FACTORS INFLUENCING AGRICULTURAL PRODUCTIVITY IN KENYA: A CASE OF NYATHUNA WARD IN KABETE SUB-COUNTY, KIAMBU COUNTY

BY

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DECLARATION

This research project report is my own work and has not been submitted for the award of a degree in any other institution.

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This research project report has been submitted for examination with my approval as the university supervisor.

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DEDICATION

This project is dedicated to my wife, Violet Mokeira, daughter, Gloriah Nyabonyi and son, Blessing Makori for their understanding, encouragement, moral support and perseverance during my study.

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LIST OF ABBREVIATIONS AND ACRONYMS

AATF	African Agricultural Technology Foundation
AGRA	Alliance for Green Revolution in Africa
AI	Artificial insemination
ASK	Agricultural Society of Kenya
ASPS	Agricultural Sector Programme Support
ATAAS	Agricultural Technology and Agribusiness Advisory Services Project
Bt	Bio-technolgy
CAADP	Comprehensive African Agricultural Development Program
CDs	Compact Discs
DVDs	Digital Video Discs
ECA	East and Central Africa
EAAFRO	East African Agricultural and Forestry Research Organisation
EAAVRO	East African Veterinary Research Organisation
FAO	Food and Agriculture Organization (United Nations)
FFS	Farmer Field School
GDP	Gross Domestic Products
GM	Genetically Modified
GPS	Global Positioning System
HYV	High Yielding Varieties
ICT	Information and Communication Technology
IPM	Integrated Pest Management
IRRI	International Rice Research Institute
IRV	Improved Rice Varieties
IT	Information Technology
KALRO	Kenya Agricultural and Livestock Research Organisation
KAPP	Kenya Agricultural Productivity Project
KARI	Kenya Agricultural Research Institute
KETRI	Kenya Tripanosomiasis Research Institute
KEVEVAPI	Kenya Veterinary Vaccines Production Institute
LUCC	Land-use and land-cover change
NAAIAP	National Accelerated Agricultural Inputs Access Programme
NALEP	National Agriculture and Livestock Extension Programme
NBA	National Biosafety Authority of Kenya
NERICA	New Rice for Africa
NGO	Non-Governmental Organization
SPSS	Statistical Package for the Social Sciences
SRA	Strategy for Revitalizing Agriculture
SSA	Sub-Sahara Africa
T&V	Training and Visiting

ABSTRACT

Farmers should be taught and be exposed to current researched and updated agricultural technologies at their disposal. Fundamentally, farmers to achieve certain goals use current and updated information but what is missing is how to package and spread the much-needed information to them. To mitigate this, agricultural stakeholders and other related agencies in Kenya should consider the best communication channels to use in the spreading of the much-needed valuable agricultural information to farmers. The dissemination of agricultural information has continued to be imbalanced; this has put the achieving of full productivity levels of our rural population into jeopardy in as far as general development is concerned. Target audience segmentation based on literacy levels, unique needs, specific land needs should be considered by the producers of agricultural information; and opening up of media and vernacular communication of messages should be targeted and enhanced. The objectives of the study are to; establish social-economic factors influencing agricultural productivity, examine the influence of agricultural technology uptake on productivity, establish the influence of extension service delivery on agricultural productivity and assess the influence of information dissemination methods used for agricultural productivity. The research has adopted a descriptive survey research design in order to establish factors influencing agricultural productivity in Kenya. 200 respondents were the sample size that was selected from a list of 7794 farmers in Nyathuna Ward Kabete Sub-County. Questionnaires were used to collect data from the respondents. The analysis of data collected was done by the use of descriptive statistical methods and inferential analysis using statistical package for social sciences and multiple correlation analysis and presented in Tables. Analyzed data show that there is a positive correlation of 0.169 between extension service delivery and agricultural productivity. There is a positive correlation of 0.117 between farmers' training methods and agricultural productivity. There is a positive correlation of 0.155 between the methods used for the dissemination of agricultural information and agricultural productivity. Social economic factors can influence agricultural productivity negatively or positively. From the findings combination of both family and hired labour is used heavily when conducting all farm activities meaning that if family labour is removed from the equation, the cost of production will go up. Technology in agriculture should be embraced and encouraged. The use of fully tested and recommended inputs is a sure way to go since this gives a farmer quality and better yields. Extension service delivery should be enhanced and strengthened. Farm Visits was the farmers' preferred training method hence this should be factored in. In the section of the dissemination of agricultural messages, Participatory Approach method is the most preferred by the farmers. The findings may provide very valuable information to the Government of Kenya officers, related agricultural agencies, researchers and other stakeholders. Formulation of policies by the Government of Kenya may be done by the use of the findings therein; so that positive impacts to the farmers are realized as far as agricultural productivity is concerned and guide the agricultural extension officers in coming up with better ways to disseminate agricultural information to farmers in their quest to improve agricultural production.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Technology and farming have a long relationship. Agriculture is itself a technological development, an innovative response to population growth by our hunter-gatherer ancestors. Society has heavily relied upon technology to meet the same challenge: how to feed an ever-increasing global population. New plant breeds, advances in chemical fertilizers and pesticides, and new solutions for large-scale crop production and processing have ushered in an era of vast agricultural productivity. Furthermore, a new "Green Revolution", being developed in laboratories and fields across the globe, has the potential to increase crop yields, promote drought and disease tolerance, and even enhance the nutritional profile of crops, all through the modification of genetic sequences within the plants and animals cultivated by farmers around the globe.

Fundamentally, agriculture has continued to be a catalyst of development that is sustainable, enhanced food security and the reduction of poverty in countries that are developing. Productivity in agricultural is also important for spurring economic growth in other sectors. According to the World Bank (2014), farmers live in remote rural areas and make up 75% of the world's poor. In Sub-Sahara Africa (SSA), productivity in agriculture lags behind globally, and is below the required standards of achieving food security, poverty goals and food sufficiency (Fuglie, 2013).

"A smarter food system is more productive, more integrated, less wasteful and more profitable. It is more efficient in using resources to produce and deliver the food consumers

need, where and when they need and want it, making it more sustainable" (Berry, 2015). The human race is facing some rapid decline of critical resources; water, energy and raw materials coupled with the deterioration of agricultural land and ecosystems that are all needed for food production (FAO, 2011). The production of food has an inherited impact on land and resources; of all the activities that we do, this is the one that we need to guard and preserve jealously to sustain us as species. Hence the need to take agriculture and agricultural productivity seriously if we need to make inroads as far as sustainable development is concerned. Poverty reduction is achievable through agriculture.

Food security refers to the access of enough food for a healthy/active life for all the people at all times. On the other hand food self-sufficiency refers to that aspect of managing to meet consumption rates and needs from one's production as opposed to buying or importing, (Maxwell, 1996).

An increase in agricultural productivity may have positive effects on Kenya's food security (Yudelman, 1987), hence the need to embrace agricultural technology in an effort to spur growth and development.

According to Kiambu County Annual Development Plan 2016/17, Agriculture remains the backbone of the economy in the county as it contributes 17.4 per cent of the county's income. Farmers here grow; beans, Irish potatoes, avocados, Sukuma, pineapple and maize. Decrease in average farm sizes has reduced due to population increase. With this in mind, Nyathuna Ward within Kabete Sub-County is an ideal place for this study since farmers here grow crops and rare animals which will make it easy for me to measure the levels of productivity and what cause low up-take of agricultural technology.

1.1.1 Global Perspective on Agricultural Productivity

According to Brown, (2005), India, has undertaken steps in the past to increase its land level of productivity. North India used to produce wheat only, but progressed to the growing of earlier maturing high-yielding rice and wheat. In that wheat could be harvested first in time to allow the planting of rice. The combination is now used widely over helping in the feeding of the populous state.

Agricultural production in India can be broadly classified into food crops and commercial crops. In India the major food crops include rice, wheat, pulses, coarse cereals etc. Similarly, the commercial crops or non-food crops include raw cotton, tea, coffee, raw jute, sugarcane, oil seeds etc. Total agricultural production has been increasing with the combined effect of growth in total cultivated areas and increases in the average yield per hectare of the various crops according to the article "Agricultural Production and Productivity in India" by Vidya Sethy.

Due to the development of new agricultural technologies, there was the rise of agricultural productivity in the United States of America between 1950 and 2000, (Fuglie, Keith, MacDonald, James and Ball, 2007). Increased agricultural productivity turned out to be the main contributor in the growth of the United States of America's economy.

The agricultural sector in Nigeria performed dismally for three decades, this prompted the government to come up with programs and agricultural schemes so as agricultural productivity can be enhanced in the country (Adeoti, 2002). According to the World Bank report of (2008)–"Agriculture for Development", Nigeria had developed and disseminated at least 57 different Improved Rice Varieties (IRVs) to the rural farmers through different

programs and policies. The efforts were geared toward increasing rice productivity to encourage the attainment of national and household food security

In 2010 Ugandan government partnered the World Bank to form a technology advisory project (ATAAS) whose main objective was to increase productivity levels in agriculture and incomes of those participating individuals. This was to be done by the improving research in agriculture and advisory services in the country of Uganda.

According to Otage, (2013) a technology-adaptation and transfer scheme was launched by the Ugandan government. The scheme was to employ the local welder in the fabrication post-harvest agricultural production technology. Sorters of maize cobs and cassava shredders were made which enabled farmers to mechanize and reduce the cost of production.

In Kenya, agriculture is taunted to be the backbone of her economy. Almost 20% of Kenyan's total land area is fertile as it has enough rain to enable farming to take place, (Kenya country profile 2007). According to Mwanda and Ministry of Agriculture, (2000) majority of Kenyans lived by farming and more than half of its agricultural production is for family consumption. Agriculture earns Kenya 25% of its GDP and it employs 75% of its workforce, (Macharia, 2013). Kenya's Vision 2030 program emphasized the fact that agricultural growth as a sector is the main issue to be looked at (Republic of Kenya, 2007).

1.1.2 Agriculture in Kenya

In the past, Government in conjunction with programs that were sponsored by donors has worked hard to increase agricultural productivity. Such programmes include; NALEP, KAPP, the National Accelerated Agricultural Inputs Access Programme (NAAIAP) and Agricultural Sector Programme Support (ASPS), (Republic of Kenya, 2007).

According to AATF, The NBA has approved open-air trials of Biotechnology (Bt) maize; which could be selling by 2018. Bt maize is among seven crops that have been under controlled trials in the country at KARI. The others are Bt cotton, drought-tolerant maize, bio fortified sorghum, viral resistant cassava, nutritionally enhanced cassava and gypsophila paniculata cut flowers. The approval of the WEMA Bt maize will go a long mainstreaming the use of science, Technology and innovation in boosting Kenya's food security. It is notable that food insecurity is still a challenge for Kenya that is faced with recurrent food shortages, especially maize, which occasionally necessitate food imports.

