beekeeping are farmers' income, access to credit, farm structures and access to beekeeping equipment. Access to credit eases the production and marketing process by facilitating the purchase of tools, equipment, packaging material and transport to the market. Lack of start-up to buy beehives and other tools negatively influence adoption of prospective beekeepers. Hence, farmers' incomes and access to credit significantly affects the uptake of such technologies. On contrary, Chuma, Mushuku reported that financial assets reported that financial assets were not essential for beekeeping at subsistence level in Zimbabwe. Although, these factors have been reported to influence adoption of beekeeping, their influence may vary across communities and agro-ecological zones.

2.2. The constraints faced by beekeepers in the adoption of beekeeping practices

There are many biotic and a biotic factors that weaken beekeeping and its values. Among the a biotic factors, climate is the major factor(Langowska al.,2016).It caused the decline of bees by a synchronizing the season of flowering plants (Le Conte& Navajas,2008; Hegland et al.,2009;Lever et al.,2014). Global warming due to climatic change may have substantial negative impact on the production of honey (Langowska et al., 2016).Birhan et al. (2015)

reported that lack of honeybee forage, shortage of rainfall, agrochemical poisons ,pest, absconds and lack of honey storage facilities affected honeybee production and productivity negatively in Ethiopia.

Bahta(, 2018) reports that poor post-harvest handling(like storing in poor containers, storing at non-normal room temperature, exposing the storage honey to dust and pests without covering the storage materials during both storage and transportation0,absence of market linkage between producers, retailers and consumers affected negatively the quality of honey. Thomson (2012) stated that a change in the utilization of agricultural land has profound effects against honeybee and the plant to be pollinated by it. Because it changes the nutritional value obtained from plant pollen and physiological development of honeybees. Mushonga (2019) showed that in the Kayonza district of Rwanda, the honey beekeeping was negatively affected by lack of education, gender bias, abscond and swarm, high costs, lack of modern apicultural equipment

2.3. The potential benefits of beekeeping for the local community and the economy

Beekeeping also known as apiculture, is the art, science and or business of managing honey bees for the purpose of producing honey, beeswax and other bee products for personal consumption and industrial use. The most important component in beekeeping industry is the bee as it is involved in primary production of bee products. There are four well-known honeybee species in the world namely: Apis mellifera, Apis dorsta, Apis cerana and Apis florae(Yahaya and Usman, 2015).

The honey bee A. mellifera is one of the most successful species in the animal kingdom judged by its ability to adapt to a wide climatic range. It is believed to have evolved in the tropics. It is highly productive and can adapt well in different climatic conditions. Although they are known as vicious and aggressive bees, they are good producers (Strauss et.al, 2015). Beekeeping is an enterprise that offers great potential for development in Swaziland since it is easy and cheap to manage. For farmers to practice beekeeping they require small pieces of land and its quality is less important since beehives are placed on trees. This enterprise serves as a means of empowering small-scale farmers who have low capital investments.

Smale and Mason, (2014) noted that beekeeping provide local people with an economic incentive for preservation of natural habitat enhancing environmental quality thus, labour in rural areas can be utilized especially during dry seasons. Beekeeping is an activity that fits well with the concept of small-scale agricultural development. It is a labour-intensive undertaking, which can be easily integrated into larger agricultural or forestry projects. Bees not only aid in pollination of some crops used in such projects, but also makes use of otherwise unused resources such as nectar and pollen. Previous studies indicates that beekeeping activity provide benefits in terms of employment, pollination of crops and conservation of biodiversity, generates income through hive products and renting bee colonies to pollinate crops.

Beekeeping is of vital importance in starting and rebuilding of economic activities that would address socio-economic problems such as HIV and AIDS, poverty and unemployment. A range of products produced in beekeeping not only are rich in nutrients but also have medicinal properties, which people may benefit from. In arable farming, bees also improve crop yields through increased efficiency in pollination and also beekeeping diversifies agriculture as it can be integrated with other agricultural activities as well as agro forestry, (Ojiem et.al, 2016).

Honey, the natural product of honeybees, has many times been described as man's ever sweetest food. Consequently, as honey contains simple sugars that are ready for assimilation upon reaching intestine, it is an excellent energy source. Furthermore, as reported by, HBRC (2020) it contains more than 180 elements and it has several uses. In other ways, of the total honey production in Ethiopia, about 41.22% was used for household consumption, about 54.68% for Sale, about 0.34% used as payment for wage in kind and the rest (3.75%) used for other Purposes (Ojo,S.O, 2020).

Beekeeping contributes to livelihood outcomes through increasing food security more so increasing food accessibility, availability and utilization. Beekeeping enhances food accessibility through direct income generation which can be used for purchasing other nutritious foods that reduce the prevalence of protein, iodine, vitamin and iron deficiencies. Beekeeping has additional nutritional benefits as an extensive source of food hence its contribution to food availability. This is mainly in form of honey which is used for several other purposes in a home including being used as a sweetener. Honey contains antioxidants, minerals, vitamins, proteins

and a high calorific value which present attractive ingredients that do not occur in artificial sweeteners, (Monela and Abdallah, 2019).

