EFFECTS OF AGRICULTURAL EXTENSION EDUCATION ON PROMOTION OF HORTICULTURAL FARMING: A CASE OF KAITI FARMERS ASSOCIATION, MAKUENI COUNTY, KENYA

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MDS/LMR/6829/13

THIS RESEARCH DESERTATION IS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF DEVELOPMENT STUDIES FROM ST. PAUL'S UNIVERSITY

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OCTOBER 2021

DECLARATION

This dissertation is a product of my own work and is not the result of anything in collaboration. It has not been previously presented to any other institution. I agree that this dissertation may be available for reference and photocopying at the discretion of the university.

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APPROVAL

We confirm that the work reported in this dissertation was carried out by the student under our supervision as the university supervisors.

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DEDICATION

I dedicate this research to my beloved wife Ruth Nduku and my dear children Blessing Mutheu & Byran Mwendwa for their understanding, support and encouragement as I sacrificed time with them while working on this dissertation.

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I want to use this medium to acknowledge everyone who has played a role in supporting and encouraging me in the course of this study and during the duration of this dissertation I thank God for giving me the health and finances as well as gratitude to pursue my studies at St. Paul's University. I also want to thank my supervisors Dr. Nason Vundi and Dr. Antony Odek who have been very understanding as I begun penning the first idea. They have made me to realize what research work really entails through their thoroughness, diligence and meaningful corrections done to my work. At the same time, I also want to acknowledge all my colleagues whom we studied with, provided fodder which enriched and expanded my knowledge beyond the horizon. I appreciate their contributions. I also want to thank St. Paul's University for according me the opportunity to pursue my studies there, for sure, through the studies that I got here; my worldview has tremendously changed for the better. Not everyone who participated in this journey can be mentioned here; to you all I say thank you and God bless you.

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ABBREVIATIONS

AET	Agricultural education and training
AP	Action Planning
MDG	Millennium Development Goals
PLA	Participatory learning appraisal
SPSS	Statistical Package for Social Sciences
SDGS	Sustainable Development Goals

ABSTRACT

Agricultural Extension occupies a central role in instilling information that increases farmers' productivity; this is based on the fact that information is the most critical element in farming since it empowers them to be able to make the right decisions. This research therefore sought to investigate how farmers in Kaiti Sub-County are influenced by the extension services. The objectives of the study included: To establish the effects of information dissemination by extension officers on horticultural farming; discuss the effects of frequency of contact by extension officers with farmers on horticultural farming and assess the effects of monitoring activities by extension officers on horticultural farming in Kaiti Sub-County, Makueni County. The study adopted a descriptive case study design and specifically targeted Kaiti Horticultural farmers aassociation and eextension officers in Kaiti Sub-County who were selected purposively. The study also adopted both qualitative and quantitative approaches in which questionnaires and interviews were administered to the respondents. A total of 88 farmers were selected using purposive sampling. Similarly, for every ten farmers, one extension officer was selected randomly, hence there was a total of 97 respondents that were targeted. 97. Quantitative Data was analyzed with the aid of the computer software sstatistical package for social sciences (SPSS) in which graphs, percentages and figures were used for illustration of data. At the same time, qualitative information was analyzed by grouping the collected information into themes and then it was described in prose using verbatim and narration. The aim was to corroborate the quantitative data. It was established that as much as there are deliberate efforts to enhance extension education services in Kaiti Sub-County, there are still gaps in terms of accessibility of the field officers as well as the frequency of meetings between the farmers and the extension officers and this has had an impact of not being able to reach out many farmers. At the same time, it was also established that monitoring and evaluation of the disseminated information is still low and it needs to be enhanced in order to have a more sustainable effect. This was in tandem with inferential results which established that frequency of contacts ($r = 0.911$, $p < 0.05$), monitoring activities ($r = 0.925$, $p < 0.05$) and promotion ($r = 0.953$, $p < 0.05$) were strongly correlated with information dissemination. Frequency of contacts strongly and positively correlated with both monitoring activities ($r = 0.855$, $p < 0.05$) and promotion of horticultural farming ($r = 0.954$, $p < 0.05$). Finally, monitoring activities positively and significantly correlated with promotion of horticultural farming ($r = 0.931$, $p < 0.05$). It is anticipated that the study will benefit not only policy makers, but also the farmers in Kaiti and other areas as well as the National and County governments. It is recommended that officers should be facilitated with adequate means of transport to increase coverage, while farmers ought to be encouraged to utilize agricultural extension services. Lastly more research needs to be done to ascertain how best agricultural extension can be utilized to promote agricultural farming in the rural areas.

CHAPTER ONE

INTRODUCTION

1.1Chapter Overview

This chapter introduces the background of the study, the statement of the research problem, purpose of the study, research objectives, and research questions, justification, the scope of the study, limitations and explanation of the key terms.

1.2 Background of the Study

Agricultural Extension education occupies a pivotal role in not only availing the right information to farmers and enabling them to make the right decisions, but also enhancing their productivity. According to Kithaka (2017), Agricultural extension can be defined as the transfer of knowledge that is scientific in nature to the farmer for the sake of applying it to the agricultural practices through farmer education. In other words, it is the delivery of information inputs to farmers. In fact, the role of extension education is invaluable in teaching farmers how to improve their productivity. Furthermore, extension education permits the movement of research from the lab to the field. According to WFP (2018), national research and extension systems need to be prioritized if the issue of food security is to be effectively dealt with. This is because of the significance that information occupies in the life of farmers. The need for extension is even more needed in rural areas where farmers have limited or no information that is keeping in mind the emerging trends in their respective fields

Globally, the concept of Agricultural extension has its roots in the mid 19th century in Ireland. This was when there was a great famine and Lord Clarendon instructed his handlers to give advice on how to tackle the situation. It them found its way to Germany which adopted itinerant teachers who gave farmers advice based on technical knowledge and expertise. In the USA, it came a bit later in the early 20th Century and the concept has spread to all parts of the world. According to Anderson (2007), extension agents in the US are usually attached to a university and their role is to develop as well as to deliver educational programs which are aimed at assisting people in not only community development, but also in economic development. They are also dubbed as county agents or rather extension educators. This was elevated Smith Lever Act of 1914 which established a system of cooperative extension that was operated by

universities with the aim of informing people about current developments in agriculture and home economics.

In the African continent, the concept has gained popularity because of the benefits that it accrues to the farmers in terms of improving their farming endeavors. For example, FAO (2013) reports that the growth of Tef, a cereal in Ethiopia which is a staple food, has been poorly done by farmers mainly because of insufficient extension services which could have convinced the farmers to grow a better yielding breed of the crop. With time, however, after the idea of extension services was adopted, there were tremendous developments on the increase of their productivity. In Zaire, there was an improved yield partly because of training that was given to farmers (DZARC, 2018), the farmers were given extension education which in effect enabled them to improve their farming practices. In Mozambique, the Alliance for Green Revolution in Africa (AGRA) started a management training program to farmers; the end result was that there was an improved output from the farming practices.

In Kenya, since the inception of the 2010 Constitution, agriculture was placed under the county government. However, the fourth schedule of the constitution part 1 function 32 assigns capacity building and technical assistance function to the National Government. According to the GOK (2017), the agricultural sector contributes about twenty six percent of the country's GDP annually in addition to twenty seven percent in terms of manufacturing, distribution as well as the service sectors. In fact, the sector employs over eighty percent of the rural work force and provides more than 18% of the formal employment (GOK, 2017). This scenario calls for a purposeful consideration of the need to prioritize agricultural extension and education, especially targeting the rural farmers. Indeed, according to the GOK (2013), the Agriculture Policy places a lot of emphasis on development of effective human resource by formulation of standards for agricultural training and skills development and promotion of investment in agricultural education, research and extension.

Makueni County has made tremendous progress regarding horticulture farming. Before devolution set in, a lot of changes were witnessed. According to NALEP (2018), Agricultural Extension and Education has helped farmers to improve produce of mangoes, citrus fruits and cabbages. This has registered considerable progress in horticulture business. In fact, the county government set up a factory to process their fruits into juice and this has translated to improved

income to the farmers. It is against this background that this study seeks to investigate the effects of Agricultural Extension Education in Kaiti Sub-County.

1.3 Statement of the Problem

Agricultural extension is a critical component to successful agricultural practices; this is because of the fact that information that is disseminated to farmers play an important role in enabling them to make decisions pertaining to the types of crops, varieties, methods of farming as well as crop management and marketing. For a long time, this component of agriculture has not been studied and abstracted. Rural farmers particularly have a lot to benefit from the expertise that comes along with agricultural extension because of the limitations of information on farming. Horticulture farming has been a major boost to farmers in Kaiti Sub-County and thus to the development of the county. This is attributed to the support farmers have received from the county government.

This support has enabled them to not only do value addition to their products, especially through processing and selling fruit juice, but also the support has relieved them from post-harvest loses. This support has enabled them to get more returns to their agricultural investments and as a result boost their income levels. However, one fundamental aspect of horticulture farming in the Sub-County that has not been fully researched and ascertained is the issue of whether agricultural extension education has impacted on the farming. Studies done elsewhere like those of Anderson (2007), World Bank (2007), World Agro forestry Center (2015) have revealed that there is a very strong link that exists between agricultural extension education and community development; when farmers have adequate knowledge and skills, they end up making the right decisions and thus getting more returns.

This in effect leads to development of the society because of the economic empowerment that comes with it. From this perspective, it is apparent that the farmers in Kaiti Sub-County are under pressure to adopt modern farming methods, innovative practices and information about market trends. This adoption of the practices will ultimately improve their agricultural production. However, not much research has been done to explain the nexus between the agricultural practices and the extension services, especially in Kaiti Sub-County and this creates a gap in knowledge especially in rural areas which demonstrates how agricultural extension plays a role in horticultural growth. At the same time, horticulture farming is relatively new in

the Sub-County; for a long time, farmers have been used to the traditional crops which have proved to be unsustainable. Therefore, based on this, they adopted new ventures, and this demands that there ought to be knowledge that links horticulture farming to extension services. This is thus the motivation for the study which aimed to investigate how agricultural extension impacts on horticultural farming practices in the Sub-County.

1.4 Objectives of the study

1.4.1 General Objective

The general objective of the study was to investigate the effects of agricultural extension education on promotion of horticultural farming through a case study of Kaiti Farmers Association, Makueni County, Kenya.

1.4.2 Specific Objectives

The specific objectives of the study were:

1. To establish the effects of information dissemination on promotion of horticultural farming in Kaiti Farmers Association, Makueni County, Kenya.
2. To examine the effect of frequency of contacts on promotion of horticultural farming in Kaiti Farmers Association, Makueni County, Kenya.
3. To assess the effect of monitoring activities on horticultural farming in Kaiti Farmers Association, Makueni County, Kenya.

1.5 Research questions

1. What are the effects of information dissemination on promotion of horticultural farming in in Kaiti Farmers Association, Makueni County, Kenya?
2. What are the effects of frequency of contacts on promotion of horticultural farming in Kaiti Farmers Association, Makueni County, Kenya?
3. How does monitoring activities affect promotion of horticultural farming in in Kaiti Farmers Association, Makueni County, Kenya?

1.6 Significance of the Study

Knowledge on how agricultural extension education applies to farming practices is needed in order to enable better, more informed decisions and choices that will lead to successful agribusinesses of rural farming. For this to happen, research is needed that will demonstrate the nexus that is there between the two realms of agricultural production and extension services.

Therefore, the study will be of benefit to several groups of people; they include: the Policy makers, the County government, and the officers in the ministry of agriculture and scholars in the field of development studies. Firstly, the policy makers will be able to take note and harness the findings of this study in coming up with policies which plays a central role on extension officers in the enhancement of agriculture. This will enable them to come up with better policies that are based on information that takes cognizance of the intricacies of horticultural farming, especially in the rural areas. Secondly, the study will also benefit the county government because, according to the constitution, it is mandated to enhance the development of agriculture, as such, the research will enable them take note of the best practices especially that of prioritizing extension and education services. These will involve prioritizing the issue of agricultural extension in their programs through the increase of resources, to the area of horticultural farming and other similar areas.

Thirdly, the study will be of benefit to officers in the ministry of agriculture who will appreciate and utilize the central role of the extension services to farmers. Lastly, the study will add knowledge in the field of Development studies, specifically on household development through agriculture.

1.7 Assumptions of the Study

The study was guided by several assumptions; the first one was that there are Agricultural Extension services in Kaiti Sub-County, Makueni County. Secondly, the study assumed that Agricultural Extension Services have effects on horticultural practices and the last assumption that guided the study was that the respondents will provide the information that is accurate concerning the issue of horticultural farming in Kaiti Sub-County.

1.8 Scope of the study

The study limited itself to the investigation of agricultural extension services on horticulture farming; there are many other factors which could lead to progress in farming, but the study picked on extension because of the invaluable role played by information in this age. At the same time, the research narrowed down to the Sub-County level and specifically the four wards in Kaiti Sub-County; namely: Kilungu, Kee, Ilima and Okia. This is because the area is

predominant for horticulture farming and so it offers a case study whose results could be generalized to other places.