However, there exist less or evidence that is significant to show the positive effects of these efforts as far as small-scale farmers are concerned. This study therefore seeks to analyze the relationship between agricultural productivity and factors influencing it including but not limited to technology uptake by farmers and communication trends.

1.1.4 Farming in Nyathuna Ward

Nyathuna is one of the five Wards in Kabete constituency within Kiambu County. Geographically, Nyathuna Ward is located less than 15 kilometers outside of the capital city of Nairobi. The area has a population of 28,771 people (Kiambu County, 2014). As part of the Nairobi Highlands area, the region's environment remains unpolluted (Kiambu County, 2014).

Some of the crops that are grown in Nyathuna Ward include; maize, field beans, irish potatoes, sweet potatoes, sunflower, tomatoes, soya beans, linseed, kales (Sukuma wiki), spinach, cabbages, avocados and other assorted indigenous vegetables. Although this is done at small-scale level, the production is enough for local consumption and the surplus is

consumed by the neighboring towns, with the bulk of the sales being in Nairobi County. Apart from crops, locals in Nyathuna Ward also practice zero grazing, poultry and pig farming. The biggest amounts of livestock products (eggs, broiler chickens and pork found) are sold at Wangige market- one of the largest in the country. Nairobi, as aforementioned, also consumes these products. The pork products also feed the 'Farmers Choice factory located in the Limuru area for the manufacturing of sausages and *smokies*. Of late young people have taken into agribusiness especially greenhouse farming as an alternative form of financial empowerment besides their formal or informal employment. They mostly supply their produce to Nairobi and Kiambu supermarkets.

With this in mind, it is evident that farmers need quality information on matters agricultural technology. This will aid them in coming up with quality agricultural products since agricultural lands have reduced with time due to increase in human population which has led to the construction of residential houses in places which were meant for agriculture. Hence this calls for proper utilization of the less land available for maximum agricultural output. It is only by embracing agricultural technology that can cure this.

1.2 Statement of the Problem

Agricultural productivity should be viewed as part of the process of achieving food security and sustainable development through agricultural technology. Therefore, through dissemination of researched agricultural information to the stakeholders and farmers, farmers can be knowledgeable on land use in their quest to increase agricultural productivity.

According to the Economy watch, (2010), development in agriculture is that one which revolutionizes the industry by bringing forth profitable agriculture and environment friendly solutions. It entails giving aid to farmers by the use of different resources. This could be done through the provision of protection, research assistance, use of technology, control and management of diseases and pests and facilitating ion the section of diversification.

In the past the Kenya government through the Ministry of Agriculture and Livestock, have tried to pass information to the farmers via agricultural extension officers (Munyua, 2000). But the quality of the information disseminated to the farmers has not been up to date, information delivery has not been good, the mode of communication also questionable owing to literacy levels of our farmers and indeed that of the extension officers, information technology has not been embraced fully making it difficult for our farmers to progress with their counterparts in other parts of the world.

This study, therefore, sought to establish factors that influence agricultural productivity in Kenya with specific reference to farmers in Nyathuna Ward, Kabete Sub-County. More emphasis will be put on how famers get information hence agricultural extension services will be relooked and redefined so as to embrace all aspects pertaining to total quality information dissemination. It should be known that extension services includes more than just advising farmers on crop or livestock matters only but it includes an organized activities that educates, guides and adds value to the general welfare of the farmer. Emphasis should be put into the professional diversity of personnel in the extension services to enable farmers get full quality information that encompasses all aspects of agribusiness that range from crop and animal farming, quality breeds and hybrids, farm inputs, land management and marketing of the same in addition to embracing Information Technology.

1.3 Purpose of the Study

The purpose of this study is to examine factors influencing agricultural productivity in Kenya with specific reference to farmers in Nyathuna Ward, Kabete Sub-County, Kiambu County.

1.4 Objectives of the study

The objectives of the study were;

1. To establish social-economic factors influencing agricultural productivity for the farmers in Nyathuna Ward, Kabete Sub-County.
2. To assess the influence of agricultural technology adoption on productivity by the farmers in Nyathuna Ward, Kabete sub-county.
3. To establish the influence of extension service delivery on agricultural productivity for the farmers in Nyathuna Ward, Kabete Sub-County.
4. To assess the influence of information dissemination methods used for agricultural productivity by the farmers in Nyathuna Ward, Kabete Sub-County.

1.5 Research Questions

The research was guided by the following research questions:

1. To what extent do social-economic factors influence agricultural productivity for the farmers in Nyathuna Ward, Kabete Sub-County?
2. To what extent does agricultural technology adoption influence productivity for the farmers in Nyathuna Ward, Kabete Sub-County?
3. To what extent does extension service delivery affect agricultural productivity for the farmers in Nyathuna Ward, Kabete Sub-County?
4. To what extent does the method used for the dissemination of agricultural information influence productivity for the farmers in Nyathuna Ward, Kabete Sub-County?

1.6 Significance of the Study

This study may provide valuable information to various stakeholders such as the Government of Kenya officers and researchers as they embark on studies in this area and other related fields. The findings also may guide the Government to formulate policies that may realize positive impacts to the farmers as far as agricultural productivity is concerned and guide especially the agricultural extension officers in coming up with the best way to communicate and disseminate agricultural information to the farmers in their quest to improve agricultural productivity and spur development in general. In addition, the findings of this study may enable farmers in Nyathuna Ward, Kabete Sub-County to understand the benefits obtained from embracing agricultural technology in their farms.

1.7 Delimitation of the Study

This study was delimited to Nyathuna Ward which is situated in Kabete Sub-County in Kiambu County. The study population included 7794 farmers in Nyathuna Ward. According to the Ministry of Agriculture, Kiambu County, Nyathuna Ward farmers practice all types of farming that range from livestock rearing, cash crop growing to subsistence farming hence it is the right place to get the information needed since farming in this area encompasses all aspects of farming. The study concentrated on four objectives that are most critical to farmers and the improvement of agricultural productivity in general: Agricultural Technology adoption, Social economic factors, extension service delivery and agricultural information dissemination.

1.8 Limitations of the Study

The study was conducted in various farms in Nyathuna Ward, Kabete Sub-County. The major limitation of this study was that of language barrier due to the literacy levels of some

of the farmers; however this was handled through the use of local administration who helped in the interpretation of the questionnaires to an easily understood language.

1.9 Basic Assumptions of the study

It was assumed that weather will not interfere with research and that the respondents will be cooperative during data collection.

1.10 Definition of significant terms

The following are the definitions of significant terms as used in the study;

Adoption of Agricultural Technology Refers to the use of researched techniques that are geared into spurring of growth and increase productivity in farms.

Agriculture Refers to the art and science of crop growing and rearing of animals.

Agricultural communication Refers to a field of study that focuses purely in the packaging and dissemination of messages that are agriculture oriented.

Agriculture development Refers to the providing of assistance to farmers with the help of various agricultural resources.

Agricultural extension Refers to imparting of researched knowledge to farmers

Agricultural Productivity Refers to a measure of the amount of agricultural output produced for a given amount of inputs.

Artificial insemination Refers to the use of harvested sperm in the fertilization of cows as opposed to use bulls.

Asymmetric information Refers to a situation where knowledge of information is skewed or imbalanced.

Communication Refers to a process of sharing of information to understand each other.

Communication for Development Refers to a process of allowing people to contribute their views and opinions in whatever situation or in any solution that is being sought as far as development is concerned.

Sustainable agriculture Refers to the production of agricultural production without destroying or compromising the ecosystem.

Sustainable development Refers to the development venture that satisfies the immediate needs of its people without jeopardizing future generations.

1.11 Organization of the study

This study is presented in five chapters. Chapter one includes the introduction of the study and it expounded on the background of the study, the statement of the problem, purpose of the study, research objectives, research questions, significance of the study, delimitations of the study, limitations of the study, limitations of the study, definition of significant terms and organization of the study. Chapter two of study contains the literature review, the theoretical and conceptual frameworks. The third chapter of the study contains research methodology and includes research design, target population, sampling procedures, research instruments, data collection procedures, methods of data analysis and ethical issues. The fourth chapter consists of data analysis, presentation, and interpretation. Chapter five of the study has the summary of findings, discussion, conclusions and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The literature review is drawn from books, journals, government publications, circulars, documents and newspapers dealing with agricultural technology matters and agricultural project issues globally, regionally and Kenya in particular. Literature on the Green Revolution and the rise of agricultural technology will be expounded. The literature review has examined various studies and they have dealt with the concept of agriculture technology, the influence it has to the farmers so far. This has been done systematically by tackling all the objectives of the study in detail. The chapter also includes theoretical framework, conceptual framework and knowledge gaps.

2.2 The Green Revolution and the rise of Agricultural Technology

Agriculture has grown steadily in the past through the replacement of human labour with machines which in turn have seen an increase in productivity. Modern farming techniques have taken shape including the use of fertilizers, pesticides, and artificial insemination. All the above agricultural practices were developed long ago, but have undergone much progress as time goes by.

The Green Revolution spread technologies that already existed, but had not been widely implemented outside industrialized nations. These technologies included modern irrigation projects, pesticides, synthetic nitrogen fertilizer and improved crop varieties developed through the conventional, science-based methods available at the time. Despite the tremendous gains in agricultural productivity, famines continued to sweep the globe through the 20th century. Through the effects of climatic events, government policy, war and crop

failure, millions of people died in each of at least ten famines between the 1920s and the 1990s that's according to the article "Ten worst famines of the 20th century" that appeared on the Sydney Morning Herald. 15 August 2011.

As the world grapples with the issue of food security, and food sufficiency, Daniel (2015) argues that any technologies put out there should be assessed and be evaluated for their viability as sustainable agricultural solutions. He shared the following five criteria; The technology designed should be responsive to the specific needs of each individual situation, rather than trying to be a broad solution for all users (Localized/Specific), It should be inexpensive, rather than increasing farmer debt burden (Affordable), The design of the technology should make every effort to consider the broader environmental, social and economic consequences of the technology prior to implementation (Holistic), It should empower farmers to make choices about how (or even if) the technology should be used, and be accompanied with robust information to assist in making those decisions (Democratic) and it should address practical problems that are agreed upon by farmers and technology providers (Useful/Practical).

Figure 1 shows the five criteria for judging sustainable agricultural technology.