Apiculture also accelerates the accumulation of savings as a result of increased income. Beekeeping increases cash flows because it supplements the household income especially during the dry seasons when on-farm income is low. Hive products may be harvested two to three times a year especially at consumption peak times, for instance, when a school fee has to be paid. Some bee products such as beeswax and propolis have long shelf lives which enable them to be stored for a long period as a form of saving and sold when need arises. Additionally, the ease of asset recovery and accumulation among beekeepers in case of insecurity was reported. This makes beekeeping a very important safety and cargo net, (Mmasa, 2019).

Beekeeping is said to improve well-being of the beekeepers through increasing the number of tools, equipment and access to basic infrastructure for instance access to roads and markets. Some of tools and equipment owned to enhance beekeeping production include bee suits, smokers, beehives and other tools used in apiary management. During beekeeping production, farmers acquire new knowledge and skills particularly those related to beekeeping. This may be acquired from organized trainings or as a result of cumulative experience in beekeeping. These skills enhance beekeepers capabilities. In addition, beekeeping gives an opportunity to farmers to network with other members in the communities. This is mainly through group formation that eases access to extension services, (Kihwele et.al 2018).

CHAPTER THREE

RESEARCH METHODOLOGY AND MATERIALS

3.1 Introduction

The tools and methods of research that was used included interview schedules, questionnaires, observation and review of documented information from research work already done, maps, journals and books. It covered the nature and sources of data, target population and unit of analysis, sampling frame and sample size, population distribution and sampling procedures, and data collection and data analysis.

3.2 Research Design

This study examined the factors that have hindered access to information about beekeeping and its adoption in Bungokho Sub County. During this study information was obtained which best described the factors of that have hindered access to information about beekeeping and its adoption. This study adopted the explorative, quantitative, descriptive, and evaluative research design. The strength of explorative design lies in its flexibility of design, which easily allowed different aspects of the problem to be considered. It involved the survey of concerned literature, the experience survey and analysis of insights stimulating examples.

3.3 Target population

Population refers to the entire group of individuals having a common observable characteristic Mugenda, (1999).This study targeted thirty (30) beekeeping farmers in Bungokho Sub-County

3.4 Sampling technique

Both probability and non-probability sampling was used. The probability sampling was done randomly by at least picking (3) three prominent farmers in each parish. Non-probability sampling was done only for a given purpose that is so pressing to be undertaken for example getting information from agricultural extension workers at the sub county

3.5 Nature and Sources of Data

The nature of the data obtained included the socio-economic characteristics of different groups of people and house hold resource, land use inform of forestry

Data on knowledge about apiculture was obtained from the household interviews.

Other sources of data and information such as general information about apiculture was obtained from MAAIF website

Two types of data were obtained; primary and secondary data.

i) Sources of Primary Data. This was obtained from household head respondents and the observations that will be made and recorded in the field.

ii) Sources of Secondary Data. Secondary data was obtained from published and unpublished information sources. NGO's, relevant references, publication, development plans, annual reports from government departments, other academic studies in other areas, books periodicals and journals. Various institutions was visited to gather information.

3.6 Data Collection Instruments

Instruments that will be used in data collection included:

i) House hold Questionnaires, The Household questionnaire were administered to farmers or household heads.

ii) Interview Schedule

Interview schedules was used in gathering information from various local council leaders and agricultural officers

iii) Photographs

They were used to capture lasting impressions of the field situation with regards to activities carried out.

IV) Review of Documented Data, these included materials already processed and published.

3.7 Data collection methods

3.7.1 Interview method

This was used to obtain information from bee-keeping farmers by asking them questions of which the response was recorded.

3.7.2 Review of Documented Data

These included materials already processed and published.