1.9 Limitations of the study

Among the challenges that were experienced during the research is the vastness of the Sub-County. To counter this challenge, the researcher trained four research assistants and used them to assist in collecting data. The researcher also used motorbikes to reach some of the areas. Withholding of information by the rural farmers was also a challenge. The researcher assured confidentiality to the farmers whom he was dealing with and also explained openly the benefit of the research to the larger community. Lastly the challenge of Covid-19 was experienced, especially with regards to adhering to the safety protocols and handling of questionnaires. To curb this, the researcher sanitized himself before giving out the questionnaires and thereafter, uses gloves while collecting and then fumigated the questionnaires. The respondents were also required to sanitize as they handle the questionnaires.

1.9 Definition of terms

In this study the following terms used had meaning as explained below:

Agricultural Extension Education: In this study, this was used to refer to the transfer of knowledge and skills to the farmers by extension officers which enable them to make the correct decisions pertaining on crop handling, control of diseases as well as market for the produce

Agricultural Innovative Practices: Refers to the implementation of new and improved technologies in the practice of agriculture

Basic farming activities: In this study it meant rearing of few cows, planting of maize and beans among during rainy season for subsistence use.

Horticulture Farming: In the study, this was used to refer to the cultivation, processing and sale of fruits and vegetables

Education: It was used to refer to that process that leads to the acquisition of skills, values and knowledge that transforms a person into a meaningful person in the society. Education can be formal or informal; formal follows a definite structure while informal does not have a structure.

Basic education in this study will be used to mean the ability to read, write and comprehend agricultural knowledge.

Rural development: This is a process that ensures that energy and resources are channeled towards the increase in productivity in the rural areas in order to keep the dwellers where they are. It can also be seen within the framework of creating and enhancing employment opportunities and increasing income for the sake of making the rural people to remain in these areas.

Sustainable development: It refers to ensuring that there is a sustainable balance that exists between the satisfaction of human wants as well as the protection of nature for the sake of future generations. This balance ensures that the current developmental needs are fulfilled without prejudicing those of future generations.

Small Scale Farming: It is the production of crops and livestock on a small piece of land without using advanced and expensive technologies

Rural farmers It refers to farmers who dwell in rural setting and own an acre or less size of farming land. Farmers who produce for their own use and surplus for shopping.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter mainly examines literature related to Agricultural extension and education especially in rural farming as per the objectives of the study. The chapter also deals with the formulation of theoretical framework as well as the conceptual framework.

2.2 Theoretical framework

2.2.1 Diffusion of Innovations Theory

This research utilized the Diffusion of Innovation Theory propounded by Rodger Everett (1962). This theory came about in a bid to explain how ideas and products usually gain momentum to spread over many people living in a specific social system. What the author avers is, that when people adopt an idea or product, it is usually as a result of this diffusion. It adds that the adoption of the new idea usually is not simultaneous; rather, it is a process whereby some people are more apt to adopt the innovation than others. People who adopt an idea early have different characteristics from those who adopt the idea later. Therefore, the theory states that when promoting a new idea to a target population, it is usually vital to understand the nature and form of the target population; this will help in understanding what will hinder the information or innovation. The five general adopter categories of the target population include: innovators, early adopters, early majority, late majority and the laggards.

There are five major factors that influence the adoption of an innovative idea. Each of these five factors is at play to a different extent in five categories, these are: relative advantage, compatibility, complexity, triability and observability. From this inference therefore, it can be said that the theory plays a significant role in explaining the intricacies of information respectability. Therefore, this theory was used to argue that farmers in Kaiti Sub-County are subjected to several categories of information receptability. This affects their uptake of Agricultural Extension Services and by extension their farming performance.

There are three general sets that help to explain the variables related to diffusion. A look at these explanations reveals advantages and disadvantages of each. Those who adopt information as well as their respective attributes and dispositions play a major role towards ensuring that the information is well spread. For this to happen, the overall social context as well as the political environment is very critical. When an innovation occurs, what matters is how it is viewed and framed by those who are using it. If well understood then, there is a high diffusion rate, and this helps to spread the information far and wide to as many people as possible.

As soon as someone gets to know that there is an innovative idea, they begin to figure out the implications of that idea to not only themselves, but also to those around them as well. This gives rise to attempts to ensure that the idea spreads and if it does, it can lead to a more information search. As a result, there are the following advantages and disadvantages; the length of time as well as financial implications as well as other resources that may be needed to accelerate the spread of the information. At the same time, how the information is perceived whether as simple or not is critical because if well perceived, it can lead to its ease in understanding. The other one is the extent of being compatible; that is does the innovation easily helps to attain the goals that have been set? Is the innovation easily observed in terms of being able to discern its accomplishments? The other important element is called triability. This refers to whether the innovation can be reversed or not; whether the decision can be managed at each and every stage.

With time, the more the users engage themselves in an analysis of the costs and benefits, they then begin to increase their level of judgments on the same. They are able to find evaluations from the trusted experts as well as those that shape the opinion of the society. These leaders are not only well informed, they also have an influence they exert which can make an impact in the society. When a person seeks advice from another in terms of modeling his behavior helps in time saving. Therefore, attributes of innovators and their social influence are both psychological as well as sociological impediments against information concerning innovations. This explains why at the social level, very minimal diffusion takes place and if it does, then at a very slow rate of diffusion.

When it comes to the degree of innovativeness, there are disparities that exist among different people. According to Everet Roger (1960), the first category of innovators is usually driven by

excitement and the lack of a constraint by social barriers. Others are driven to innovation because of conducting a balancing act that ensures that the merits of an innovation are more than their demerits. The other category is the late comers; they usually do it because of the fact that the society imposes pressure on them to do so. The laggards, on the other hand, are usually less driven by social pressures in doing an innovation and as such, they usually take their time to adopt these innovations. Some other people normally adopt innovations because they are able to weigh their merits and demerits as well. Those many recipients who come in late do so because of the need to satisfy social pressure. Those messages that are usually tailored to spread information on innovativeness are usually driven by the need to have more adaptable responses from the people. Many people decide to stay aloof and watch the outcomes of the innovation ideas.

The relevance of the innovations is usually perceived by the innovators, and this happens whether or not the relevance is not connected to the potential adopter. A similar effect is likely to befall those who have the same job title or same type of employer as well as those that share the same common beliefs or work in the same company and have the same job title. If put together; these factors are likely to lead to the adoption of the innovation or even its subsequent rejection. Experts in the field of forecasting, modeling as well as experimental sciences have spent time to analyze the disparities that exist among individuals of different creed and race as well as classes and have arrived at the inescapable conclusion that innovations that occur in different countries can facilitate diffusion because they ensure that those countries that adopt innovation later after others have had it have better experiences in comparison with the early adopters. This is because they have an opportunity to benefit from the improvements of the innovation without having to do it alone. They also learn from the mistakes of the countries that adopted the innovation early and hence build up on these mistakes.

A distinction should be made between the activity of dissemination and the diffusion process. Whereas dissemination involves the adopters being able to share target-specific information with others with regards to the innovation, diffusion on the other hand implies the transmission of innovations through mass media platforms and media channels to as many people and audiences as the platform is able to get. As far as innovations are concerned, there ought to be a process that is complex in its implementation strategy because it is a bottom-up approach that begins at

the grassroots. However, dissemination is a broad-based approach which is more or less top bottom approach aimed at reaching out to the entirety of the population.

This theory helped the study in arguing that agricultural extension is driven by the need to diffuse information to farmers for better decision making pertaining their farming practice. It affirms the thought that innovation can be enhanced through sharing of ideas between the farmers and the extension officers who have expertise knowledge.

2.2.2 Agricultural Extension Theory

This theory was propounded by Rolin (1982) and its central argument is that Agricultural Extension occupies a very important role in so far as disseminating knowledge and in enabling farmers to become competent decision makers. Extension, in general is part of a larger system of protagonists who influence farmers' decisions. Therefore, extension is a sub system of the larger system in which research enables the transfer of knowledge from the research sub system to utilize of the system. Extension from this perspective connotes the practice of extending knowledge from the experts in offices and books to the farmers wherever they are. It entails cascading the relevant information that is helpful to the farmer in order for him to make the right decisions pertaining crop breeds, nurturing crops, pests and diseases, harvesting as well as marketing strategy. According to Rolin (1982), this theory looks at efforts to make agriculture more sustainable, both at farms and higher levels. It examines the effects of sustainable agriculture for land users and other stakeholders as social actors and goes on to analyze how conditions for change can be created. The main purpose of agricultural extension is to help land users to become experts at managing complex eco-systems in a sustainable manner. The management does not focus on instrumental control of eco-systems to optimize the value of key variables, but on adaptive and responsive management of diversity and complexity to optimize opportunities and outcomes.

Therefore, this theory is helpful in this study since it outlines the importance that Agricultural Extension occupies in farming. It is like a 'software' empowerment which bestows on the farmer the requisite skills, knowledge and ability to be able to make the right decisions that can enable them to not only improve yields, but also to be able to use the land in a sustainable manner devoid of destroying it for the sake of short- term goals.

2.2.3 Sustainable Theory of Development

This is a theory that advocates for the meeting of human development goals while at the same time sustaining the ability of natural systems to provide the natural resources and ecosystem services on which the society depends. The desired result of this approach is usually a society where living conditions and resources are used to continue to meet the needs of the future without compromising the future generations' ability to meet their own needs. From this perspective, since agricultural extension has the aim of improving yields without necessarily compromising the quality of the land, its goal is usually to develop a sustainable development that will not only cater for the current needs, but also preserve the land and agricultural resources for the future generations.

The concept of sustainable development stems from the urge and need to ensure that on one hand, human needs are met while on the other, the natural systems are able to be maintained and preserved for the safe use of future generations. The end goal that drives sustainable development is that living conditions are able to meet human needs while at the same time the natural systems are kept intact. From this perspective, sustainable development aims at safeguarding the future generations from blatant and wanton misuse of resources. The resources handed over to the current generation by the previous generations ought to be used in a prudent way to enable those who will live in future to use them and at the same time maintain the. This is an endless cycle of ensuring that the environment is kept safe. This principle has been accorded a lot of importance and prominence; the Sustainable Development Goals (SGDs) which bind all countries in the world to accelerate the attainment of social and economic as well as political conditions by the year 2030, place a lot of importance on the issue of sustainable development. These goals do address the issues of poverty as well as climate change and peace.

The concept has its origin in the 1980's especially with regards to forest management. It was realized that human beings were depleting forest resources without a useful plan for the future and that this would compromise the ecosystem and lead to disastrous effects. As the concept kept changing, it shifted its focus towards environmental as well as social and economic progress as a panacea for safeguarding future generations. In fact, most of the systems in the modern world are in the process of endeavoring to preserve not only ecosystems, but also natural resources as well. Adjusting the climate chance calls and covenants that countries pledge is a key determinant of

economic opportunities; if well adjusted, this will be a win win situation for both the ecosystems and the economic development as well. This approach is what is called the Managed Sustainable Development approach which seeks to not only preserve the resources, but also it seeks to guarantee economic progress.

However, there have been strong criticisms that have been leveled against this approach. One of the contentions is the definition of what is to be sustained. It is argued that when it comes to non-renewable resources, sustainability is a mirage. This is because, according to the proponents of this school of thought, once the resources on earth are misused, it automatically leads to their diminish. Other critics have accused the proponents of this school of thought of pursuing a business model under the guise of sustainability. To them, the concept of sustainable development has nothing to do with environmental conservation or safeguarding the future, it is merely a business model that is conveniently disguised as a platform or a blueprint to enhance sustainability.

Way back in the seventeenth and eighteenth centuries, people in Europe were really engaged in unbridled cutting of forests without replacement. This was the time in which it was argued that every landowner has a national duty to not only sow seeds and plant trees, but also stops the growing appetite for the destruction of natural resources. Soon thereafter, there emerged a litany of scholars who advanced the philosophy of conserving the forests for the sake of posterity. These included the then French minister Colbert as well as Carlowitz. These ideas spread to the United States and the forest service in the US came to appreciate and officially make it a formal policy that resources are to be used wisely.

In the mid-sixties, books were published by experts such as Carson and Boulding which placed a lot of emphasis on the nexus that exists between economic development and environmental degradation. They stressed how important is for the economic developments to ensure that they align themselves with the ecological needs and systems. These ideas were given impetus by those of Hardin who stated that there needs to be a global equilibrium that ensures that both economic development and environmental conservation take place without compromising any. He stressed that it is possible for economic development to occur while at the same time preserving and protecting the environmental resources. He averred that what was needed was a

shift of focus from just pursuing economic development to ensuring that the pursuit does not compromise the needs of the environment. If this is not done, he stated, there would be a sudden state of collapse of the globe and this would negatively affect the people living in the globe.

