INFORMATION NEEDS OF AND USE BY RURAL FARMERS IN BUNGOMA COUNTY, KENYA

by

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DECLARATION

I, **Judith Tamnai Naibei,** declare that the dissertation: **Information Needs of Rural Farmers in Bungoma County, Kenya** is my own work in both design and execution, and that all used or quoted sources have been duly acknowledged by means of complete referencing.

23 October 2018

Researcher's signature

Date

ABSTRACT

The objective of this qualitative case study was to determine the information needs of rural farmers in Bungoma County, Western Kenya. The study explored various literature on information needs of rural farmers and the information services available to them. The data were collected through face-to-face interviews with twenty lead farmers who are hosts of Farmers' Field Schools. The findings show that farmers in Bungoma County are mostly interested in information that helps them to generate quick incomes from their agribusinesses. They access agricultural information mostly from verbal messages passed on by extension officers and local administration leaders. The farmers confessed that the information accessed from electronic sources like local FM radios is very useful in enhancing their agricultural enterprises and therefore agricultural development partners, policy makers and stakeholders in Western Kenya should use local FM radio often to disseminate information on agricultural development. The challenges encountered by the farmers in their quest for information relates to affordability. This study contributes to social change by recommending agricultural development partners, policy makers and stakeholders in Western Kenya implement programmes for reducing the distances that farmers travel to access agricultural information and the costs they incur in applying the knowledge gained from the various information channels.

ABSTRACT (ZULU)

Lolu cwaningo lokuthola kabanzi ngesimo belugxile ekuqaguleni izidingo kwezolwazi nokusetshenziswa kwalo kubalimi basemakhaya endaweni yaseBungoma County, esentshonalanga Kenya. Kulolu cwaningo kuye kwabhekisiswa izincwadi nemibhalo ehlukahlukene maqondana nezidingo zolwazi zabalimi basemakhaya kanye nalezo zinsiza zolwazi abakwaziyo ukufinyelela kuzo. Ulwazi lwedatha luye lwaqoqwa ngokuthi kwenziwe izingxoxo-mibuzo nabalimi abangamashumi amabili okuyibona abavelele futhi abaye basingathe uhlelo lwabalimi olubizwa nge-Farmers' Field Schools. Okutholakele kukhomba ukuthi intshisekelo yabalimi baseBungoma County ikakhulukazi imayelana nokuthola ulwazi oluzobasiza ekwakheni ngokushesha imali eyingeniso kumabhizinisi abo ezolimo. Kuvamise ukuthi ulwazi lwezolimo baluthole ngemibiko edluliswa ngomlomo ivela kubalimisi (extension officers) nakubaholi bezokuphatha basendaweni. Balibeke ngembaba abalimi elokuthi luwusizo kakhulu ekwesekeni amabhizinisi abo ezolimo ulwazi oluvela emithonjeni ye-elekthronikhi efana nesiteshi somsakazo we-FM sasendaweni, ngakho-ke kungaba ngcono uma labo okubanjiswene nabo (partners) kwezokuthuthukisa ezolimo, futhi nabakhi benqubomgomo kanye nalabo ababambe iqhaza entshonalanga Kenya bengasebenzisa isiteshi somsakazo we-FM sasendaweni ukusabalalisa ulwazi lokuthuthukisa ezolimo. Ukubhekana nezindleko yilona hlangothi abahlangabezana nezinselelo kulo abalimi, ekuphokopheleni kwabo ukuthola ulwazi. Lolu cwaningo luyigalelo ekuguquleni ezenhlalo yomphakathi ngokuphakamisa ukuthi labo okubanjiswene nabo ekuthuthukiseni ezolimo, abakhi benqubomgomo kanye nalabo ababambe iqhaza entshonalanga Kenya mabaqalise ukusebenzisa izinhlelo zokunciphisa amabanga amade okudinga ahanjwe ngabalimi ukuze bafinyelele kulwazi lwezolimo kanye nezindleko abangena kuzo uma sebesebenzisa lolo lwazi abaluthole ngemizila eyehlukene yolwazi.

ABSTRACT (SOTHO)

Nepo ya nyakišišo ye ya khwalithethifi e be e le go laetša dinyakwa tša tshedimošo le ditšhomišo tša balemi ba dinagamagae go la Bungoma County, bodikela bja Kenya. Nyakišišo e nyakišišitše dingwalwa tša go fapana mabapi le dinyakwa tša balemi ba dinagamagae le ditirelo tša tshedimošo tše ba di hwetšago. Datha e kgobokeditšwe ka dipoledišano tša go dirwa thwii le balemi ba go eta pele ba masomepedi bao e lego benggae ba Dikolo tša Tlhabollo ya Balemi. Dikutullo di laetša gore balemi go la Bungoma County ba na le kgahlego gagolo go tshedimošo yeo e ba thušago go tšweletša letseno la ka pela go tšwa go dikgwebotemo tša bona. Ba hwetša tshedimošo ya temo gagolo ka melaetša ya molomo ye e fetišwago ke balemiši le baetapele ba selegae ba tshepedišo. Balemi ba dumetše gore tshedimošo ye e hwetšwago methopong ya elektroniki bjalo ka setiši sa FM sa radio ya tikologo e na le mohola matlafatšong ya dikgwebo tša bona tša temo gomme ka go realo bašomišani ba tlhabollo ya temo, bangwaladipholisi le bakgathatema ka bodikela bja Kenya ba swanela gore ba upše ba šomiše setiši sa FM sa radio go phatlalatša tshedimošo ka ga tlhabollo ya temo. Ditlhohlo tše balemi ba kopanago natšo mošomong wa bona wa tshedimošo di amana le phihlelelego. Nyakišišo ye e kgatha tema go phetogo ya leago ka go eletša bašomišani ba tlhabollo ya temo, bangwaladipholisi le bakgathatema go la borwa bja Kenya gore ba phethagatše mananeo go fokotša bokgole bjoo balemi ba bo sepelago go hwetša tshedimošo ya temo le ditshenyegelo tše ba di dirago tšhomišong ya tsebo ye e hweditšwego go tšwa dikanaleng tša go fapana tša tshedimošo.

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KEY TERMS

The following key terms are frequently used in this study:

INFORMATION ACCESS

INFORMATION USE

INFORMATION NEEDS

INFORMATION SERVICES

INFORMATION-SEEKING

INFORMATION LITERACY

LIST OF ABBREVIATIONS AND ACRONYMS

The following abbreviations and acronyms are used in this study:

ACDI/VOCA:	Agricultural Cooperative Development International/ Volunteers in Overseas Cooperative Assistance Volunteers in Overseas Cooperative Assistance
ACDI:	Agricultural Cooperative Development International
ADSW:	Anglican Development Services Western
AGRA:	Alliance for a Green Revolution in Africa
ASK:	Agricultural Society of Kenya
FAO:	Food and Agricultural Organization of the United Nations
FFS:	Farmer Field School
FTC:	Farmers' Training College
GDP:	Gross Domestic Product
GIZ:	Deutsche Gesellschaft für Internationale Zusammenarbeit.
ICIPE:	International Centre of Insect Physiology and Ecology
ICT:	Information Communication Technology
JKUAT:	Jomo Kenyatta University of Agriculture and Technologies
KACE:	Kenya Agricultural Commodity Exchange
KALRO:	Kenya Agricultural and Livestock Research Organization
KAVES:	Kenya Value Chain Enterprise
KTN:	Kenya Television Network
MOA:	Ministry of Agriculture
NGOs:	Non-Governmental Organizations
ROP:	Rural Outreach Program
SACCOs:	Savings and Credit Cooperative Organizations

SARD:	South African Agricultural Research Development
SMS:	Short Message Service
TV:	Television
UNISA:	University of South Africa

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CHAPTER ONE

GENERAL INTRODUCTION

1.1 INTRODUCTION

Information services such as those offered by national libraries, agricultural information centres and extension services provide the means and channels for information transmission from the information producers to farmers or from farmer-to-farmer. Information providers also package information in a format that can be understood and utilized. Another important role of information service providers is to direct farmers to the relevant information sources in a timely and affordable way.

Farmer information needs have been known to be very specific depending on the agro-ecological zone and the type of farming activity the farmer is involved in. The individual farmer characteristics, such as level of education, wealth status and membership to farmer groups, also affect their information needs and their ability to utilize the information (Behrens, 1994; Opara 2010). Low literacy levels among the rural populations in Africa seem to be one of the key challenges that could affect the farmers in Bungoma County in their quest to access information. However, the specific information needs of farmers in Bungoma County are not known and it was necessary to investigate their specific information needs in order to offer an information service that would suit their needs. This is the focus of this study.

The study also analysed how lack of know-how or where to source the information they need affects farmers from Bungoma County. Low level of training on how to access and use information was another area that the study was seeking to establish and how it impacts the farmers from Bungoma County with regards to receipt of information.

1.2 CONTEXTUAL BACKGROUND TO THE STUDY

Agriculture is the single most important sector in the Kenyan economy, employing about 30% of all Kenyan workers in the formal sector and 62% in the informal sectors (Republic of Kenya 2013; 2014). It also provides employment to over 80% of the country's population living in rural

areas who derive their livelihood directly or indirectly from it (Alila & Atieno 2006). It seems that the role of information services in this economic sector is quite significant in enhancing the development of the agricultural sector to revamp it, ensure food security, create sustainable employment and eradicate poverty. Information providers also package information in a format that can be understood and utilized. Another important role of information service providers is to direct farmers to the relevant information sources in a timely and affordable way. Personal experience and observation have revealed that agricultural information is mostly disseminated through a combination of traditional and modern channels. The traditional channels include farmers' seeking information from fellow farmers (a social network), information providers and extension officers. Other information channels that are being used include printed publications such as books, brochures, newsprints and journals.

Modern information channels also include FM radio stations and TV channels that cover almost all parts of the country, internet and web information services as well as the farmers' cell phones. These modern information services disseminate information on agricultural market data that is periodically updated. The researcher observed that, in spite of the current status of agricultural information, the Kenyan agricultural sector has got substantial information that has intermittently been trickling down from the agricultural information generating centres to the farmer level. However, information has not adequately been reaching the targeted users due to lack of appropriate dissemination channels, unsuitable packaging and lack of awareness of the availability of information sources by the said farmers (Rege 2006:3; Starasts 2015:157). As a result, agricultural production has not yet increased.

Farmers need timely and accurate information to enable effective decision-making. With this in mind, rural and agricultural communities require appropriate information on agricultural supplies, inputs, new technologies, early warning systems (drought, pests and diseases), credit, market prices and competitors. Farmers need such information to enable them to effectively plan their agricultural activities. These needs are so apparent especially in Bungoma County in Western Kenya.

Western Kenya is one of the most populated region in the country where 1.4% of the Kenyan

land mass supports over 12% of the country's 42 million citizens. An agricultural transformation would result in food security and higher incomes in the region and bring great socio-economic stability in Kenya. This study focused on Bungoma County because of its high agricultural potential to produce enough food for the neighbouring regions and generate significant wealth in Kenya. The County is the leading producer of sugarcane in Western Kenya (Government of Bungoma County 2013). Compared to the entire land surface in Kenya, Bungoma County is a relatively small area consisting of only 0.5% of Kenya's surface area of 582,650 km^2 yet, it supports 4% of Kenya's 42 million citizens. This signifies the socio-economic importance of this county where this study was carried out. It is situated in Western Kenya and is one of the Kenya's forty seven counties.

Farmer information needs have been known to be very specific depending on the agro-ecological zone and the type of farming activity the farmer is involved in. The individual farmer characteristics, such as level of education, wealth status and membership of farmer groups also affect their information needs and their ability to utilize the information (Opara 2010).With this in mind, this study investigated the information needs of farmers in Bungoma County and endeavoured to establish how the farmers access and use agricultural information.

1.2.1 Agricultural Information in Bungoma County

Assessing information needs of farmers is an important step for policy makers and stakeholders to improve access and availability of agricultural information among rural farmers in sub-Saharan Africa. A study by Starasts (2015) revealed that farmers' access to information on best farming practices is a necessary ingredient for increasing food production and incomes among rural farmers in sub-Saharan Africa. Further studies in Kenya indicate that rural farmers are producing food stuffs below their potential capacity due to a number of factors, most of which centre around poor farming practices (Alila & Atieno 2006; Republic of Kenya 2013). Alila and Atieno (2006) reported that the agricultural sector in Kenya employs over 80% of the population in rural areas yet, due to low crop yields, they contribute only a meagre 9% of the country's Gross Domestic Product (GDP). There are several studies which indicate that if farmers in rural regions could be provided with updated information on best-bet farming practices they could

increase their current crop yields from one ton per hectare to over three tons per hectare, consequently doubling their farm incomes and alleviating poverty (Benard & Ngalapa 2014; Christoplos 2010; Crandall 2015; Etyang 2013). These findings imply that information service providers have a critical role to play in creating the necessary framework for accessing agricultural information. Unfortunately, the flow of information in the agricultural sector in Kenya has suffered due to lack of infrastructure and other necessary transmission channels that could enhance quick dissemination of information especially on farm inputs, market accessibility and access to financial facilities (Rege 2006:3). Rege (2006:3) reported that there is a lack of systematic procedures for synthesizing, storing and disseminating agricultural information for easy use by the small-scale farmers.

It is also important to note that the current Kenyan status of information in the agricultural sector with respect to the existing policies, structure and information flow mechanism from policy research level to the farmer level is wanting. Kenyan farmers, like those found in Bungoma County, Western Kenya, do not enjoy sustainable food sufficiency and income from their agricultural activities. Many factors are to blame for their food insecurity and poverty conditions but the main factor points to their inability to access appropriate information for increasing their farm production and for remunerative markets to support profitable agricultural enterprises (Oladele 2006:199-205; Starasts 2015:157). In the Kenya government's study that was conducted in 1997, the information disseminated to the farmers was found to be outdated, poorly timed and lacked information on the sources of farm inputs and marketing channels for farm outputs. A study has therefore been required to determine whether this situation has been rectified.

Although efforts have been undertaken to correct this situation, the initiative is still challenged by a lack of financial, human and technical capacity to generate, manage and disseminate accurate agricultural information (Republic of Kenya 2014). Shibanda (1991) reported that information has not adequately been reaching the targeted users due to lack of appropriate dissemination channels, unsuitable packaging and lack of awareness of the availability of information sources by the said farmers. As a result, agricultural production has not yet increased. Rege (2006) discussed the consolidation of information as a means of availing

information; however, there is need to also assess strategies to publicize available information. Gunga (2010), an educationalist, only noted that the potential of information communication technologies (ICTs) to improve lives is a human gift that is yet to be fully realized in Kenya. He, however, did not look at the technological skills that could inhibit access and utilization of information. This study looked at these gaps and gave recommendations on how to address them.

1.2.2 The case of Bungoma County

Bungoma County is in Western Kenya and is one of the Kenya's forty seven counties. Although this county comprises of a relatively small area, it supports 4% of Kenya's 42 million citizens. The economy of Bungoma County relies mainly on sugarcane and maize production and processing. Agroforestry interventions in the county are widespread providing farmers with food products, fodder for livestock and a myriad of environmental services. The County experiences high amount of rainfall that is evenly distributed throughout the year. It is served by a rich network of large perennial rivers that serve as reliable sources of water for small scale irrigation. This signifies the socio-economic importance of this study area. Farmers in Bungoma County need information as an essential input into their farming activities. This will assist them in finding ways of acquiring the right inputs for their farming activities. The information will also assist the farmers in decision making, knowing the right institutions from where they could get financing for their farming activities as well as ascertaining the right markets for their produce and the competition in the said markets.

1.3 PROBLEM STATEMENT

From the background discussion on the information needs of farmers in Kenya, it is apparent that farmers in the country continue to suffer from hunger and poverty due to several factors, one of them being lack of access of the necessary information to revamp their agricultural productivity. Several studies, including those by the Republic of Kenya (2014), Etyang (2013) and Gunga (2010) point to the fact that most farmers in Kenya are not accessing the information necessary for agricultural transformation. Therefore, the research problem was: What are the information needs of rural farmers in Bungoma County and how do they access and use agricultural information?

1.3.1 Objectives of the study

The study was based on four specific objectives, as outlined below:

1. To determine the information needs of rural farmers in Bungoma County, Western Kenya.
2. To identify the information sources that are available to rural farmers in Bungoma County
3. To establish how farmers in Bungoma County access and use agricultural information.
4. To identify the challenges rural farmers experience in accessing and utilizing agricultural information in Bungoma County.
5. To establish possible solutions for the challenges faced by farmers in Bungoma County in accessing and utilizing agricultural information.

1.3.2 Research questions

The research questions were as follows:

a) What are the information needs of rural farmers in Bungoma County?
b) What agricultural information sources are available for rural farmers in Bungoma County?
c) How do the rural farmers in Bungoma County access and use agricultural information?
d) What are the challenges experienced by rural farmers in Bungoma County in their quest to access and use information services?
e) How do rural farmers in Bungoma County address the various challenges that hinder them from accessing agricultural information?

1.4 LITERATURE REVIEW

The literature review aims to contextualize the role of information services to farmers and factors that limit their access to the necessary information. More specifically, the literature review contextualizes the research problem in terms of relevance and contribution to the information services and access by identifying aspects that require further research. The materials covered in the literature review were selected from the following online databases: JSTOR (http://www.jstor.org/), LanTEEAL (http://library.uplb.edu.ph/index.php/database) and downloads from UNISA library databases. In searching for information, keywords and key

phrases such as ‘information needs’, ‘information services’, ‘information seeking’, ‘information literacy’, and ‘agriculture’ were used. In this section, farmers’ information needs and services have been discussed briefly. The literature review in chapter two covers various aspects of the study varying from information needs and agricultural information needs to agricultural information and knowledge access with highlights on the agricultural information sources and channels for information access.