CHAPTER FOUR
PRESENTATION OF THE ANALYSIS AND DISCUSSION OF FINDINGS

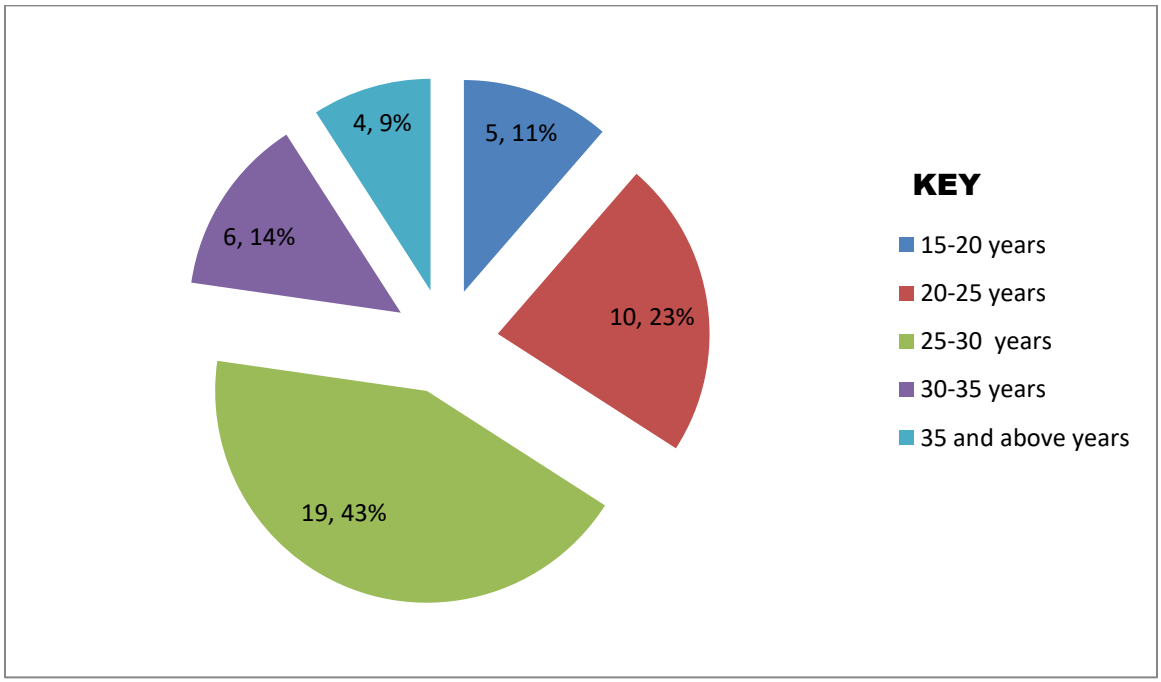
4.0. Introduction

This chapter presents the findings of the study. Discussion and analysis of the different responses to some key questions was also done in this chapter following the research objectives as seen below;

4.1. Back ground information of respondents

This section shows the age, sex, marital status, and education level as explained below;

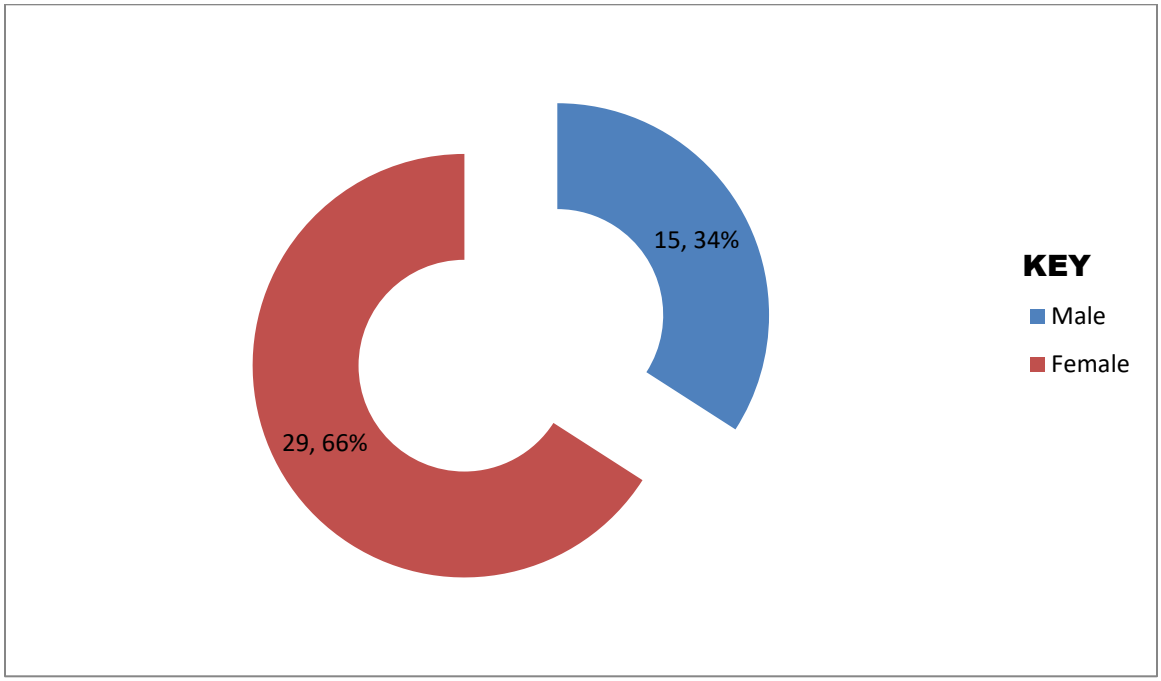
Figure 1: Age of the respondents



Source: Primary Data, (2024)

The findings indicate that 11% of the respondents aged between 15-20 years, 23% of the respondents aged between 20-25 years, 43% of the respondents aged between 25-30 years, 14% of the respondents between 30-35 years and 9% of the respondents being between 35 and above years.