These approaches opened a box for full range theorizations on the issue of sustainable development. For example, in 1992, there was a global conference that focused on the environment and development. In this conference, the members who attended stressed the need for a just, sustainable as well as a peaceful globe in the twenty first century. For this to be attained, it was realized that several things had to be realized first. These include information as well as integration as well as participation and if these are well met, they would be able to assist the countries to achieve development. These pillars are interrelated and all play a contributory role in ensuring that the issue of sustainability it achieved fully. The presupposition is that when it comes to sustainable development, everyone is a user as well as a provider of information that concerns with sustainability at all levels. It stressed a paradigm shift from the older ways that only focused on profit-making and business to new all-inclusive and all-encompassing approaches that are alive to the issue of environmental and social protection as a panacea for realizing development. At the same time, agenda number 21 of the conference placed emphasis on public participation when it comes to decision making as a prerequisite of achieving sustainability in terms of development.

Sustainability, according to a study conducted in 2013 by the UNEP (United Nations Environmental Program), should be relooked at from a multi-dimensional realm such as economics, ecology as well as politics and culture. These realms permit the inter connecters that exists among humans and the environment and as such, a decision that fails to take or put into consideration this inter connecters fails to attain the goals of sustainable development in all its forms. For human survival to be guaranteed, there must be quality and availability of air, water, food as well as shelter. These are only possible in the perspective of sustainable environment. However, in their absence, human risk succumbing to diseases such as cancer which also threatens their existence. Therefore, all these realms are connected and interrelated in several respects. Therefore, from the foregoing, all species; whether plants or animals need each other, and this can only be guaranteed through sustainable development approaches.

In conclusion, the theory of sustainable development posits that in the event there is no sustainability, then it would result into a total diminishing of the earth's resources and this will have a negative effect on human beings and the animals as well as the species that reside on earth. Therefore, this theory is a long term-futuristic approach that is aimed at guaranteeing the survival of the earth many years to come. However, the absence of sustainability is capable of leading to destruction of lives as well as the distortion of the natural flow of the world and this will bring a catastrophe to the human survival which is the direct opposite of the intentions of development. Therefore, these three theories help explain the connection between extension agricultural performance among rural farmers.

2.3 Empirical Review

2.3.1 The Concept and Practice of Agricultural Extension

According to FAO (2018), the concept and practice of agricultural extension are the central themes of successful agriculture. Extension is a term which is open to a wide variety of interpretations. Each extension agent operates in a unique environment which in turn influences their perspective and approach. However, according to World Bank (2016), extension is used to refer to a process embedded in education which permits the benefiting of rural folks. The intention of this process is that it targets the rural farmers and gives them not only advice, but also information that will enable them to address their problems. When this is done, there is usually an increase in not only production, but also it translates into the increase in the standard of living of the farm that is being targeted. Wheeler (2016) avers that what extension aims at achieving is the changing deliberately and systematically the perceptions, attitudes and outlook in solving their problems.

According to Dolinska and D'Aquino (2016), the origin of agricultural extension is not very clear but in the last two thousand years, Chinese agricultural officials used to provide advice to farmers on how they can engage in farming practices. At the same time, there is evidence to the effect that in about eight hundred BC, the official that was in charge of agriculture in China's Zhou dynasty used to organize for training for farmers in which he taught them on crop rotation as well as drainage. Furthermore, the official also facilitated farmers by leasing to them grain stores and he also supplied food to them in times of famine.

In modern times, Dolinska (2016) reports that agricultural extension begun in the mid nineteenth century in Ireland. This was because of the destruction of Irish potatoes by fungal infection between the years 1854 and 1951 as well as severe famine. Consequently, the British government had to arrange for specialists in form of instructors to visit farmers in the rural places in order to teach and inform them on the best ways to engage in farming and more so alternative farming. The success of this endeavor was lauded by Germans and they in turn had to come up with their own approach which also involved sending instructors to the field to visit farmers and educate them. By the close of the nineteenth century, this practice had spread to the whole of Europe including France, Italy as well as Netherlands and Denmark.

The origin of the term university extension can be traced back to 1967 in the Oxford and Cambridge universities in Britain. It was used to denote what took place beyond the universities in terms of education and outreach. Having been realized that information pertaining agriculture cannot be limited only to the universities, they coined a system that allowed them to go beyond and give information to farmers from a practical sense. In the United States, colleges also begun to conduct demos on agriculture as well as giving lectures to not only farmers, but also their clubs and this marked the beginning of the term agricultural extension (Dolinska, 2016).

The concept of agricultural extension was moved a notch higher in the United States when two laws were passed that is Hatch Act in 1887 and the Smith Lever Act in 1914. These acts not only established a system that values agricultural extension, but also this was to be in partnership with universities and colleges as well as creating a system of outreach and community social responsibility on the part of the universities that ensured that farmers and the general population was kept abreast on the developments that took place in the fields on home economics, agriculture and similar areas (Dolinska 2016).

For any successful agricultural extension to be said to have taken place, communication must be effective. However, in those systems that are by orientation paternalistic, this is always not the case. For effective extension service to take place, there are four elements that must be present that will be occurring simultaneously. The very first is what is called technology transfer; it gained prominence during the times of colonial period, and it extended to late 1970s and early 1980’s. This model is a bureaucratic model that favors a top bottom approach that is tailored towards radiating specific recommendations to farmers telling them on the specific practices that

they should approach to guarantee agricultural success. The second component is what is called advisory work. This is the one that modern governments across the world in conjunction with private entities do address the concerns and inquiries of farmers and based on their technical expertise, they offer prescriptions to the farmers. This also encompasses donor managed projects that target specific issues on farmers. Besides, Non-Governmental Organizations also offer technology transfer.

Similarly, there is the Human Resource Development component. This model begun way back during the days of agricultural extension; it took place first in USA and Europe. In this model, colleges and universities offered training to the rural folks who were unable to manage to attend full time programs; this was therefore some sort of in-service program that was aimed at training efficient resources in terms of information that is relevant to agricultural production. This model agave a leeway to the people to utilize the knowledge they got in the best possible means and ways to improve agricultural farming.

There is some disagreement about whether or not the concept and name of 'extension' really encompasses all of the paradigms. Some experts believe that the term should be restricted to persuasive approaches, while others believe it should only be used for educational activities. Paulo Freire has argued that the terms ‘extension’ and ‘participation’ are contradictory. For him, meaningful learning occurs when the learner participates in the learning experience fully and they are able to exchange the ideas gathered through the farming practice with the extension field officer. This involves a dialectical process that is both sided and not one sided in which the extension officers treat themselves as the master of knowledge and thinks that those they are sharing information with are clueless and lack any experience with them that they can meaningfully share. The truth is even the farmers have contributions to make in knowledge creation; this is because having engaged in farming for a long time, they have gathered years of hands on experience which enables them to be participants in education process. There are philosophical reasons behind these disagreements. From a practical point of view, however, communication processes that conform to each of these four paradigms are currently being organized under the name of extension in one part of the world or another. Pragmatically, if not ideologically, all of these activities are considered to be represented in agricultural extension.

From this perspective, the aim of extension is not just limited to the end economic and physical products, but it encompasses the overall empowerment of the people living in the rural areas. Therefore, the facilitators of extension services, who in this case are the officers, ought to help these rural folk to not only understand deeply their problems, but also look at ways and means of solving these particular problems. The key intention of extension, from this perspective, is actually to work with rural people for the sake of improving their livelihoods. This involves helping farmers to improve the productivity of their agricultural and also developing their abilities to direct their own future development.

2.3.2Effects of Information Disemination on Farming

According to Dolinska and D'Aquino (2016), it is not uncommon to find farmers with a lot of knowledge as pertains the context that they operate within in terms of their farming system. However, the work of extension is to avail the requisite knowledge to them and boost what they have in order to make the right decisions. One good example revolves around knowing what causes crops to be damaged, how to control pests and even processes of making and understanding how manure and compost manure works in order to nourish plants. Such information is very key to farmers in making the right decisions.

When the farmer applies this knowledge, he will be able to get acquainted with skills that are new and this application may enable them to have technical knowledge for effective farming. In addition, the farmer who can enable them gain soft skills like organizational ones; the possession of such skills will also enable the farmer to be able to understand the dynamics of group management. Other benefits may entail; economic skills, analytical skills as well as record keeping skills; all of them will boost the ware withal of the farmer in terms of improving productivity. According to Oni (2008), information acts like a 'software' tool which enables the user to be well poised to make the right decisions. In fact, successful farming is pegged on the decisions of the farmer; if the decisions are well informed, then the end result is success in farming. However, if the decisions are not well informed, then the end result will be failure in farming. Therefore, agricultural agencies ought to prioritize information dissemination because this is what may differentiate the success or otherwise of farming.

The recent strides in the area of Information Technology have made it possible for volumes of data to not only be processed, but also to be analyzed and disseminated to as many people as

possible within the shortest time possible. This is an advantage to farmers because they are able to get the relevant information at the touch of a button. This is what has commonly been referred to as e-agriculture. This development has made it possible to share a lot of valuable and meaningful information to farmers at the time when they need it and hence it has translated it into better practices and productivity in their farming endeavors. This would not have been possible before the evolution of the Information and Communication Technology (Oni, 2008).

With this advent in information technology; farmers have gotten a new impetus in terms of improving their farming methods. Using mobile phones as well as computers, farmers are able to have an interphone with the agricultural officers and as such field their questions and get instant responses. At the same time, farmers are able to link amongst themselves and exchange information. This is helpful in ensuring that they share practices amongst themselves which goes a long way towards ensuring that they are able to advice each other. For example, developments in agriculture in China have been attributed to agricultural information dissemination via information communication technology modules. Through this module, many farmers have benefitted from the ICT because they have gotten the right information tailor made to suit their needs and expectations. It has also helped in ensuring that they have up to date information that they can use practically. In fact, studies carried out in China have revealed a great deal of impetus has been realized to farmers after the realization of the ICT and its integration agricultural extension. It would be inaccurate to fail to believe that with these developments in technology, farmers should not benefit from the information technology and communication. This behooves developing countries which have a problem of food security to borrow these best practices and domicile them in their agricultural pursuit. They should move away from the reliance on the traditional methods to modern ones (Oni, 2008).

2.4 Effects of Frequency of Contacts by Farmers and Agricultural Extension officers

Closely related to the issue of information is the proximity and availability of the extension officers; agricultural information is dynamic, and this dynamism bestows on the extension officers the need to constantly update and reinforce information to the farmers. For example, Oni (2008) avers that change of a season can have tremendous effect on the routine of farmers. This will demand that they be educated on how to handle such a change. The same applies to the crop breeds; they need to be updated with the different varieties as well as the best at each time.

Therefore, this means that extension officers are supposed to be frequent visitors to the farmers. At independence, the department of extension services was empowered fully and this enabled the extension officers to frequently meet the farmers; however, with time, the department begun losing touch with farmers and it became very difficult to meet the farmers. This has had a net effect on farming produce.

Isolation is usually a major limitation which many farmers face. Ogunela and Mukhtar (2009) states that usually makes the farmers have little to do because they end up spending a lot of their time undergoing struggles under very harsh times while at the same time providing for their households. Extension workers need to take note and use the information to encourage the farmers to move their status away from poverty. It is important for extension worker to work closely with farmers, helping them to take the initiative and generally encouraging them to become involved in extension activities. Equally important is to convince them to make decisions that will enable them to emancipate themselves from poverty. Extension works for rural people, not for urban dwellers. At the same time, extension works for the people because it ensures that their needs are satisfied completely. Because of this reason, the people in the rural areas need to be fully involved and their needs ought to be met. At the same time, they ought to be the ones deciding on how the rules governing their operations will be administered. This can only happen if the people are able to see the fruits of the policies put in place. This bestows on the extension officer's duty to ensure that the policies have had positive contribution in the people's lives. The needs of the people and the technical and economic needs should be the defining factors for the success of extension work. A good example could be found in a decision made by the government to maximize the amount of food grown in the country; if this is to be attained therefore, the extension officers will have to make sure that they increase the food that is grown in volumes. This will entail encouraging the farmers to make sure that they improve their output through improvement of methods of farming which can be made possible through frequency of contacts between the officers and the farmers (Oni (2008).

2.5 Effects of Monitoring Activities by Extension Officers on Agricultural Production

Just as giving information is important, monitoring to ensure that the information given has been implemented properly is equally important. According to Wallace (1996), farmers who are not illiterate tend to misunderstand instructions given and as a result, can easily fail to implement

fully and properly the information given by extension officers. Therefore, unless the extension officers have full proof mechanisms to monitor, their efforts can end in futility. In the era of technology, monitoring goes beyond physical visitations to include calling, sending pictures and even video clips demonstrating what is being implemented. For this to happen, both the farmers and the extension officer's ought to appreciate the role of technological advancements.