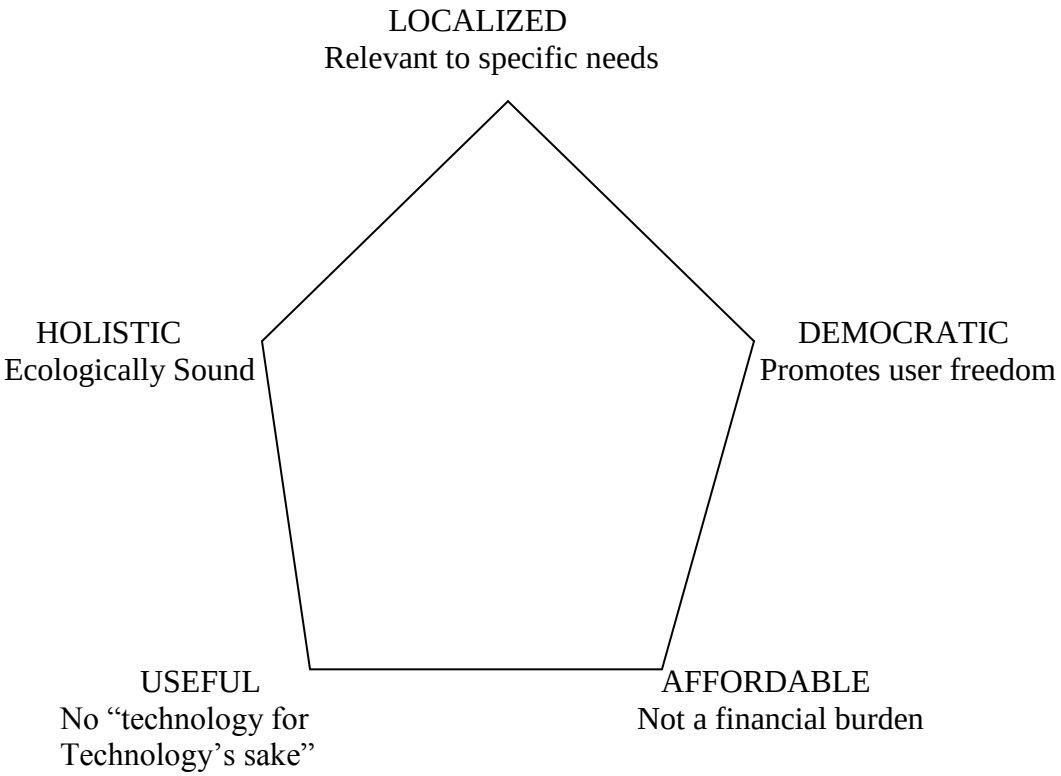

Figure 1: Five criteria for judging sustainable agricultural technology. Rankin,(2015).

2.3 Social Economic factors Influencing Agriculture Productivity

Kilonzi, (2011) says that Social economic factors are the matters arising from an increase in population, access to properties such as land and access to farm inputs. Access to land for cultivation may be dictated by communal rules on land ownership in an area while access to inputs such as certified economic issues might affect seeds and fertilizers.

Individual get general skills from education which helps the in problem-solving, (Wiebe and Gollehon, 2007). Kilonzi, (2011) further says that through education, one is enabled to get information through reading or listening. The level of education of an individual affects his or income. A more educated a farmer is likely to be rich, (Amao and Awoyemi, 2008). This may be explained that education exposes an individual with regard to farm chores.

Musemwa and Mushunje, (2012) argues that a farmer that educated is faster in technology adoption than a less educated one. According to Djauhari, (1987) superior education enables a farmer to appreciate and adopt a new technology due to its advantage. Ariga, Jayne, Kibaara and Nyoro, (2009) further echoed this by saying that the level of education has a significant effect on fertilizer use. Adolwa, (2010) noted that education level of farmer was significant and positively influenced uptake of soil fertility technology in Western Kenya.

Age too can be a reason that affects the chances of technology uptake. In Kenya, a study by Kilonzi (2011) found that the age of farmer respondents in Busia as; below 30 years- 3.3%, 30-45 years - 50%, and 40-60 years- 46.7%. Wiredu, (2010) states that age of a farmer can be used as a proxy for the farmer's experience. This means that an experienced farmer would most likely be an older farmer. Most of the younger people may not be willing or motivated to engage in agriculture. This results in younger community members moving out of the villages in search of jobs elsewhere as they may not consider farming as a source of employment.

2.4 How agricultural technology adoption Influences productivity

According to studies done in the past several factors appear to have had an impact in the determination of the rate at which farmers adopted new technologies in their efforts to raise productivity.

2.4.1 Secure output markets

It is agreeable that farmers will always adopt new skills to increase production for family consumption. But chances of farmers innovating and investing in terms of cash, labour or learning are highly motivated by the knowledge of markets that are secure. It is argued that the government's role in stabilizing output prices was the key feature of many successful

early Green Revolution environments. The same cannot be said in Africa was a function which has been dismantled in Africa where innovation has been limited (Dorward, 2004). Unreliable maize markets in Malawi have made many farmers to do farming inefficiently, (Orr and Orr 2002).

2.4.2 Supporting infrastructure and irrigation

Fundamentally an effective infrastructure will encourage innovation and uptake of new technologies. Kenya has sought to tap into the technology by contracting Israel personnel in Galana farms as the country gears up the use of irrigated farms to increase food production.

2.4.3 Effective input supply systems, including credit to farmers

The supply of inputs effectively is essential more so when there is change of technology or an advancement of the same. According to Tripp, (2001) low supply of seeds has slowed the adoption of new varieties of crops. Omamo and Mose, (2001) argue that increasing fertilizer use has been curtailed by issues to do with the provision of the right products packed in affordable units. The major problems for many innovations are not the conventional seed chemical technologies but the establishing the systems to provide those inputs. Wambugu and Kiome, (2001) argue that in order one to deliver banana plantlets in Africa, a network of intermediary nurseries are required. Bohringer and Ayuk, (2003) further argue that nurseries are essential for the growing of many technologies but getting farmer groups to adopt this has not been easy.

2.5 Role of Extension Service delivery in the Improvement of Agricultural Productivity

Farmers need information on various topics, at intervals, before new technology is adopted. Information that farmers need may vary according to one's need. It ranges from inputs, pests and disease control, prices of commodities to even weather forecasts (Aker, 2011). This

information can be obtained from different areas that may include, among others, their social network and from their own trial and error. Unfortunately information is not costless in yet to fully develop countries.

According to Anderson and Feder, (2007), agricultural extension is the delivering of inputs information to farmers. The officer is always armed with fresh and new techniques and messages for his clients. This approach lacks a two-way flow of information. It does not separate information according to the agro systems. During the dissemination of a new technology is when extension service is of much benefit to the farmers, once most of them become aware of it the extension drive fizzles out (Byerlee, 1998). The essential components of extension service are the information and communication aspect of it but rarely do these systems and get integrated with development policies and strategies (FAO, 2012).

This scenario creates a communication gap that more often than not affects productivity, in that it slows down both the farmers and the extension officers' efforts towards the improvement of the agricultural sector (Braun, Arnord, Jiggins, Roling, Berg and Snijders, 2005). According to Banque, (2012), there is also a key interest by stakeholders, in improving the extension services, for its beneficiaries to have greater interest through the availability and accessibility to agricultural information.

Agricultural extension services in Kenya was commenced after the 2nd World War, and it was to assist large scale farmers who were mainly white, this was for the main reason that they needed plans for their farms in addition to getting new crop and livestock technologies so as increase production (Kibett, Omunyin and Muchiri, 2005).

On the other hand extension service for reserves which were African dwelled on general community development issues such as the conservation of water and soil. This was an independent exercise detached from the Agriculture Ministry. A single officer could combine both regulatory and educational functions, while all controls and directions travelled top to bottom (Boone, 1989). The system's failure and weakness was the duplication of duties and churning out of contradicting pieces of information from agencies that dealt with extension service.

A worldwide review of public extension systems found out that quite a number of agricultural extension services were not functioning:

The level of accountability and low motivation of extension field staff- It is particularly problematic to monitor the presence and motivation of extension field staff owing to the fact that they work in different geographical areas which were regions apart. More often than not lack of supervisory actions and evaluation of their work can result in absent from duty or poor-quality extension officers which reduces further the use of agricultural extension services. Remunerations and incentives that can motivate the extension staff are poor which in turn affect the service offered to the farmers (Rivera, Qamar and Crowder, 2001).

The impact of Extension services to farmers' wellbeing could not be substantiated. The review found out that this amplifies the problems related to poor funding, low motivation levels and lack of appropriate technological skills at the famers' disposal. The wide area of coverage and sustainability measure is an issue too and Anderson and Feder (2007) reckons that in most developing countries the farming sector is comprised of small-scale clientele, and they are dispersed geographically hence the offering of extension service becomes

tedious and a costly affair in terms of travelling to reach them, limited geographic coverage and unsustainable services leading to farmers' abandonment.

Poor and weak linkages between agricultural extension systems, universities and research centres- It was noted that in developed regions mostly in European countries and in the United States of America, the service of extension are more often than not linked with the higher learning facilities like universities which is not replicated in most countries that are developing. With this scenario, it means that a country's agricultural priorities are not aligned with their learning centres which means that agricultural technologies will not be always be adopted locally (Purcell and Anderson, 1997). More often than not this disjointed efforts lead to poor adoption of agricultural technologies.

If positive impacts of extension service are to be felt, agricultural agencies and stakeholders should strive to tackle issues that curtail the successful implementation of programmes associated with extension service delivery. Towards the achievement of this, extension activities are supposed to be undertaken in an environment that is supportive, as accommodating as possible so long as it is within the resources available (Rivera, Qamar and Crowder, 2001).

The collaboration strategy between extension officers and farmers should be supported and encouraged. If both would work together harmoniously, they could spur economic development and bring about change in the food sector of a community. Hence every effort should be done to eliminate any communication gap that might hinder this collaboration (Roling, 1990).

2.6 The influence of information dissemination methods on Agricultural Productivity

Rosegrant and Cline, (2003) noted that fresh and updated agricultural information is not availed to quite a number of farmers in the rural areas that can allow them to produce food cheaply and efficiently. Their level of agricultural productivity will increase tremendously if they are given information on prudent farming techniques and new agricultural technologies. These technologies should take into account the ecosystem for sustainability reasons. Towards this, farmers should be trained on agricultural methods and technologies that have a sustainable feel such that resources like water, air and soil are not affected in any way but rather improved greatly.

Yudelman, (1984) says that among the earlier approaches that focused on technology transfer, Training and Visit was one of them. With this approach, information on farmer education was from top to down and it was assumed that the information supplied fitted everyone. Farmers' word did not matter with this approach, it was assumed that famers needed technical information to improve productivity hence the answer to this was to impart the same to them. This approach was entrenched in developing countries that were ready to use it nationally. In a way, this top-down approach was very popular with political ideologies of a majority of countries.

In a study done by Bindlish and Evenson, (1997) it noted that with this method in place, extension service delivery was productive and there was growth in terms of yields and agricultural production in general. Gautam (2000) found out that, in Kenya, the approach had positive impacts in terms of training of staff, coverage of farmers had improved geographically and research was now linked.

Rivera, (2001) found out that, due to the funds needed in actualizing the approach, it could not be sustained after the Word Bank stopped sponsoring it. Farmers in turn did not like it either since they played a passive role in its implementations.