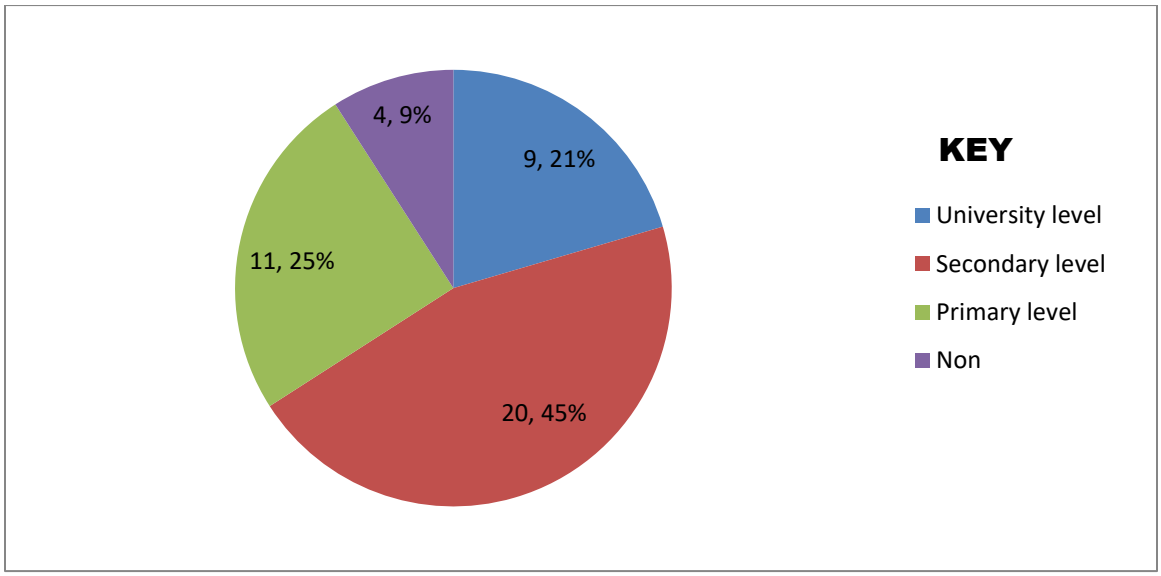
Figure 2: Sex of the respondents



Source: Primary Data, (2024)

The findings show that 34% of the respondents as male and 66% of the respondents as female

Figure 3: Marital status of the respondents



Source: Primary Data, (2024)

The study revealed that 21% of the respondents attained university level, 45% of the respondents had secondary education, 25% of the respondents had primary education, and 9% of the respondents had no education.

4.2. The current state of beekeeping practices in Bungokho sub county, Mbale District.

This was the first objective under study and responses obtained are explained below;

Table 4.1: The current state of beekeeping practices in Bungokho sub county, Mbale District.

Response	Frequency	Percentage
Familiar with Beehive Technology		
Very familiar	16	36
Somewhat familiar	19	43
Not familiar	9	20
Total	**44**	**100**
Used Beehive Technology in your projects		
Yes	34	77
No	10	23
Total	**44**	**100**
The biggest advantages of using Beehive Technology		
Easy to use and implement	15	34
Fast development speed	12	27
Scalable and flexible	9	20
Cost-effective	5	11
Good for prototyping	3	8
Total	**44**	**100**
Limitations of using Beehive Technology		
Limited functionality compared to other frameworks	9	20
Steep learning curve	10	23
Lack of documentation and resources	19	43
Limited community support	6	14
Total	**44**	**100**
The performance of Beehive Technology compared to other similar technologies		
Better	22	50
Worse	05	11
Similar	17	39
Total	**44**	**100**

Source: Primary Data, (2024)

The findings indicated that 36% of the respondents said that they were very familiar with beehive technology, 43% of the respondents were somewhat familiar, and 20% of the respondents as not familiar.

Besides, 77% of the respondents agreed to have used beehive technology, and 23% of the respondents disagreed.

In addition, 34% of the respondents stated that advantage of using beehive technology was easy to use and implement, 27% of the respondents said fast development speed, 20% of the respondents stated scalable and flexible, 11% of the respondents pointed out cost-effective and 8% of the respondents noted good for prototyping.

Furthermore, 20% of the respondents pointed out limited functionality compared to other frameworks, 23% of the respondents said steep learning curve, 43% of the respondents indicated lack of documentation and resources and 14% of the respondents noted limited community support

The study indicated that 50% of the respondents report that the performance of beehive technology was better compared to other similar technologies better, 11% of the respondents stated worse and 39% of the respondents said similar.