1.5 JUSTIFICATION OF THE STUDY

Bungoma County has been experiencing food shortage for many years especially in terms of feeding her own population as well as yielding enough food and cash crops for commercial purposes (Government of Bungoma County 2013]). As an extension officer in the region, the researcher also observed that this has been happening despite internal and external efforts to improve the recurring situation. Several documented and undocumented explanations have been offered. Some of these explanations include poor technology, lack of access to markets and improper inputs. Information or the lack of the right information seems to be a common denominator for all the explanations that have been offered. There are two possible reasons. Firstly, there is a problem with the dissemination of agricultural information. As a result, many farmers are not getting access to the information they need. Secondly, there is no available literature on work undertaken to assess the information needs among Bungoma County farmers and, as a result, little is known about the challenges these farmers face with regards to their information needs.

The study could support extension officers in assessing and recommending the right type of information required by farmers in the county so that policymakers, value chain actors, extension agents and electronic and press media could better target and package their agricultural information for greater socio-economic impacts in Kenya. The knowledge gained from this study could help the farmers make informed choices for improving their farming enterprises.

The purpose of this qualitative study was to determine the information needs of rural farmers in Bungoma County, Western Kenya. Farmers in Bungoma County need information as an essential input into their farming activities. This study could support extension officers in

acquiring an understanding of the information needs of farmers in Bungoma County, and to acquire an idea of what agricultural information sources they use. Furthermore, extension officers will learn more about the challenges the farmers face when accessing the desired type of agricultural information.

1.6 RESEARCH METHODOLOGY

This section presents the research design and methodology for the current study. In this study, the researcher used a qualitative approach of inquiry and a case study design where lead farmers in Bungoma County were interviewed to get their perceptions on information needs, accessibility and usage. A case study design was deemed appropriate because the study focused on one of the forty-seven (47) counties in Kenya. Through the case design the study endeavours to describe how information needs of farmers differ in Bungoma County, how the farmers in the county access agricultural information, how the farmers in the county use agricultural information, and how the farmers address the various challenges that hinder them from accessing agricultural information.

1.7 POPULATION AND SAMPLING

Population is an entire group of individuals, events or objects having observable characteristics (Lohr 1999). The target population in a study refers to the subjects or units from which a researcher hopes to collect information (Creswell 2009:2013). In the case of this study, the target population was the rural farmers of Bungoma County. The county has a population of 1.3 million people and it consists of nine sub-counties that also form the nine political constituencies in the county. Over 85% of the population in Bungoma County live in rural areas and eke out their living from agricultural activities.

Creswell (2009:217) explained that in a qualitative approach purposeful sampling is used to select participants who have experienced the central phenomenon. In addition, Etikan, Musa and Alkassim (2016:1) continued to explain that purposeful sampling is more relevant in large populations where adequate randomization may not be possible. In this study, the researcher used purposive sampling. In order to ensure a fair representation of the study sample, five out of the nine sub-counties in Bungoma County were randomly sampled and then purposeful sampling was applied to pick the four lead farmers in each of the five sub-counties who are hosts of Farmers' Field Schools (FFS). The sample size was therefore twenty lead farmers.

1.8 DATA COLLECTION

Data collection refers to the process of gathering desired information from different sources on given variables using a systematic approach in order to answer specific research questions and address a given problem (Creswell, 2009:218; Shapiro et al. 2004:1225). Data collection can be done using different forms that can also include web-based information and communication technologies (Shapiro et al. 2004:1225-27). In this study, face-to-face interviews were used and were audio-taped to allow for data transcription after the interviews.

1.9 ISSUES OF RELIABILITY AND VALIDITY

Data reliability refers to the consistency to which similar values can be obtained at different times or by different people using a given described instrument and standard (Creswell 2013). On the other hand, validity is the extent to which an instrument measures what it purports to measure. Validity is about questioning the intended use of certain measurements and therefore it is broader than reliability but both concepts are geared towards reducing research errors (Creswell 2009). Data validity was ensured through representation of a range of different realities and being fair in the selection of a representative sample that was interviewed.

1.10 ETHICAL CONSIDERATIONS

This study was guided by the research principles and ethics as outlined in the UNISA research policy, more specifically on quality, professional and ethical guidelines and proper acknowledgement of all relevant sources of data and information. Proper pre-interview discussions were undertaken to ensure that participants understood the benefits and all the issues related to the survey and they willingly consented to participate. A consent form giving the purpose and expected benefits of the research together with a promise of confidentiality was prepared for them to sign. In addition, the form requested the participants to confirm that they understood the contents and their roles in the interview by signing the consent form. Confidentiality of all the participants was ensured through the use of identification codes to conceal the identity of the respondents.

1.11 DELIMITATION

The focus of this study was on information needs of farmers in Bungoma County. The findings of this study were based on only twenty lead farmers who host a farmers' field school. Since the

Farmer Field Schools consist of many members that are normally in excess of thirty, it was assumed that the views of the lead farmers would more or less be the same as the other members. Although the study focused on the farmers' information needs, I was also able to collect data on the information sources that are mainly used by the farmers and the data also provided some information which could be interpreted as social networking activities that are focused on information sharing. This study, however, did not establish the farmers' information activities such as seeking, searching, and sharing.

1.12 DEFINITIONS OF KEY CONCEPTS

1.12.1 Information access

Information access is defined by Mathiesen (2014) as the availability, reachability, findability, comprehensibility and usability of information. Therefore, farmers have access to information when they have the freedom or opportunity to obtain, make use, and benefit from that information. This is closely related to the Webster dictionary definition of 'access' where it refers to the freedom or ability to make use of something (Merriam-Webster Inc. 2004).

1.12. 2 Information use

Information use is defined by Gänswein (2011:33) as the amount of available data that can be processed by individuals or organizations when making strategic decisions. In the context of this study, information use refers to the amount of available data that farmers can process when making strategic decisions on their farming enterprises.

1.12.3 Information needs

Information needs can be defined as the recognition of the existence of uncertainty which results in the act of seeking data, ideas and facts that are useful in addressing the uncertainty in question (Krikelas 1983:5-20). According to Savolainen (2012), information needs of different personalities may take on three different contexts: conceptualization of information need based on the situational action, information need in the context of task performance, and information need based on the dialogue. As such, information need may be referred to as the joint conceptualization of the constructed understanding of the additional information required to make sense of the issue at hand. In the context of this study, the term is used to relate to the desire by farmers within Bungoma County to have access to agricultural information that may

better their agricultural produce and hence improving their livelihoods.

1.12.4 Information services

The *Online Dictionary for Library and Information Sciences* (Reitz 2012) defines information services as services promoting access to learning and information resources. In addition, the Business Dictionary (2012) defines information services as an agency or department for providing processed or published information on specific topics to an organization's internal users, its customers or the general public. For the purpose of the study, an information service is thus defined as the "act of availing farmer-relevant information to farmers in a useful and understandable format."

1.12. 5 Information-seeking

Information seeking can be defined as "the process of looking for information, a consequence of a need to satisfy a certain goal" (Wilson 2000:1). This is similar to Krikelas's (1983:5-20) definition where he defines information seeking as an activity undertaken to satisfy a perceived need whereby the information seekers perceive that possessed knowledge is insufficient to deal with a particular issue or problem. Within the context of this study, information seeking was defined as the actions farmers intentionally take in order to acquire specific information they need to meet their unique goals (Dutta, 2009).

1.12.6 Information literacy

According to Webber and Johnston (2017) information literacy is the ability to identify, locate, evaluate, organize and effectively create, use and communicate information to address issues or solve problems. Chevillotte (2010) cites the American Library Association's definition when she states that an information literate person is able to recognize when information is needed and is able to locate, evaluate, and use effectively the needed information. These definitions were adopted for this study because they fitted well with its goal and objectives. According to this definition, information literacy is the "ability to effectively access and evaluate information for a given need" (Chevillotte 2010).

1.13 OUTLINE OF DISSERTATION

Chapter 1

This chapter includes the introduction and background information, the statement of the problem

and the rational of the study. The scope and limitation of the study, the goals and objectives together with the hypothesis have been covered in chapter one.

Chapter 2

To put the study into perspective, chapter two focuses on the literature review to contextualize the research, clarify concepts and identify appropriate methodological approaches on the study design and data analysis.

Chapter 3

Chapter three discusses and justifies the research methodology that was used in the study. The methodology discusses issues to do with the study design, the data collection approaches and data analysis. This chapter also looks at the potential methodological limitations or challenges encountered in the study.

Chapter 4

This chapter presents the analysis of the results of qualitative data gathered from the leaders of twenty Farmer Field Schools spread across five sub-counties of Bungoma County.

Chapter 5

Chapter five provides a thematic analysis of the empirical data by discussing the empirical data in terms of the information needs themes that were identified in chapter two. This chapter therefore shows how the farmers' context and their personal factors affect their information needs and use in Bungoma County.

Chapter 6

Chapter six presents the conclusions, limitations and recommendations from the study.

CHAPTER TWO

FARMERS' INFORMATION NEEDS AND AVAILABLE AGRICULTURAL INFORMATION SERVICES

2.1 INTRODUCTION

In order to render a good information service, it is necessary to know and understand the potential users' information needs. This chapter explores some of the empirical and policy-related literature that focused on the information needs of farmers and the impact of the same on their agricultural productivity. In this chapter, as well, farmers' information needs and agricultural information services are articulated. Here different aspects of information needs are discussed followed by agricultural information needs. Attention is also paid to the agricultural services that are available for farmers.

2.2 BACKGROUND INFORMATION

Information is and has always been a vital element in the decision making process of every course of action and lack of it would result in making misinformed decisions that may have unfavourable outcomes. Information, according to Starasts (2015:157), is the product that emanates from processing, manipulating and organizing data in a way that adds value to the knowledge of the person receiving it. Information has consistently been a significant element in the development of human society and has shaped the way in which we think and act over a long period of time (Oladele 2006:199-205; Starasts 2015:157).

In agriculture, information is crucial for increasing agricultural production and improving marketing and distribution strategies (Oladele 2006:199-205; Starasts 2015:157). In order to compete in the global market today, farmers should have access to the latest information with regards to improved farming techniques, new methods of cultivation, new crops, seeds, pesticides, water management, marketing of the product, government policies regarding agriculture, export potential of their crops and the information about the allied activities like fish farming, apiculture, poultry, dairy, and weather information on local and regional levels (Starasts 2015:157).

Ochieng (1999) asserts that access to information is a vital tool for empowering individuals to

make informed decisions or take action for them or for community development. Access to accurate, timely and appropriate information enables farmers to make better decisions about what to produce, when to produce and where to sell it than those who do not have such information (Ferris 2005; Starasts 2015:158).

In Kenya, access, efficiency and affordability of agricultural information continues to be major impediments for raising agricultural productivity. Professionals in the agricultural field have increasingly become interested in the information seeking needs of farmers since the patterns would help in the development of appropriate programmes for dissemination of such information whenever acquired.

2.3 INFORMATION NEEDS

Information needs can be defined in various ways. One of the general definitions that is currently still accepted for information needs is that by Krikelas (1983:5-20), where he defines information needs as "the recognition of uncertainty existence, which results in the act of seeking data, ideas and facts that are useful in addressing the uncertainty in question." Information needs therefore represent gaps in the current knowledge of the user (Benard, Dulle & Ngalapa 2014). Many approaches have been fronted to describe the "information needs" of individuals in different capacities.

Wilson (1999:249-271) in his model pointed out that an information need is secondary to a primary need such as food, shelter, and clothing. The level of information needs may differ between people, or a group of people, depending on a range of factors, such as age, level of education, socio-economic status, range of information sources available, level of awareness, and ease of use of information (Kaniki 2003).

Agricultural information needs vary from one socio-ecological condition to another. Many factors play a role in determining the needs of different farmers since they vary from one region to another. Farmers require different types of information for day to day agricultural activities (Benard et al. 2014). However, the diverse nature of smallholder farmers in most countries in the sub-Saharan Africa makes it a big challenge for anyone to categorically claim to know all the information needs of farmers. The farming community is information dependent and is faced by

many new and complex challenges (Ozowa 1995:15-20).

2.4 INFORMATION NEEDS IN CONTEXT

Timko and Lyon (1989:607-627) stressed the importance of contextualizing information needs as they believed they form the foundation for an understanding of information needs and seeking behaviour. Naumer and Fisher (2010:2452-2458) support this view. According to Naumer and Fisher (2010) it is often necessary to understand the context of human needs that gave rise to a need for the information. This approach to understanding information needs requires a broader understanding of people's personal situations. The term 'context' can be defined as the quintessence of a set of past, present and future situations (Savolainen 2012; Zimmermann, Lorenz & Oppermann, 2007).

According to Savolainen (2012) and Zimmermann et al. (2007), there are three contextual elements that give rise to information needs. These elements are situation in action, task performance and dialogue. This study seeks to inform its users on the understanding of agricultural information needs in relation to the determination of the situational needs of farmers, the tasks they are required to engage in meeting such needs, and the aspect of dialogue being engaged in such discussions. The situational needs are expected to encompass the work context, which is agricultural farming. The context here also takes into consideration the changing seasons of planting and the climatic aspects such as floods in the region and droughts in the area of study, which are both contextual factors that are likely to affect the informational needs of farmers in the region; hence, their agricultural outputs.

2.4.1 Situational needs

A situational need can be defined as some situation in which a user finds him or herself in which there is a need for information (Glendenning, Babu & Asenso-Okyere 2010). Glendenning et al. (2010) assume that a situational information need encompasses all factors the user brings to the situation which include previous knowledge, awareness of information that is available, affective or emotional factors, the expected use of the information and any time constraints within which the user is working.

Situational needs are described as either being spatial or temporal. The temporal aspects are said

to be demonstrated by a need for information required in the day, week or for a longer period (Julien & Michels 2004). According to Wilson (1981:3-15), there exists a time lapse in some situations, especially in the context of temporal constituents of the situational needs between the recognition of the information need and the information seeking action. Farmers may need a variety of information and knowledge for the enhancement of their productivity (Chevilotte 2010). The nature of information needed by the farmers may relate to the weather reports and their effect on the planting and harvesting seasons, the types of crops to be planted, the market reports regarding the products produced by the farmers, the application of fertilizers during planting and the information regarding the period when planting is to begun (Chevilotte 2010).

Glendenning et al. (2010) noted that the situational needs may be affected by the crops being planted in a particular season, the type of agricultural activity, for example, crop production and livestock rearing, and soil conditions in the area. Ozowa (1995:15-20) classified information needs for the farming community into five broad categories: agricultural inputs, agricultural credit, marketing, agricultural technologies and extension education. These classifications of agricultural information needs and their anticipated impacts on the agricultural practice in the county are as discussed in the subsequent sections of this chapter.

2.4.1.1 Agricultural inputs

The agricultural input sector has a critical impact on the agricultural productivity of a nation as it influences farmers' access to and use of productivity enhancing inputs (Krausova & Banful 2010). In many African countries, private investment in input distribution is discouraged by an unfavourable business climate characterized by continued government procurement and distribution of inputs, which undercut private markets, increase the uncertainty of input marketing, and result in high levels of rent seeking (Morris, Kelly, Kopicki & Byerlee:2007).

The study by Alila and Atieno (2006) showed that the high costs of inputs and veterinary services had a negative impact on the development of the agricultural sector in Kenya. Their study also pointed out that most farmers were unable to access essential services such as veterinary services due to the withdrawal of government subsidies. The study points out the fact that farmers need information on alternative sources of inputs that are more affordable and easy

to use without necessarily having to rely on government subsidies.

2.4.1.2 Agricultural credit

The need for the information on agricultural credit becomes justified when it gets to farmers at the earliest appropriate time (Gitonga & Machira 2008:11-169). This can be enhanced through channels such as credit banks, government officials, friends, extension officers, and the media among others (Gitonga & Machira 2008:11-169). While the government has programmes in support of the agricultural credit, the challenge sets in due to the low literacy level of the farmers in relation to the existence of the loan facilities (Gitonga & Machira 2008:11-169). Subsequently, the information needs of farmers over the agricultural credit facilities relate to the source of the loans, the location and lender's name, the types of loans to be offered, and the terms of the credit such as the loanable amount, interest rate and the repayment mode (Ozowa 1995:15-20).

In their study on the issues and processes of agricultural policy in Kenya, Alila and Atieno (2006:8) highlighted several key policy issues, one of them being the effect of financing on agricultural activities. Their study noted that lack of sufficient financing for agricultural activities had an adverse effect on production and investment in value addition of agricultural activities.

2.4.1.3 Marketing

Marketing of agricultural produce has been a major hindrance in realization of the production potential among the smallholder farmers (Alila & Atieno 2006). The need to furnish farmers with information about commodity prices is key in ensuring that farmers get value for the produce (Alila & Atieno 2006). Marketing relates to all the business activities that are involved in the movement of the agricultural produce from production points to consumers (Alila & Atieno 2006). Farmers' market related information needs would relate to the information on current prices of produce, product planning (information on crops and varieties to grow in a particular season so as to ensure marketability), market sales forecasts, sales timing, group marketing techniques and information on marketing practices that can improve agricultural productivity of the farmers (Alila & Atieno 2006). The information needs of farmers also entail

the information that will enable them to make rational and appropriate decisions. The market information services are required to collect and process the market data in a systematic and continuous way to the extent that it becomes available to all market participants for use in agricultural decision-making (Alila & Atieno 2006).

This contextual aspect of farmers' information needs was also reported on by Timko and Lyons (1989:607-627). They found that farmers' information needs are dependent on the producer market. However, farmer information needs are not just restricted to the producer markets, but cover all aspects related to farming activities.

2.4.1.5 Agricultural technologies

The information needs of farmers in relation to agricultural technology relates to the desire to minimize drudgery in conducting farm chores and thus save labour and increase incomes from their farms (Ozowa 1995: 15-20). In terms of agricultural technology, the smallholder farmers are interested in information on production technology, which encompasses cultivation, fertilizer application, pest control and management, weeding and harvesting or yields among other agronomic practices. Abbas, Lodhi, Bashir and Mahmood (2008:99-108) argued that lack of information adapted to local needs and lack of technical knowledge at farm level were the principal factors for the low yield and inert production.