Due to the above reasons, new approaches that were more participatory in nature were sought out. Participatory approaches were democratic and they gave a farmer some voice and they felt empowered in one way or another. Farmers were allowed to think freely and when a problem occurred they could be guided by an extension officer in a deep analysis of the same. The work of extension officer was to arrange or act as a facilitator in the provision of technical information which can be used to solve the farmers' problems. These approaches horned the decision-making skills of the farmers as they learnt how to define goals, how to do their own planning, management, implementation and evaluation of development projects.

One of the participatory approaches is the Farmer Field Schools. This method is based on adult-learning model where the use of experiments is major. According Braun, Jiggins, Roling, van den Berg and Snijders, 2005) this method originated from Asia where it was used in the promotion of pest management integrated programmes and it was introduced in sub- Saharan African in the mid-1990s.

In this method farmers could meet regularly for during the entire cropping season, learning took place through field observations, then they could gather together and deliberate on what they have noticed. This also became a learning experience and through their interactions, farmers could horn their skills in making decisions, leadership skills, how to communicate and managing their farm projects.

Another method was that of Commodity Approach. This revolves around firms in the private sector. Basically a company could strike a deal with farmers in a certain region to produce a certain crop or livestock. The company provides the technology needed, they also offer extension service, credit facilities and they check the quality standards of what the farmer does and the marketing of the whole venture. On the other hand the farmer's work is to provide the space more so land where the project will take shape and when harvesting he/she sells to the company.

Information and Communication Technology platforms, if integrated and used well, can boost the dissemination of agricultural information. It is cheap, faster and easy to adapt with majority of people now owning at least a mobile telephone. The sharing of knowledge among farmers themselves, extension service providers and other related agricultural agencies can be facilitated in this plan which can be an easy and cheaper way of doing any communication. Information on new technologies could be distributed in a record few minutes. Either way, free-flow of information should be allowed and feedback taken into account more seriously. This can be done by the avoidance of top-down approach of information dissemination. Room should be given to farmers to ask questions about a given technology, explanations given and actions are justified. This also could add knowledge to researchers and field extension officers. Zijp (1994) noted that ICTs are capable of encouraging and enhancing two-way information flows and this ensures that development activities do not fail. Two-way communication indeed is participatory in nature.

2.7 Theoretical Framework

Theories are there to describe, forecast, and comprehend something and, in certain cases, to question and add existing information by the use of critical suppositions. The theoretical

framework is an anatomy or shape or form that can grasp or support a theory in a research study (Swanson, 2013). In this study I adopted the Diffusion of Innovations Theory.

2.7.1 The Diffusion of Innovations Theory

This is a theory that tries to find in what way, what is the cause, and at what speed new techniques and technologies get to be known. The proponent of this theory was Everett Rogers. According to Rogers, (2003) he was a professor of communication studies. This theory estimates that arriving at judgments, giving of opinions and information provision is done by interpersonal relations and the media. Rogers argues that for an innovation to occur some elements must be in play; the technology or innovation, the channels of communication, period of time and an interrelationships of individuals. Human resource is relied here heavily. The technology must be adopted immensely for it be self-sustaining.

Basing this research on this theory the aspect of communication comes into play, it dictates that for an innovation to be adopted it should be told over time in a given group of people in this case, the extension service providers and the farmers. The communication channel should be right and the timing is critical. The process of adoption relies heavily on human capital. Hence proper and adequate resources should be pumped into the personnel docket for the technology to be diffused properly. Tailor-made brochures with specific agricultural messages can be circulated to the farmers which are easy to read, easy to refer and easy to archive for future reference.

The field extension officers can conduct agricultural seminars where specific agricultural messages can be taught via either a recorded audiovisual or one on one. If the training is not done properly and professionally, farmers will not get that vital needed knowledge that can

spur agricultural productivity. The messages should be packaged in simple terms/language for easy understanding to the farmers. The information can be disseminated via radio, television or packaged on CDs/DVDs or Tapes to be played back at the comfort of the farmer's house.

The feedback element of communication entails that the extension officers can get reports from the farmers from what they were taught and trained on. This may be used as a benchmark to gauge whether learning took place or not.

2.8 Conceptual Framework

Mathieson, (2001) defines conceptual framework as a structure that breaks down the main ideas that are under the study and how they relate with each other. The breakdown can be done in a narrative manner or represented in a graphical form. This breaking down of ideas helps the researcher to explain his or her research questions in addition to the aim of the study (Stratman and Roth, 2004).

A conceptual framework was adopted here so as to show the relationship between the various factors that influence the agricultural productivity in Kenya with specific reference to farmers in Nyathuna Ward in Kabete Sub-County. Figure 2 shows the Conceptual Framework of the study.

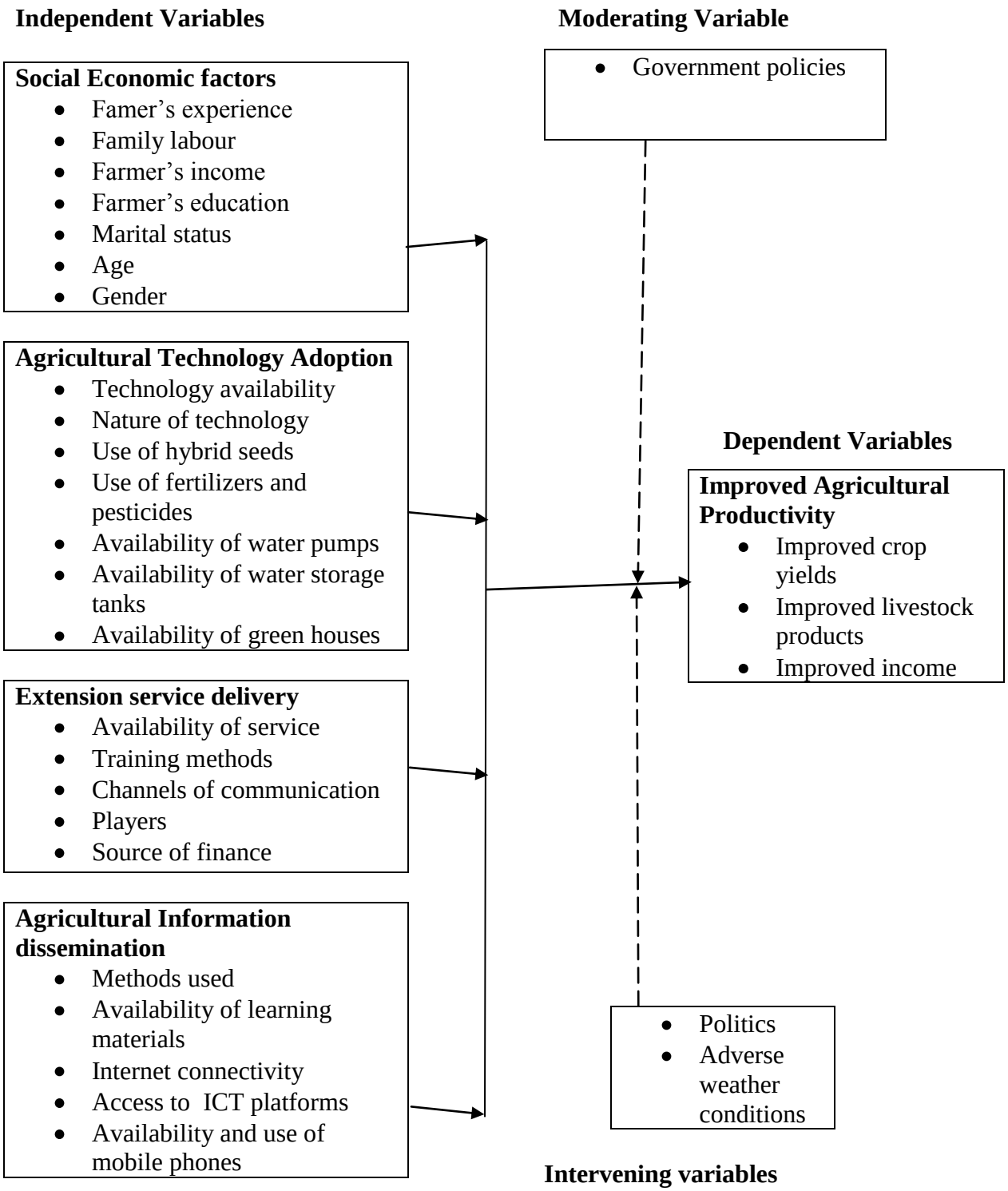

Figure 2: Conceptual Framework

2.9 Summary of Literature Review

Most economies of developing countries in Africa depend on Agriculture. Farming technologies are being used to mitigate matters of food security and food sufficiency but their effects are not felt in a significant way. Kilonzi, (2011) says that Social economic factors such as access to land for cultivation may be dictated by communal rules on land ownership in an area while access to inputs such as certified seeds and fertilizers may be affected by economic issues. Several factors appear come into play when trying to know rate at which farmers adopt new technologies in their bid to improve agricultural productivity; markets for their produce, supporting infrastructure and irrigation, Effective input supply systems and credit to farmers. Farmers need information on various matters that affect them directly and they normally need it at various stages during their production periods; weather patterns, pest control, diseases management, type of inputs available, ploughing techniques and markets for their produce (Aker, 2011). Normally this kind of knowledge is gotten from various sources including but not limited to extension officers, fellow farmers or from their own try and error method. Unfortunately information is not free in Africa- it is expensive. This high cost of getting agricultural information hinders agricultural growth, slows rural development and indeed it affects the economy of a nation.

2.10 Knowledge Gap

Poor dissemination of agricultural information on new agricultural technologies reduces the effects of agricultural research and technology uptake by our farmers. There is poor and weak linkages between agricultural extension systems, universities and research centres- It has been noted that in developed regions mostly in European countries and in the United States of America in particular, the services of extension are more often than not linked with

the higher learning facilities like universities which is not replicated in most countries that are developing. With this scenario, it means that a country's agricultural priorities are not aligned with their learning centres which means that agricultural technologies will not be always be adopted locally (Purcell and Anderson, 1997). More often than not this disjointed efforts lead to poor adoption of agricultural technologies. Agricultural policies are not aligned with our learning institutions and poor funding of the same hinders every effort that can salvage the situation.

Despite the efforts made, farmers in Kenya are still affected by low yields from their farms. Owing to this, it is clear that appropriate measures in the packaging and dissemination of agricultural information should be applied. In addition to, equipping extension officers with skills, investing in personnel and technology uptake by famers in Nyathuna Ward, Kabete Sub-County.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter contains the research methodology that has been used in the study. The research design, target population, sample size and sampling procedures, description of research instruments, validity and reliability of instruments, data collection procedures, data analysis techniques and ethical considerations are presented.

3.2 Research Design

The study used a descriptive survey research design. Ogula, (2005) defines a research design as a plan, structure and strategy of investigation to obtain answers to research questions and control variance.