4.3. The benefits of beekeeping for the local community and the economy in Bungokho subcounty, Mbale District.

The respondents were asked several questions and responses obtained are discussed below;

Table 4.2: The benefits of beekeeping for the local community and the economy in Bungokho subcounty, Mbale District.

Response	Frequency	Percentage
Importance of beekeeping in the environment		
Pollination of crops and wildflowers	18	41
Supporting biodiversity	11	25
Improved soil health	9	20
Reduced use of chemical pesticides and fertilizers	6	14
Total	**44**	**100**
Plan to expand your beekeeping operations		
Yes	39	89
No	5	11
Total	**44**	**100**
Ever considered taking up beekeeping as a hobby or profession		
Yes	25	57
No	19	43
Total	**44**	**100**
The main source of labor used on your farm		
Husband	19	43
Wife	10	23
Children	9	20
Hired	6	14

Total	**44**	**100**
Beekeeping has contributed to your overall financial well-being		
It has helped me earn a steady income	10	23
It has provided me with a supplemental income	09	20
It has allowed me to save money on food and other expenses	20	46
It has not had a significant impact on my financial well-being	5	11
Total	**44**	**100**

Source: Primary Data, (2024)

The study showed that 41% of the respondents stated that importance of beekeeping in the environment was pollination of crops and wildflowers, 25% of the respondents said supporting biodiversity, 20% of the respondents noted improved soil health , and 14% of the respondents stated reduced use of chemical pesticides and fertilizers.

The findings revealed that 89% of the respondents had a plan for beekeeping operations, and 11% of the respondents disagreed.

In addition, 57% of the respondents agreed that they ever considered taking up beekeeping as a hobby or profession, and 47% of the respondents disagreed.

Besides, 43% of the respondents reported that the main source of labor used on farm was husband, 23% of the respondents said wife, 20% of the respondents noted children, and 14% of the respondents said hired labour.

In addition, 23% of the respondents pointed out that beekeeping has contributed to their overall financial well-being as it had helped them earn a steady income, 20% of the respondents revealed that it has provided them with a supplemental income, 46% of the respondents said that it had allowed them to save money on food and other expenses and 11% of the respondents stated that it had no significant impact on my financial well-being.

4.4. The constraints faced by beekeepers in the adoption of beekeeping practices in Bungokho sub county, Mbale District.

The findings were obtained through questions asked to respondents as discussed in the table below;

Table 4.4: The constraints faced by beekeepers in the adoption of beekeeping practices in Bungokho sub county, Mbale District

Response	Frequency	Percentage
The biggest challenge you face in beekeeping		
Diseases and parasites	21	48
Pests and predators	13	29
Poor weather conditions	4	9
Lack of forage and nectar sources	6	14
Total	**44**	**100**
Noticed any decline in honey production in recent years		
Yes	39	89
No	5	11
Total	**44**	**100**
What do you attribute the decline in honey production to		
Pesticides and other chemicals	18	41
Habitat loss and fragmentation	12	27
Climate change	8	18
Diseases and parasites	6	14
Total	**44**	**100**
Do you encounter pests or diseases in your beehives		
Every few months	10	23
Once a year	14	32
Rarely	20	45
Total	**44**	**100**

Source: Primary Data, (2024)

The field findings show 48% of the respondents said that the biggest challenge faced in beekeeping was diseases and parasites, 29% of the respondents indicated pests and predators, 9% of the respondents pointed poor weather conditions and 14% of the respondents stated lack of forage and nectar sources.

Besides, 89% of the respondents agreed to have noticed a decline in honey production in recent years while 11% of the respondents disagreed.

In addition, 41% of the respondents stated that pesticides and other chemicals were attributed to decline in honey production, 27% of the respondents said habitat loss and fragmentation, 18% of the respondents stated climate change and 14% of the respondents stated diseases and parasites.

The findings indicate that 23% of the respondents said that every few months they encounter pests or diseases in their beehives, 32% of the respondents said once a year and 45% of the respondents stated rarely.

CHAPTER FIVE: DISCUSSION OF RESULTS

5.0. Introduction

This chapter presents the discussion of the results as discussed below;

5.1. Discussion of the results

5.1.1. The current state of beekeeping practices in Bungokho sub county, Mbale District.

The findings indicated that 36% of the respondents said that they were very familiar with beehive technology, 43% of the respondents were somewhat familiar, and 20% of the respondents as not familiar. The study agreed with Schneider and Gugerty, (2019) the architecture of Langstroth is more preferred by bee keepers since it produced honey with best quality. However, it could not match KTBH in honey production and bee colonization in turn KTBH could not compete with log hive in bee colonization. The main challenge was to come up with a bee hive that could maximize advantages of three types in one unit. There are several possible approaches to improvement of African traditional apiculture. Whichever approach is adopted would need to be holistic and preferably integrated with other rural activities. It should not, however, be highly sophisticated and demanding of advanced technology in early stages.