The Kenyan farmer is often affected by a myriad of challenges that range in magnitude based on the information available on a specific challenge. The most common challenge is the lack of up-to-date technology due to a limited or inadequate link between research and extension services to farmers, resulting in a lag in the facilitation of an increased utilization of demand-driven research and farming technologies; thus, the continued constraining of the agricultural efforts and productivity in the region (Gitonga & Machira 2008:11-169).

Within the last couple of decades, there has been a lot of investment by donor and development agencies into research activities that are aimed at addressing the food security among the smallholder farmers in the sub-Saharan Africa. These efforts depict the need for farmers to acquire relevant information from the extension agents through the research they conduct in

relation to food security (Ekoja 2004:198; Harorimana & Watkins 2008).

In the 1990s, researchers such as Shibanda (1991) pointed out the lack of interaction between researchers and farmers as one of the principal weaknesses in the development and dissemination of improved farming methods. The participatory approaches such as training and communal seminars were said to be playing a vital role especially in determining the acceptability and profitability of a technology before it is promoted on a large scale (Sanginga & Woomer 2009:263). The diversity of the communities and farmers among the communities requires different approaches as there is no single method that fits all the situations. This calls for use of various approaches such as offering training and communal seminars to enlighten the farmers on the benefits derived from the presented agricultural information and knowledge that will result in high agricultural productivity (Chevilotte 2010).

In conclusion, there's a need for the establishment and proper utilization of agricultural information systems in the rural settlements as it would play a major role in the generation, transformation, and consolidation of information received and fed back to farmers.

2.4.2 Task performance

Information needs and information seeking processes depend on a worker's tasks (Vakkari 1999:819-837). A worker's job consists of tasks which are identified by an actor (Vakkari 1999:819-837). Each task has a recognizable beginning and end, the former containing recognizable stimuli and guidelines on objectives to be attained as well as the necessary steps put in place to achieve them (Byström & Järvelin 1995:191-213).

According to Byström and Järvelin (1995:191-213), the key factors that affect task performance are the complexity of the task being undertaken and consequent information needs. By task complexity, one looks at the repetitive, analysability, the number of alternative paths of task performance, and innovative outcomes of a task (Campbell 1988:40-52). Not only does task performance constitute processes of task performance and problem solving related to it but it also looks at the work role associated with it. The degree of prior knowledge about a task is key in determining the type of information needed to accomplish a task (Byström & Järvelin 1995:191-213). Tasks in relation to this study included when to plant, what crops to plant and the dynamics

of rain in agricultural production.

2.4.2.1 Rain

Agricultural performance is highly dependent on a sufficient amount of rainfall. Poor rains tend to adversely affect agricultural productivity, incomes and hence investments in rural areas (Alila & Atieno 2013). The study by Alila and Atieno (2013) reported that the frequency and intensity of droughts and floods has been on the increase in the past three decades, resulting in high crop failure and livestock deaths. Recurrent droughts, floods and the associated losses are concerns that have featured much in public debate in the recent past (Alila & Atieno 2013). These conditions depict an information need for farmers to be rightfully informed on the changing weather patterns so as to adequately prepare themselves in case of such extreme weather conditions.

Benard et al. (2014:20) study noted that most farmers complained about lack of up-to-date and timely information on weather conditions. The study also explained that the variability and unpredictable rains led to the failure of farmers in planning on the right time to plant their crops. Alila and Atieno (2013) noted that lack of efficient technologies, destruction of rainfall catchment areas, poor management of government irrigation schemes, degradation of surface water and uncontrolled exploitation of underground water were some of the causes of low productivity, especially in export crops. This points to the fact that farmers need to be informed on how best to utilize rain water as well as taking up irrigation in case of low rainfall and drought seasons.

2.4.2.2. What to plant

Factors that influence a farmer's decision with regards to what crops to plant include water availability, soil fertility, and risks of floods, droughts, frost, or pest or weed infestations, and the importance of each of these factors varies with the types of crops planted (Munyua & Stilwell 2013). This information is important to farmers as it aids them in planning which crops to plant and at what time of the year (Etyang 2013).

The studies by Hardie, Parks and Van Kooten (2004:101-139) and Goetz and Zilberman (2007) observed that policies and regulations had both a positive and negative correlation impact on the profitability of different agricultural systems by either facilitating or hindering trade in particular

types of agricultural products. Hence, depending on the regulations set, a farmer is in a position to know what to plant and on how much land is to be utilized thus creating an information need that needs to be addressed.

From the discussion on task performance as a contextual element that gives rise to information needs, the degree of prior knowledge about a task is key in determining the type of information needed to accomplish a task. Not only does it constitute processes of task performance and problem solving related to it but it also looks at the work role associated with it.

2.4.3 Dialogue

Dialogue related information needs look at the question versus negotiation process in relation to interviews that involve written or spoken conversational exchanges between two or more individuals (Savolainen 2012). Thus, dialogue takes place when information is disseminated, irrespective of whether that dissemination is in a written or verbal format. The process relies on the level of specificity in articulating the questions. Dialogue impacts on the information needs of farmers through the diagnosis of the context to which they identify likely difficulties, and in the collaborative choice of techniques to be adopted towards the addressing of the difficulties (Glendenning et al. 2010). In his research paper, Manning (2010:2-4) pointed out that conversation and interaction with stakeholders is a key mechanism for sharing knowledge. However, Manning's (2010: 2-4) findings assumed that some farmers already have information that they can share through interactions. Ferris (2005) noted that farmers who had access to accurate, timely and appropriate information made better decisions about what to produce, when to produce and where to sell it than those who did not have such information.

There exist many channels through which agricultural information can be shared (Ekoja 2004: 195; Rees, Momanyi, Wekundah, Ndungu, Odondi, Oyure, Andima & Rege 2000). The channels are the vehicles through which the information is transferred or received. Disseminative channels do not allow for feedback whereas communicative channels allow for feedback from the source and recipient of the information (Momodu 2002:406-410). According to Rogers (2003:18), communication channels are paths followed by messages in getting from a source to a receiver. The channels are categorized into four categories. They include interpersonal, that is face-to-face mass media, local, and cosmopolitan channels of communication (Elly & Silayo 2013:547).

According to Muhammad (2005), the sources of information can be divided into two main categories, interpersonal and impersonal. Face-to-face exchange of information between individuals is regarded as interpersonal, whereas mass media sources are known as impersonal methods enabling one or a few persons to reach many addressees at a time (Elly & Silayo 2013:547).

2.4.3.1 Inter-personal communication

Interpersonal communications, also known as the face-to-face communication, involves more than one farmer and the nature is such that it is used in trickling-down information gained from sources such as the government or extension education agents (Gitonga & Machira 2008:11-169). Such information could be essential in meeting the farmers' information needs in the manner that enables them to make sound productivity decisions (Gitonga & Machira 2008:11-169).

2.4.3.2 Impersonal communication

Impersonal channels of communication include the use of mass media such as television, radio, newspaper and magazines. Mass media generally allow for few individuals to reach out to larger audiences (Rogers 2003:78-79). It is entirely cosmopolitan whereas interpersonal channels could either be cosmopolitan or local. Rogers (2003:78-79) indicated that cosmopolitan channels usually link individuals with sources outside the given social system set up. Print based media include books, billboards, brochures and posters.

2.5 PERSONAL FACTORS AFFECTING INFORMATION NEEDS

The personal factors that are generally discussed in information needs and seeking behaviour literature are personal knowledge and experience, personal information literacy, and personal preferences. These factors determine whether a person will need certain information or not, and from where he/she will seek the information.

2.5.1 Personal knowledge and experience

An experienced farmer already knows from his experience which crops are the best to cultivate on his land and when to plant them as compared to a young inexperienced farmer who would need guidance on making these decisions (Ozowa 1995:15-20). The inexperienced farmer would, because of his lack of knowledge and experience, feel uncertain and experience a need for information, which will prompt him or her to approach an information system or an extension officer or ask an experienced farmer (Ozowa 1995:15-20).

Spurk, Schanne, Mak'Ochieng and Ugangu (2013) noted that most farmers in Kenya had a strong need for basic agricultural knowledge, which contrasts with the commonly shared understanding that the African farmer has a traditional knowledge of basic agriculture and good agricultural practice. Over 80% needed more information on how to use fertilizer, breeds of seeds and pesticides, ways of earning more income and how to market their produce, a clear indicator that farmers still need to know more about the issues they are already dealing with (Ozowa 1995:15-20).

2.5.2 Personal information literacy skills

Information needs of farmers are largely affected by the low information literacy levels or access to information thus, contributing to the low adoption rate of agricultural technologies for production (Chevilotte 2010; Webber & Johnston 2017). Low information literacy levels among the smallholder farmers has been pointed out as the main constraint to effectively disseminate and communicate agricultural information on various technologies (Sanginga & Woomer 2009:263). The general lack of awareness among the smallholder farmers is attributed to their low information literacy levels (Ozowa 1995:15-20).

Well educated farmers can easily access information from various sources, and can create knowledge out of those sources. This was revealed by Benard et al. (2014:16-19) who conducted a study on the assessment of information needs of rice farmers in Tanzania. The study showed that most of the rice farmers had attained primary level education and were therefore in a better position to access, comprehend and adopt new agricultural innovations and practices. Rehman, Muhammad, Ashraf, Mahmood, Ruby and Bibi (2013:324-329) noted that that there existed a

highly significant relationship between education of the farmers and their access to agricultural information.

2.5.3 Personal preferences

Personal preferences vary from one aspect to another and have a positive correlation with the level of trust that one has in the source of information and, from the researcher's point view, every farmer has his or her preferred source of information that he or she relies on (Chevilotte 2010).

Spurk et al. (2013) conducted a joint research in Kenya on shortcomings of communication in agricultural knowledge transfer in Kenya and ways to improve it. The study's findings showed that some farmers in rural areas were pro-active in looking for information. They often approached other farmers and family, government extension officers and agro-input shops as opposed to consulting traders and buyers. The study's findings also reported that the most trusted source of agricultural information was government agricultural extension services including their officers and the Ministry of Agriculture, followed by trust in other farmers. Next was mass media, followed by trust in agro-input shops, non-governmental organizations (NGOs) and buyers. The trend where farmers relied on friends, neighbours and farmers' colleagues was also observed by Yahaya (2002).

Spurk et al. (2013) and Ekoja's (2004:200) studies revealed that, with regards to the dialogue element of information needs, farmers preferred getting agricultural information via the radio as compared to other channels of communication. Farmers mostly used their local FM stations, according to their naming of the station they mostly listen to. The study pointed out that in Bungoma East, West FM, Citizen and Sulwe FM were the preferred radio stations. Spurk et al. (2013) also pointed out the unique position of the radio as a media channel as confirmed by farmers' answers about their preferences. 83% of the study population preferred the radio as a media channel and 21% preferred the mobile phone as a media channel. That indicated a large discrepancy between the hype, at least felt in Nairobi and other urban regions, about mobile phones and applications for farmers, for example, M-Farm, i-cow, i-hub, *Sokoni* SMS, Kilimo *Salama* and the assessment of farmers themselves (Crandall 2015; Mutwiri 2013).

Spurk et al. (2013) revealed that most farmers in Kenya prefer comprehensive information that is, most of them opt for more explanations and accompanied by various options. They had strong preferences regarding the way they want to receive information, with most preferring personal information by visits or by field days as opposed to watching agricultural programmes on the television. The study's findings also showed that most farmers preferred to receive information before planting. More than 60% preferred it when a problem or an incident came up during planting season while 10% preferred information shortly before the harvest. Thus, this section reflected on the impact personal factors have on information needs. The subject matter is essential in the sense that it provides the means by which a small-scale farmer would enhance his/her efficiency in the utilization of the basic production resources at his/her disposal.

2.6 AGRICULTURAL INFORMATION SERVICES

Agricultural information is an essential element that contributes towards production in farming. This is because farming is a technical activity that requires farmers to have regular access to updated information in order to address emerging challenges (Ekoja 2004:193). As such, there is a need to understand what an agricultural information system entails as well as its functioning in order to manage and improve it (Demiryurek, Erdem, Ceyhan, Atasever & Uysal 2008:1-25).

Roling (1988:33) defines an agricultural information system as one in which agricultural information is generated, transformed, consolidated, received and fed back to underpin knowledge utilization by agricultural producers. Demiryurek et al. (2008: 1) further defines an agricultural system as one that can also integrate different sources of information used in analysis and provide vital information to its various users as well as one that can be well managed to enhance its effectiveness and performance.

2.6.1. Extension education as an agricultural information service

Agricultural extension refers to all the different activities that provide the information and advisory services that are needed and demanded by farmers and other actors in agrifood systems and rural development (Christoplos 2010:2). Christoplos (2012:2) further notes that agricultural extension has to include technical knowledge involving facilitation, brokering and coaching of the various stakeholders so as to improve market access, our environment as well as being well informed of risk patterns and how to face such eventualities.

Munyua, Adams, and Thomson (2002:2) carried out a study on designing effective linkages for sustainable agricultural extension and found that there exists a need for the value of information about improved technologies in agricultural extension organizations in sub-Saharan Africa to be sensitized. The study also reported that there was a need for timely and reliable information which prompts an information need for the extension agents to avail such information to farmers for decision making purposes.

The study by Morris et al. (2007) pointed to the need for information to be adequate and responsive to farmers' needs and suggested that shortcomings in information to farmers might be a major hindering factor for adoption of innovations by farmers. Agricultural extension, according to Rogers (2003:78-79), Van den Ban and Hawkins (1996) and Van Crowder (1996) is the main link between farmers and research. Glendenning et al. (2010) reported that extension education affects the information needs of farmers, given that it has a trickle-down effect on how information is received by farmers from the limited number of extension officers available to provide the services. Gitonga and Machira (2008:11-169) reported that agricultural information was enabled through the training of model farmers who were then tasked with the dissemination of the information acquired to other farmers due to the lack of a sufficient extension human work force needed to provide extension services to them.

Rees et al. (2000) study reported a major gap in the technical information availed to farmers as opposed to the operation skills they received through extension education. It also showed that most farmers and extension officers were dissatisfied with the quality and inadequate human resources provided by the government of Kenya and non-governmental organizations, blaming this shortfall as the main reason for poor information flow to the farmers. Both Rees et al. (2000) and Muyanga and Jayne (2006) agree that more detailed initiatives need to be done about information and communication with regards to extension education.

2.6.2 The use made of agricultural information services

In their study focusing on the strengths and weaknesses of agricultural information systems and communication networks used by dairy farmers in Turkey, Demiryurek, Erdem, Ceyhan, Atasever and Uysal (2008:1-25) found that farmers who were members of the Dairy Cattle Breeders' Association in Samsun Province of Turkey were more knowledgeable on agricultural

processes and techniques than farmers who were not members of the Association. This was associated with better access to dairy farming information provided by agricultural experts to farmers' groups. This is despite the fact that the primary function of the information system was to generate and disseminate agricultural information.

Spurk et al. (2013) showed that there were problems in the timing and the quantity of information assessed by small-scale farmers in Kenya. The study reported that the information was inadequate in timing and insufficient in quantity. On the other hand, Spurk et al. (2013) found that the assessments for usefulness, trust and comprehensibility were very positive. Their study also pointed out that the flow of information from extension workers to farmers was wanting as it was characterized as being irregular, not systematically supervised and often not sufficiently specific for farmers.

Abbas, Bashir and Mahmood (2008:99-108) carried a study on dissemination of wheat production technologies and interface of out-reach efforts with farmers and found that the main factors that contributed to low production reflected a lack of information that was adapted to local needs and lack of technical knowledge at farm level .

Rehman, Muhammad, Ashraf and Hassan (2011:119-124) noted that Pakistan, having been an agricultural country with rich natural resources, suitable climatic conditions, deep soils, favourable topography, and water resources, was experiencing slow agricultural growth. Rehman (2010) attributed Pakistan's low agricultural production to a lack of effective implementation of policies on adequate and easily accessible agricultural information to the farmers necessary to enhance the agricultural production. FAO's (2008) study findings concurred with the findings of Rehman (2010).

In South Africa, Yusuf, Masika and Ighodaro (2013) reported a steady decline in the number of rural inhabitants which was attributed to tough economic times in urban areas and declining agricultural opportunities in rural settlements. The study pointed out a need in rural communities and especially farmers for information on how they could enhance productivity and reduce

vulnerabilities to agricultural and livelihood challenges such as poverty, necessitating more research to be carried out in finding solutions (Yusuf et al., 2013).

The study conducted by Alila and Atieno (2006) established that available data on agriculture is often outdated as characterized by it being untimely and unreliable. The recommendation to correct this situation through the establishment of various agricultural information services in the recent times are still challenged by lack of financial, human and technical capacity to generate, manage and disseminate accurate agricultural information (Alila & Atieno 2006)

There are more than ninety radio stations operating in Kenya with the majority operating in urban areas like Nairobi, Kisumu and the Rift Valley regions (Media Council of Kenya 2013). Spurk et al. (2013:18-21) and Ekoja (2004:200) found that most farmers preferred the use of radio to access agricultural information. Magazines were the least used with only 5% of the study population preferring them. The study also noted that farmers watched agricultural programmes on television like the "*Shamba Shape up"* on Citizen Television, a renowned television channel in Kenya. The study noted that the penetration and use of mobile phone technology to access information is also gaining ground by farmers, mainly because of applications such as M-farm, which provides farmers with vital information. Other classifications include indigenous source of knowledge (Munyua & Stilwell 2013:327), internet services development workers and agencies, outreach services, co-operatives, and faith-based organizations through which the agricultural information can be shared (Adolwa et al. 2012:71-86).

2.7 SUMMARY

The reviewed studies have revealed that the informational needs of agricultural stakeholders may be studied from both a situational context and personal perspective, such that it becomes imperative for farmers and other players in the sector to prioritize the attainment of their socio-economic goals. The review has also focused on the situational needs of farmers in the sense of justifying the informational needs of farmers based on the seasonal changes experienced in agricultural farming. Subsequently, in order for farmers to satisfy their information needs, they need to get access to the right agricultural information. This is in recognition of the need for agricultural information systems to disseminate the agricultural information that is needed by the farmers who in turn can share it with other farmers in their networks.