The choice of this design is appropriate for this study since it use a questionnaire as a tool of data collection and helps to establish the embracing and up taking of agricultural technology by the famers. (Mugenda and Mugenda, 2003) asserts that this type of design enables one to obtain information with sufficient precision so that hypothesis can be tested properly. In addition to that it is also a framework that guides the collection and analysis of data.

3.3 Target Population

Ogula, (2005), says that a population is any group of institutions, people or objects that have common characteristics. Mugenda and Mugenda (2003) describes the target population as complete set of individual cases or objects with some common characteristic to which the research want to generalize the result of the study. The target population for this study will be the7794 farmers in Nyathuna Ward according to the Ministry of Agriculture Kabete Sub-County (Kiambu County, 2015).

3.4 Sampling Size and Sampling Procedures

Mugenda and Mugenda, (2003) defines a sample as a smaller group or sub-group obtained from the accessible population. On the other hand sampling is a procedure, process or technique of choosing a sub-group from a population to participate in the study (Ogula, 2005). This subgroup is carefully selected so as to be representative of the whole population with the relevant/similar characteristics. Each individual member or case in the sample is referred to as subject, respondent or interviewees. Sampling is the process of selecting a number of individuals for a study in such a way that it is fairly a representative of the large group from which they were selected.

The study used stratified random sampling method to select famers in Nyathuna Ward in Kabete Sub-county. A stratified random sample is a population sample that requires the population to be divided into smaller groups, called 'strata'. Stratified random sampling ensured that each Sub-Location in Nyathuna Ward is represented without any biasness whatsoever. Random samples can be taken from each stratum, or group. Stratified random sampling method as described in Yamane, (1967) was be applied to come up with the sample size. The strata were the different Sub-Locations of Nyathuna shown in Table3.1.

Table 3.1 Number of farmers in Nyathuna Ward

County Assembly Ward Name	Number of Farmers in the Ward	County Assembly Ward Area In km2	Nyathuna Ward Sub-locations
Nyathuna Ward	7,794	17.80	Nyathuna, Kirangari, Karura and Gathiga

Source: Ministry of Agriculture, Kiambu County.

3.4.1 Determination of Sample Size

Sampling frame is defined as the complete list of all members of the total population (Saunders and Lewis 2012). Since the target population is finite, the Yamane, (1967) Table will be used. The target population is 7,794 farmers, as shown in Table 3.1. The sample size is 200 respondents and respondents will be distributed equally in all the four Sub-Locations of Nyathuna Ward.

Table 3.2 shows how the respondents will be distributed in each civic ward based on the Yamane, (1967) Table.

Table 3.2: Sample Size

Strata of Sub-Locations	**No. of Farmers**	**Sample population**	**Percentage**
Nyathuna	2,373	61	30.5
Kirangari	1,949	50	25.0
Karura	1,505	39	19.5
Gathiga	1,967	50	25.0
Total	7,794	200	100

After collecting and sorting the questionnaires from the farmers, 133 questionnaires were fully filled while the remaining were incomplete, this translated to 66.5% response rate. The researcher also gave out one questionnaire to one extension office which was filled and returned translating to an 100% return and response rate which was also considered adequate for analysis and making conclusions, consistent with Mugenda and Mugenda (2003) which says that a response rate of 60% is good and 70% and above is excellent.

3.4.2 Sampling Procedure

Ogula, (2005) defines sampling as a process or technique of choosing a sub-group from a population to participate in the study; it is the process of selecting a number of individuals for a study in such a way that the individuals selected represent the large group from which they were selected the study will involve 7, 794 farmers from Nyathuna Ward. The study will pick the selected few respondents with the aim of ensuring that they will take part in the study.

3.5 Data collection instruments

Data collection is the means by which information is obtained from the selected subject of an investigation. Mugenda and Mugenda, (2003). Questionnaires will be the main data collection instruments that will be used to collect primary quantitative data during the study. The questionnaire will contain both structured and unstructured questions. The open-ended questions was be used to limit the respondents to given variables in which the researcher is interested, while unstructured questions was used in order to give the respondents room to express their views pragmatically (Kothari, 2005).

The questionnaires were used because they allow for a greater geographical coverage of respondents within a short time and flexible enough to give the respondents adequate time to respond to the items, they are cheap to administer given that the only costs are those associated with printing or designing the questionnaires, their postage or electronic distribution, the absence of an interviewer provides greater anonymity for the respondent and when the topic of the research is sensitive or personal it can increase the reliability of responses. Questionnaire also offers a sense of security (confidentiality) to the respondent and last but not least it is an objective method since it reduces biasing error caused by the

characteristics of the interviewer and the variability in interviewers' skills (Mugenda & Mugenda, 2003).

The questionnaire was organized according to the major objectives of the research.

3.6 Validity and Reliability

Validity and Reliability are accepted as scientific proof, by scientists and philosophers alike. By following a few basic principles, any experimental design will stand up to rigorous questioning and skepticism.

3.6.1 Pilot testing of the instruments

This involves the checking of the suitability of the questionnaires and interview guide. The quality of research instruments determines the outcome of the study. Alan and Emma (2011) point out that the quality of research outcome is determined by the quality of instruments. Mugenda and Mugenda (2003) states that a relatively small sample of 10 to 20 respondents can be chosen from the population during piloting which is not included in the sample chosen for the main study. The pilot group will be acquired through random sampling. Mugenda and Mugenda (2003) suggest that the piloting sample should be 10% of study sample depending on sample size. Piloting helps in revealing questions that are vague to allow for their review. The pre-test also allows the researcher to check on whether the variables collected could easily be processed and analyzed. Hence 10% of the 200 respondents will be 20 respondents. The 20 respondents who will be used for piloting will be picked from the neighbouring ward of Kabete. After the piloting, the questions in the questionnaire will be assessed and those that are found not to be clear will be polished for clarity.

3.6.2 Validity of the instruments

Validity is the accuracy and meaningfulness of inferences, which is based on research results (Mugenda & Mugenda, 2003). It is the degree to which results obtained from the analysis of data actually represent the variables of the study. It is the degree to which results obtained from the analysis of the data actually represent the variables of the study. Dowling (2004) refers to validity in research as how accurately a study answers the study question or the strength of the study conclusions. It helps the researcher to confirm that the questionnaire items give the desired outcomes. Mugenda & Mugenda, (2003) agree with the assertion that validity has to do with how accurately the data obtained in the study represents the variables. Content validity was used to ensure that the questionnaire had relevant questions that would answer the research questions. The questionnaires were subjected to professional critique from my supervisor and other professionals. The content-related technique measured the degree to which the questions items reflected the specific areas covered. It ensured that the questionnaire remains focused, accurate and consistent with the study objectives.

There are two major types of validity; internal and external validity. Internal validity refers to the extent to which the designers of a study have taken into account alternative explanations for any causal relationships they explore. External validity refers to the extent to which the results of a study are generalizable or transferable. It is the degree to which research findings can be generalized to populations and environments outside the experimental setting. External validity has to do with representativeness of the sample with regard to the target population. Validity in this study was ensured through stratified random sampling that ensured that famers from Nyathuna Ward are well represented.

3.6.3 Reliability of the instruments

Reliability is the extent to which a research instrument consistently measures characteristics of interest over time. A research instrument is reliable if it has two aspects: stability and equivalence (Donald and Delno, 2006). If an instrument accurately assesses what it ought to and gives consistent results after repeated measurements of the same object, then it is reliable. This study used internal consistency reliability, which is measured by Cronbach alpha: a test of internal consistency that is frequently used to calculate the correlation values among the answers on an assessment tool. A threshold of 0.7 and above for Cronbach alpha value is recommended for a reliable research instrument

3.7 Data Collection Procedures

After successfully defending the proposal, the researcher applied and obtained a research permit from National Commission of Science, Technology and Innovation and embarked on data collection by hand delivering the questionnaires. Audience with the sampled local administration in the region was sought to clarify the researcher's purpose and mission of the study. Upon getting clearance, the researcher in person distributed the questionnaires to the sampled famers in the entire four Sub-locations of Nyathuna Ward of Kabete constituency with the assistance of the local administration. During the distribution of the instruments, the purpose of the research was being explained to the respondents.

3.8 Data Analysis Technique

Data analysis is the process of collecting, modeling and transforming data in order to highlight useful information, suggesting conclusions and supporting decision-making Sharma, (2005). It involves examining what has been collected in a survey or experiment and making decision and inferences. Data analysis aims at reporting the information collected

from respondents of this study. Findings are presented, analyzed and discussed in conjunction with the objectives of the study. Both quantitative and qualitative approaches were used for data analysis. Quantitative data from the questionnaire was coded and entered into the computer for computation of descriptive statistics. The data was analyzed by employing descriptive statistics and inferential analysis using statistical package for social science. This technique gives simple summaries about the sample data and presents quantitative descriptions in a manageable form, (Orodho, 2003).

Together with simple graphics analysis, descriptive statistics form the basis of virtually every quantitative analysis to data, (Kothari, 2005). Correlation analysis to establish the relationship between the independent and dependent variables was be employed. The data was then presented using frequency distribution tables and percentages, for easier understanding. The qualitative data generated from open-ended questions were categorized in themes in accordance with research objectives and reported in narrative form along with quantitative presentation. The qualitative data is used to reinforce the quantitative data.

3.9 Ethical Considerations

Explanation was done to the respondents about the research and that the study was for academic purposes only. It was made clear that the participation is voluntary and that the respondents were free to decline or withdraw any time during the research period. Respondents were not coerced into participating in the study. The participants had informed consent to make the choice to participate or not and information obtained was treated confidentially. They were guaranteed of their privacy and protected by strict standard of anonymity and protection from any harm whether physical or emotional.

Authority was sought from relevant Departments before conducting the research by using the cover letter that explained the intention of the study.

3.10 Operational Definition of Variables

An operational definition of variables is a detailed specification of how one would go about measuring a given variable. Operational definition is tied to the theoretical constructs under study, therefore, guiding the development of operational definitions that would tap the critical variables. Table 3.3 gives the types of variables and how they were measured in the study.

Table 3.3: Operational definition of the variables

Objectives	Variables	Indicators	Measurement scale	Tools of Analysis	Type of Analysis
	Independent				
Establishing the influence of social-economic factors on agricultural productivity	Social-economic factors	Farmer's; Experience Labour Income Education Marital status Age Gender	Nominal	Frequencies Percentages	Descriptive
Assessing the influence of agricultural technology adoption on productivity	Agricultural Technology Adoption	Technology; Availability Nature Type of inputs Type of fertilizer Breeding system Availability of; Water tanks Green house	Nominal	Frequencies Percentages	Descriptive
Establishing the influence of extension service delivery on agricultural productivity	Extension service delivery	Availability of service Training methods Channels of communication Players Source of finance	Nominal	Frequencies Percentages	Descriptive
Assessing the influence of information dissemination methods used for agricultural productivity.	Agricultural Information dissemination	Methods used Content availability Internet connectivity Access to ICT platforms Availability and use of mobile phones	Nominal	Frequencies Percentages	Descriptive
	Dependent				
Factors influencing agricultural productivity	Agricultural Productivity	Improved crop yields Improved livestock products Improved income	Ratio	Frequencies Percentages and Correlation	Descriptive

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

This chapter presents the findings of the data, which was collected from the respondents, Presentation and Interpretation. The purpose of the study was to investigate factors that influence agricultural productivity in Kenya a case of Nyathuna Ward in Kiambu County.