Besides, 77% of the respondents agreed to have used beehive technology, and 23% of the respondents disagreed. In addition, 34% of the respondents stated that advantage of using beehive technology was easy to use and implement, 27% of the respondents said fast development speed, 20% of the respondents stated scalable and flexible, 11% of the respondents pointed out cost-effective and 8% of the respondents noted good for prototyping. In agreement with Workneh and Ranjitha, (2018)said that the use of movable frame hives, for example, might not be advantageous in early stages because of the requirements for prepared hive construction components and precision needed in construction. Instead an intermediate hive of top bar type might be a more appropriate early stage intervention. Often known as Kenya Top Bar Hive in Africa-because it was first introduced there in 1960s - such Hives, of which there are several variations, have many advantages of movable frame hives but have a lower capital cost and minimal recurrent costs.

Furthermore, 20% of the respondents pointed out limited functionality compared to other frameworks, 23% of the respondents said steep learning curve, 43% of the respondents indicated lack of documentation and resources and 14% of the respondents noted limited community support. The study indicated that 50% of the respondents report that the performance of beehive technology was better compared to other similar technologies better, 11% of the respondents stated worse and 39% of the respondents said similar. In line with Hausser and Mpuya (2020)said that the ATIRI program enabled a greater number of farmers to access appropriate technologies on demand over a wider geographical span in the country. This

empowered farmers in the 'less favoured areas' (the arid and semi-arid lands) to access superior technologies for improved livelihood. Among the technologies widely demanded by farmers in the pastoral areas of Baringo County are those for improving honey production. The Langstroth bee hive, an improvement on the Kenya Top Bar Hive (KTBH), since it has a queen excluder and a super compartment, was highly sought for by the bee keepers. The KTBH is in turn an improvement on the Log Hive in the sense that its internal volume was bigger and it has bars to assist the bees start honey manufacturing more easily.

5.1.2. The benefits of beekeeping for the local community and the economy in Bungokho sub county, Mbale District.

The study showed that 41% of the respondents stated that importance of beekeeping in the environment was pollination of crops and wildflowers, 25% of the respondents said supporting biodiversity, 20% of the respondents noted improved soil health , and 14% of the respondents stated reduced use of chemical pesticides and fertilizers. In relation to Smale and Mason, (2014) noted that beekeeping provide local people with an economic incentive for preservation of natural habitat enhancing environmental quality thus, labour in rural areas can be utilized especially during dry seasons. Beekeeping is an activity that fits well with the concept of small-scale agricultural development. It is a labour-intensive undertaking, which can be easily integrated into larger agricultural or forestry projects. Bees not only aid in pollination of some crops used in such projects, but also makes use of otherwise unused resources such as nectar and pollen. Previous studies indicates that beekeeping activity provide benefits in terms of employment, pollination of crops and conservation of biodiversity, generates income through hive products and renting bee colonies to pollinate crops.

The findings revealed that 89% of the respondents had a plan for beekeeping operations, and 11% of the respondents disagreed. In addition, 57% of the respondents agreed that they ever considered taking up beekeeping as a hobby or profession, and 47% of the respondents disagreed. Besides, 43% of the respondents reported that the main source of labor used on farm was husband, 23% of the respondents said wife, 20% of the respondents noted children, and 14% of the respondents said hired labour. In agreement with Monela and Abdallah, (2019) noted that beekeeping contributes to livelihood outcomes through increasing food security more so increasing food accessibility, availability and utilization. Beekeeping enhances food accessibility through direct income generation which can be used for purchasing other nutritious foods that reduce the prevalence of protein, iodine, vitamin and iron deficiencies. Beekeeping has additional nutritional benefits as an extensive source of food hence its contribution to food availability. This is mainly in form of honey which is used for several other purposes in a home including being used as a sweetener. Honey contains antioxidants, minerals, vitamins, proteins and a high calorific value which present attractive ingredients that do not occur in artificial sweeteners.

In addition, 23% of the respondents pointed out that beekeeping has contributed to their overall financial well-being as it had helped them earn a steady income, 20% of the respondents revealed that it has provided them with a supplemental income, 46% of the respondents said that it had allowed them to save money on food and other expenses and 11% of the respondents stated that it had no significant impact on my financial well-being. In support with Ojiem et.al, (2016) noted that beekeeping is of vital importance in starting and rebuilding of economic activities that would address socio-economic problems such as HIV and AIDS, poverty and unemployment. A range of products produced in beekeeping not only are rich in nutrients but also have medicinal properties, which people may benefit from. In arable farming, bees also improve crop yields through increased efficiency in pollination and also beekeeping diversifies agriculture as it can be integrated with other agricultural activities as well as agro forestry.