Wallace (1996) posits that whenever extension officers visit farmers, the purpose ought to be on improving the previous advice on previous visits; based on this premise, it would be meaningless to have several meetings without having a deliberate follow-up plan. The visit itself will entail the extension officer taking notes based on what he/she has observed. This will involve taking note of each microscopic detail that the officer is able to observe and gather. Organization is key for this to be attained; the officer must have a place that he/she can record the day that the farmer was visited and the intention of that visit. This should be followed by a recommendation that came about as a result of the visit. This step is very important in that it allows the officer to arrange a follow-up activity with the farmer. Based on the recommendations, the agent can decide to have a follow up activity such as referring a colleague who has knowledge in a specific area to share the information with the farmer. If this is not done, Wallace (1996) warns that it could end up disappointing the farmer or even end up losing trust in the extension officer all. The entire process demands outmost confidence and trust by the farmer in the extension officer; for this to be efficiently done, a lot of mechanisms ought to be in place that will guarantee improving people's livelihoods is adhered to and fully met. Monitoring helps track changes in the patterns of livelihoods to decipher its effects; if there are any effects, it is said that there has been a transformation and as such the objectives of extension will have been met. Monitoring is also a recent trend in organizational and project management; for projects to be said to have succeeded, they are evaluated based on their satisfying the targets that were set at the onset. These are evaluated during the monitoring and evaluation stage. Therefore, agricultural extension education ought to be subjected to benchmarks that allow the conception of whether they have met the intended objectives or not.

Since it is apparent that living in the rural areas places many impediments on the farmers; these challenges hamper their optimum realization of productivity. Until the advent of Information and

Communication Technology, rural farmers were greatly disadvantaged in terms of acquiring the relevant information; however, the evolution in ICT has helped to mitigate against this challenge. At the same time, the absence of policies which are oupled with haphazard implementation approaches has hampered the attainment of increased food production. This is so in spite of the fact that Africa is endowed with vast land that is arable and 70% of the labor force is dependent on agriculture. Were it not for the challenges mentioned there about, agriculture could have the aim of attaining a multiplier effect in the sense that it could generate high social and economic returns as well as promote diversification and progress socially (Ogunela & Mukhtar, 2009).

Rural development signifies the foundation of the development of Agriculture, especially in Sub Saharan Africa. Any development programs that are aimed at attaining development must prioritize rural development otherwise those programs will be bound to fail. In countries such as Nigeria, a large portion of individuals depend on small scale agriculture in their agricultural activities. In addition, a majority of these farmers operate small portions of land up to three or four hectares. This, coupled with inadequate access to improved technology makes it hard to profit for their investments (Ogunlela & Mukhtar, 2009). According to Oni (2008) agriculture in Nigeria plays an immense role in the economy of the country. This is because it facilitates the acquisition of employment in the rural areas, food security as well as export earnings. At independence, before the exploration of oil in the country, there was heavy reliance on agricultural produce such as groundnuts, cocoa, palm produce, cotton as well as rubber.

The nexus between HIV/AIDS and farming is inescapable. This is a great challenge that affects both the farmers as well as the agricultural extension workers. Apart from the usual challenges that are faced by extension workers, such as locust invasions, famine and natural disasters, the challenge posed by HIV/AIDS is very unique in respects. According to FAO (2016), the disease affects the nature of the work, health of the extension workers as well as the farmers. These challenges are compounded in Sub Saharan Africa where we have a lot of people who are infected and affected by the disease in comparison to other areas in the parts of the world. According to statistics by the World Health Organization (2019), Sub Saharan Africa has the highest percentage of the people who are infected with the HIV/AIDS virus in the whole globe.

Since Agriculture is the main source of food in this part of the world, the impacts of HIV are biting and real.

First, it should be known that the majority of those people who are affected by this disease are rural folks; this is because of the fact that in the rural areas there is high levels of illiteracy which accelerates the spread of the disease; when the disease is viewed from a mythical perspective and not medical perspective or scientific perspective, the means of fighting it is substantially reduced. Second, extension workers themselves interact with the farmers; at times the widows whose husbands have died of the disease. This interaction already poses a health risk to the workers if they take the services to a social level. The temptation is high because the widows are bound to look at the workers as husband-figures because they provide them with assistance in terms of information and technical expertise; something their husbands used to do. These are the predisposing factors that are likely to make the extension farmers exposed to the disease and this can be a potential bomb to them. In fact, FAO (2001) states that the extension workers were more likely to be infected with the HIV disease than those agricultural workers who stay in office because of these factors already mentioned above.

Far from being exposed to the disease owing to the nature of their work, in their own volition, extension workers are also as predisposed just like any other worker. The travelling and meeting as many people as possible has the capacity of exposing them to the disease. At times they are forced to sleep in lodgings, especially when they are visiting far flung areas and this is already a factor that can make them to be affected negatively with the disease. Besides, since they live in families, extension workers are negatively affected because they take care of the sick ones, they pay hospital bills for them and also take care of their children by paying their school fees and upkeep. This in itself ends up draining their resources and making them to incur a lot of money. Besides, they also attend funerals and incur a lot of money owing to their perceived position in the society.

Unlike in the past, the attendance of funerals is now a frequent thing, and it involves heavy costs due to ceremonies such as slaughtering of precious animals and serving meals to large number of persons. Low morale, depression, economic worries, and less productivity are now common in

extension organizations due to HIV/AIDS. Extension workers who by training are required to motivate farmers to try and adopt new agricultural technology are themselves depressed and frustrated, and this affects their output (FAO, 2001).

A comparative case study of discussions made with the extension workers in different countries led to the conclusion that HIV/AIDS has a biting effect on their ability to discharge their duties. The first element is when their duties are negatively affected because of the fact that they have to attend funerals. This limits the discharge of their work effectively and as a result they spend more time on what they are not supposed to be doing. However, the nature of their work allows them to do so because having served in communities, they develop close contact with them and death of a member in that community becomes a concern for the agricultural extension officers. This can be worse if the dead person was a member in the cohort that the extension officers were administering. Being the number one death causer, the extension officers have indeed felt the brunt of the disease.

An example is given of how strenuous extension officer's job is; the district officer has a jurisdiction of four hundred square miles and he covers four thousand families. This becomes a daunting task for the officers as well as the organizations and the government agencies that deal with the training of new staff. This not only goes a long way in demoralizing the extension officers, it also leads to lethargy in their work and the end result is lack of attainment of their objectives. Therefore, unless such human resource issues are handled well by the government, the continued lack of contact between the farmers and the extension officers is bound to continue. There is supposed to have an endless conversation between the two stakeholders if there is to be realization of the farming objectives. The government ought to prioritize the employment of more extension officers as well as deploying itineraries-those who are part time and can help the farmers at the earliest opportunity (Oni, 2008).

As far as the indirect effects of HIV/AIDS are concerned, the bulging cost to the officers is quantifiable. Besides losing dependants as well as taking over the responsibilities of the dead relatives, the officers are forced to incur a lot of expenses in terms of taking care of the sick as well as the logistics related to the funerals. In some cases, because of their health and the demands of the job; which includes travelling on motorbikes to far flung areas; they are unable to

continue with the duties and hence retire early on medical grounds or early retirement. This leads to dwindling of family resources and increases the rate of family poverty and hence becomes an insurmountable challenge to the extension officers. Closely related to that, Olayiowa and Adeleye (2005) aver that the department of extension services in Malawi has incurred a lot of expenses as a result of taking care of the medical needs of its patients who have suffered the disease as well as taking care of the funeral costs of the patients. This has also strained their budget by making them to concentrate on what they are not meant to in terms of their operational budget. The end effect of this is to reduce frequency of visits by the officers to the farmers and hence complicating the practice more.

Changes in income structures seem to have changed the traditional approach towards strategy and policy formulation as a result of the many radical changes that have took place in terms of the levels of income, lifestyles as well as evolution of the clientele orientation. These changes have forced the NGOs to go back to the drawing table and repackage their products in order for them to resonate with the clientele. As far as those organizations that give out credit and technology transfer are concerned, they have had to adjust to meet and suit the current needs to avoid being overtaken by events. Furthermore, these organizations have also bore the brunt of HIV AIDS because of the dynamics the disease has brought to the farming population. For example, failure to meet the requirements to be given credit facilities by widows whose husbands died of HIV and AIDS is usually a challenge that the extension officers face; it puts them in a dilemma of because on one hand they want to follow the requirements for application while on the other they know these farmers and their plight, and their work is to assist them. This problem is usually rife in the rural areas. This has placed the organizations that deal with agricultural extension in a fix and it is a daunting task for them.

The traditional composition of the recipients for extension services is changing. Those places that have a higher affinity of HIV prevalence. Those that have been negatively affected by the disease are not just men, but also women and youth as well as the adolescence. These have been affected high by mobility as well as morbidity. A majority of the children, old as well as young adults have a high affinity of being affected. Many women and children who are partakers in farming and have long prolonged illnesses as well as have undergone death of their relatives as well as their friends and kins. The greatest challenge usually lies in taking care of those that have

been left behind by the deceased. Since the statistics of those who die lie in the youthful stages, these that are old are usually forced to retreat back to farming despite their being old. This means that those who are given the extension services officials are usually negatively affected. Closely related to that, Adeleye (2005) aver that the department of extension services in Malawi has incurred a lot of expenses as a result of taking care of the medical needs of its patients who have suffered the disease as well as taking care of the funeral costs of the patients. This has also strained their budget by making them to concentrate on what they are not meant to in terms of their operational budget. The end effect of this is to reduce frequency of visits by the officers to the farmers and hence complicating the practice more.

In travelling in the fringes and rural parts of most parts of the Sub-Saharan countries, especially those that have been hardest affected by the AIDS pandemic, one is bound to witness a lot of funerals taking place. Time is spent by the energetic and productive youthful population on funeral arrangements at the expense of meaningful and productive agricultural practices. Because of the frequency and the fact that they are many, they end up consuming a lot of time that could have been translated into productive work. The effect this has on agricultural extension is that there is less contact with agricultural officers and hence they end up missing very critical information and demonstrations. In the same way the farms are bypassed, the agricultural extension officers are also ignored (FAO, 2015).

The other aspect that accelerates the effects of the HIV/AIDS pandemic is living in denial. This is where people in the rural areas fear to talk about it. This is because of fearing to be stigmatized. This has accelerated a lot of deaths among these rural folks. Unless the pandemic is faced head on by accepting that the virus is with them, it would be hard to surmount it. Because of this, it becomes hard for farmers to seek technical information at the expense of fighting the HIV disease. This has also complicated the nature of work of the extension officers; the farmers no longer seek only technical information from the officers, they also seek information concerning HIV/AIDS and this bestows on the officers the duty of ensuring that they are well prepared to handle such information. This means that training programs for the extension officers need to put in mind the emerging issues in order to prepare them to be in a position of responding appropriately. However, if they are not well prepared, then they can end up becoming

useless in the wake of information dissemination because extension information is not packaged in isolation, but it must be aware of the realities facing the community.

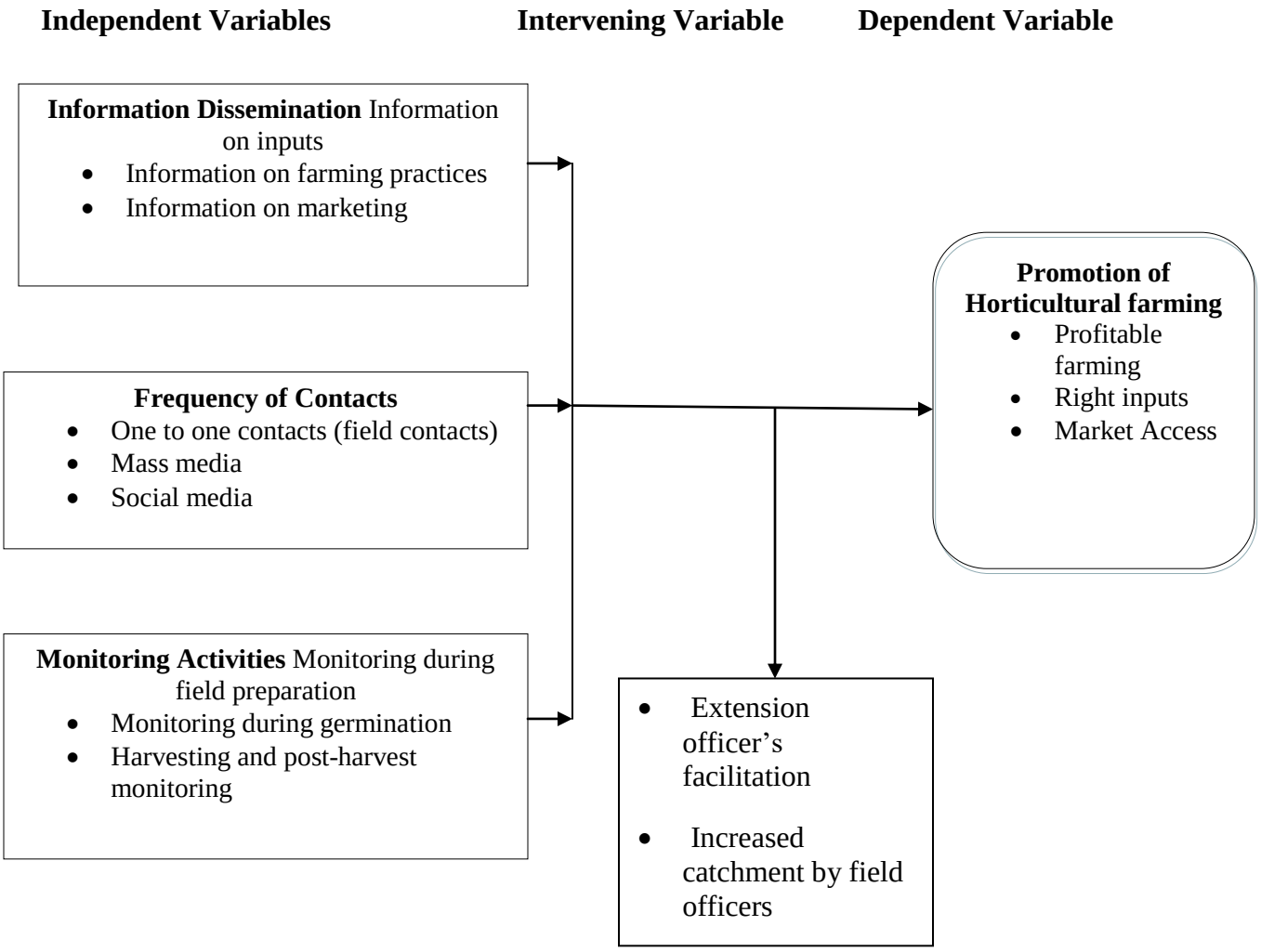
A good example is in Tanzania where because of their husband ill health is, women were forced to spend sixty percent on agricultural related activities. To compound the situation, there have been rising cases of infection rates among these women, yet they happen to account for eighty percent of the small scale farmers' population in Africa. Latest figures put women's infection rate at fifty-eight and this automatically poses a challenge to food security. This has led to a high risk of people to be affected with starvation and as per the figures; those vulnerable to infection are at fifteen million people. The main cause of this dire position of food security is actually the famine and lack of agricultural extension services that come as a result of the disease. This bestows the burden to governments the need to ensure that they prioritize the extension vs disease training (FAO, 2015).