The review noted that the attainment of successful informational needs of farmers requires the realization of the sources and channels of agricultural information in the manner that it becomes possible to ensure that both the content to be presented to the farmers and the expertise of the farmers constitute equal gain. This is in recognition of the need for successful dissemination of the agricultural information to the extent that it becomes possible for the shared information to be trickled down to other farmers. Several studies reviewed indicate that there are many challenges that hinder farmers in Kenya from accessing the right agricultural information which in turn impedes them from adopting best-bet agricultural practices. Generally, the main focus of this chapter has been on the determination of the empirical, policy and theoretical reviews by other scholars, while bearing in mind the study's objectives and research questions. This case study aimed at determining the information needs of rural farmers in Bungoma County. This chapter provides a linkage to the research methodology chapter that aims at presenting the mode of implementing the findings of this chapter under various models in the county, with the aim of building on previous studies' findings. The following chapter provides the methodology used by the researcher to execute the qualitative case study.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 INTRODUCTION

Research methodology is defined as the process and procedures adopted by a researcher to collect and analyse data with regard to a given societal problem (Kothari 2005). The systematic plan of actions, which is used in the process of collecting and analysing data with the aim of achieving any given study's objectives, is then referred to as the study design (Kothari 2005). The focus of this chapter is on the research methodology and design adopted for the study on the information needs of rural farmers and the factors influencing their access to information in Bungoma County.

3.2 BACKGROUND

Research methodology refers to the general approach used by a researcher to undertake a given study (Creswell 2013). As described by Creswell (2009:145-203) there are three types of research methodologies, namely quantitative, qualitative and mixed methods research. In a quantitative approach, the researcher collects empirical data which is used to test hypotheses or a theory that consists of variables by analysing the empirical data using inferential statistics (Creswell 2009:145). With the use of a quantitative approach, the researcher can decide at the beginning of an experiment or survey the statistical method to use in testing the hypotheses or theory. The outcome of the analysed data can enable the researcher to generalize the research findings from a representative sample of a large population (Onwuegbuzie & Leech 2005:377-380). On the other hand, a qualitative approach does not entail the use of statistical methods but rather involves understanding and interpreting phenomena (Onwuegbuzie & Leech 2005:377-380).

A qualitative approach does not require standardization, hence the researcher continually interacts with a target population to collect verbal information that is used to understand and document the behaviour, patterns and opinions of that population through their responses (Onwuegbuzie & Leech 2005:378). As indicated by Onwuegbuzie and Leech (2005:378), once the researcher understands the behaviour of the target population, a subsequent quantitative study

could be designed to collect empirical data of that population in order to verify a hypothesized trend. Fetters et al. (2013: 2149) reported that a mixed methods approach combines both qualitative and quantitative approaches and therefore it has the advantage of strengthening the weaknesses of the two approaches while simultaneously capitalizing on the existing strength of each other. Since the nature of the study determines the research methodology to be followed, the following paragraphs first investigated what research methods were followed in studies focusing on farmers' information needs and information behaviour studies.

3.3 RESEARCH ON FARMERS' INFORMATION BEHAVIOUR

As described in the literature, there are several approaches for studying a given phenomenon in a society (Elly & Silayo 2013; Ekoja 2004; Munyua & Stilwell 2013; Starasts 2015). The table below illustrates some of the studies that used qualitative, quantitative or both approaches to examine a given phenomenon.

Table 3.1: Research approaches as reviewed in literature

Study	Title	Research methodology	Data collection
Ekoja I. 2004	Sensitizing users for increased information use: The case of Nigerian farmers	Mixed methods involving qualitative and quantitative approaches.	Questionnaires and interviews
Starasts, A. 2015	Unearthing farmers' information seeking contexts and challenges in digital, local and industry environments	Qualitative case study where sixteen key informants were selected purposefully	Semi-structured face-to-face interviews with key informants
Munyua, H.M. and Stilwell, C. 2013	Three ways of knowing: agricultural knowledge systems of small-scale farmers in Africa with reference to Kenya	Mixed methods involving both qualitative and quantitative approaches	Cross-sectional survey and focus group discussions with farmers' groups
Elly, T. and	Agricultural information	Mixed methods involving	Structured

Silayo, E.E. 2013	needs and sources of the rural farmers in Tanzania: A case of Iringa Rural District	qualitative and quantitative approached where the area of study was selected purposefully and the sampled farmers chosen randomly	questionnaire and in-depth face-to-face interviews with key informants

Since the purpose of this study was to acquire an understanding of the farmers' information needs, this research involved a qualitative study.

3.4 QUALITATIVE RESEARCH

As described by Fetters et al. (2013:2138), qualitative research is more relevant in cases where a researcher seeks to understand the meaning of a given phenomenon. Creswell (2009:173-202) reported that qualitative research is more relevant where a researcher knows very little about the targeted study population. This kind of research, therefore, starts from the 'unknown' position and then it advances to discover what is not known and when a sufficient amount of information is known about the subject matter, then quantitative research could follow to collect empirical data about the matter (Fetters et al. 2013:2145). Qualitative research involves the collection of exploratory data about behaviour, emotions, and general characteristics of the target population (Fetters et al. 2013:2138). Qualitative research entails interviewing the sampled respondents when they are in their natural settings (Fetters et al. 2013:2138-2142). Studies on information needs are generally qualitative studies as they are explorative in nature. Since this study is an explorative study, a qualitative research approach was followed.

3.4.1 Case study

As described by Yin (2003), a case study design is more applicable where the researcher wants to find solutions to the "how" questions. This particular study sought to describe how information needs of farmers differ in Bungoma County, how the farmers in the county access agricultural information, how the farmers in the county use agricultural information, and how the farmers address the various challenges that hinder them from accessing agricultural information. Therefore, the case study design was deemed appropriate in order to focus on one county in

Kenya to enable for an in-depth investigation.

3.5 TARGET POPULATION

Population is an entire group of individuals, events or objects having observable characteristics (Lohr, 1999). The target population in a study refers the subjects or units from which a researcher hopes to collect information (Creswell 2009:2013). In this study, the target population was the rural farmers of Bungoma County. According to the 2009 national census, Bungoma County had a population of more than 1.3 million people, but based on an annual growth rate of 3.1%, the current population in the county is 1.75 million (Government of Bungoma County 2013) . The county consists of nine sub-counties that also form the nine political constituencies in the county. The nine sub-counties and their respective populations are shown in Table 3.2

Table 3.2: Sub-Counties in Bungoma County, Western Kenya

No.	**Sub-county**	**Population**	**Projected population in 2017**
1	Mt. Elgon	172,377	220,064
2	Tongaren	187,478	239,343
3	Bumula	178,897	224,388
4	Kanduyi	229,701	293,245
5	Webuye West	129,233	164,984
6	Kabuchai	141,113	180,152
7	Sirisia	102,422	130,757
8	Kimilili	132,822	169,566
9	Webuye East	101,020	128,966
Total		**1,375,063**	**1,751,465**

Over 85% of the population in Bungoma County lives in rural areas and eke their living mostly from agricultural activities. Most of the rural households have small land holdings of less than two hectares where they grow mostly food crops such as maize, beans, groundnuts, and potatoes, among others. The large scale farmers mostly engage themselves in sugarcane growing (Government of Bungoma County 2013).

3.6 DATA COLLECTION

As stated by Creswell (2009:217-218) and Shapiro et al. (2004:1223), data collection is the backbone of all research and it refers to the process of gathering desired information from different sources on given variables using a systematic approach in order to answer specific research questions and address a given problem.

In qualitative approaches, like in this study, data collection entails obtaining sufficient permission from all governing authorities, and sampling of the target population to get a representative sample that can be studied within the stipulated timeframe and the available resources (Creswell 2009:217). After sampling, the researcher goes ahead to seek voluntary consent from the research participants. After consent is obtained from the sampled participants, the researcher goes ahead to interview while them making pertinent observations that can help in interpreting the data (Creswell 2009:218). In this study, the data collection process that was done among 20 leaders of farmer field schools (FFS) involved a few steps as highlighted below.

3.6.1 Sampling

Creswell (2009) pointed out that sampling refers to the process of selecting the sample size as well as the units or people to be included in a study's sample size. A sample is a sub-section of the target population. To arrive at a sample size, proper sampling techniques should be applied. A sample should be a representative of the target population. Kothari (2005) pointed out that sampling design comprises of the sampling frame, sampling techniques and sample size. There are several sampling techniques that are used in qualitative sampling. Examples include convenience sampling, purposeful sampling and snowball sampling.

Creswell (2009:217) explained that in a qualitative approach, purposeful sampling is used to select participants who have experienced the central phenomenon. Purposeful sampling is also applicable where the target population is very large making adequate randomization not possible (Etikan et al., 2016:1). In this study, the researcher used purposive sampling to select four lead farmers from five sub-counties of Bungoma County. In order to ensure a fair representation of the study sample, five out of the nine sub-counties in Bungoma County were randomly sampled and then purposeful sampling was applied to pick the four lead farmers who are hosts of farmers' field schools (FFS). The sample size was therefore twenty farmers.

A Farmers' Field School (FFS) is an extension delivery approach where a formal group of farmers converge at their leader's home to share information and exchange ideas on best-bet farming practices. Thus sampling and interviewing the FFS lead farmers ensured that the views of most farmers in the study area were represented. In addition, a recent study in Western Kenya by Ndirangu et al. (2013) showed that farmers in the region are small-scale and they exhibit similar farming behaviour. Since the target population exhibited homogenous characteristics, twenty lead farmers were a fair representation of the farmers in Bungoma County. In addition, it was practically feasible to collect data for this study, analyse it, and write the Masters' dissertation within the period provided by the University of South Africa.

3.6.2 Respondents' profile

The respondents were randomly selected from five different sub-counties of Bungoma County: Kambuchai, Kanduyi, Kimilili, Sirisia and Webuye West. A total of twenty interviews were conducted with the leaders of Farmer Field Schools (FFS) that were conveniently selected across the five sampled sub-counties. For confidentiality purposes, special codes were assigned to the respondents based on their sub-counties. The assigned codes for the sub-counties were: Kambuchai (Kbc), Kanduyi (Kdy), Kimilili (Kml), Sirisia (Srs), and Webuye West (Wbyw). Four out of the twenty respondents had primary education while the rest had either secondary or tertiary education. All eight respondents from Kanduyi and Webuye West sub-counties had acquired full or partial secondary education. Maize, the staple cereal crop in Kenya, was grown by all the respondents. Maize was intercropped mainly with beans while two of the respondents intercropped it with either soybeans or cowpeas. All the respondents except two in Kambuchai sub-county keep livestock besides crop farming. The detailed profiles of all the respondents across the five sub-counties and twelve locations in Bungoma County are presented in Table 3 below:

Table 3.3: Detailed profiles of respondents interviewed in Bungoma County

Respondent's code	Sub-county	Location	Education level	Farming experience (years)	Farming practices
Kbc1	Kambuchai	Sirale	Primary; class 8	62	Maize, beans, agroforestry, fishery, bananas
Kbc2		Nangwe	Tertiary; diploma	25	Maize, beans, sorghum, fingermillet, horticulture, poultry
Kbc3			Tertiary; certificate	20	Maize, livestock, groundnuts, coffee, cassava, finger millet, sweet potatoes
Kbc4			Secondary; form 2	20	Maize, horticulture, poultry, livestock
Kdy1	Kaduyi	Namisembe	Secondary; form 4	52	Maize, beans, livestock, groundnuts, sugarcane, fishery
Kdy2		Mechi-Meru	Secondary; form 4	37	Maize, beans, livestock, bananas, sweat potatoes, soya beans, groundnuts, simsim
Kdy3		Bukembe	Secondary; form 4	21	Maize, soya beans, livestock, poultry

Kdy4		Namirembe	Secondary; form 4	33	Maize, beans, livestock, groundnuts, green grams
Kml1	Kimilili	Kimilili	Secondary; form 2	24	Maize, beans, livestock, poultry, sweet potatoes, bananas, horticulture
Kml2			Tertiary; certificate	30	Maize, beans, livestock, poultry, bananas, sweet potatoes
Kml3			Primary; class 7	26	Maize, beans, livestock, poultry, sweet potatoes, groundnuts
Kml4			Primary; class 8	19	Maize, beans, livestock, poultry, sunflower, horticulture, pigs
Srs1	Sirisia	Toloso	Tertiary; certificate	40	Maize, livestock, poultry, groundnuts, cowpeas
Srs2			Secondary; form 3	40	Maize, beans, livestock, poultry, bananas, agroforestry, soya beans
Srs3		Bisunu	Primary; class 8	30	Maize, beans, livestock, poultry, horticulture,
Srs4			Secondary; form 2	35	Maize, beans, livestock, poultry, green grams, cassavas, finger millet

Wbyw1		Sitikha	Secondary; form 2	20	Maize, beans, livestock, poultry, bananas, agroforestry
Wbyw2	Webuye West	Webuye	Secondary; form 4	30	Maize, beans, livestock, poultry, bananas, agroforestry
Wbyw3			Secondary; form 2	10	Maize, livestock, poultry, bananas, sweet potatoes
Wbyw4		Sitikhot	Secondary; form 4	15	Maize, livestock, bananas, horticulture, sweet potatoes

3.6.3 Consent

Before the data collection procedures could commence, the necessary permissions had to be sought from my university, that is the University of South Africa (UNISA), my employer (AGRA), and from the County Government of Bungoma. As described by Cooper and Schindler (2013) the consent of study participants refers to the voluntary willingness of respondents to take part in the proposed study. Generally, getting respondents' consent sets a clear platform whereby the study participants have become aware of what to expect before, during and after a given study (Cooper & Schindler 2013; Nunkoosing 2005). Creswell (2009:75) reported that a researcher should always introduce himself/herself and the purpose of the study. This helps to create an environment of neutrality and to build a good rapport with the respondent. In this study, participation of the respondents was on a voluntary basis after participants' consent was sought and agreed. The procedure for seeking participants' consent was as follows:

I approached the sampled research participants, greeted them cordially, and then introduced myself and the purpose of my study and its importance. I ensured that this was done in a language that they understood best (vernacular or Kiswahili). This is why I engaged local enumerators to help me in this process. The aim was to create rapport and a conducive environment before engaging them in the interview process. Once rapport had been created, I explained to them that my data collection procedure would involve interviewing them and I gave them the estimated interview duration. I also explained to them that the data I collected from them would be held confidentiality and would be used for the purposes of the study only. I allowed them to ask questions for clarification and, when everything was clear to them, I asked them whether they were willing to participate in the study voluntarily. For those who accepted to participate in the study, I asked them to sign the consent form (Appendix B).

3.6.4 Interviews

In this study, data were collected through face-to-face interviews with twenty lead farmers who are hosts of a Farmers' Field School (FFS). As described by Creswell (2009:70-79), an interview is a conversation between two parties – an interviewer and an interviewee. According to Creswell (2009:73), interviews should be conducted in a conducive environment to avoid either party from disengaging prematurely. In this study, the researcher used an interview

schedule to engage with the research respondents. In this study, face-to-face interviews with twenty lead farmers of FFS were used and they were taped to allow for a later transcription of the data (Kothari, 2005).

3.6.4.1 Interview schedule

An interview schedule refers to a set of questions that guide the researcher in engaging with the respondents in order to solicit responses that are adequate to answer the research questions (Creswell 2009:79).There are different types of interview schedules: structured, semi-structured (Galetta 2013:9) and unstructured (Starasts 2015:158).

Structured interviews: These are dialogues where the researcher provides some structure based on his or her research interests and an interview guide but also allows for flexibility so that the respondent can provide spontaneous descriptions or narratives (Miller, McGlashan, Rosen, Somjee, Markovich, Stein, & Woods 2002:864). The advantage of structured interviews is that they have excellent reliability for respondents who meet the research criteria (Miller et al. 2002:864). The researcher has the benefit of deciding prior to conducting the structured interview whether a given respondent is suitable to participate or not (Miller et al. 2002:864). The disadvantage of structured interviews is that they require some sort of training before engaging the respondents (Miller et al. 2002:864).

Semi-structured interviews: These are dialogues guided by some questions that are meant to open a narrative and keep it unfolding by introducing specific questions that are informed by theory (Galetta 2013:9). These interviews provide an avenue through which a researcher explores with the respondents the contextual influences exhibited in the narrative but not necessary narrated as such. They provide an inspiration to investigate a social problem as well as disentangling the threads causing the social problem (Galetta 2013:9). By using face-to-face semi-structured interviews the sampled farmers were given an opportunity to respond to the questions asked and then provide pertinent information that was useful in transcribing, coding and analysing the collected data (Creswell 2013).

Unstructured interviews: These are non-interrogative dialogues where a researcher engages a group of respondents in an informal manner to get a broad sense of the social problem under

investigation (Galetta 2013:22). These type of interviews provide the respondents with considerable control over the interview process and hence the dialogues could be too long yet not beneficial to both the researcher and the respondents (Galetta 2013:22). They are also not appropriate in research inquiries that involve sensitive matters.

In this study I used semi-structured interviews to collect data from the twenty farmers who had been sampled. This is because the central core of the analytical framework of understanding the information needs of farmers and the challenges they face in accessing agricultural information would have been constrained had I not used semi-structured interviews. Therefore, semi-structured interviews were pertinent in addressing my research questions as they were quite promising in yielding a more complete story in relation to my research focus. They offered crucial insights of individual experiences of farmers enabling me to explore their narratives of information needs and the challenges they face in their different locations.