4.2 Presentation of Findings

Out of the 200 questionnaires that were distributed to the respondents, 133 questionnaires were retained after sorting them out, which translates to 66.5% response rate. The researcher also gave out one questionnaire to one extension office which was filled and returned translating to 100% return and response rate which was also considered adequate for analysis and making conclusions, consistent with Mugenda & Mugenda (2003) which says that a response rate of 60% is good and 70% and above is excellent. Qualitative and quantitative approach was used when collecting data. Williams, (2007) says that while the quantitative approach provides an objective measure of reality, the qualitative approach allows the researcher to explore and better understand the complexity of a phenomenon.

4.2.1 Distribution of Respondents by Gender

Table 4.1 shows the number of respondents by gender.

Table 4.1: Distribution of respondents by gender

Gender	Frequency	Percentage
Male	70	52.6
Female	63	47.4
Total	133	100.0

From the Table 52.6% of the respondents were men while female respondents were slightly lower at 47.4%.

4.2.2 Findings on Farmers' Experience

In order to get the experience of the farmers, the number of years worked in farming of the respondents was used as the indicator. Table 4.2 gives the tabulated responses.

Table 4.2: Number of Years worked as a farmer

Famer's Experience	Frequency	Percentage
1-5 years	33	24.8
6-10 years	38	28.6
11-15 years	17	12.8
16-20 years	14	10.5
Above 20 Years	31	23.3
Total	133	100.0

From the Table, it is evident that most (28.6%) famers are those that have practiced farming for 6-10 years. More than half (53.4%) of the respondents have done farming for between 1-10 years.

4.2.3 Findings on Labour Used in Farms for Various Activities

These are findings on labour where the type of labour used in a particular farm activity was the indicator. The type of labour used by the respondents was tabulated on Table 4.3.

Table 4.3: Labour Use in Respondents' Farm

Type of Labour	Ploughing		Sowing		Weeding		Harvesting		Feeding	
	Freq	Per	Freq	Per	Freq	Per	Freq	Per	Freq	Per
Family	34	25.6	41	30.8	37	27.1	36	27.1	46	34.4
Hired	8	6.0	4	3.0	4	3.0	5	3.8	3	2.5
Family/ Hired	91	68.4	88	66.2	92	69.2	92	69.2	84	63.1
Total	133	100.0	133	100.0	133	100.0	133	100.0	133	100.0

The Table shows that hired labour is the least used type of labour.

4.2.4 Findings on Farmers' Education

Table 4.4 shows results on farmers' education. The aim was to find out the last level of formal education of respondents.

Table 4.4: Education Level of Respondents

Level of Education	Frequency	Percentage
Did not attend school	11	8.3
Primary level	36	27.1
O/A level	83	62.4
Certificate/Diploma	3	2.3
Total	133	100.0

The results show that majority (62.4%) of the respondents have achieved at least O/A level of education and 8.3% of the respondents did not attend school at all.

4.2.5 Sources of Income of Respondents

Respondents were asked on their sources of income and their response is a shown in Table 4.5.

Table 4.5: Sources of Income of Respondents

Form of income	Frequency	Percentage
Farm-work	104	78.2
Salary	3	2.3
Business	26	19.5
Total	133	100.0

Most (78.2%) of the respondents receive their income from farm work while 2.3% of the respondents receive their income from salary.

4.3. Findings on the extent of Technology Adoption

These are findings on the extent of technology adoption in farms where a type of agricultural technology was the indicator. Table 4.6 shows the extent of technology adoption among the respondents.

Table 4.6: The extent of Technology Adoption

Technology Adoption	Hybrid		Fertilizer		Manure		Greenhouse		Irrigation		Insemination		Zero Grazing	
	Freq	Per	Freq	Per	Freq	Per	Freq	Per	Freq	Per	Freq	Per	Freq	Per
Yes	133	100	133	100	132	99.2	5	3.8	128	96.2	102	76.7	100	75.2
No	0	0	0	0	1	0.8	128	96.2	5	3.8	31	23.3	33	24.8
Total	133	100	133	100	133	100	133	100	133	100	133	100	133	100

The findings show that agricultural technology has been adopted highly in the following order; use of certified seeds at 100%, the use of fertilizers at 100%, the use of manure at 99.2%, irrigation at 96.2%, and artificial insemination at 76.7% and zero grazing at 75.2%. On the other hand the use of greenhouses is minimal at 3.8% of the respondents. Either way the respondents noted that through the use of agricultural technology; yields have increased, there is increased soil fertility and pests and diseases are easily controlled and managed.

4.4 Agricultural Extension Service Delivery

To find out about the agricultural extension service delivery in Nyathuna Ward, the respondents were asked whether they get agricultural extension services, and Table 4.7 shows their responses.

Table 4.7: Availability of Agricultural Extension Service

Availability of Extension Services	Frequency	Percentage
Always	6	4.5
Sometimes	86	64.7
None	41	30.8
Total	133	100.0

The findings show that a third (30.8%) of respondents do not receive agricultural extension services, only a few (4.5%) frequently receive extension services and 64.7% occasionally receive the support. From the questionnaire given to the agricultural extension officer, it is noted that their services are fairly adequate though the farmers have interest in new technology but only a few manage to implement them. Extension officers face challenges such as not being able to move from one area to another during rainy season owing to poor roads, the officers are so few as compared to area to be covered hence reaching all farmers in case of farm visits is cumbersome and there are no enough funds to facilitate their work. Also he noted that stubborn soil borne diseases that affect farms in their area are not easy to get rid of hence affecting soil productivity. Further he noted that farmers suffer from high cost of production and they are sometimes sold fake seeds, which in turn affect farm yields.

4.4.1 Training Methods used by the extension service providers

To find out the methods used by the agricultural extension service providers to train farmers in Nyathuna Ward, the respondents gave out the following responses as Table 4.8 shows.

Table 4.8: Training Methods used by Extension officers

Training Methods	Frequency	Percentage
Chief Barazas	10	7.5
Use of Lead Farmers	6	4.5
Visits to Farms	98	73.7
Field Demonstrations	19	14.3
Total	133	100.0

The data shows that 73.7% of the respondents agreed that Farm Visits is the preferred training method followed by Field Demonstrations 14.3%.

4.4.2 Channels of communication used by the extension officers.

Table 4.9 shows results on the channels of communication that famers get extension knowledge from. The aim was to find out the best channels of communication that farmers get agricultural information from.

Table 4.9: Channels of communication used

Channels of Communication	Frequency	Percentage
Radio	1	0.8
Television	9	6.8
Television/Radio	95	71.4
Television/Radio /Newspaper	19	14.3
Word of Mouth	9	6.8
Total	133	100.0

Most (71.4%) of the respondents receive agricultural extension knowledge from a combination of Television and Radio followed by a combination of Television, Radio and Newspapers at 14.3%.

4.4.3 The players in the extension service delivery

In order to know the players in the extension service delivery, the respondents were asked who offer the services. Their responses were as tabulated on Table 4.10.

Table 4.10: The players in the extension service

Players in Extension Service	Frequency	Percentage
Government Officers	31	23.3
NGOs	19	14.3
Both	83	62.4
Total	133	100.0

Majority (62.3%) of the respondents said that both the Government and NGOs offer extension service.

4.4.4 The financiers of the extension service

Table 4.11 shows the financiers of the extension services.

Table 4.11: The financiers of the extension service

Financiers of Extension Service	Frequency	Percentage
County Government	19	14.3
NGOs	8	6.0
Both	32	24.1
Not Sure	74	55.6
Total	133	100.0

The findings show that 55.6% of the respondents do not know who funds extension services while 24.1% of the respondents said that the exercise is funded by both the County Government and NGOs.

4.5 Findings on Agricultural information dissemination

To find out about the agricultural information dissemination in Nyathuna Ward, the respondents were asked whether they get agricultural information, and Table 4.12 shows their responses.

Table 4.12: Dissemination of Agricultural Information

Availability of Agricultural Information	Frequency	Percentage
Yes	132	99.2
No	1	0.8
Total	133	100.0

The findings show that 99.2% of the respondents agree that there is Agricultural Information at their disposal while 0.8% of them disagreed.

4.5.1 Frequency of getting agricultural information

In order to get to know how often farmers in Nyathuna Ward received agricultural information, the respondents were asked the same and Table 4.13 shows their responses.

Table 4.13: Frequency of agricultural information to farmers

Frequency of Agricultural Information	Frequency	Percentage
Always	7	5.3
Sometimes	82	61.7
Minimal	42	31.6
None	2	1.5
Total	133	100.0

The findings show that majority (61.7%) of the respondents receive agricultural information occasionally. 31.6% of the respondents said they rarely receive agricultural information while 1.5% said that they do not receive agricultural information at all. A few (5.3%) respondents frequently receive agricultural information.

4.5.2 Agricultural information dissemination methods

To find out the methods that are used to disseminate agricultural information, farmers in Nyathuna Ward responded as Table 4.14 shows.

Table 4.14: Methods of disseminating agricultural information

Methods of Disseminating Agricultural Information	Frequency	Percentage
Training and Visit	34	25.6
Participatory Approach	52	39.1
Farmer Field School	13	9.8
Commodity Approach	34	25.6
Total	133	100.0

Majority (39.1%) of the respondents agreed that Participatory Approach method was the most used in the dissemination of Agricultural Information while the least preferred method was Farmer Field School 9.8%. Other than the above, the researcher sought to know other methods that famers get agricultural information and Table 4.15 show the responses gotten.

Table 4.15: Other methods of receiving agricultural information

Other Methods	Frequency	Percentage
Television Programs	31	23.3
Radio Programs	5	3.8
Television/Radio Programs	97	72.9
Total	133	100.0

Television and Radio Programmes at 72.9% are other sources of Agricultural information to the farmers according to the findings from the respondents.

4.5.3 Mobile phones Ownership

On whether farmers in Nyathuna Ward possess mobile phones, their responses are captured in Table 4.16.

Table 4.16: Mobile phones connectivity

Mobile Phone Ownership	Frequency	Percentage
Yes	130	97.7
No	3	2.3
Total	133	100.0

From the findings, majority (97.7%) of the respondents own mobile phones.

4.5.4 How Internet is accessed

To find out how the farmers access Internet, their responses were as shown in Table 4.17.

Table 4.17: The farmers' source of Internet

Source of Internet	Frequency	Percentage
Mobile Phone	27	15.8
Personal Computer/Laptop	2	0.8
Cyber Café	4	1.5
No Access	100	65.4
Total	133	100.0

The findings show that most (65.4%) of the respondents do not have access to the Internet while 15.8% access it via their mobile phones.