According to Food and Agriculture Organization (2016), agricultural workers that have been lost through the disease are about seven million since 1985 and out of these, it is Sub–Saharan Africa that has severely been affected. In the 1990s and early 2000, there was a great loss of agricultural labor force because of the HIV/AIDS pandemic. This loss manifested itself in dwindling agricultural activities and consequently loss of livelihoods. Such a situation forced the focus of agricultural extension officers to shift gears and even address social issues because of the fact that the disease as well as agricultural activities is intertwined, and both must be understood and tackled as such. According to a study that was done by Anazodo (1982) in Nigeria revealed that engagement in small scale agriculture, dwindling livelihoods have affected their living standards.

2.7 Conceptual frame work

Theoretical Framework in research refers to a diagrammatic representation of the relationships between the variables of the study as enshrined in the topic. The relationship usually occurs at three levels: the independent variables, the moderating variables and the dependent variables. The framework that will guide this study is outlined below:

Fig. 2.1 Conceptual Framework



From the figure above it is demonstrated that independent variables entail the effects of agricultural extension which include information dissemination, frequency of contacts by the farmers and the extension officers as well as effects of monitoring activities by extension officers on horticultural farming. These variables constitute the nature and mode of operation of agricultural extension. For it to be said to have occurred, it should entail information dissemination, frequency of contacts as well as the monitoring of the activities that the farmers have already been taken through to ensure and enhance sustainability. For example, information on inputs, farming styles as well as marketing will help farmers have informed decisions concerning their farming endeavors. Secondly, frequency of contacts also helps to improve the relationship between the field officers and farmers; this could be in the form of

one on one contacts during the field as well as through social media platforms and through mass media platforms; these forums enhance information sharing between them. At the same time, Intervening variables are the challenges that face the agricultural extension officers like unwillingness to take the information, illiteracy and the expansiveness of the Sub-County.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The chapter is dedicated towards the explanation of the methods that were used in data collection and analysis. Specifically, the study elaborates the steps that were followed in the course of this study. The chapter outlines the research design, the sampling procedures, data collection and the analysis. The chapter also outlines the ethical considerations that were adhered to in ensuring the work fulfills the threshold required for research.

3.2 Research design

This study employed a descriptive research design. This is a type of design that is applied to a specific topic especially when carrying out an assessment of the topic to determine and report things the way they are and if a researcher wants to get details about the issue under investigation (Mugenda & Mugenda, 2003). Since the study sought to examine the effects of agricultural extension education services on farmers; the researcher chose this design because it allowed the combination of both qualitative and quantitative techniques. This design therefore is very ideal as it allowed the researcher to use questionnaires as well as interviews in collecting data.

The main aim of descriptive design is that it describes affairs as they exist which may lead to formulation of knowledge and solutions to significant problems. The researcher used this design by interviewing a sample of respondents to find out their attitudes/opinions in relation to the effective utilization of extension education among rural horticultural farmers in Kaiti Sub-County, Makueni County.

3.3 Target population

In this research, the target population was Horticultural farmers in Kaiti Sub-County Makueni County. The Kaiti horticultural farmers association has a membership of 130 farmers (County Government of Makueni 2019). According to Krejcie and Morgan (1970), the appropriate sample for 130 is 97 (See Appendix iv). Therefore, based on this formula, 97 farmers and agricultural extension officers were targeted for the study. The information on how horticultural farming performs in the area as well as how rural farmers utilize extension education in horticulture farming.

Table 3.1: Sampling Frame

WARD	NO. FARMERS	SAMPLE
Ukia	30	24
Kee ward	35	25
Kilungu	30	24
Ilima	35	24
Total	**130**	**97**

Source: County Government of Makueni (2020)

3.4 Sample Size and Sampling Procedures

The research adopted two types of sampling namely: purposive and systematic. Since this study was a case study, the horticulture farmers were selected purposively. They were targeted based on their membership into the Kaiti Horticultural Farmers Association. Thereafter, systematic sampling was employed in which from the list, the farmers were selected randomly until when the sample of 97 was reached based on Krejcie and Morgam (1970) formulae of selecting an appropriate sample. For every ten farmers, one extension officer was selected randomly, hence out of the 97; there were 9 extension officers in addition to 88 farmers. The extension officers were targeted using KII (Key Informant Interviews).

3.5 Data Collection Instruments

The researcher employed both qualitative and quantitative instruments of gathering data. Whereas the quantitative tools were questionnaires, the qualitative tools were interview guides. Questionnaires were convenient when handling a large number of respondents and can also be filled without the presence of the researcher. At the same time, the questionnaires were helpful in capturing demographic information and that information that needed exact responses. Furthermore, the researcher formulated interview guides for the Key Interview Informants, which was employed on the field officers. The guides had open, closed and probing questions. Using focused KII is less threatening, economical; create sense of agreement, validation and triangulation of the data collected. The researcher was able to capture the feelings of the

respondents, clarify some issues, and have high yield because they have direct return rate compared to questionnaires which has low return

3.6 Pilot testing

Prior to the actual study the researcher chose 10 farmers who responded to the structured questionnaires. The rationale behind this was to assess the internal validity and measure consistency of the instrument to provide data that answered the research questions and attain the research objectives. This helped the researcher to fine tune the research instruments depending on the feedback gotten from the respondents. If it fails to do so then the researcher is considered to have failed to review the instrument. Pilot testing participants was excluded from data collection to avoid biasness.

3.7 Data Collection Procedure

The researcher was introduced by the agricultural extension officers to the rural farmers to avoid suspicion. Due to time factor the researcher trained two research assistants for four hours to assist in data collection in various research sites. The assistants helped in administration of questionnaires and in carrying out the interviews. The respondents were guided on how to fill the questionnaires to minimize errors. At the same time, the field officers were interviewed by the researcher with prepared questions. Mugenda and Mugenda (2003) assert that, interviews make it possible to obtain data required to meet specific objective of the study. The dates for the interview and convenient places to meet were communicated to the respondents in ample time.

3.8. Validity and Reliability

According to Joppe (2000), validity in quantitative research determines whether the research truly measures that which it was intended to measure or how truthful the research results are. In this research, validity was achieved by constructing the research questions based on the objectives of the study; this that the research answers what it set out to.

On the other hand, reliability is dependability, consistency, stability and honesty of given research procedures, instruments and tools (Kumar, 1996). It is the degree of consistency between two measures of the same thing. It can also be defined as the extent to which results are consistent over time and are accurate representation of the total population under study and if results can be reproduced under similar methodology (Golafshan, 2003; Joppe, 2000). In this

case, reliability was enhanced through pilot testing of research instruments and comparing the results with those of the final study.

3.9 Data Analysis and Presentation

Because of the fact that the study employed both quantitative and qualitative approach to data collection, the analysis also followed the same pattern. Quantitative data was derived from the closed ended questions in the questionnaires while qualitative data was derived from the interviews and observation. Therefore, based on this understanding, quantitative data was analyzed by use of Statistical Package for Social Science program (SPSS) to calculate descriptive statistics like the mean, mode median and standard deviation. First it was keyed in the software and cleaned to ensure that any errors are corrected at the data entry stage. Thereafter, the data was presented by use of bar graphs, pie charts, tables and line graphs. The researcher also processed the qualitative data. This data, which was gathered in form of interviews from the respondents as well from the open-ended questions from the questionnaires, were also analyzed. This took several steps; these entailed grouping the findings in themes and then narrating the findings in order to corroborate with the quantitative data; the qualitative approach also employed verbatim and quotations from the interview responses in narrations. Furthermore, the study also employed inferential statistics in data analysis; this entailed the presentation of data using correlation analysis that tested the independent variables against the dependent variable.

3.10 Ethical Considerations

In order to guarantee the authenticity and integrity of the study, several measures were put in place right from the time of data collection through the data analysis. These entailed ensuring that the legal requirements of conducting research are adhered to and that the results of the research are a reflection of the true picture. Therefore, this study adhered to the following ethical considerations. The researcher begun by acquiring clearance to do research from the University. This clearance letter was then presented to the National Council for Science and Innovation (NACOSTI). During the actual research, confidentiality of the respondents was guaranteed through making the questionnaires and interview schedule anonymous. At the same time, the respondents were allowed to withdraw from the research at any given point in time, with or without reasons. Moreover, consent forms were administered to the respondents in a bid to ensure that they willingly participate in the research.

CHAPTER FOUR

DATA ANALYSIS AND PRESENTATION AND DISCUSSION

4.1 Introduction

This chapter focuses on the presentation of the data that was collected through both questionnaires as well as interview schedules in the field. The first part of the chapter will present the demographic data of the respondents then with the presentation of the data in accordance with the set objectives.

4.2 Response Rate

A total of 88 questionnaires were administered to the respondents. Out of these, 77 of them came duly filled. This represented a response rate of 96.2 which was considered appropriate given the challenges that came with administration of questionnaires in view of the current COVID-19 pandemic challenges.

4.3 Demographic Characteristics of the Respondents

In order to establish the features of the respondents, the researcher investigated the demographic features of the respondents to ascertain their appropriateness in being able to respond to the questionnaires. The findings are presented in Table 4.1.

Table 4.1: Gender of Respondents

	Gender			
	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Male	37	48.1	48.1	48.1
Female	40	51.9	51.9	100.0
Total	**77**	**100.0**	**100.0**	

Source: Author, 2021

From the table above, it is apparent that out of the total number of the respondents, the percentage of females was higher, 51.9% in comparison with that of the males which stood at 48.1%. This was because many women were easily available at the time of research being that they are fully at home taking care of the household. However, the disparity was a representation

of the situation on the ground where women are left by their men to take care of the households as they go out to fend for their families.