3.6.4.2. Administering the interview

According to Creswell (2009:73), interviews should be conducted in a conducive environment to avoid either party from disengaging prematurely. As explained by Creswell (2009:73), a researcher should always use an open-ended approach with well thought-out probing sections in order to keep the interviewee engaged throughout the interview. In this study, an interview guide was used to ensure collection of detailed data. Because of the devolution nature of the agriculture sector in Kenya, I visited the Bungoma County offices to introduce myself and seek for permission to conduct my study. I later visited the five sub-county offices that I had sampled, introduced myself and sought for permission to visit and interview lead farmers within the respective sub-counties. Because of the expansiveness and language diversity in Bungoma County, I engaged the Sub-county Agricultural Extension Officers and a local interpreter to help me in identifying the sampled lead farmers and to conduct the face-to-face interviews. The Sub-county Agricultural Officers and the local interpreter helped in striking a quick rapport with the twenty sampled lead farmers. They also helped in explaining and clarifying the purpose of the study, using either vernacular or Swahili languages. This was a precautionary measure to ensure that I would be able to meaningfully engage with any of the sampled lead farmers irrespective of their literacy status. Fortunately, all the lead farmers were found to understand the national Swahili language in Kenya. Therefore, the interviews were conducted using the Swahili national

language.

Before interviewing the lead farmers in the sampled sub-counties, I provided the background information about the interview and its purpose and then I requested them to participate in the study voluntarily. After they agreed to participate in the study, I gave them a consent form to sign. Using the interview guide, I recorded the name of the interviewee, his/her demographic information (e.g. age and education level), date of the interview and contact details of the interviewee. In addition, I requested the interviewee for permission to record the interview proceedings. Then I tested the *Sony ICD PX333 Digital Voice Recorder* that I used to record the interview that lasted for approximately half an hour. I took detailed notes throughout the interview session as my local interpreter engaged the participants in deep discussions using Swahili language but based on the interview guide. At the end of the interview, I thanked the participant and requested permission to follow up with them on emerging issues through the Sub-County Agricultural Extension Officer or a telephone call.

After the interview, I saved the audio-taped conversations in a computer database so that I could listen to them several times to come up with a detailed transcription. I also contextualized the interview notes, completed the data sheets and entered the information into a computer for further analysis, management and retrieval.

3.7 RELIABILITY AND CREDIBILITY

3.7.1 Reliability

As defined by Onwuegbuzie and Leech (2005:379-381), data reliability refers to the consistency to which similar values can be obtained at different times or by different people using a given described instrument and standard. As reported by Yin (2003:36) it is important to test for reliability in a qualitative case study in order to minimize errors and bias and ensure that the data is dependable. Consequently, in order to address reliability issues in this case study, the various data obtained from the respondents were triangulated in the manner described by Onwuegbuzie and Leech (2005:379). Following the devolution of the Kenya's agriculture sector in 2013, most of the agricultural information was moved from the National Ministry of Agriculture to the County offices. The secondary data that were sought from the office of County Director of

Agriculture based in Bungoma Town was used for triangulation purposes in order to ensure reliability.

3.7.2 Credibility

Credibility is a measure to which a given dataset can be trusted and, as reported by Yin (2003:36), data credibility in case studies can be increased by conducting post-hoc interviews. Yin (2003:37) reported that pilot studies help to refine certain aspects such as design, fieldwork procedure and data collection instrument in a case study. Consequently, in order to test for credibility of the interviews, a pilot study was conducted with two lead farmers in Kimilili Sub-county prior to the main study. These farmers were part of those sampled for the main study. This was necessary to ensure internal validity of the datasets. The responses provided by the lead farmers in the pilot study helped to refine the interview questions in order to avoid duplication of responses. During the main interview process, the sampled farmers were well probed in order to ensure that the information they provided was credible and trustworthy. As reported by Flick, Von Kardorff and Steinke (2004:185) validation of interviews and their sequencing can be tested by analysing whether the respondents are talking truthfully. Validity in this study was also assured by listening repeatedly and keenly to the audio-taped interviews to get a general sense and meaning of the responses before data transcription. Special attention was given to detect vagueness or contradictions of responses since these help to test for data validity as reported by Flick et al. (2004:184).

3.8 DATA ANALYSIS

In a qualitative method of inquiry, data analysis entails making sense out of the test responses provided by the research participants (Creswell 2009:183). Thus, the process of data analysis involves data preparation for analysis, performance of various analyses, and then deep-diving to understand the data much better (Creswell 2009: 183). In this case study, the interviews with leaders of the Farmer Field Schools were audio-recorded and fully transcribed for analysis using an induction approach. This was done through several steps as described below:

1) Listening to the interview conversations repeatedly before transcribing them, typing the interview responses, and arranging them into different respondents from five sub-counties in Bungoma County,

2) Reading through the data to understand their overall meaning,

3) Coding and organizing the data into common themes

4) Describing and representing the various themes of data in a qualitative narrative

3.9 EVALUATION OF THE RESEARCH METHODOLOGY

This study was carried out in Bungoma County, Western Kenya. The county has an estimated population of 1.7 million people and over 85% are farmers. Given the limitations of time and financial resources, not all the farmers in the county were sampled. Instead, a sample of 20 lead farmers who were purposefully chosen across five of the nine sub-counties of Bungoma County were interviewed. The instruments of data collection were interviews with the lead farmers and own observations. The farmers who were sampled for this study were requested to participate voluntary and provide the necessary information. Upon their agreement to participate voluntary in the study, they were asked to sign a consent form that is attached to this thesis as Appendix B.

3.10 SUMMARY

This chapter has provided an explanation of the research method and design used in the qualitative case study. The chapter described the strategies used in the study as well as sampling, interviewing, data collection and analysis. The study targeted twenty leaders of Farmers' Field Schools spread across five sub-counties in Bungoma County to establish the information services farmers in these sub-counties need, the difficulties experienced as well as the agricultural sources available to them. With respect to the study's objectives, face-to-face interviews were used as the data collection instruments for this study and the profiles of the interviewed participants have been provided in this chapter. The choice to use interviews was informed by the fact that the study was required to make inferences about the information needs of farmers in Bungoma County, which could be best analysed from opinions, experiences and outcomes provided by the lead farmers. In chapter four below, the research findings with regard to information needs, sources and challenges faced by farmers in Bungoma County have been analysed and discussed.

CHAPTER FOUR

RESEARCH FINDINGS OF THE STUDY

4.1 INTRODUCTION

This chapter presents the analysis of the qualitative data gathered from the leaders of twenty Farmer Field Schools (FFS) spread across five sub-counties of Bungoma County. The research findings represented in this chapter comprise of two sections: the first section provides information on the respondents' field schools and the benefits they enjoy by joining the schools. The second section provides the findings in relation to different themes and sub-themes that emerged from the data analysis.

4.2. CHARACTERISTICS OF FARMER FIELD SCHOOLS

In this section, a number of short questions were asked in order to get the conversation with lead farmers started. For instance, in order to acquire an idea of how farmers participated in farmer field schools (FFS) which were headed by the respondents, I asked: *"How many farmers attend the same farmer field school as you do?"*

Based on the responses provided by the lead farmers, it was revealed that the number of members per FFS range between twelve and thirty-five members. However, the majority of the groups have an average of thirty members.

I also wanted to establish the main farming system practised by the farmers and therefore I asked: *"What is the main farming system practiced by members of your field school?"*

When asked about their main farming practices it was established that maize is grown by all farmers and it is either intercropped or rotated with several legume crops but mostly beans and groundnuts. Besides crop growing, most of the farmers keep livestock and poultry.

In addition, I wanted to know the benefits they enjoy by being members of an FFS and hence I asked: "*Why do you think it is important to belong to these associations?"*

In response to this question, Respondent Kbc1 answered:

"You know, Agricultural Extension experts are few in our sub-county and therefore it is easier for the few officers to reach many farmers with extension services if they are gathered in one central place as a group. In addition, when we gather at a central place as a group, we are able to exchange ideas especially on the use of indigenous knowledge to address site-specific challenges."

Respondent Kdy2 from a different sub-county replied:

"*The benefits of being in an FFS are many. For instance, it is much easier to voice our grievances to the government as group. It is also easier to get credit from microfinance institutions when we approach them as a group. In addition, it is motivating to work as a group than as an individual."*

Respondent Kml2 from a different sub-county also replied:

"When farmers aggregate in an FFS group, it is easier for one person with professional knowledge in a particular area to train others and hence benefit many farmers with the use of little energy and resources. For instance, in my FFS, I am able to train many farmers on dairy goat production within a very short time. After the training, I have seen many of them who have applied the knowledge transferred to them to generate significant income for their families."

Based on the above responses, the following reasons for participating in Farmer Field Schools can be deduced. The number in square bracket indicates the number of respondents who gave the reason stated.

- It is easier to get information when in a group since agricultural officers will reach a bigger audience at once for training [5]. This finding is consistent with that of Demiryurek et al. (2008:1-25) who found that farmers in Turkey who were members of the Dairy Cattle Breeders' Association were more knowledgeable on agricultural processes and techniques than farmers who were not members of the Association because of better access to dairy farming information provided by agricultural experts to farmers'

groups.

- Farmers are able to share experiences on new farming technologies and also indigenous knowledge [6]. This finding agrees with that of Munyua & Stilwell (2013:327) who reported that farmers benefited greatly from one another when they gather in groups and shared indigenous knowledge on agricultural practices.
- It is easier to access government services since they have a voice as a group [4]. This is consistent with the findings of Demiryurek et al. (2008:1-25).
- Joint group activities are easier to accomplish [4]. This finding is consistent with that of Chevilotte (2010) who reported that communal seminars were leading to mass awareness of best-bet agricultural practices that increase farmers' productivity when adopted.
- Pooling together of resources to achieve bigger goals is made possible through Savings and Credit Cooperative Organizations (SACCOs) and thus farmers can access credit facilities where group members act as guarantors [5]. This finding is consistent with that of Gitonga & Machira (2008:11-169) who reported that it is easier for microfinance institutions to teach farmers about financial literacy when they are in groups. Such trainings help to reduce the risk of lending to smallholder holders making it easier for them to access credit as a group as opposed to an individual farmer.
- Easier to benefit from development partners [2]. This finding is consistent with those of Webber and Johnston (2017) and Chevilotte (2010) who reported that it was easier for development partners to reach farmers when they gather together in a group.
- Farmers can jointly organize for exchange visits [5]. This seems to be new information and there is need for further research to find out how the farmers raise financial resources to fund their group's exchange visit and how they apply the knowledge gained through the exchange visits to compensate for the funds spent on the exchange trips.

4.3 A NEED FOR SPECIFIC SOURCES OF AGRICULTURAL INFORMATION

As pointed out by Chevilotte (2010), farmers may need a variety of information and knowledge for the enhancement of their productivity. In order to determine the information needs of farmers in Bungoma County, the FFS leaders were asked to explain their common sources of agricultural information, what type of information they seek from the identified sources, how often they use the information sources and whether they find the sources to be useful in advancing their

agricultural productivity. These sub-questions were asked in order to answer the first research question in section 1.4.2: *What agricultural information sources are available for rural farmers in Bungoma County?*

When asked to mention the main sources of agricultural information, Respondent Kml3 answered as follows:

"In Wema FFS, we are a self-help group that likes to gather information from different sources for comparison reasons. For instance, there is an NGO called One-Acre Fund whose researchers visit us often to train us on livestock production. … We also train one another as FFS members through exchange of indigenous knowledge and with information we gather from the radio or TV…. In addition, we recently visited a village exhibition at the local market that was sponsored by Airtel Company where we learned many issues including doing agriculture as a business for income generation to improve our livelihoods."

To the same question, Respondent Kdy4 answered as follows:

"The Ministry of Agriculture Extension Officers are the ones who mostly bring us important agricultural information like soil fertility improvement technologies…. They also organize for us exchange visits to other groups where we also learn best-bet agricultural practices including livestock production…… We have also been visited by some researchers who took soil samples from our farms and later revisited us with advice to apply agricultural lime to reduce acidity in our soils…. I have also visited agricultural shows in Kitale and Bungoma Posta grounds where I was given brochures and pamphlets with information on best performing maize and bean seed varieties in our region and methods for improving livestock production."

In addition, Respondent Kbc2 answered as follows:

"We get agricultural information mostly from the Ministry of Agriculture extension officers who visit our FFS to advise us on issues to do with reduction of post-harvest losses, control of pests and diseases and other agronomic practices…. We have also been visited by researchers from KALRO who established demonstration plots on our farm."

From the responses provided by the FFS leaders it was established that farmers in Bungoma County obtain agricultural information mostly from three broad sources – printed, electronic and

verbal resources. The detailed forms of each source are summarised in Table 4.1 below.

Table 4.1: Type of information sources used by farmers in Bungoma County

Printed resource	**Electronic resource**	**Verbal resource**
• Pamphlets & brochures [2] • Newspapers [4] Books with guidelines on various farming techniques from different stakeholders [7]	• Radio [17] • TV programmes dealing with Agriculture [10] • Mobile alerts on weather and farming practices [3] • Internet [3]	• Extension officers from the Ministry of Agriculture (MOA) and County agricultural office [19] • Public meetings organized by the local administration [18] • Agricultural shows and Farmers' field days [20] • NGO staff promoting different technologies [18] • Farm input and produce dealers [17]. • Research institutes/ organizations [20] • Social networks like fellow farmers, market traders, relatives and friends [20].

The responses in section 4.3. showed that the farmers need access to certain sources. The discussion in this section will now endeavour to establish why certain sources are used and for which purpose.

(a) Printed resources

As shown in Table 4.1, two of the twenty FFS leaders interviewed responded that they use pamphlets and brochures as a source of agricultural information, four said they use newspapers and seven said they use books. The findings revealed that printed sources were not popularly used by farmers in Bungoma County to solicit for agricultural information. As pointed out in literature by Sanginga & Woomer (2009:263) and Ozowa (1995:15-20) this behaviour could be

attributed to personal information literacy and personal preferences. Ozowa (1995:15-20) reported that farmers in Nigeria used less of printed resources like books because of low information literacy. Similar findings were reported among farmers in Western Kenya by Sanginga and Woomer (2009:263). The sub-sections below provide detailed responses of the lead farmers who sourced information from printed resources.

i. Books

Only seven of the twenty respondents interviewed used books as sources of agricultural information. For instance, when the FFS leaders were asked to explain the information type they require from books, Respondent Wby3 answered:

"I only refer to a book if it is given to me by a trainer or a resource person and then I am advised on how and when to use it. For instance, last year we were visited by some NGO researchers who gave us books with information on poultry and rabbit production. They trained us briefly and then referred us to various sections of the books they gave us for further information….. The biggest challenge with a book as a source of agricultural information is that if you fail to attend a meeting where such books are given out then you may never get access to the book because we do not have a nearby library where such books can be displayed and accessed by the public. We keep asking our development partners to build for us a local library but this request has never been materialized and therefore our FFS members serve as moving library who carry vital information in their heads!"

On a similar question on the type of information that the FFS leaders require from a book, Respondent Kml2 who was a college graduate with a certificate in agriculture answered:

"*For me, I like farming and I practice it for income generation and therefore I look for any book with the relevant information that I need regardless of whether it is used in primary, secondary or tertiary institutions…… In most cases, I access and buy the books from a bookshop because we do not have a public library in our village."*

Generally, the responses from the FFS leaders revealed that printed resources are rarely used by farmers in Bungoma County as a source of information to advance their agricultural productivity. This is despite the fact that the majority of the respondents were well educated with either a secondary or tertiary level of education (Table 3.1). This could also be attributed to lack of a

nearby library to store such printed resources such as books, newspapers, pamphlets and brochures.

ii. Newspapers

When asked to explain the information type they require from newspapers, Respondent Wby3 answered:

"There are some extension officers from the Ministry of Agriculture who visited and gave us a newspaper called Organic Farming…. I refer to it when I want to know how to apply organic manure and the quantity of the organic manure to apply on my farm."

The response of this farmer supports the findings of Sanginga and Woomer (2009:263) that a farmer will look for information from whatever source if he/she is aware of the value of that particular information.

iii. Pamphlets and brochures

Out of the twenty respondents interviewed, only two of them mentioned the use of pamphlets and brochures as sources of agricultural information. This is unlike the case of Nigerian farmers where most of them were found by Ekoja (2004:198) to source agricultural information from brochures and leaflets.

When asked to explain the information type they require from pamphlets and books Respondents Kbc2 and Wbyw1 gave the following answers respectively:

"*When I want detailed information on soil fertility management and high yielding maize seed varieties, I refer to certain pamphlets and brochures given to us by ACDI/VOCA who have been working very closely with the Kenya Maize Development Programme. The pamphlets contained information on integrated soil fertility management and high yielding seed varieties of maize."*

"I am a lead farmer and therefore I often read pamphlets and brochures to equip myself with the right farming and marketing information to train my FFS members. ----- When I am doing follow up among my FFS members to evaluate whether they are adopting improved farming technologies, I carry the pamphlets and brochures with me for reference purposes. Sometimes I am given pamphlets and brochures by several NGO researchers to distribute among my FFS members and I also keep a copy for myself."

From the response given by these participants it was revealed that personal knowledge and skills create a need for more information. This findings support the report of Sanginga and Woomer (2009:263) that farmers would look for more information once they realize that they can benefit from such information.

Generally, all the respondents mentioned that there was no nearby library and they use printed resources like books and newspapers when they want to acquire a further understanding of the information they had retrieved from electronic and verbal resources.

(b) Electronic resources

As shown in Table 4.1, the farmers make use of the radio, agriculture related television programmes, mobile alerts and the internet.

i. Radio

Radio seemed to be the most popular electronic resource that is used by farmers in the Bungoma County. The common radio stations listened by the farmers include: Kenya Broadcasting Corporation (KBC), Sulwe FM, West FM, Citizen FM, Nyota FM, and Radio-Mambo. The reasons farmers preferred radio as a source of information could include the time of day the programs are broadcasted. For instance, when Respondent Kbc1 was asked to name the most popular source of agricultural information, he answered as follows:

"Most of my FFS members, including myself, listen to West FM and Nyota FM radio which broadcast information on modern methods of farming from 10 am when most of us are working on the farm. I normally carry my radio to listen while I am working on the farm. This way I multitask through working with my hands while my ears benefit from the information I get from the radio stations that normally broadcast in my vernacular language."

Similarly, while answering the same question, Respondent Kbc3 said:

I like listening to the farming program broadcasted by Sulwe FM radio that is aired at 1.30 pm when I am taking lunch and relaxing before I go back to the farm for the afternoon working sessions. The program is aired in Kiluhya and I learn a lot of information on soil fertility improvement from that radio program."