4.5.7 Useful agricultural information in the Internet

In trying to find out whether farmers in Nyathuna ward get useful agricultural information in the Internet, they responded as Table 4.18 shows.

Table 4.18: Useful agricultural information on the Internet

Useful Agricultural Information	Frequency	Percentage
Yes	20	15.0
No	113	85.0
Total	133	100.0

From the findings majority (85%) of the respondents do not find useful Agricultural Information in the Internet.

4.6 Findings on Improved Agricultural productivity

Table 4.19 shows the responses from the farmers on agricultural productivity in general. The respondents were asked about their gauging of specific variables that are in line with agricultural productivity.

Table 4.19: Improved Agricultural productivity

Improved Agricultural productivity	Embracing Technology		Improved Crop Yields		Improved Livestock Products		Improved Income		Benchmarks set		Enhanced Extension Service		Agricultural Productivity	
	Freq	Per	Freq	Per	Freq	Per	Freq	Per	Freq	Per	Freq	Per	Freq	Per
Definitely False	0	0.0	0	0.0	0	0.0	1	0.8	0	0.0	9	6.8	0	0.0
False	1	0.8	0	0.0	0	0.0	4	3.0	8	6.0	25	18.8	0	0.0
Neither	23	17.3	18	13.5	10	7.5	50	37.6	61	45.9	43	32.3	23	17.3
True	93	69.9	98	73.7	100	75.2	66	49.7	61	45.9	56	42.1	89	66.9
Definitely True	16	12.0	17	12.8	23	17.3	12	9.0	3	2.2	0	0.0	21	15.8
Total	133	100	133	100.0	133	100.0	133	100.0	133	100.0	133	100.0	133	100.0

From the Table above it is evident majority (82.7%) of respondents agree that there is improved agricultural productivity, 81.9% have embraced technology, while 58.7% agree that there is improved income from their farms.

4.7 Correlation Analysis Results

Correlation analysis was done to establish the relationship between the independent variables; Level of Education of Farmers, Farmers' Experience, Extension Services, Farmers' Training Methods, Dissemination of Agricultural Information and Methods of Information Dissemination against the dependent Variable Improved agricultural Productivity. If the correlation coefficient is closer to zero, the correlation between the

variables is weak. If the correlation coefficient is closer to one, the correlation between the variables is strong. In addition, a positive correlation coefficient shows a direct relationship between the variables while a negative correlation coefficient shows an inverse relationship. These results are presented in Table 4.20.

Table 4.20: Correlation Analysis

Variables		**General Improved Agricultural Productivity**
Level of Education	Pearson Correlation	-0.024
	Sig. (2-tailed)	0.783
	N	132
Farmer's Experience	Pearson Correlation	-0.023
	Sig. (2-tailed)	0.790
	N	132
Availability of Extension Services	Pearson Correlation	0.169
	Sig. (2-tailed)	0.052
	N	132
Farmers Training Methods	Pearson Correlation	0.117
	Sig. (2-tailed)	0.259
	N	95
Dissemination of Information	Pearson Correlation	0.003
	Sig. (2-tailed)	0.968
	N	132
Methods of Information Dissemination	Pearson Correlation	0.155
	Sig. (2-tailed)	0.107
	N	109

The results show that there is a negative correlation of -0.024 between farmers' level of education and agricultural productivity. There is also a negative correlation of -0.023 between farmer's experience and agricultural productivity. There is a positive correlation of 0.169 between extension service delivery and agricultural productivity. This shows that with proper extension service delivery, there will be an improvement in agricultural productivity.

There is a positive correlation of 0.117 between farmers' training methods and agricultural productivity, implying that if farmers are trained well, agricultural productivity will improve. There is a weak positive correlation of 0.003 between dissemination of agricultural information and agricultural productivity while there is a positive correlation of 0.155 between the methods used for the dissemination of agricultural information and agricultural productivity. This implies that if agricultural information is disseminated adequately it will have a positive impact on agricultural productivity.

4.8 Summary of Chapter Four

Data was computed from 133 questionnaires from farmers and one from the area agricultural extension officer. The findings show that most famers preferred mixed labour (family and hired labour) in performing all four farm activities- Ploughing at 68.4%, sowing at 66.2%, Weeding at 69.2%, Harvesting at 69.2% and animal Feeding at 63.1% respectively. Further findings reveal that that majority of the farmers have achieved at least O/A level of education at 62.4%, while 8.3% of them have not attended school at all. It is evident that majority of the farmers at 78.2% get their income from farm work. Also agricultural technology has been highly embraced; use of certified seeds at 100%, the use of fertilizers at 100%, the use of manure at 99.2%, irrigation at 96.2%, the use of Artificial insemination at 76.7% and zero grazing at 75.2%. Either way the farmers noted that through the use of agricultural technology; yields have increased, there is increased soil fertility and pests and diseases are easily controlled and managed. Further findings show that a third of the farmers at 30.8% do not receive agricultural extension services. Only a few at 4.5% frequently receive extension services and 64.7% occasionally receive the support. It was also found that 73.7% of the farmers agreed that Farm Visits is the preferred training method followed by Field

Demonstrations at 14.3%. On the other hand, findings reveal that most farmers at 71.4% receive agricultural extension knowledge from a combination of Television and Radio followed by a combination of Television, Radio and Newspapers at 14.3%. Majority of the respondents at 39.1% agreed that Participatory Approach was the most used in the dissemination of Agricultural Information while the least preferred method was Farmer Field School at 9.8%. Training and Visit and Commodity Approach tied at 25.6%.

Majority (82.7%) of the respondents reported that there is improved agricultural productivity and 81.9% have embraced technology. Correlation results show that there is a negative correlation of -0.024 and -0.023 between farmers' level of education and farmer's experience and agricultural productivity. There is a positive correlation of 0.169 between extension service delivery and agricultural productivity. Also there is a positive correlation of 0.155 between the methods used for the dissemination of agricultural information and agricultural productivity. This implies that if agricultural information is disseminated adequately it will have a positive impact on agricultural productivity.

CHAPTER FIVE

SUMMARY OF FINDINGS, DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This final chapter gives a summary of the findings of the study in line with the objectives of the study. Discussion on the findings, conclusions, recommendations and suggestions for further research are given at the end of the chapter.

5.2 Summary of Findings

5.2.1 Summary Findings on Social Economic Factors

The results show that there is a negative correlation of -0.024 between farmers' level of education and agricultural productivity. There is also a negative correlation of -0.023 between farmer's experience and agricultural productivity.

5.2.2 Summary Findings on Agricultural Technology Adoption

The findings show that agricultural technology has been adopted highly in the following order; use of certified seeds 100%, the use of fertilizers at 100%, the use of Artificial insemination at 76.7% and zero grazing at 75.2%. On the other hand the use of greenhouses is minimal at 3.8% of the respondents. Either way the respondents noted that through the use of agricultural technology; yields have increased, there are improved soil fertility levels and pests and diseases are easily controlled and managed.

5.2.3 Summary Findings on Extension Service Delivery

From the questionnaire given to the agricultural extension officer, it was noted that their services are fairly adequate and that though the farmers have interest in new technology but only a few manage to implement them. Further findings show that there is a positive

correlation of 0.169 between extension service delivery and agricultural productivity. This means that agricultural productivity can be affected positively if extension service is offered adequately. There is a positive correlation of 0.117 between farmers' training methods and agricultural productivity, implying that if farmers are trained well, agricultural productivity will improve.

5.2.4 Summary Findings on Agricultural Information Dissemination Methods

There is a weak positive correlation of 0.003 between dissemination of agricultural information and agricultural productivity. Television and Radio Programs at 72.9% are other sources of Agricultural Information according to the findings from the respondents.

5.2.5 Summary Findings on Improved Agricultural Productivity

Majority (82.7%) of the respondents reported that there is improved agricultural productivity. Up to 81.9% of the respondents have embraced technology, while 58.7% agree that there is improved income gotten form their farms. Further economic gains can be achieved if extension service delivery will be effective and adequate.

5.3 Discussion

The discussion of findings has been structured around each research objective and the findings made from the data analysis.

5.3.1 The Influence of Social Economic Factors on Agricultural Productivity

There is a negative correlation of -0.023 between farmer's experience and agricultural productivity. The results differs from that of Wiredu, Gyasi, Marfo, Asuming-Brempong, Haleegoah, Asuming-Boakye and Nsiah (2010) who showed that in rice cultivation in

Ghana, age had positive effect on yield meaning experience in rice cultivation implied accumulated knowledge in rice production. There is a negative correlation of -0.024 between farmers' level of education and agricultural productivity meaning that a farmer's education level has a negative relationship with agricultural productivity. The findings are similar to those of Obierio, (2013) who found out that there is a negative correlation of -0.075 between education and maize yield in Siaya County, meaning education is negatively correlated with farm yield. This too differs with Evenson and Mwabu (1998) who found that the effects of schooling on farm yields are positive but statistically insignificant. This could be attributed to a number of reasons; lack of agricultural knowledge and what are motivating people to farm. On education Djauhari, Djulin, and Soejono, (1987) also showed that farmers with more years of education are more ready to adopt the new technology due to the fact that some technology information is sophisticated to read and interpret properly hence needing someone with enough education.

5.3.2 The Effect of Agricultural Technology Adoption on Agricultural Productivity

Majority (82.7%) of respondents agree that there is improved agricultural productivity, a total of 81.9% have embraced technology, while 58.7% agree that there is improved income from their farms. Further findings show that agricultural technology has been adopted highly in the following order; use of certified seeds 100%, the use of fertilizers 100%, use of manure at 99.2%, the use of Artificial insemination 76.7% and zero grazing 75.2%. On the other hand the use of greenhouses is minimal (3.8%) of the respondents. Djauhari, Djulin and Soejono, (1987) showed that the age and experience of farmers correlated with the rate of adoption of new technology where it was found that older farmers frequently adopted maize varieties that was high yielding. Either way the respondents noted that through the use of agricultural

technology; yields have increased, there is increased soil fertility and pests and diseases are easily controlled and managed.

5.3.3. The Effect of Extension Service Delivery on Agricultural Productivity

Findings show that there is a positive correlation of 0.169 between extension service delivery and agricultural productivity. This means that agricultural productivity can be affected positively if extension service is offered adequately. In a study done at Busia County, Kilonzi (2011) reported that 84% of respondents said that they were not receiving the agricultural extension services contrary to my findings that say that 30.8% do not get the service. However this can be attributed to the fact that enough extension personnel have not been deployed to the County due to the remote nature of the place as compared to Nyathuna Ward, which is near the City and has improved infrastructure which attracts extension service employees.