5.1.3. The challenges faced in beekeeping on household income among beekeepers in Bungokho Sub-County Mbale District.

The field findings show 48% of the respondents said that the biggest challenge faced in beekeeping was diseases and parasites, 29% of the respondents indicated pests and predators, 9% of the respondents pointed poor weather conditions and 14% of the respondents stated lack of forage and nectar sources.

Besides, 89% of the respondents agreed to have noticed a decline in honey production in recent years while 11% of the respondents disagreed.

In addition, 41% of the respondents stated that pesticides and other chemicals were attributed to decline in honey production, 27% of the respondents said habitat loss and fragmentation, 18% of the respondents stated climate change and 14% of the respondents stated diseases and parasites.

The findings indicate that 23% of the respondents said that every few months they encounter pests or diseases in their beehives, 32% of the respondents said once a year and 45% of the respondents stated rarely.

5.2. Conclusion

The findings indicated that very familiar with beehive technology, used beehive technology, using beehive technology was easy to use and implement, fast development speed, scalable and flexible, cost-effective, good for prototyping, limited functionality compared to other frameworks, steep learning curve, lack of documentation and resources, limited community support, performance of beehive technology was better compared to other similar technologies better, and worse. In addition, the study showed that importance of beekeeping in the environment was pollination of crops and wildflowers, supporting biodiversity, improved soil health and reduced use of chemical pesticides and fertilizers. Besides, the findings revealed that

had a plan for beekeeping an operation, taking up beekeeping as a hobby or profession, the main source of labor used on farm was husband, wife, children, and hired labour.

5.3. Recommendation

Use integrated pest management (IPM) techniques to minimize the use of chemicals in the hive. IPM involves using a combination of methods such as monitoring for pests and diseases, removing infected frames, and using natural predators or parasites to control pests.

Practice good sanitation and hygiene habits when working with bees. This includes wearing protective clothing, washing equipment regularly, and disinfecting tools and equipment between uses.

Provide adequate space and resources for the colony to grow and thrive. This includes ensuring that the hive is large enough, providing ample food sources, and controlling swarming by splitting colonies when necessary.

Monitor colonies regularly for signs of disease, pests, and other issues. Regular inspections can help identify problems early on and prevent them from becoming more serious.

Use locally adapted queen bees and breed for desirable traits such as resistance to disease and parasites, gentleness, and high honey production.

Implement sustainable forestry practices when harvesting wood for hives and other beekeeping equipment. Sustainable forestry practices include selecting appropriate tree species, avoiding over-harvesting, and reforestation efforts.

consider using organic acids or essential oils instead of synthetic chemicals for Varroa mite control. Organic acids and essential oils have been shown to be effective against mites while being safer for bees and the environment.

Plant bee-friendly flowers and herbs in your garden or community to provide a diverse source of nectar and pollen for bees. Bee-friendly plants include lavender, coneflower, blackberry, and mint.

Support local pollinator conservation initiatives and advocate for policies that promote pollinator health. This can include supporting organic farming practices, creating pollinator gardens in public spaces, and reducing pesticide use in urban areas.

Educate yourself and others about bee biology, behavior, and ecology. Understanding bees' needs and habits can help you better care for them and promote their health.

Collaborate with other beekeepers and researchers to share knowledge, best practices, and resources. This can help advance the field of beekeeping and lead to new discoveries and innovations.

Continuously monitor and evaluate the impact of climate change on bee populations and adjust beekeeping practices accordingly. Climate change may affect the availability of nectar and pollen, so it's important to adapt beekeeping strategies to ensure colonies continue to thrive.

REFERENCES

Abadi B, Abebe A, Delenasaw Y (2016). Community Perception on Beekeeping Practices, Management, and Constraints in Termaber and Basona Werena Districts, Central Ethiopia. Hindawi Publishing Corporation.

Kamatara K (2006) Effects of hive type and location on colonization rate and pest perseverance, Undergraduate degree research project Makerere University, Uganda

Karealem E, Gebey T, Preston TR (2009. Constraints and prospects for apiculture research and development in Amhara region, Ethiopia.

Nebiyu Y, Messele T (2013). Honeybee production in the three agroecological districts of Gamo Gofa zone of Southern Ethiopia with emphasis on constraints and Opportunities.

Tessega B (2009). Honeybee production and marketing systems, Constraints and Opportunities in Burie district of Amhara Region. Department of Animal Science and Technology Bahir Dar University, Ethiopia

Wilson, R.T 200. Current Status and Possibilities for Improvement of Traditional Apiculture in Sub-Saharan Africa.Partridge House, Umberleigh, UK

APPENDICES

APPENDIX I: QUESTIONNAIRE

RESPONDENTS QUESTIONNAIRE

Dear Respondent, My name is MAGAI Peter, a student of whom currently undertaking a bachelor's degree in Science Education of Busitema University, Nagongera Campus. I am conducting a study on the constraints facing bee production in BUNGOKHO SUB COUNTY. You have been randomly selected as a voluntary representative participant of this study. I am kindly requesting you to spare some time and respond to the questions I wish to ask you as honestly as possible. The information provided will be treated strictly as confidential and will only be used for this study. The findings of the study and the recommendations arrived at may help government and other development partners to design programs which benefit the beekeeping farmers of Bungokho Sub-County and the world at large.