While answering the same question, Respondent Wbyw2 said:

"I personally prefer listening to Citizen Radio on Sunday after church service from 2.30 pm. It airs a program in Kiswahili called Makutano Junction. The program is full of agricultural information that is aired in the form of drama where there are several characters who practice agriculture in the right way and others who practice it wrongly. In that program, it is very entertaining to listen to the knowledgeable farmers teaching those who are not aware of best-bet agricultural information. At the end of the radio program the characters who learn from the knowledgeable farmers appreciate a lot on the way of getting information from fellow farmers."

This finding is consistent with that of Spurk et al. (2013) who found that over 83% of the farmers in Western Kenya get agricultural information from the radio. As reported by Rogers (2003:78-79) information disseminators prefer radio and other mass media channels because one person can reach large numbers of people within a short time. This is perhaps the reason radio is the most popular source of agricultural information in Bungoma County.

ii. Television

The use of the radio as a resource was followed by television. Half of the respondents indicated that they watch television for information. When the FFS leaders were asked whether they regularly use TV as a source of information, Respondent Kbc3 said:

"I watch Citizen TV on Sunday at 3 pm. At this time a farmers' program called Shamba Shape up is aired in Kiswahili. The program educates me on how to conduct farming as a business. If a farmer wants to make money through farming practices, then this is the program to watch because it comes on weekend and especially on Sunday when most people are relaxing at home after their church service."

Similarly, Respondent Wbyw2 gave the following answer when asked the same question:

"When there is an agricultural show in Bungoma and I fail to attend due to unavoidable circumstances, I watch Citizen TV documentaries just before the news broadcasting of 9 pm. Even when there are major agricultural exhibitions in our sub-County, Magharibi local TV station is very good in covering them in both the 7 pm and 9 pm News. I watch and listen attentively to such news in the TV to learn about emerging agri-business ventures."

From the responses given to the FFS leaders, it emerged that the common TV channels watched and listened by the farmers are Citizen, Nation, K24, KTN and Magharibi. This finding support

the study of Spurk et al. (2013) who reported that farmers in Western Kenya were increasingly using television as a source of agricultural information as a result of popular programs like the "*Shamba Shape up"* on Citizen Television.

iii. Mobile alerts and internet sources

Mobile and internet sources were used by few leaders and mainly to access information sent to them via their emails. This is unlike the study of Mutwiri (2013) who reported fast penetration of mobile phones in the rural areas and subsequent potential increase of mobile phones as a source of agricultural information. The findings, however, support the study of Spurk et al. (2013) that mobile phones are yet to become a popular source of agricultural information in Western Kenya.

When the FFS leaders were asked whether they regularly use mobile phones as a source of information, Respondent Wbw4 said:

Yes, I get sms alerts weekly on cattle keeping and poultry farming because I have subscribed to the service as advised by our area veterinary officer. Only a few farmers in this area have subscribed to the service and therefore they do not get the alert".

In terms of internet as a source of agricultural information, the interviews with the FFS leaders revealed that the internet is not a popular source among farmers in Bungoma County. For instance, when the FFS leaders were asked whether they regularly use the internet as a source of information, Respondent Wbw1 said:

"Only a few of us, like our FFS secretary who has a laptop, can access information via the internet. I have also seen some of our young members who own smart phones search for agricultural terminologies in their smart phones. In addition, when some of the NGOs that we collaborate with send us information on days and program for attending field days via email, our FFS secretary downloads, prints and presents to us the information when we gather as a group."

In addition, Respondent Kbc4 mentioned:

"Only few of us know how to use internet. For example my FFS group, we use our secretary who downloads for us information shared through emails."

This finding supports the study of Benard et al. (2014:16-19) that due to information illiteracy some farmers fail to access certain types of information. It also reveals a need for the FFS leaders to be trained on information literacy skills in order to make them conversant with Internet uses.

Similarly, Respondent Kml1 gave the following answer when asked the same question regarding the use of the internet:

"Internet is only used by the rich farmers. Personally I do not have a smart phone and a computer and therefore I do not use internet as an information source. However, some of my fellow farmers use their smart phones to get SMS alerts on agronomic practices and output markets. They normally send a question of interest to a particular code number and then an answer comes within a very short time."

From this response, it emerged that some farmers in Bungoma County get mobile alerts on weather and farming practices enabling them to make decisions on when to plant, add fertilizers and apply other appropriate practices.

(c) Verbal resources

As shown in Table 4.1, verbal resources were the common information sources for farmers in Bungoma County. These include Extension Officers from the Ministry of Agriculture (MOA) and county agricultural office, public meetings organized by the local administration, agricultural shows and farmers' field days, NGO staff promoting different technologies, farm input and produce dealers, research institutes/organizations and social networks like fellow farmers, local market traders and relatives and friends.

i. Extension Officers from the Ministry of Agriculture and county agricultural office.

More than half of the FFS leaders interviewed said that they seek information from the Extension Officers employed by either the Ministry of Agriculture or County Government of Bungoma. When they were asked whether they seek information from the Agricultural Extension Officers, Respondent Kbc3 answered:

"Last year our farms were invaded by the notorious Fall Army Worms and most of us had to rush quickly and seek information from the Ministry of Agriculture (MOA) officers on how to control the worms because they were resisting most of the pesticides we were familiar with. When we visited their offices we were advised to use pesticides like Belt, Rocket and Otherne which were very effective in controlling the worms. - - Generally whenever we have an epidemic, catastrophe or a disease outbreak, we seek help from the MOA officers."

ii. Public meetings organized by the local administration

More than half of the FFS leaders interviewed quoted public meetings organized by the local leaders (barazas) as a common source of information. When they were asked whether they seek information from public meetings organized by the local administration (barazas), Respondent Kdy2 said the following:

"When subsidized fertilizer or improved seeds are available in the government offices, our chief normally informs us through his Assistant chiefs and village elders who tell us when to gather in a public place for further information on the inputs which are later sold to us at a subsidized price. In addition, our chief sometimes makes follow up visits together with agricultural stakeholders to monitor whether we are using the subsidized inputs as advised at the public meetings."

iii. Agricultural shows and farmers' field days

All the twenty FFS leaders interviewed said that they frequently visit agricultural shows organized by the Agricultural Society of Kenya or farmers' field day where they gather valuable information for improving their farm productivity. When the FFS leaders were asked whether they seek information from agricultural shows and farmers' field days, Respondent Kml1 said the following:

"I attend various agricultural shows that are organized by the Agricultural Society of Kenya (ASK). For instance, between last year and this year, I have visited ASK in Bungoma, Busia, Kitale, Kakamega, Nakuru and Kisumu. I have also attended several farmers' field days and I do this to get as much information as possible on the use of inputs like fertilizers that do not acidify the soils. I am also interested in information on the emerging threats to crop production. I use the knowledge gained in all these shows to train my FFS members."

iv. NGO staff promoting different technologies

Of the twenty FFS leaders interviewed, fifteen of them agreed to have sought information from various NGOs that work in their region. When they were asked whether they seek information from NGO staff, Respondent Kml4 answered:

"As an FFS leader, I am the link between my group members and any NGO officers who want to work with us. Most NGOs who visit us come to inquire about availability of land to establish demonstration plots. We learn a lot from the demo plots during field days."

v. Farm input and produce dealers

With the exception of one FFS leader, all the FFS leaders mentioned farm input and produce dealers as important sources of agricultural information, especially on the use of fertilizers, improved seeds and pesticides. When they were asked whether they seek information from farm input and produce dealers, Respondent Srs3 answered:

"When I visit a farm input dealer, I seek information on the appropriate fertilizers and herbicides to use. These days there are so many fake fertilizers and herbicides and therefore I inquire from the sellers to get their assurance that they are selling genuine products to me."

vi. Research institutes/organizations

All the FFS leaders said that they have interacted and sought information from researchers from either the national research organization, KALRO or even from universities and NGOs.

When the FFS leaders were asked whether they seek information from research institutions/organizations, Respondent Wbyw2 answered:

"A farmer will get information from a researcher based on the discipline being researched on. For instance, if a researcher is investigating on weed control, we get information on how to control weeds like the parasitic Striga weeds. If the researcher is investigating on soil fertility matters, we get information on the appropriate type of fertilizers to use in correcting nutrient deficiencies in the soil. If the researcher is dealing with pest control, we get information on various methods of pest control like the Push-Pull technology promoted by an NGO called ICIPE."

vii. Social networks

Although the literature that was reviewed for the purposes of this study did not identify social networks as important sources of information, the interviews conducted among the FFS leaders

revealed that farmers in Bungoma County also seek information from social networks such as fellow farmers, local market traders and relatives and friends.

- Fellow farmers

When the FFS leaders were asked whether they seek information from fellow farmers, Respondent Srs2 said:

"As we gather together in our FFS group, we encourage any of our colleagues with information on new technologies for advancing our farm productivity to share with us. Once we are trained by any of the knowledgeable farmer in our FFS group, we then go to apply the new technology on our individual farms."

- Local market

When the FFS leaders were asked whether they seek information from the local market, Respondent Kbc1 said:

"I am near Bungoma town and I visit the market place often to talk with my colleagues who are either selling or buying a farm product. I ask them about the prevailing prices of the products they are transacting on, mostly cereals like maize and sorghum and also sweet potatoes."

- Relatives and friends

When the FFS leaders were asked whether they seek information from relatives and friends, Respondent Kml3 said:

"Truly speaking, we learn a lot from ourselves as well as from our FFS trainers. We exchange a lot of indigenous knowledge on pest control, planting practices and storage of our farm produce."

4.4 INFORMATION REQUIRED BY BUNGOMA FARMERS

In order to understand the information required by farmers in Bungoma County, the FFS leaders interviewed in this study were asked to mention the types of information they seek from the various sources. Their responses under the printed, electronic and verbal resources were as follows:

(a) Information sought in printed resources

Normally, farmers in Bungoma County turn to printed resources when they want to get deeper

understanding of the information derived from electronic and verbal resources.

For example, Respondent Kdy2 mentioned:
"I read pamphlets like 'Organic Farmer' when I want to get further insights on when and how to apply new technologies like integrated soil fertility management practices for optimum productivity and profitability from my farm …. When I want to understand more about a given new technology, I visit a bookshop to buy a referenced book that contains the information I am interested in. Also when I go to agricultural shows and public meetings, I listen to the information being disseminated and when I create interest in a particular issue, I then ask the exhibitors to give me a pamphlet or brochure that I can read more."

From the interviews conducted among the FFS leaders, it emerged that the information sought by the few farmers who read pamphlets, brochures, newspapers and books include:

- Best-bet agronomic practice for profitable farming
- Leadership skills of Farmer Field Schools
- Livestock rearing for optimum profits
- Methods for weed control
- Application of organic inputs and inorganic fertilizers

(b) Information sought in electronic resources

In order to get an in-depth understanding of what the farmers require from electronic resources, the FFS leaders were asked to explain the information they seek from radio, television, mobile alerts and the internet. Their responses under each of these categories were as follows:

(i) Radio

Most of the FFS leaders interviewed said that they use the radio to understand how to use agrochemicals and fertilizers since this information is very well explained in their local vernacular language. For instance, when Respondent Kml2 was asked to explain the type of information he seeks from the radio, he responded as follows:

"You know I like listening to Mulembe FM radio that broadcasts in our Luhya language and it brings us advertisements with information on how to use pesticides like Belt that is effective in

controlling Fall Army Worms that damage our maize crop. I also listen to their farming programs where they explain to us how to use blended fertilizers that do not acidify the soil."

(ii) Television

From the interviews conducted among the FFS leaders it was revealed that half of them own a television set (TV) thanks to the Kenya's rural electrification program that has connected them to the National grid power line. From the TV programs that they watch they are able to get information on any outstanding agricultural venture, control of pests and diseases and venues and dates of agricultural shows organized by ASK. For instance when Respondent Kbc1 was asked to explain the type of information he seeks from the TV programs he responded as follows:

"One good thing of a owning a TV is that you get to relax before it watching the 7 o'clock News broadcast and in between the news sessions there are several commercial advertisements that remind you of important venues and dates of agricultural events like the shows organized by the Agricultural Society of Kenya (ASK). On the Sunday following a major agricultural show event, I watch the Shamba Shape up program that is aired in Citizen TV where I get practical information on how to apply a given new farming technology that might have won an outstanding award during the ASK show."

(iii) Mobile alerts and internet

From the interviews conducted among the FFS leaders it was revealed that only a small proportion of them access agricultural information through their mobile phones and the internet. The few who source information from these resources normally look for email correspondences, search for new terminologies and short message service (SMS) alerts on various farming aspects depending on the code that one has subscribed to. For instance, when Respondent Kbc3 was asked to explain the type of information he seeks from the mobile phones and internet he responded as follows:

"Besides the food crops that I grow, I keep poultry and dairy cattle for income generation. I subscribe to various SMS codes so that I can get information on control of poultry and livestock diseases. I am also interested in knowing the prevailing market prices of eggs and milk before I send my workers to sell them in the market."

Similarly Respondent Wbyw1 said:

"Because we work with a number of stakeholders who normally send us pertinent information via email, we task our FFS secretary to keep constant checks in the internet for correspondences that need our quick actions."

(c) Information sourced in verbal resources

In order to get in-depth understanding of what the farmers require from the verbal resources, the FFS leaders were asked to explain the information they seek from the various verbal resources shown in Table 4.1. The details were given under each category as follows:

(i) Extension officers from the Ministry of Agriculture (MOA) and the County Agricultural Office

All the lead farmers agreed that they seek various categories of information from MOA extension agents and County Agricultural Officers. Each of the lead farmers gave different types of information that they seek from these officers. They include:

- Support on how to use new farming technologies
- Use of new fertilizers blends, improved seeds and pesticides
- Control of pests and diseases like Fall Army Worms
- Agronomy on fodder species for optimum livestock production
- New high yielding crop varieties
- Value addition ventures

For example, Respondent Srs1 mentioned that:

"When I want information on new farming technologies to enable me undertake agriculture as a business, I visit the agriculture technical officers at Sirisia sub-county. They provide me with pertinent information like the performance of H613 hybrid maize seeds, how to plant the seed, how to manage, protect and how to minimize post-harvest losses for maximum profits".

Another respondent from the same sub-county reported that:

"Normally I am the one who visits the Ministry of Agriculture offices to seek for information like effective pesticides to control notorious pests like the current Fall Army Worms which have invaded my farm. The agriculture officers do not regularly come to my home but whenever they

come, I seize the opportunity and ask them about new high yielding crop varieties, their spacing and relevant agronomy and the best fertilizer to apply to get high crop yields."

ii. Public meetings organized by the local administration

All the lead farmers agreed that they attend public meetings organized by the local administration and when they attend such meetings they are able to get the following agricultural information:

- Sources of subsidized seeds and fertilizers
- Group management skills
- Dates for major agricultural meetings and expectations from FFS leaders

For example Respondent Kml1 mentioned that:

"I like to attend public meetings (barazas) convened by our chief and other leaders because they provide us with information about subsidized and new fertilizer blends which do not acidify the soil, they inform us on the advantages of mixing farm yard manure with lime and fertilizers in order to reduce soil acidity. This improves soil fertility and makes improved seeds to give higher yields. When I get this information, I teach my FFS members on the same."

iii. Agricultural shows and farmers' field days

All the lead farmers interviewed in this study agreed that they have attended several agricultural shows and farmers' field days where various agricultural technologies were demonstrated. The venues for these events were given as follows:

- Agricultural Society of Kenya (ASK) show grounds at Bungoma, Eldoret, Kakamega, Kitale, Busia, Kisumu, Nakuru, Kachugi, Kanduyi, and Malaba
- Mabanga Farmer Training College (FTC)
- Farmer Field School (FFS) local exhibitions
- Fields days on neighbours' farms

When the lead farmers attend agricultural shows and farmers' field days, they seek the following information:

- Remunerative agribusiness ventures that can generate quick income

- Discover crop irrigation opportunities
- Guidance on doing farming the right way for increased crop yields
- New technologies for increasing food production and income
- Discover emerging remunerative markets and build new networks
- Effective measures for controlling pests and diseases
- Knowledge on the source of quality farm inputs and understand how to differentiate fake and genuine quality inputs
- Understand good crop and animal husbandry including poultry

For example, Respondent Wbyw4 mentioned that:

"I attend agricultural shows to learn about good animal husbandry including poultry keeping….. I also grow bananas and their yields are very low. I therefore, visit agricultural shows in Bungoma to learn new technologies for improving the productivity of my bananas….. Also when I visit Farmers' field days I seek information on how to identify and differentiate between genuine pesticides and fake ones."

iv. NGO staff promoting different technologies

All the lead farmers interviewed in this study agreed that they have interacted with staff of various non-governmental organizations (NGOs) either on their farms or in relevant agricultural meetings. Some of the active NGOs that have visited the lead farmers during promotion of various agricultural technologies include: Rural Outreach Program (ROP), Anglican Development Services Western (ADSW), Food and Agricultural Organization of the United Nations (FAO), International Centre of Insect Physiology and Ecology (ICIPE), Kenya Agricultural Commodity Exchange (KACE), Agricultural Cooperative Development International/Volunteers in Overseas Cooperative Assistance (ACDI/VOCA), Kenya Value Chain Enterprise (KAVES), Ace Africa, One Acre Fund and Vi Agroforestry and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ).