A total of 73.7% of the respondents agreed that Farm Visits is the preferred training method; there is a positive correlation of 0.117 between farmers' training methods and agricultural productivity, implying that if farmers are trained well, using the best method for them, agricultural productivity will improve. In this case Farm Visits should be the perfect choice. A further 71.4% receive agricultural extension knowledge from a combination of Television. From the questionnaire given to the agricultural extension officer, it was noted that their services are fairly adequate and that though the farmers have interest in new technologies only a few manage to implement them. Extension officers face challenges such as not being able to move from one area to another during rainy season owing to poor roads, the officers are so few as compared to area to be covered hence reaching all farmers in case of farm visits is cumbersome and there are no enough funds to facilitate their work. Stubborn soil borne

diseases that affect farms in their area are not easy to get rid of hence affecting soil productivity. The extension officer further noted that farmers suffer from high cost of production and they are sometimes sold fake seeds, which in turn affect farm yields.

5.3.4 The Influence of Information Dissemination Methods on Agricultural Productivity

Majority (39.1%) of the respondents reported that Participatory Approach was the most used in the dissemination of Agricultural Information Training and Visit and Commodity Approach tied at 25.6% as the methods being used. There is a weak positive correlation of 0.003 between dissemination of agricultural information and agricultural productivity. In other studies Bonabana-Wabbi, (2002) noted that technologies more often than not contain information that is not easy to comprehend or interpret, due to a farmer's ability to read effectively is necessity hence the need to package information in the simplest language possible.

5.4 Conclusion

The following are the conclusions made from the study; Social economic factors can influence positively or negatively how much productivity the farmer gets from his or her farm. From the study, family labour is combined with hired labour when conducting farm activities meaning that if family labour is removed from the equation, the cost of production will go up. Agricultural technology should be embraced and encouraged if agricultural productivity will be realized. The use of certified seeds and fertilizers is a sure way to go since this gives a farmer quality and better yields. Extension service delivery should be enhanced since it has a positive correlation with agricultural productivity. There is a positive correlation of 0.117 between farmers' training methods and agricultural productivity hence

Farm Visits should be encouraged since it is the most preferred farmers training method. Dissemination of Agricultural messages should be strengthened. Participatory Approach is the most preferred method in the dissemination of Agricultural Information.

In conclusion therefore, farmers prefer that personal touch from the extension service providers and agricultural agencies. This can be seen from the methods they prefer which are Farm Visits and Participatory Approach respectively. This calls for serious investment in agricultural sector more so on human resource, skills and adequate funding.

5.5 Recommendations

The following are the recommendations of the study;

1. The adoption of agricultural technologies is a necessary condition for the achievement of agricultural productivity, poverty eradication and the stimulation of growth in other sectors of the economy. The more farmers adopt new techniques, the more productive farmers benefit from an increase in their welfare. Towards this, the National and County Governments should collaborate between themselves in coming up with technological policies that can spur technology uptake by our farmers.
2. The collaboration strategy between extension officers and farmers should be supported and encouraged. If both would work together and harmoniously, they could spur economic development and bring about change in the food sector of a community. Hence every effort should be done to eliminate any communication gap that might hinder this collaboration. To achieve this linkages between agricultural extension systems, universities and research centres should be put in place so as to hasten technology generation and uptake by farmers

3. The Ministry of Agriculture in every County should put up an agricultural depot in every sub-county to supply Government subsidized farm inputs for easy access and to curb the selling of fake seeds to unsuspecting farmers in addition to coming up with processing plants and offering good storage of agricultural produce that goes to waste during harvesting periods.
4. The Department of Agriculture at the national government should be at the forefront in the churning out and the encouragement of more agricultural Television and Radio programmes to educate our farmers. Towards this, collaboration between the government and local broadcasters should be in place to aid in the spreading of agricultural information that is well researched and packaged bearing in mind the target audience.

5.6 Suggestions for Further Research

The following are suggestions for further research;

1. Severe soil borne diseases such as Fusarium wilt and Bacterial wilt that negatively affect agricultural productivity of farms should be studied and remedies found so as to curb further losses of crops.
2. Other factors like the increase of human population that has led to the construction of residential structures on lands that were formally agricultural should be studied.

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APPENDICES

APPENDIX 1: INTRODUCTORY LETTER

20th May, 2016

Richard Omache Nyakoi,
P.O. Box 49010-00100 GPO,
Nairobi.
Tel: +254 720 872044.
Email: richomache@gmail.com

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

RE: INTRODUCTORY LETTER

I am a graduate student in the School of Continuing and Distance Education at the University of Nairobi. In partial fulfillment for the requirements of degree of Master of Arts in Project Planning and Management, I am undertaking a research on "Factors Influencing Agricultural Productivity in Kenya: A Case of Nyathuna Ward in Kabete Sub-County, Kiambu County-Kenya"

I kindly request your input in filling of the questionnaire. Please note that your honest responses will be treated confidentially and information will be used for academic purpose.

Your acceptance to complete the questionnaire is highly appreciated.

Thank you in advance for your co-operation.

Yours Faithfully,

Richard Omache Nyakoi

Reg No.: L50/76225/2014

APPENDIX 2: QUESTIONNAIRE FOR FARMERS IN NYATHUNA WARD

Instructions

Fill in the blank spaces and tick (√) the relevant boxes appropriately

SECTION A: FACTORS INFLUENCING AGRICULTURAL PRODUCTIVITY IN KENYA: A CASE OF NYATHUNA WARD IN KABETE SUB-COUNTY, KIAMBU COUNTY

PART A: The Socio-Economic factors

1. How old are you? Tick (√) one.

Less than 20 years		21 – 25 years	
26 – 30 years		31 – 35 years	
36 – 40 years		41 – 45 years	
46 – 50 years		More than 50 years	

2. Gender: Male ☐ Female ☐

3. Marital status: Single ☐ Married ☐ Widowed ☐

4. Which language do you communicate with? English ☐ Kiswahili ☐ Vernacular ☐

   Kiswahili/ Vernacular ☐ All ☐

5. How many members are in your household? (Those who live and depend on you)……...

6. Level of education: Did not attend school ☐ Primary ☐ O/A level ☐

   Certificate/Diploma ☐ Bachelors ☐ Post graduate ☐

7. How many years have you practiced farming? 1-5 Years ☐ 6-10 Years ☐

   11 –15 Years ☐ 16-20 Years ☐ Above 20 Years ☐

8. What type of labour do you use in your farm for the following activities?

ACTIVITY	Family Labour	Hired Labour	Mixed Labour (Family/Hired)	Mechanical (Tractors/Machines)
Ploughing				
Sowing				
Weeding				
Harvesting				
Feeding				

9. What is your source of income? Tick (√) as appropriate

Farm work	
Non-farm work- (salary)	
Non-farm work- (business)	
Remittances- from family, friends	
Pension	
Others- specify	

PART B: The Extent of Technology Adoption

10. Please indicate whether any of the following technologies has been adopted in your farm? Tick (√) yes or no as appropriate.

Extent of Technology Adoption	YES	NO
Use of certified seeds (Hybrid seeds)		
Use of inorganic fertilizer (Inorganic fertilizers- like D.A.P, C.A.N etc		
Use of Organic fertilizers – like farmyard manure		
Building of green house (s)		
The use of planting seasons		
Use of irrigation		
Use of water pumps		
Availability of water storage tanks		
The use of weather forecasts in crop planting		
Use of Artificial insemination in breeding		
Use of bulls in breeding		
Adoption of zero grazing units		

In your own opinion give two reasons why you think the adoption of agricultural technology has an influence on productivity in farms?

……

……

…….

PART C: Extension service delivery

11. Do you get agricultural extension service? Always ☐ Sometimes ☐ None ☐
12. What training methods do the extension service providers utilize? Chief Barazas ☐
    Use of lead farmer(s) ☐ Use of audio visual devices ☐ Visits to farms ☐
    Use of Brochures/Pamphlets ☐ Field Demonstrations ☐
13. What are the channels of communication used by the extension service providers? Radio ☐
    TV ☐ Newspapers/Newsletters ☐ TV/Radio ☐ TV/Radio/Newspaper ☐
    Word of mouth ☐ Mobile text messages ☐ Posters ☐
14. Who are the players in this service? Government officers ☐ NGOs ☐ Both ☐
15. Who funds the exercise? County Government ☐ NGOs ☐ Both ☐
    It is free ☐ Not sure ☐
16. Do you have a mobile phone? Yes ☐ No ☐
17. How often do you use a mobile phone? Always ☐ Sometimes ☐ Not at all ☐

Give two reasons as to why extension service delivery is important in the improvement of agricultural productivity in farms.

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PART D: Agricultural information dissemination

18. Do you get agricultural information? Yes ☐ No ☐
19. How often do you get agricultural information? Always ☐ Sometimes ☐
    Minimal ☐ None ☐
20. What method is used in the dissemination of the agricultural information? Train & Visit ☐
    Participatory approach ☐ Farmer Field School ☐ Commodity Approach ☐
21. Apart from the above methods what other ways do you receive agricultural information?
    Mobile text messages ☐ Pamphlets ☐ Television programs ☐
    Posters ☐ Radio ☐ Internet ☐ Tv/Radio ☐ Others ☐
22. Do you have access to internet? Yes ☐ No ☐

23. How do you access the internet? Mobile phone ☐ Personal Computer/Laptop ☐

Cyber café ☐ No Access ☐

24. Do you get useful agricultural information in the internet? Yes ☐ No ☐

Give two reasons why dissemination of agricultural information influences productivity?

……

……

……

PART E: Improved Agricultural Productivity

The questions in this sub-section are on the evaluation of agricultural productivity levels. Use a scale of 1-5, where (1-definitely false, 2-False, 3-Neither, 4-True and 5- Definitely true)

Improved Agricultural Productivity	1	2	3	4	5
Farmers are embracing technology in their farms					
There is improved crop yields					
There is improved livestock products					
There is improved income					
Better technology adoption benchmarks have been set up					
There is enhancement of extension service delivery					
Agricultural productivity has improved generally					

THANK YOU FOR YOUR PARTICIPATION IN THE STUDY

APPENDIX 3: QUESTIONNAIRE FOR AGRICULTURAL EXTENSION OFFICER

Instructions

Fill in the blank spaces and tick (√) the relevant boxes appropriately

1. How would you describe your agricultural extension services in Kabete Sub-county?
   Extremely adequate ☐ Very adequate ☐ Adequate ☐
   Fairly adequate ☐ Not adequate ☐
2. What are the challenges that you face working with farmers in Nyathuna ward in your agricultural extension activities?

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3. In your view what are the issues that farmers in Nyathuna Ward face in their quest to access and use farm inputs like certified seeds and fertilizers?

   .....

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4. In your own assessment how do farmers in the area receive new agricultural technology? Have interest and adopts it ☐ Have interest but do not adopt ☐
   No interest at all ☐
5. In your own opinion what needs to be done to improve agricultural productivity in the country?

   .....

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THANK YOU FOR YOURPARTICIPATION IN THE STUDY