Please confirm you I have your consent to participate in this study. Yes_____; No_____
Thank you for your cooperation.
MAGAI PETER

This questionnaire is made up of four sections A, B, C, and D. Please answer each question by writing in the space provided or tick against a box for the choice provided. The information provided is considered strictly confidential and will only be used for this research.

SECTION A: DEMOGRAPHIC CHARACTERISTICS

Village:……
Parish:…….…….

1. Gender

1. Female 2. Male

2. Age in years

A) 18-24. B) 25-35. C) 36-45. D) 46-55. E) 56 and above

3. Marital status

1. Married. ☐ 3. Divorced ☐

2. Single. ☐ 4. Widowed ☐

4. Education level

What is your education level?

1. Nott attended any formal education ☐

2=Primary school ☐

3=Secondary school ☐

4=Tertiary education

5. Years of experience in bee keeping ☐

1. 1-5 years ☐

2. 6-10 years ☐

3. 11-15 years

4. 15 and above years

SECTION B: The current state of beekeeping practices in Bungokho subcounty, Mbale District.

5. How long have you been involved in beekeeping activities?

a) 1-5 years ☐

b) 6-9 years ☐

c) 10-15 years ☐

d)15-21 years

e) 22 and above years

6. If yes, how many beehives do you have?

a) 1 Beehive

b) 2-4 Beehives

c) 5-7 Beehives

d) 8-10 Beehives

e) 11 Beehives and above

7. How many colonies do you currently maintain?

a) 1-5

b) 6-10

c) 11-20

d) 21 or more

8.What is your primary reason for keeping bees?

a) Honey production

b) Pollination

c) Beeswax production

d) Personal interest/hobby

9. What beekeeping methods are commonly used in Bungokho Sub County?

a) Traditional Beekeeping

b) Conventional Beekeeping ☐
c) Organic Beekeeping ☐
d) Permaculture Beekeeping ☐
e) Top-Bar Hive Beekeeping ☐
f) Warre Hive Beekeeping ☐
g) Kenya Top-Bar Hive Beekeeping ☐
h) Tanzanian Top-Bar Hive Beekeeping ☐

10. What types of beehives are predominantly utilized in the area?

a) Langstroth hive ☐
b) Top-bar hive ☐
c) Warre hive ☐
d) Kenya top-bar hive ☐
e) Tanzanian top-bar hive ☐
f) Log hive ☐
g) Straw hive ☐
h) Hollow tree hive ☐
i) Flow hive ☐

11. How many liters of honey do you get in the year?

a) 4-9 liters ☐
b) 10-15 liters ☐
c) 16-21 liters ☐
d) 22 and above liters ☐

SECTION C: The constraints faced by beekeepers in the adoption of beekeeping practices in Bungokho subcounty, Mbale District.

12. What challenges do you encounter in adopting modern beekeeping practices?

a) Lack of access to information and training
b) Limited availability of resources
c) Climate and environmental factors
d) Regulations and policies
e) Limited infrastructure
f) Negative perceptions and attitudes towards beekeeping

13. Are there any specific issues related to pest and disease management in beekeeping?

a) Bee viruses
b) Fungal infections
c) Bacterial infections
d) European foulbrood
e) Hive pests

14. What are the factors causing the decline in production

a) Shortage of farm land
b) Low price of bee products in the market
c) Low demand for bee products in the market
d) Limited water resources
e) Limited skills in beekeeping
f) Labor constraint

15. How important are each of the following factors in determining which beekeeping practices you use?

a. Traditional knowledge and practices

b. Scientific research and evidence

c. Market demand and customer preferences

d. Environmental sustainability

e. Cost and profitability

16. Have you received any formal training in beekeeping?

a. Yes

b. No

17. If yes, what was the source of your training? (Select all that apply)

a. Government extension service

b. Private company or consultant

c. NGO or community organization

d. Online courses or resources

SECTION D: The potential benefits of beekeeping for the local community and the economy in Bungokho Sub-County, Mbale District.

18. In what ways has beekeeping positively impacted your community?

a) Beekeeping can help to increase crop yields through pollination
b) Beekeeping is source of income through the sale of honey, and beeswax
c) Beekeeping can promote environmental awareness and conservation efforts
d) Beekeeping can bring people together and foster a sense of community.
e) Honey is a nutritious food that contains vitamins, minerals, and antioxidants.