During interaction with the staff of these NGOs the lead farmers normally seek for the following information:

- Sources of affordable microfinance services

- Effective methods for control of pests and diseases
- Dairy management practices for optimum profits
- Best technologies for horticultural production
- Networking opportunities with other FFS
- Profitable agribusiness ventures
- Socio-economic benefits of the projects they are promoting
- Training opportunities to strengthen their FFS

For example, Respondent Kml3 said:

"I have benefited greatly from the frequent visits made by officers from One-Acre Fund who have trained me on proper spacing for maize and informed me about sources of affordable financial services…. They have also provided me with crucial information for increasing milk production from my cows….. They have even given me several pamphlets to read more about crop and dairy farming."

v. Farm input and produce dealers

Seventeen (85%) of the lead farmers agreed to have visited an input/produce dealer to seek for any of the following information:

- Availability of quality seeds and fertilizers and their costs
- Usage rates for fertilizers, seeds and pesticides
- Best-bet agronomic practices and crop protection
- Aggregation centres for grain produce
- Drought tolerant crop varieties
- Farm produce with greatest demand for higher profits
- Linkages they have with value chain players for farmers' benefits
- Market price of maize to compare with price offered by brokers
- Market price of maize to compare with price offered by schools
- Offers on advertisements
- Use of pesticides without negative effects

Some of the input and produce dealers mentioned by the lead farmers were Kenya Seed Company, Western Seed Company and Syngenta.

For example, Respondent Wbyw3 stated that:

"Farm input dealers like those who operate Agro-vet shops around here are business minded… They like to discuss market prices of various products. They provide us with information of new pesticides that can substitute what you knew especially, if the pesticide you knew is out of stock! They will educate you about the available substitutes that can play the same function as what you wanted until you get convinced and buy the new pesticide!"

vi. Research institutes/organizations

Seventeen (85%) of the lead farmers interviewed asserted that they have either been visited by a researcher or they have visited a research organization to seek for agricultural information. The most common research institutions/organizations that interact with the lead farmers are the Kenya Agricultural and Livestock Research Organization (KALRO) and Egerton University. They have been partnering with a number of NGOs working in Western Kenya. The lead farmers normally seek the following information from the research organizations:

- Agribusiness ventures and technologies on farm demonstrations
- Benefits of emerging technologies like conservation agriculture
- Emerging best-bet practices for income generation
- Performance of agroforestry technologies
- Performance of recommended seed varieties
- Profitability and practicability of new farming technologies
- Sources of capital, training opportunities, strengthening of FFS
- Weather forecasting and soil testing services

For example, Respondent Kbc2 claimed:

"We have learnt from the research organizations that we need to apply best-bet agronomic practices so that we can produce enough and sell the surplus produce to generate income. This way we become food secure and be able to generate income to carter for our family needs….We ask them about the profitability of new farming technologies like those of rotating sunflower and maize which we do on contract farming."

In addition, Respondent Kml4 said:

"We interact often with many researchers from KALRO, ICIPE and University students who come to seek for land to establish research trials. When we accept to host the research trials, the officers establish many demonstration plots and then convene meetings around them to teach us on new farming technologies".

vii. Social networks

Various social networks were mentioned by the FFS leaders as sources of various types of agricultural information. They include fellow farmers, local market traders and relatives and friends.

1. Fellow farmers

With the exception of one farmer, all the lead farmers agreed to have consulted a fellow farmer on how to advance their crop productivity. The specific information that the lead farmers normally seek from their fellow farmers include:

- Sources of affordable microfinance services
- General performance of crops, livestock and poultry
- Networking opportunities with other FFS
- Performance of technologies demonstrated by various organizations
- Profitable agribusiness ventures
- Progress of FFS activities

For example, Respondent Kml4 declared:

"As lead farmers, we establish demonstration plots near the roads where other farmers can see and create interest in the good performing crops. When our fellow farmers see the healthy crops on our demo plots they come to inquire more information about the technologies being demonstrated. We train them on how to apply the technologies and later they go and practice the same on their farms."

2. Local market traders

All the lead farmers interviewed agreed that they have visited either the local markets or nearby big towns like Bungoma to seek for agricultural information which included the following:

- Better prices of staple foods, poultry and livestock
- Emerging networks for collaborations
- New buyers of farm produce and their price offers
- Prevailing prices of staple foods and their demand

For example, when one of the respondents was asked about the information he seeks from the local market, he answered as follows:

"As a farmer I am interested in knowing which of the many farm products that I have can be sold at a given season to make maximum profits. I make a comparison of the selling prices of maize, cowpeas, beans and poultry to determine which I can sell at remunerative prices."

3. Relatives and friends

With the exception of three lead farmers, all the farmers who were interviewed agreed that they have consulted either a relative or a friend for the following information:

- Source of cheap transport means of farm produce to the markets
- Emerging networks for enhancing farm productivity
- Availability of off-takers for contract farming
- Emerging new ICT for agriculture technologies and their profitability
- Exchange of indigenous ideas
- General market information

For example, one of the Respondents reported that:

"When we go to attend public meetings many stakeholders attend to inform farmers about their products and the profitability of the technologies they promote. When we get such information, we disseminate the same to our friends and relatives when we get home and vice versa…. I personally contact my friends to inquire about cheap transport means of my farm produce to remunerative markets."

The analysis above confirmed the findings of Kaniki (2003) that the level of information needs may differ between people, or a group of people, depending on a range of factors, such as level of education, socio-economic status, range of information sources available, level of awareness,

and ease of use of information. In summary, through in-depth interviews with the lead farmers in Bungoma County, it was found that farmers required the following types of information to advance their agricultural productivity:

i. best-bet agronomic practices
ii. affordable farm inputs
iii. high yielding pests and disease resistant crop varieties
iv. soil testing services
v. income generating opportunities
vi. remunerative markets
vii. pests and diseases control
viii. affordable farm inputs
ix. value addition
x. fabrication of farm tools
xi. soil & water conservation
xii. weather patterns
xiii. Livestock & poultry farming
xiv. fodder species
xv. farm management

4.4.1 Frequency of using the required information

In order to understand the frequency with which the farmers in Bungoma County use the information that they seek from the various resources, the FFS leaders were asked the following question. *How often do you use the information that you require to advance your farm productivity?* In response to this question, Respondent Kbc3 said:

"The practical use of agricultural information is season based. For instance, if I want to apply information I got on correct spacing of maize or beans, then I apply this at the start of the rain season when I am planting. If I want to use information on reduction of post-harvest losses, then I apply this at the end of the rainy season when I have harvested my crops."

To the same question Respondent Kdy3 answered:

"I apply the information that I require to advance crop productivity at any moment of need. In

other words, it is demand-driven! For instance, if I am training my fellow farmers, I use the information at my disposal irrespective of where I accessed the information. My end goal is to accomplish the intended purpose."

From the responses received from the interviewed FFS leaders, it was established that farmers in Bungoma County regularly use the information they need and access to improve their crop productivity.

4.5 FARMERS' ACCESS TO AGRICULTURAL INFORMATION IN BUNGOMA COUNTY

Farmers' accessibility to agricultural information was assessed by asking the FFS leaders to answer questions relating to easiness to reach the various sources of information.

(a) Access to printed resources

In order to assess how easy it was to access information in printed resources, the FFS leaders were asked to explain how easy it was to access information from books, newspapers, pamphlets and brochures. From the responses provided by the FFS leaders, it was established most farmers do not easily access information from the electronic resources. The main reason for their inaccessibility was the cost associated with it which farmers find to be high given the many household needs that require money to be fulfilled. Their responses under each of these categories were given as follows:

(i) Books

When the FFS leaders were asked to explain how easy it was to access information from the books, Respondent Kml1 said:

"*It is not easy for me to access and read a book with agricultural information. Instead, I read magazines, pamphlets and newspapers because they are the ones that are easily available to me and even to most of my FFS members. Most of the NGOs and extension officers who give out training handouts prefer to distribute these materials instead of books."*

(ii) Newspapers

When the FFS leaders were asked to explain how easy it was to access information from the

newspapers, Respondent Kml3 said:

"There are newspaper pull-outs like Seeds of Gold that is contained in Saturday Daily Nation but not many farmers have access to it. This is because it requires someone to buy the newspaper or to borrow it from a friend to read. Many times I am interested in reading the information but I lack the money to buy the newspaper because of many competing needs of my little income."

(iii) Pamphlets and brochures

When the FFS leaders were asked to explain how easy it was to access information from the pamphlets and brochures, Respondent Wbyw4 said:

"Sometimes ago we used to get so many pamphlets and brochures from KALRO and NGOs like ICIPE explaining on the application of technologies like push-pull for control of maize stalk borer but we no longer get them these days. When we get them from these organizations, we read them but when we do get them then we do not access the agricultural information they contain."

(b) Access to electronic resources

In order to assess how easy it was to access information in electronic resources, the FFS leaders were asked to explain how easy it was to access information from radio, television, mobile alerts and the internet. From the responses provided by the FFS leaders, it was established that most farmers access information easily from the various types of radio stations that broadcast in either vernacular or Kiswahili. However, information access from TVs, mobile phones and the internet was not readily available to most farmers because they do not own them. Their responses under each of these categories were as follows:

(i) Radio

The following question was asked in order to assess the accessibility of information from the radio, *"How easy is it to access agricultural information from the radio?"* In response to this question Respondent Kml1 answered:

We have many radio stations like Nyota FM, Mulembe, Radio Jambo and Citizen among others. These radio stations have specific times for airing agricultural programs and because they are many, accessing information from the radio is very easy."

(ii) Television

A similar question as in the above case of radio was asked but on TV accessibility and in answering the question, Respondent Kml4 said:

"In my home I do not have a TV set but I would really be happy if I was blessed with one. There a few of my neighbours who own a TV and I am sure they are able to watch a number of agricultural programs that are aired in the TV. For the time being, I do not a TV but I will buy in future when my income levels increase significantly."

(iii) Mobile Alerts and Internet

When the FFS leaders were asked to explain how easy it was to access information from the Mobile phones and the internet, Respondent Wbyw3 said:

"For me personally I do not access any agricultural information from the mobile phones and Internet. However, our FFS secretary has a laptop and is able to download email communication from our partners and then then convey the information to us when we gather as a group."

(c) Access to verbal resources

In order to assess how easy it was to access information from verbal resources, the FFS leaders were asked to explain how easy it was to access information from Extension Officers in the MOA and county offices, public meetings organized by the local administration, agricultural shows and farmer field days, NGOs staff promoting different technologies, farm input and produce dealers, research institutes/organization and social networks. Their responses under each of these categories were as follows:

(i) Extension Officers in the MOA and county offices

When the FFS leaders were asked to explain how easy it was to access information from the MOA and County offices, Respondent Srs1 said:

"Sometimes ago, extension officers used to visit us often but they no longer do this anymore. They only visit our FFS say once or twice a year but we often meet them when we attend public meetings or field days."

On the same question Respondent Kml1 responded as follows:

"I am an FFS leader and since the extension officers do not visit us often, I make an effort to visit them in their offices. I ask them all the questions that I need responses and then I use the information gathered to train my FFS members."

These responses imply that a farmer has to make a deliberate effort to access information from an extension officer because they no longer visit farmers often as they used to several years ago.

(ii) Public meetings organized by the local administration

When the FFS leaders were asked to explain how easy it was to access information from public meetings popularly known as "barazas", Respondent Kbc3 said:

"*These are the most accessible source of information because when our local chief calls for public meetings, he invites different resources people like researchers, extension officers and other agricultural experts who come to advise us on best-bet methods of increasing crop production."*

(iii) Agricultural shows and farmer field days

On a similar question as above but focused on agricultural shows and field days, Respondent Kbc3 said:

"Agricultural shows are good sources of information but they only happen once in a year. If the venue is far from your homestead or if you do not have the gate entry fee, then it becomes difficult to access information from this source. However, field days can happen quarterly in a year and they are more accessible compared to agricultural shows."

(iv) NGOs staff promoting different technologies

Similarly on the same question but focused on information access from NGOs, Respondent Kml1 said:

"We have so many NGOs that operate in our area. These include One Acre Fund, Western Kenya that have taught us many things including livestock production. Some other NGOs have also come to ask for availability of land to conduct demonstration plots. Others, we meet at various agricultural forums and we get a lot of information from them when we chat together."

(v) Farm input and produce dealers

When the FFS leaders were asked to explain how easy it was to access information from farm input and produce dealers, Respondent Wbyw3 said:

"A farm input dealer cannot give you all the information you need. His/her biggest goal is to make profit and therefore he/she will provide you with information on the products you want to buy. In my case, I buy farm inputs like seeds and fertilizers at the start of the rain season and this is the only time I go to an input dealer for information. In the case of produce dealers, I enquire and go to the buyer who offers the highest price even if he/she is located further away from my homestead."

From the responses given by this category of information providers, it was revealed that farmers are interested at information that can make them better off in terms of net profits.

(vi) Research institutes/organization

When the FFS leaders were asked to explain how easy it was to access information from research institutes, Respondent Kdy3 said:

"We interact with several research institutions like KALRO and several universities who normally visit us when they are experimenting or evaluating the technologies that they promote. They engage us on our farms and in the process we are able to learn a lot from the research officers."

(vii) Social networks

From the interviews conducted among the FFS leaders it was revealed that farmers readily access agricultural information from various social networks like fellow farmers, local market traders, relatives and friends. Their responses under each of these categories were as follows:

1. Fellow farmers

Respondent Kml1 said:

"For us as an FFS we meet every week and every member is encouraged to share new ideas with the group members. We freely and readily provide information to each other."

2. Local market traders

Respondent Kbc3 answered:

"You see our local market is very near my home, I access it at my pleasure and I go there if I want to know the prevailing prices of the farm products that I have. For instance, if I want to sell my cereals, chicken of vegetables from home, I first visit the local market to know the prevailing price so that I do not sell at a loss."

3. Relatives and friends

Respondent Kbc3 answered:

"*Relatives and friends are very accessible but I cannot ask them any information I want. I only ask them about agricultural information if I have evidence that they have the right information what I want to enquire."*

4.6 FARMERS' USE OF AGRICULTURAL INFORMATION

In order to assess the farmers' use of agricultural information, the FFS leaders were asked to explain why they need agricultural information and the usefulness of the information they accessed from the various resources. Their responses are provided in the following sections:

4.6.1 Need for agricultural information

From the responses provided by the FFS leaders, it was established that farmers need agricultural information for the following uses:

- Get guidance on doing farming the right way in order to increase crop yields, food security and incomes
- Discover crop irrigation opportunities
- Understand effective measures for controlling pests and diseases
- Know source of right inputs
- Understand how to differentiate fake and quality inputs
- Understand good crop and animal husbandry
- Know the right seeds and fertilizer to apply for optimal yields and profits

4.6.2 Usefulness of the information source to Bungoma farmers

Briefly explain why you wanted to know this information and how the question was formulated?

Famers have found the information obtained useful for improving their farming practices. For instance Respondent Kbc3 answered:

"The agricultural information that we get from various sources is very useful and most of it has been adopted by me and my farmers to increase crop yields." This feeling was provided by 13 other FFS leaders.

Similarly, Respondent Kbc4 said, *"The agricultural information that we get from various sources is useful but adoption of the technologies is largely hindered by expensive farm inputs."* Four other FFS leaders shared the same opinion.

The farmers proposed the following ways for improving the usefulness of the agricultural information they access from various sources:

- More training in public meetings (baraza's).
- Farmers should work closely with agricultural extension officers and these services should be brought closer to the people and made free to access.
- Development partners to provide farmers with enablers of access to information like internet enabled mobile phones, televisions and radios.
- Facilitation for transport to attend field days, exchange visits and agricultural shows.
- Provision of subsidies for implementation of expensive technologies.
- Use of posters and farming guides in the local markets to pass on agricultural information. Brochures and pamphlets to be written in local languages to communicate more effectively with the rural farmer.
- Empower farmers more by training farmer trainers who can act whenever an extension officer retires or is unavailable.
- Use of video assisted information dissemination methods and YouTube.
- NGOs and other development partners with strict conditions of supporting farmers to loosen their requirements to encourage farmers (for example, the one-acre fund).

4.7 CHALLENGES FACED BY FARMERS TO ACCESS AND USE AGRICULTURAL INFORMATION

In order to understand the challenges faced by farmers in Bungoma County in accessing

agricultural information, the FFS leaders were asked to explain the problems they encounter when looking for agricultural information. From their responses, the following challenges were identified:

- Few extension officers to consult before making a decision
- Infrastructural constraints like lack of electricity to power TVs, radio and mobile phones
- Misinterpretation of theoretical information causing errors in application of agricultural practices and technologies
- Mismatch between farmers' needs and available information
- Untimely access of the required information
- Insufficient information on the use of new fertilizers and agrochemicals
- Long distance to reach the extension officers
- Non-coordinated messages from stakeholders
- Unaffordability of ICT-based dissemination channels
- Use of communication channels that are not farmer-friendly

4.8 FARMERS' MITIGATION OF CHALLENGES TO ACCESS AND USE OF AGRICULTURAL INFORMATION

When the FFS leaders were asked to suggest possible solutions for addressing their challenges, they proposed the following interventions:

- Build capacity of farmers in ICT in order to improve on timeliness of information delivery.
- Offer practical lessons on diverse methods for accessing agricultural information
- Disseminate agricultural information in local languages.
- Increase exchange programs.
- Extension Officers should visit farmers more often and build capacity of farmers in ICT.

- Improve on timeliness, availability, accessibility and affordability of the information in order to increase farmer awareness.
- Offer practical lessons on diverse methods for accessing agricultural information.
- Open sub-centres to bring extension services closer to farmers.
- Provide free and compulsory extension services.
- Provide transport and communication means to extension agents to dissemination agricultural information.
- Subsidize inputs and extension services.
- Empower FFS members to serve as extension agents and access necessary information.

From the responses provided by the FFS leaders, it was revealed that there are many challenges that hinder access and use of agricultural information in Bungoma County but there are local solutions known to the farmers that could be adopted by agricultural stakeholders to address them.

4.9 SUMMARY

In this chapter the responses provided by leaders of Farmer Field Schools in Bungoma County were analysed to reveal the information needs of rural farmers in Bungoma County and how they access and use agricultural information. It became apparent the farmers seek agricultural information from three broad categories of resources which are printed, electronic and verbal. The levels of popularity of these resources vary greatly among the farmers due to a myriad of reasons. For instance, printed resources that include books, newspapers, pamphlets and brochures were used by fewer farmers compared to electronic resources that include radio, television, internet and mobile alerts. Among these types of electronic resources, radio was widely used by the rural farmers in Bungoma County as a source of agricultural information. Television sets were also commonly used especially by farmers who have electricity power in their homes.