Table 4.2: Age of the Respondents

	Frequency	Percent	Valid Percent	Cumulative Percent
0-20	2	2.6	2.6	2.6
20-30	13	16.9	16.9	19.5
Above 30	62	80.5	80.5	100.0
Total	**77**	**100.0**	**100.0**	

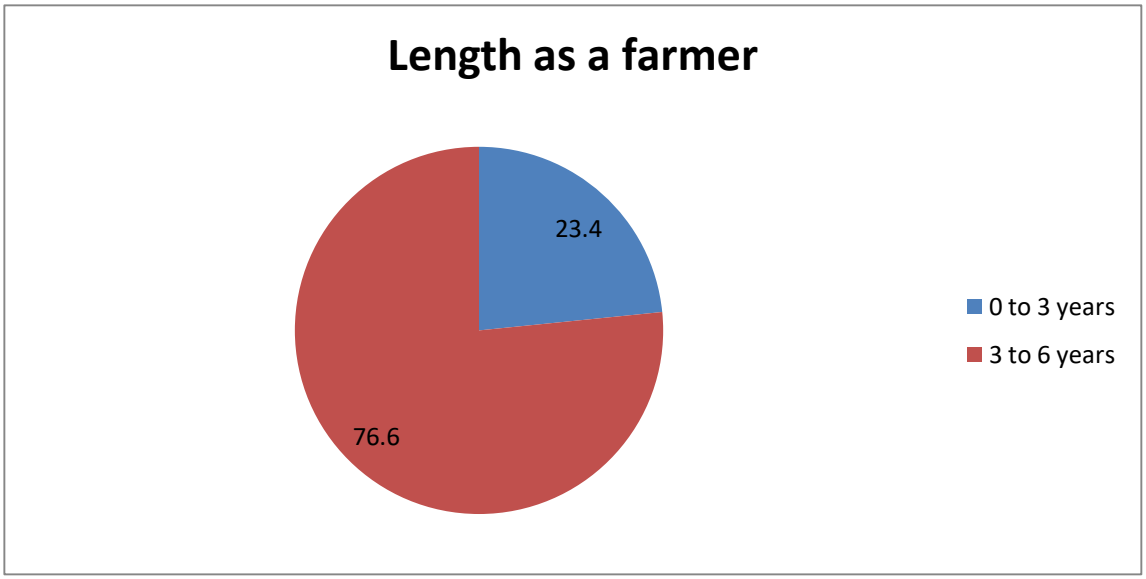
Source: Author, 2021

Age was also considered as an important parameter in this study. This is because of the fact that as one gets older, there comes experience and as such the person is better poised to respond to the issues appropriately. Therefore, from the table 4.2 above, a majority of the respondents, 80.5% were within the age bracket of above 30. Another 16.9% were aged between 20 and 30 with only a paltry 2.6% ranging between 0-20 years. This was an indication that the respondents had the appropriate capacity based on their experience to respond to the questions that were raised over the issues under investigation.

4.3.3 Length of operating as a farmer

Length of farming was an important consideration for this study. The more the farmer gains experience in age, the more he/she is able to understand the issues of extension and the dynamics of farming in general. The findings of the length are presented in the figure below:

Figure 4.1: Length of period of practicing farming



Source: Author, 2021

From the figure 4.1 above, it is apparent that a majority of the respondents, 76.6%, had been practicing farming for a period of between 3 to 6 years while the remaining 23.4 had been farmers for a period of between 0 to 3 years. It was considered that this was requisite experience that the farmers had to enable them to understand the issue of agricultural extension and hence appropriately respond to the issues under the investigation of this study.

4.3.4 Level of Education

Educational level was of importance for this study because its focus was on agricultural extension which aims at instilling in farmers the requisite skills and knowledge to be able to improve their farming practices. To this end, the farmers were asked to indicate their highest educational qualifications and the findings are presented below:

Table 4.3: Level of Education

Level of Education				
	Frequency	Percent	Valid Percent	Cumulative Percent
Certificate	45	58.4	58.4	58.4
Diploma	10	13.0	13.0	71.4
Degree	5	6.5	6.5	77.9
Masters	1	1.3	1.3	79.2
None	16	20.8	20.8	100.0
Total	77	100.0	100.0	

Source: Author, 2021

From the table 4.3 above, it is apparent that only 20.8% of the respondents indicated not having any educational qualification. However, a majority of them were literate; 58.4% indicated having certificate qualifications while those with diploma were 13.0%. The remaining had a degree and masters respectively at 6.5% and 1.3%. This was an indication that a majority of the farmers that were targeted were literate and hence understood properly the issue of agricultural extension.

4.3.5 Marital Status

The respondents' marital status was also established by the researcher in a bid to find out the composition of the households that were being targeted for the study. The findings are presented in table 4.4 below:

Table 4.4: Marital Status of the Respondents

Marital Status				
	Frequency	Percent	Valid Percent	Cumulative Percent
Married	60	77.9	77.9	77.9
Single	14	18.2	18.2	96.1
Divorced	2	2.6	2.6	98.7
Others	1	1.3	1.3	100.0
Total	77	100.0	100.0	

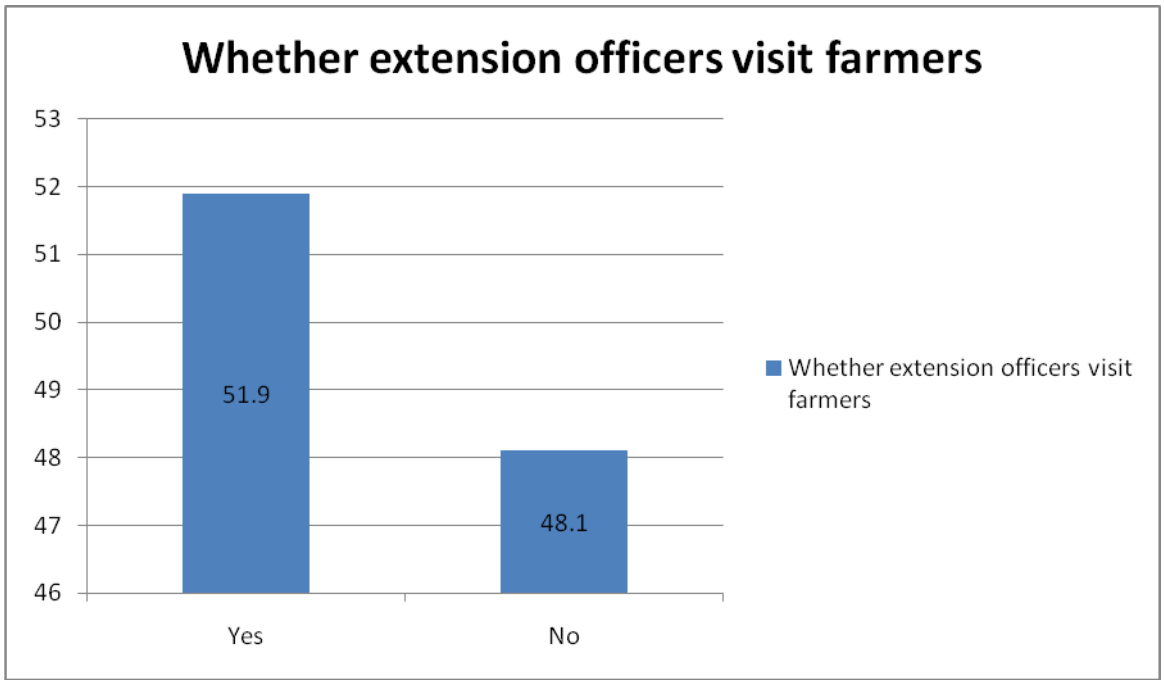
Source: Author, 2021

From the table 4.4 above, a majority of the respondents, 77% were married while another 18.2% were single. The remaining 2.6% and 1.35 indicated as divorced and others respectively. This was therefore that the respondents were living in homesteads and as such, were accustomed to the livelihood of farming.

4.4 Effects of Information Dissemination on Horticultural Farming

Agricultural extension entails interactions between the farmers and the extension officers. For these visits to be meaningful and productive, they ought to be organized frequently. Therefore, the researcher wanted to find out the frequency of visits of the extension officers to farmers. The findings are presented in figure 4.2 below:

Figure 4.2 Whether extension officers visit farmers frequently



Source: Author, 2021

From the figure above, a slight majority of the farmers, 51.9% indicated that the extension officers do visit them frequently. However, another 48.1% answered in the negative that the extension officers do not visit them frequently. Some went ahead to insist that they have never seen them in their farms at any given point. This was a clear demonstration that the extension officers were not as exhaustive and widespread as possible in the Sub-County to cover the entire population which is need of its services. Asked to state if the visits are useful, the farmers had divergent views on the same; 50.6% answered in the affirmative while another 49.4% answered in the negative. This also was an apt demonstration that the activities of the extension officers were not as remarked and did not have a great impact on the farmers as it is supposed to have.

The results are in sync with the views of Oni (2008) who avers that information acts like a 'software' tool which enables the user to be well poised to make the right decisions. In fact, successful farming is pegged on the decisions of the farmer; if the decisions are well informed, then the end result is success in farming. However, if the decisions are not well informed, then the end result will be failure in farming. Therefore, agricultural agencies ought to prioritize

information dissemination because this is what may differentiate the success or otherwise of farming. If this is ignored, then farmers run the risk of making irreversible mistakes that can cost them while failing to guarantee the issue of food security in their respective societies. Similarly, Dolinska and D'Aquino (2016), notes that it is not uncommon to find farmers with a lot of knowledge as pertaining the context that they operate within in terms of their farming system. However, the work of extension is to avail the requisite knowledge to them to boost what they have in order to make the right decisions. One good example revolves around knowing what causes crops to be damaged, how to control pests and even processes of making and understanding how manure and compost manure works in order to nourish plants. Such information is very key to farmers in terms of making them make the right decisions.

Alemayehu (2016) contributing to this debate asserts that productivity in agriculture represents a milestone as far as the development of the economy of a country is concerned. In most of the developing Nations, agriculture symbolizes an important step towards the eradication of extreme poverty. Therefore, agricultural information is an essential complement to growth in other sectors (FAO, 2020). For most developing countries, improved agricultural productivity is hinged on the requisite information that the farmers possess. One estimate is that, on average, a 1% increase in agricultural yields reduces the number of people living on less than a dollar a day by 0.83% (Gebska, 2020). However, in reference to recent years, agricultural performance, this has been disappointing especially in sub-Saharan Africa countries and as such, information ought to be disseminated to as many farmers as possible to enable them to make the right decisions.

4.5 Effects of Frequency of Contacts by Extension Officers on Horticultural Farming

The purpose of agricultural extension is to enable the farmer to keep up to date with the current trends in farming for the right decisions that pertains their practice. This therefore demands that they ought to be kept abreast with the latest information. To be able to find out if agricultural extension workers visit the farmers in Kaiti Sub-County regularly, the respondents were asked to indicate whether extension officers give current information to them. The findings are presented in the table 4.5 below:

Table 4.5 Whether given frequent information

Whether given frequent information				
	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	31	40.3	40.3	40.3
No	46	59.7	59.7	100.0
Total	77	100.0	100.0	

Source: Author, 2021

From the table 4.5 above it is apparent that a majority of the respondents, 59.7% indicated that they are not given frequent information by the officers. On the other hand, another 40.3% did indicate that they were given information on a frequent basis. Ideally, farmers ought to appreciate the role of extension officer in making them to engage in the right decisions. This therefore presents a significant challenge in terms of not being able to get the correct information on time. Some farmers averred that most of the information that they have on recent developments is gotten from the media; they cited some educative television channels which give them a lot of updated information that if used, helps them to improve their farming practices. Some even cited internet where they explained that they are able to get the right updated information in terms of the best breeds and crop diseases as well as market information through the internet. The fact that farmers are able to traverse these sources to get the right information means that there is a discernible gap that needs to be filled in terms of agricultural extension services.

Agricultural extension visits are focal points in enhancing the interaction between the officers and the recipients of the services who are the farmers. Therefore, to this end, the study sought to find out how frequent the meetings are held between the farmers and the extension officers. The findings are presented in the table below:

Table 4.6 Frequency of visits

	Frequency	Percent	Valid Percent	Cumulative Percent
Weekly	15	19.5	19.5	19.5
Monthly	15	19.5	19.5	39.0
After Two Months	29	37.7	37.7	76.6
After Three Months	18	23.4	23.4	100.0
Total	77	100.0	100.0	

Source: Author, 2021

A majority of the respondents, 37.9% indicated that the extension officers visited them after every two months. Another 23.4% indicated that they were visited after every three months. The remaining indicated that they were visited on a weekly basis and monthly at 19.5% and 19.5% respectively. Asked if they are comfortable with the frequency of visits, the farmers answered in the negative stating that for horticulture farming, a lot changes and needs to be closely monitored and if not it can result in loses. They therefore expressed their wish to have the visits increased so that they take care of every little development that take place. In an interview with one of the KIIS, the following was established:

> *The reason as to why we as extension officers do not visit the farmers regularly is because of the fact that we are not fully facilitated by the government. It is our wish, we could even be doing it weekly but that demands that we have extra cash in terms of logistics but that is not the case; the facilitation we have is so meager.* (KII 001).

This serves to demonstrate that the extension officers are usually impeded by the financial constraints which prevent them from moving freely and accessing the farmers regularly as may be the case. It thus behooves on the department of agriculture to be able to come up with mechanisms that will enable them to regularly visit the farmers.

One challenge that usually faces the agricultural extension services is the interplay that is there between the farmers and the officers in the field. As much as the field officers may be willing to disseminate the information to the farmers, the farmers may demonstrate inertia and ineptitude in receiving the information. Therefore, to this end, the researcher sought to establish whether farmers were always there to receive the information given by the extension officers. The responses are presented in figure 4.3 below:

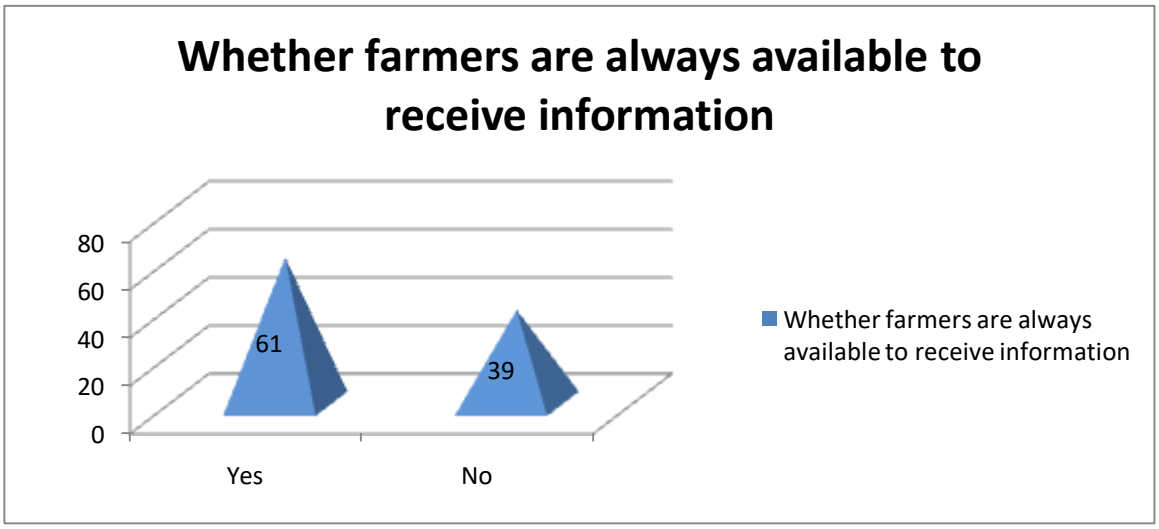


Figure 4.3 Availability of farmers
Source: Author, 2021

From the figure above, a majority of the respondents, 61%, indicated that the farmers are always there to receive information from the extension officers. Another 39% indicated in the negative. Those who indicated in the affirmative said that since the extension officers always have a schedule of events that they shared with the farmers, they always anticipate their visits and as such present themselves to receive them. However, those who answered in the negative stated that they have other businesses to attend to and as such, if their schedule is not in tandem with that of the extension officers, their schedule takes precedence. They also stated that if they are not available, they usually sought information given from those who are available. This therefore is another challenge because if the farmers fail to turn up for extension services, the end looser are usually the farmer and the farming practices.

4.6 The Effects of Monitoring and Evaluation by Extension Officers on Horticultural Farming

Agricultural extension not only has the effect of helping the farmers to improve their crop production, but it also has the effect and objective of ensuring that they access markets as well as have innovative practices. Comprehensive coverage of the extension officers of their jurisdiction is a very important step towards attaining the objectives of extension. This is because every area has unique challenges and peculiarities that need to be addressed uniquely. Therefore, the respondents were asked to indicate whether the extension officers visit all areas of the Sub-County. The responses are presented below:

Table 4.7: Intensity of visits

Whether Extension Officers visit all areas in the Sub-County

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	32	41.6	41.6	41.6
No	45	58.4	58.4	100.0
Total	77	100.0	100.0	

Source: Author, 2021

From table 4.7, it is apparent that the extension officers do not visit all the areas in the Sub-County by the responses from 58.4% farmers who indicated in the negative. Those who indicated that the extension officers visit all areas in the Sub-County were 41.6%. Asked further to indicate what the reasons could be explained for this disparity in visits, those who indicated that they visit all areas stated that the field officers are few and as such their coverage cannot comprehensively attend to all areas in the Sub-County; instead, farmers are asked to move to those areas that are designated for extension services and receive their training from these areas. On the other hand, those who indicated that the officers do not visit all areas stated that the extension officers fail to visit far flung areas of the Sub-County and this affects their ability to get information on markets and innovative practices.

In an interview with one of the KII, it was found out that distance is a major constraint as can be deduced from this statement:

> *The Sub-County is vast and in some cases, it is so remote. This could be a limiting factor to the extension officers who have limited*

> *knowledge of the areas and the net effect of this is the failure to disseminate the information to all farmers. Even those who relay the information that they have been given do not do it in exactly the same way as they were told; at the same time, each farm is unique in its own respects and it needs advice based on the uniqueness of the case.* (KII 4).

Therefore, from the above, it can be deduced that the distance to and from the centers as well as the proximity can greatly influence the success or otherwise of the extension officers. This finding is in sync with those of, Oni (2008) that when the distance between the farmer and the extension officer is long, it tends to disadvantage the farmer because he/she may miss out on important information. At the same time, distance also keeps the extension officer out of touch with the realities on the ground.

Because of manpower challenges; the distance to particular places is bound to hinder the extension officers from attaining full coverage. Therefore, the farmers were asked to indicate if they are hampered in terms of distance from getting to the centers that extension services are offered. Their response is indicated in table 4.8 below:

Table 4.8: Effects of distance

If distance discourages farmers from meeting officers

	Frequency	Percent	Valid Percent	Cumulative Percent
Agree	47	61.0	61.0	61.0
Disagree	30	39.0	39.0	100.0
Total	77	100.0	100.0	

Source: Author, 2021

From table 4.8 above, it is apparent that distance is a major hampering factor in as far as making it difficult for farmers to meet extension officers as indicated by the 61% of the respondents who answered in the affirmative. The remaining 39% indicated in the negative. This implies that as far as distance is concerned, the

farmers were constrained from getting access to the services; this, in effect, means that they would largely be disadvantaged and the intention and objectives of agricultural extension will not be met as intended. Asked to explain how distance limits them, they stated that the centers that the extension officers usually hold their meetings and seminars are far flung; in most cases they are near towns and urban centers and as such, it becomes difficult for them to travel to those areas because of logistical effects.

Monitoring and evaluation ensures that the skills and knowledge disseminated to farmers are put into constant use and practice. To be able to understand whether farmers keep in mind what they are told frequently by the extension officers, they were asked to indicate if they forget what they are told by extension officers. The findings are presented in Table 4.9 below:

Table 4.9: Farmer's level of forgetfulness

Whether you forget what you are told by extension officers				
	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Agree	53	68.8	68.8	68.8
Disagree	24	31.2	31.2	100.0
Total	77	100.0	100.0	

Source: Author, 2021

From the table 4.9 above, a majority of the farmers, 68.8% did indicate that they forget what they are told by extension officers while another 31.2% disagreed with the statement. This was an indication of the need for more monitoring and evaluation to ensure that the farmers implement what they are told and to ensure there is a follow up of the skills that are disseminated to the farmers. At the same time; the farmers pointed out that the sessions are not interactive because the farmers usually do not get a change to ask relevant questions and raise their concerns. They suggested that if the sessions were more inclusive, it would enable them have an opportunity to remember and

internalize the concepts and hence the problem of forgetting would be a thing of the past.

To ascertain if the extension officers monitor the progress of their services, the farmers were asked to indicate whether their farms are monitored by the extension officers. The responses are presented in the following table below:

Table 4.10 Monitoring and progress

Whether extension officers monitor progress				
	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Yes	27	35.1	35.1	35.1
No	50	64.9	64.9	100.0
Total	77	100.0	100.0	

Source: Author, 2021

From the table 4.10 above, it can be seen that the majority of the respondents, 64.9% indicated that the extension officers do not monitor their progress while the remaining 35.1% indicated in the affirmative. Therefore, what this implies is that there is need for more monitoring activities by the extension officers to reinforce their training to the farmers. Monitoring can assist to clear the misunderstanding of information that was given to a farmer by an extension officer. In some cases, extension officers may advice farmers based on a general principle but in practice, it may prove to be ineffective; therefore, what monitoring does is that it ensures the entrenchment of this information to the farmers and. Feedback is also a very necessary component of agricultural extension; it enables the extension workers to know the areas that they can improve in terms of making their training be more fulfilling to the farmers.

Lastly, the respondents were asked to indicate whether the extension officers give information based on progress of farming. This is a very important aspect of agricultural extension because the information ought to be tailor made to meet the needs of the specific farmers. The responses are presented in table 4.11 below:

Table 4.11: Information by Extension officers

Whether Extension officers give information based on progress of farming				
	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Yes	32	41.6	41.6	41.6
No	45	58.4	58.4	100.0
Total	77	100.0	100.0	

Source: Author, 2021

It can be deduced in table 4.11 that a majority of the respondents, 58.4% did not believe that the extension officers gave information based on progress of farming. The remaining 41.6% answered in the affirmative. Wallace (1996) posits that whenever extension officers visit farmers, the purpose ought to be on improving the previous visit's advice; based on this premise, it would be meaningless to have several meetings without having a deliberate follow-up plan. The visit itself will entail the extension officer taking notes based on what they have observed. This will involve taking note of each microscopic detail that the officer is able to observe and gather. Organization is key for this to be attained; the officer must have a place to record the day that the farmer was visited and the intention of that visit. This should be followed by a recommendation that came about as a result of the visit. This step is very important in that it allows the officer to arrange a follow-up activity with the farmer. Based on the recommendations, the agent can decide to have a follow up activity such as referring a colleague who has knowledge in a specific area who can share the information with the farmer. If this is not done, Wallace (1996) warns that it could end up disappointing the farmer or even end up losing trust in the extension officer all together.

4.9 Inferential Statistics

This study also employed inferential statistics in drawing conclusions. It sought to establish the statistical correlation between the three variables namely information dissemination, frequency of contacts and monitoring activities with promotion of horticultural farming. The results are presented in form of correlation analysis as follows:

Table 4.12: Correlation Analysis Results

	Information dissemination	Frequency of contacts	Monitoring activities	Promotion of horticultural farming
Information dissemination	1			
Frequency of contacts	0.911**	1		
Monitoring activities	0.925**	0.855**	1	
Promotion of horticultural farming	0.953**	0.954**	0.931**	1

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Author, 2021

Table 4.12 shows the correlation results among the study variables. Frequency of contacts ($r = 0.911$, $p < 0.05$), monitoring activities ($r = 0.925$, $p < 0.05$) and promotion ($r = 0.953$, $p < 0.05$) were strongly correlated with information dissemination. Frequency of contacts strongly and positively correlated with both monitoring activities ($r = 0.855$, $p < 0.05$) and promotion of horticultural farming ($r = 0.954$, $p < 0.05$). Finally, monitoring activities positively and significantly correlated with promotion of horticultural farming ($r = 0.931$, $p < 0.05$)

Table 4.13: Estimation Results between Agricultural Extension Education and Promotion of Horticultural Farming

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.982	0.965	0.963	0.0831

a. Predictors: (Constant), Information dissemination, Frequency of contacts, Monitoring activities

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13.857	3	4.616	668.782	0.000
	Residual	0.504	73	0.007		
	Total	14.361	76			

a. Dependent Variable: Promotion of horticultural farming

b. Predictors: (Constant), Information dissemination, Frequency of contacts, Monitoring activities

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.062	0.034		1.803	0.075
	Information dissemination	0.214	0.067	0.232	3.184	0.002
	Frequency of contacts	0.398	0.044	0.486	9.114	0.000
	Monitoring activities	0.276	0.053	0.300	5.184	0.000

a. Dependent Variable: Promotion of horticultural farming

Source: Author, 2021

The model summary depicted in Table 4.13, R denotes the correlation coefficient between agricultural extension education and promotion of horticultural farming. The correlation coefficient (r = 0.982) confirms a strong positive correlation between agricultural extension education and promotion of horticultural farming. The coefficient of determination (R^2 = 0.965) indicates that nearly 96.5% of disparity in promotion of horticultural farming is explained by agricultural extension education while the remaining 3.5% is accounted for by other variables not taken into consideration in this study.

The overall regression model was statistically significant in estimating the relationship between agricultural extension education and promotion of horticultural farming. The significance value in assessing the reliability of the overall regression model for the hypothesized linkage was 0.000 which is below 0.05, the critical value at 95% level of significance as illustrated by the analysis of variance (ANOVA) Table 4.13 (F = 668.782, $p < 0.05$). This suggests that the sample data used was perfect for making conclusions about the population parameters.

The individual indicators for agricultural extension education documented consistent findings. The empirical findings suggest that information dissemination ($\beta = 0.214$, $t = 3.184$, $p < 0.05$), frequency of contacts ($\beta = 0.398$, $t = 9.114$, $p < 0.05$) and monitoring activities ($\beta = 0.276$, $t =$

5.184, $p < 0.05$) positively and significantly predicted promotion of horticultural farming. This implies that there is a positive correlation between the independent and dependent variables.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECCOMENDATIONS

5.1 Introduction

This chapter focuses on presenting a summary of the study as well as conclusions based on the findings of the study. Thereafter, the chapter will give recommendations that will emanate from the findings that are both practical and theoretical as well as suggestions for future research.

5.2 Summary

The study sought to determine the effects of agricultural extension services on horticulture farming in Kaiti Sub-County, Makueni County, Kenya. The study was guided by three objectives namely: To establish the effects of information dissemination by extension officers on horticultural farming in Kaiti Sub-County; to discuss the effect of frequency of contacts by extension officers with farmers on horticultural farming in Kaiti Sub-County and to assess the effects of monitoring activities by extension officers on horticultural farming in Kaiti Sub-County. Farmers from Kaiti Horticultural Association were chosen for this study using random sampling. This method of sampling was chosen deliberately because of the fact that the farmers have the adequate knowledge and experience in horticultural farming which would enable them to respond to the questions contained in this research. A total of 97 questionnaires were administered to the respondents and they came back duly filled. At the same time, interviews were conducted on extension officers who operate in the Sub-County. Based on this, the summary of this research is as follows:

5.2.1 Effects of Information Dissemination on promotion of Horticultural Farming

It was established that there are great strides in providing information to farmers by the extension officers. This was seen in the responses which indicated that by and large, they have been on several occasions given the opportunity to meet the officers and shared information. However, it was also established that the frequency of meetings is not yielding as much results as they are supposed to. This is because horticulture farming is a short- term activity and as such, the farmers need to be met as regularly as

possible. This was not the case from the responses that were gathered from the field. The net effect is farmers that have not yet appreciated the role of extension services because of the reason that they are not fed with frequent, updated information. Others decide to look for alternative sources of information which can be misleading and hence lead to trial and error. Regarding effects of dissemination of information, it was deduced that there is need for much more sessions and at the same time, more manpower in the field to engage the farmers on a regular basis. This is so given that the Sub-County is vast, and the number of extension officers is unable to carry out effectively their role of agricultural extension in the Sub-County.

5.2.3 Effects of Frequency of contacts on Promotion of horticultural Farming

It was established that there were contacts between the farmers and extension officers; however, these contacts were not very frequent and in some cases they were inexistent. More so, the few contacts did not yield much because they were organized haphazardly and as such, the farmers were at pains to even comprehend the contents of the meetings. As a result, the farmers were hesitant to unilaterally state whether they benefited much leaving a lot of doubts as to whether the meetings were beneficial. Most farmers expressed their interest and need to have more contacts with the extension officers because of the fact that horticulture farming does not take a long period of time, at most three months and during that time they ought to be educated on a regular basis to avoid incurring losses.

5.2.3 Effects of Monitoring activities on promotion of Horticultural Farming

The role of monitoring and evaluation plays a very critical role in ensuring that there is sustainability and longevity of the information disseminated to the farmers. From the findings, it was established that there is a weak link between the information disseminated and monitoring to ensure that the information is put into practice. A majority of the respondents expressed reservations regarding constant monitoring. It thus implies that for extension services to succeed in Kaiti Sub-County and other counties as well there needs to be a robust mechanism that will ensure that there is monitoring and follow up of the information that farmers are given by the extension officers. This will also curb misinformation that can have negative effects on the

farmers. Misinformation comes in when farmers begin to rely on non-experts in making decisions that pertain the farming activities. Since such information, which is on social media as well as on the internet is general, it may not be able to address the specific unique needs of the farmers and could end up backfiring. Therefore, to curb this, farmers ought to be reached out by all means. This could even require innovations in Information Technology and Communication that can be harnessed towards ensuring that more farmers are reached out through all the available mediums which include smart phones, SMS, online interactions and other media.

5.3 Conclusion

The study has established that extension education is a vital component in ensuring that farmers in Kaiti Sub-County are able to be updated with recent trends as well as correct and accurate information regarding horticulture farming. This was seen from the statistics which established that regarding the independent variables namely: Frequency of contacts ($r = 0.911$, $p < 0.05$), monitoring activities ($r = 0.925$, $p < 0.05$) and promotion ($r = 0.953$, $p < 0.05$), they were strongly correlated with information dissemination. Frequency of contacts strongly and positively correlated with both monitoring activities ($r = 0.855$, $p < 0.05$) and promotion of horticultural farming ($r = 0.954$, $p < 0.05$). Finally, monitoring activities positively and significantly correlated with promotion of horticultural farming ($r = 0.931$, $p < 0.05$). Based on this, several conclusions can be deduced from the study as follows

The study concludes that as much as there is a degree of information that is disseminated, there still needs to be a diversification in the methods that the extension officers employ in disseminating information. This can be through the emerging platforms such as creating user friendly websites as well as through social media interactive platforms such as what sup groups as well as face book pages and virtual meetings such as zoom and Google meet.

The study also arrived at the conclusion that regarding the frequency of contacts between the farmers and extension officers, they need to be increased in light of the many changes that take place in horticulture farming. It was established that at times,

when the contacts are less frequent, the farmers lose the critical information they need at specific stages of their crops and this interferes with their crop production.

Regarding the effects of monitoring and evaluation by extension officers on horticultural farming, the study concludes that there should be an increase in monitoring of agricultural activities in order to ensure that the farmers follow the instructions as well as the guidelines that they are given by the extension officers. At the same time, monitoring ensures that the extension officers follow what they are supposed to do in order to improve their services.

5.4 Recommendations

Based on the study findings, the following are the recommendations for not only practical purposes, but also theoretical purposes: The first is that the County Government should employ more agricultural extension officers. At the same time, the officers should be facilitated with adequate means of transport to increase their coverage. Furthermore, farmers ought to be encouraged to utilize agricultural extension services. Besides, information Communication and Technology (ICT) be strengthened in order to allow remote learning between the farmers and the extension officers.

5.5 Recommendations for further research

More research should be carried out in the following areas:

- Challenges facing extension officers and solutions to the challenges
- Role of ICT in improving extension services
- Determinants of successful Agricultural Extension services

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APPENDICES

APPENDIX 1: QUESTIONNAIRE

Dear Respondent,

My name is Daniel Thathi, a Master's student at St. Paul's University Limuru. I am carrying out a study titled '***The Effects of Agricultural Extension Education on Horticultural Farm Productivity in Kaiti Sub-County, Makueni County'.*** I kindly request you to fill this questionnaire to enable me to collect the necessary information for the study. All responses you give will be treated with outmost confidentiality, as such; you will not be required to indicate your names. The information will be used for the purposes of research only.

SECTION A

Demographical information

1. Kindly indicate your gender. Male ☐ Female ☐
2. Indicate your age 0-20 ☐ 20-30 ☐ Above 30 ☐
3. For how long have you been a horticultural farmer?
   - 0-3 year ☐
   - 3-6 Years ☐
   - Above 6 Years ☐

4. Level of education. Certificate ☐
   - Diploma ☐
   - Degree ☐
   - Masters ☐
   - None ☐

5 Indicate your Marital Status: Married ☐ Not Married ☐ Single ☐ Divorced Other ☐

SECTION B: Effects of Information Dissemination on Horticultural Farming

1. As a farmer, have you ever been visited by an Extension officer? Yes ☐ ☐

b) If yes, what information did the officer give to you?.....

……

…….

c) Was the information useful? Yes ☐ No ☐

d) If yes, explain how it was useful……

……

……

e) What do you think could have been covered more by Extension Officers?.....

……

……

……..

SECTION C: Effects of Frequency of Contacts by Extension officers on Horticultural farming

7a) Do the Extension Officers visit regularly? Yes ☐ No ☐

b) If yes, how regularly? Weekly ☐ Monthly ☐ after two Months ☐ After three Months ☐

c) Are the farmers easily available to receive the information from the officers? Yes ☐ No ☐

d) If no, state why

……
……
……
…….

e) If yes, what modes of information giving are usually employed by the extension officers?

……
……
……

8a) Do the officers manage to visit all the areas in the Sub-County? Yes ☐ No ☐

b) Kindly respond to the following Statements

Statement	**Agree**	**Disagree**
You are discouraged by distance from meeting the officers		
Farmers easily forget what they are told because of less meetings with the officers		
The officers do not give new information that is helpful to the farmers		

SECTION D: Effects of Monitoring and Evaluation by extension officers on horticultural officers

9a) Do the Extension officers monitor your progress? Yes ☐ No ☐

b) If yes, after how long?…….

……
…….

c) How do they monitor your progress? Physical Checks ☐ Calling ☐ any other……

d) Do they give you information based on the progress of your farming activities Yes ☒ ☐

c) If yes, what is the nature of the information?.....

……
……

……..

d) What are the benefits of monitoring by the extension officers?

……
……
…….

d) As a farmer, what are the challenges you face in horticultural farming?.....

……
……
……
……..

e) How can those problems you are facing be solved by extension services?.....
.....
.....

THANK YOU

APPENDIX II: INTERVIEW GUIDE FOR EXTENSION OFFICERS

1. For how long have you engaged the community in extension services?

2. What are some of the areas that you cover?

3. Is the community receptive to your services?

4. In which ways do you help them access markets?

5. In which ways do you help the farmers come up with innovative ways of farming?

6. What are some of the challenges that you face in your programs?

7. What can be done to enhance farmer's uptake of extension services?

8. Who is responsible for ensuring farmers get the correct information?

APPENDIX III: RESEARCH PERMIT

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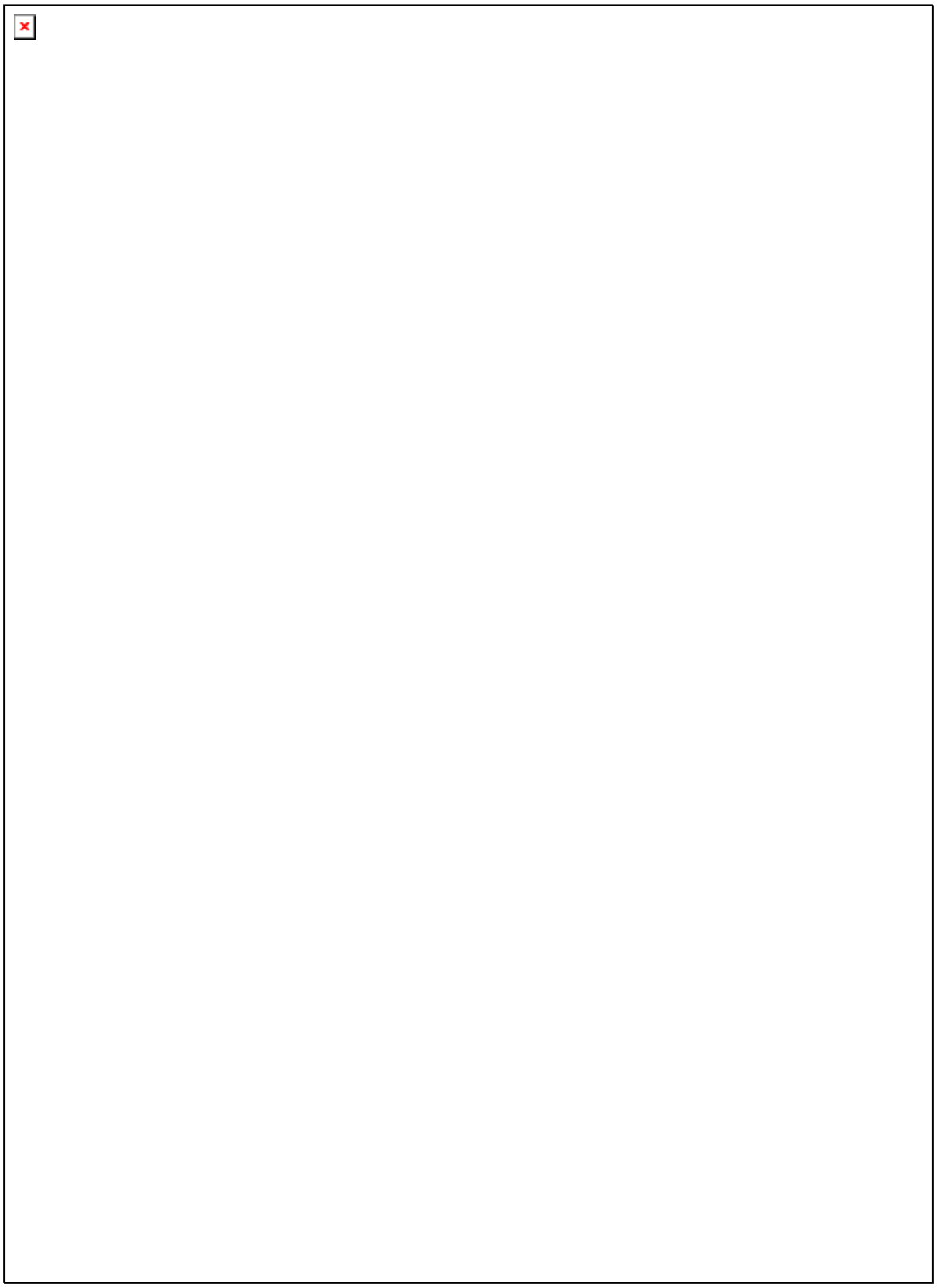
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APPENDIX IV: ST. PAUL'S UNIVERSITY RECOMMENDATION LETTER



APPENDIX V

KREJCIE AND MORGAN'S FORMULAE FOR CALCULATING SAMPLE

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

Note.—*N* is population size. *S* is sample size.

Source: Krejcie & Morgan, 1970