Verbal resources were the most popular source of agricultural information among the rural farmers in Bungoma County. These were extension officers from the Ministry of Agriculture

(MOA) and the County Agricultural Office, public meetings organized by the local administration, agricultural shows, farmers' field days, NGO staff promoting different technologies, agrodealers and research institutes. The analyses of the lead farmers identified social networks such as fellow farmers, local market traders, relatives and friends as important sources of information in Bungoma County. Therefore there is a need for future studies to determine the importance of social networks in the dissemination and sharing of agricultural information.

While the findings of this study shed light on where farmers in Bungoma County seek agricultural information and the challenges they face in their quest for information, chapter five will provide a discussion on how context and personal factors affect farmers' information needs in Bungoma County.

CHAPTER FIVE

INFORMATION NEEDS OF FARMERS IN THE BUNGOMA COUNTY

5.1 INTRODUCTION

The information needs framework that guided the literature review in chapter two showed that information needs can be viewed from a contextual point of view and from a personal (subjective) point of view. This chapter will now integrate the analyses of the interviews discussed in chapter four according to information needs, personal factors affecting information needs and agriculture information systems.

5.2 INFORMATION NEEDS

Underlying the research problem stated in chapter one, section 1.3, the aim of this study was to determine the information needs of rural farmers in Bungoma County and establish how the farmers access and use agricultural information. As evidenced in section 2.3, information needs represent a gap in an individual's knowledge. The findings of this study as highlighted in chapter four endorses Savolainen's (2012) framework indicating that certain contextual elements in the context in which users find themselves give rise to information needs. These are situation of action, task performance and dialogue and their relevance to this study are detailed below.

5.2.1 Situational information needs

As highlighted in chapter four, section 4.4, some of the information needs reported by the farmer field school (FFS) leaders in Bungoma County relate to their situational needs. For instance, farmers in Bungoma County need information in order to deepen their knowledge on effective measures for controlling pests and diseases and to know sources of right inputs. As reported by Barry (1995) situational information needs encompass all factors the user brings to the situation which include previous knowledge, awareness of information that is available, the expected use of the information and any time constraints within which the user is working. Relating this context to what the FFS leaders responded and reported in chapter four, section 4.4, a new pest known as Fall Army Worm invaded their farms in 2017 and they were in need of information on effective pesticides for controlling this new pest. They therefore visited the Extension Officers at the Ministry of Agriculture and County Offices to look for the needed information.

Further, the FFS leaders said that they often buy fake fertilizers and seeds from the shops that were not giving them the expected yields and profits. Consequently, they are in need of information regarding sources of genuine inputs. This is in line with what was reported by Chevilotte (2010) that the nature of information needed by the farmers may relate to the types of crops to be planted, the market reports regarding the products produced by the farmers and the application of fertilizers during planting seasons. All these relate to situational information needs.

5.2.2 Task performance related information needs

The FFS leaders interviewed in this study revealed that farmers in Bungoma County need agricultural information for a number of reasons. For instance, the farmers need information to guide them in doing farming the right way in order to increase crop yields, food security and incomes. This revelation is consistent with the findings of Oladele (2006:199-205) and Starasts (2015:157) who reported that information is crucial for increasing agricultural production. This study also revealed that farmers in Bungoma County need information to understand how to differentiate fake and quality inputs, understand good crop and animal husbandry, and to know the right seeds and fertilizer to apply for optimal yields and profits. This relates to task performance needs as reported by Byström and Järvelin (1995:191-213) that the degree of prior knowledge about a task is key in determining the type of information needed to accomplish that given task. These findings are also in line with what Ferris (2005) and Starasts (2015:158) reported that appropriate information enables farmers to make better decisions about what to produce, when to produce and where to sell it than those who do not have such information.

5.2.3 Dialogue

As per the FFS responses highlighted in chapter four, Table 4.1, farmers in Bungoma County prefer verbal resources (personal contacts) for agricultural information. The verbal resources ensure that there is a dialogue between the farmers in need of the information and the person providing the information. As reported by Savolainen (2012) dialogue takes place when information is disseminated, irrespective of whether that dissemination is in a written or verbal format. Almost all the FFS leaders preferred information disseminated through the various verbal resources indicated in Table 4.1. The farmers use these resources because they have a need for information that would support them in developing their personal knowledge and skills, improve

their ability to train the farmers in their field school, and to support them in making decisions.

The study by Manning (2010:2-4) that was reviewed in chapter two, section 2.4, revealed that farmers in Kenya normally have information that they can share through interactions. The findings of this study as highlighted in chapter four, Table 4.1, revealed that all the FFS leaders in Bungoma County need the information shared through their social networks such as fellow farmers, market traders, relatives and friends. This study, however, did not dig deeper to understand the importance of this resource and future studies could expand the findings of this study and determine why farmers really prefer this resource and what could be done to build the capacity of the farmers in order to make the information they provide more valid.

5.3 PERSONAL FACTORS AFFECTING INFORMATION NEEDS

This study revealed that there are number of personal factors that affect information needs of farmers in Bungoma County. These were: farmer's knowledge and experience, information literacy skills, and farmer preferences.

5.3.1 Personal knowledge and experience

From the responses of the FFS leaders highlighted in chapter four, it became apparent that the farmers in Bungoma County who are in need of information would visit various resources to look for the information, especially if it would be beneficial. They would, for instance, attend agricultural shows and exhibitions, field days and field schools among other places. Their responses confirm the findings of Ozowa (1995:15-20) that an inexperienced farmer who lacks knowledge and experience would be prompted to approach an information system or an Extension Officer or an experienced farmer to quench the need for that information.

5.3.2 Personal information literacy

As highlighted in chapter three, Table 3.3, the FFS leaders interviewed had varying levels of education and their information needs were also different. For instance, all the respondents with primary education and below confessed that they do not read books. Additionally, over half of the respondents agreed that they do not seek information from the internet. The reasons only a few farmers seek agricultural information from books and the internet could be related to the farmers' literacy levels. These findings are consistent with the report of Benard et al. (2014:16-19) who, in a related study conducted in Tanzania, found that well educated farmers can easily

access information from various sources, and can create knowledge out of those sources. The findings are also in line with the report of Sanginga and Woomer (2009:263) who found low literacy levels among smallholder farmers to be a big constraint in the effective dissemination and communication of agricultural technologies.

5.3.3 Personal preferences

Radios and verbal resources seem to be the responding lead farmers' most preferred sources of information. The reasons the responding lead farmers gave for this phenomenon were proximity and ease of accessibility, availability and convenience of radio programs that are aired in the evening after the day's work, enforcement from authorities when calling for public meetings, extension staff agents who visit farmers at their homes, friendliness of farmer-to-farmer communication and practical lessons offered through demonstration on farmer field days. The responses provided by the FFS leaders confirmed the findings of Spurk et al. (2013) who reported that farmers in Western Kenya preferred getting agricultural information via the radio as compared to other channels of communication.

In addition, the responses provided by the FFS confirmed that there are various personal socio-economic factors such as ownership of a smart phone, computers and access to electricity that influence their information needs. For instance, some of the responding farmers in this study said that they saw their fellow farmers using mobile phones to get information but that they could not do this because they did not own smart phones. As reported in chapter four, the proportion of farmers in Bungoma County who were accessing agricultural information through mobile phones seemed to have increased from the 21% reported by Spurk et al. (2013) to 35% in this study. The explanation provided by FFS leaders were also in line with that of Spurk et al. (2013) who also reported that most farmers in Western Kenya preferred comprehensive information with deeper explanations compared with those offered on farmers' field days.

5.4 AGRICULTURAL INFORMATION SERVICES

This study identified a number of agricultural information services that are available to the FFS lead farmers and which seem to provide for their information needs. These include access to an Extension Officer either from the Ministry of Agriculture, NGOs or individual experts. The frequency of accessing these services depends on the information needs of the farmers. Most of the FFS leaders said they are the ones who call the Extension Officers to visit them when they

are in need of certain information while a few of them said they are visited by an Extension Officer while on his/her normal call of duty. The responses given by the FFS leaders are in agreement with the findings of Munyua, Adams, and Thomson (2002:2) who found that there exists a need for the value of information about improved technologies in agricultural extension organizations in sub-Saharan Africa.

5.4.1 Extension education as an agricultural information service

When the FFS were asked to name the type of education or information services they get from the various extension staff, most of them mentioned training on best-bet agronomic practices as the key service. This is consistent with the findings of Munyua, Adams, and Thomson (2002:2) that farmers in sub-Sahara need training on improved technologies for improving their land production. It was also in line with the study of Gitonga and Machira (2008:11-169) who found that when Extension Officers train lead farmers, there is a multiplier effect in terms of information dissemination to fellow farmers. The other services that the FFS leaders derive from the Extension Officers include: linkages with other value chain players, distribution of subsidized seeds and fertilizers, control measures for pests and disease, awareness of field days, evaluation of new technologies, veterinary services and training on fish farming. These findings are consistent with the report of Van den Ban and Hawkins (1996) and Van Crowder (1996) who found extension education to have a strong link between researchers and farmers.

5.4.2 The use made of agricultural information services

When the FFS leaders were asked to explain the usefulness of the information provided by Extension Officers, fifteen lead farmers said that the information is very useful and most of it has been adopted by farmers to increase their crop yields. This finding is consistent with that of Demiryurek et al. (2008:1-25) who found that farmers who had access to information on dairy production in Samsun Province in Turkey produced higher quantities of milk than those who did not have access to the information. A few of the responding FFS leaders found the information useful but the adoption of the technologies was hindered by lack of improved seeds, fertilizers and other inputs that were beyond the purchasing power of the farmers. This finding is consistent with that of Abbas et al. (2008: 99-108) who reported that the main factors that contributed to low production of wheat reflected a lack of information that was adapted to local needs of farmers like appropriate inputs and lack of technical knowledge at farm level.

Three of the FFS leaders agreed that the information disseminated by the Extension Officers was useful but sustainability in terms of adoption could be assured by economic empowerment of the FFS leaders who serve as a link between the farmers and other stakeholders. This is consistent with the study by SARD (2007) who attributed a decline of agricultural production to tough economic times. The study by SARD (2007) pointed out a need for farmers in rural areas to be supported with information on how they could enhance productivity and reduce vulnerabilities to agricultural and livelihood challenges such as poverty.

5.5 SUMMARY

The focus in this chapter was to compare the findings deriving from the empirical component of the study with those reported on in the literature review. Based on this discussion, it seems apparent that farmers in Bungoma County need information in order to increase their crop yields, food security and incomes through the adoption of best-bet practices such as effective use of inputs and control of pests and diseases. The discussion highlighted how different personal factors such as knowledge and experiences, information literacy and preferences affect the information needs of the farmers. In addition, the discussion highlighted the agricultural information services that are available to the farmers and what they seem to be using quite often. The interpretation of the study results were compared with the findings in existing literature. Chapter six will address the conclusions, limitations and recommendations of the study and suggestions for future study.

CHAPTER SIX

CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

6.1 INTRODUCTION

The purpose of this chapter is to answer the research questions, to make some suggestions on how to improve agricultural extension services and to make suggestions for future research. The research questions of the study are answered based on the respondents' personal experience and leadership information about Farmer Field Schools. In this chapter I will also highlight both the limitations to the study as well as the value of the study. The overarching research question for the study was: What are the information needs of rural farmers in Bungoma County and how do they access and use agricultural information? In order to answer the research question, the following sub-questions needed to be answered:

a) What are the information needs of rural farmers in Bungoma County?
b) What agricultural information sources are available for rural farmers in Bungoma County?
c) How do the rural farmers in Bungoma County access and use agricultural information?
d) What are the challenges experienced by rural farmers in Bungoma County in their quest to access and use information services?
e) How do rural farmers in Bungoma County address the various challenges that hinder them from accessing agricultural information?

6.2 CONCLUSIONS TO THE RESEARCH QUESTIONS

The following sub-sections provide detailed answers to the research questions.

6.2.1 What are the information needs of rural farmers in Bungoma County?

From the interviews conducted with FFS leaders, it was established that farmers in Bungoma County need agricultural information for deepening their knowledge on effective measures for controlling pests and diseases as well as to know sources of right inputs. The farmers in Bungoma said that they are in need of information regarding sources of genuine inputs, especially fertilizers and improved seeds. They also need information to guide them in doing farming the right way in order to increase crop yields, food security and incomes.

6.2.2 What agricultural information sources are available for rural farmers in Bungoma County?

From the interviews conducted with FFS leaders, it was established that farmers in Bungoma County source information from printed, electronic and verbal resources. The common printed resources are pamphlets and brochures, newspapers, and books with guidelines on various farming techniques from different stakeholders. The electronic resources include radio, television programmes dealing with agriculture, mobile alerts on weather and farming practices and the internet. The verbal resources include Extension Officers from the Ministry of Agriculture (MOA) and county agricultural offices, public meetings organized by the local administration, agricultural shows and farmers' field days, NGO staff promoting different technologies, farm input and produce dealers, research institutes and social networks. The farmers' social networks include fellow farmers, market traders, relatives and friends.

6.2.3 How do the rural farmers in Bungoma County access and use agricultural information?

Through the interviews conducted, it was established that rural farmers in Bungoma County access and use agricultural information mainly through:

- Field days organized by the FSS network where agricultural extension officers and other stakeholders are invited to train farmers on different crop management methods and animal husbandry depending on the need of the farmers. Farmer-to-farmer training through sharing of experiences learnt from different exposures by the farmers.
- Use of electronic media especially FM radio stations that use local languages to disseminate agricultural news.
- Printed guidelines where a farmer can read and implement the guidelines on his own.

It was also established that access to information can be improved through:

- Lowering costs/rates of airing agricultural programmes for radios and television in order to encourage stakeholders to use their platforms to reach a larger audience.
- Availing more agricultural experts during the field days to train farmers and supply farmers with farming manuals for target crops.

- Increase the frequency of public gatherings (*baraza's*) and encouraging farmers to attend.
- Enhance farmer-to-farmer communication in their farmer associations.

The role of agricultural information to farmers in Bungoma County is:

- To ensure farmers get the right inputs for optimum production
- Be able to differentiate fake and genuine farm inputs especially fertilizers
- To learn about crop and animal husbandry
- To learn how to carry out crop rotation
- How to improve production through irrigation technologies
- Bulking and marketing
- Timing in order to grow crops that have high demand in the market

6.2.4 What are the challenges experienced by rural farmers in Bungoma County in their quest to access and use information services?

The challenges experienced by rural farmers in Bungoma County in their quest to access and use information services include:

- Slow response by extension officers whenever called up on to address issues to do with pest and disease outbreak, and valuation of malicious damage of crops. This leads to losses if farmers do not get the information from technical officers in time to curb the problems. The number of Extension Officers is low and cannot reach each farmer individually.
- Timing of radio and television programmes is a challenge since the farmers cannot be with their radios and televisions when agricultural programmes are aired. A lack of electricity to power these devices also proved to be a reason affecting their use of these resources. .
- Lack of access to internet, televisions and radios as a source of information for current farming methods.
- Farmers may lack money for transport to attend field days, exchange visits, sms alerts and agricultural shows and thus they lack an opportunity to learn more.
- New crop varieties failing to yield the desired results as per the directions despite farmers following instructions. This could be attributed to poor farmer interpretation and application of inputs due to lack of technical capacity.

- Delay of information transmission due to a breakdown of communication between Extension Officers, local administration and farmers.
- Some technologies are difficult to implement without technical support and expenses involved thus farmers lose interest.
- Fertilizer use and prices are not standardized thus confusing farmers on how to apply them for different crops and soils.
- Some farmers are so conservative regarding their traditional farming methods making it difficult to implement modern farming techniques. Most farmers who are aged to adopt easily to new farming methods.
- Farmers who do not attend public meetings (*barazas)* and do not belong to groups miss the opportunity of accessing current information on agricultural development.

6.2.5 How do rural farmers in Bungoma County address the various challenges that hinder them from accessing agricultural information?

The challenges facing farmers in Bungoma County could be addressed through capacity building of farmers to enable them have some knowledge on how to tackle the challenges before further inputs by technical staff is sought. In addition, agricultural radio and television programmes should be scheduled in the evenings and communication to the farmers done earlier to ensure more farmers are reached through these methods. Also development partners should support the farmers to acquire smart phones, radio and television so that these resources can be used by more farmers as a means of information dissemination. Other mitigation measures include exchange visits to model farms and agricultural shows, dedication of Extension Officers in order to reach all the farmers with the information they need and the use of information communication technologies.

6.3 LIMITATIONS OF THIS STUDY

In this study the researcher identified some limitations regarding the empirical study. These are highlighted in the sub-sections below.

6.3.1 Inconsistent responses

Some of the FFS leaders provided some contradictory responses. For instance, some of the respondents said they were not visited by an extension agent and when they were asked a question related to how useful they found the information provided by the extension agents, they said they found it useful and most of it had been adopted by farmers to increase crop yields.

6.3.2 Interview environment

Interviews should be carried out in a quiet and conducive environment since they are normally recorded for later transcription. However, in one of the interviews, two children of the responding farmer ran towards us playing and briefly interrupted us before they were cautioned by the farmer to maintain silence. In another homestead a cock crowed near us and its noise was heard in the recorded interview. During the transcription of these two interviews such noises were heard in the recorded tape which made the researcher take longer time than anticipated to comprehend the point that the farmers were explaining before the short interruptions.

6.4 RECOMMENDATIONS

The recommendations below are aimed at improving farmers' access to agricultural information in Bungoma County. Recommendations are also made to further research in terms of improving farmers' access to information through social networks. Since some farmers alluded that it is easier for them to jointly organize for exchange visits when they are in groups, there is need for further research to find out how the farmers raise financial resources to fund their group's exchange visit and how they apply the knowledge gained through the exchange visits to compensate for the funds spent on the exchange trips. In addition, since the majority of the FFS leaders confessed that they do not know how to use the internet, there is a need for them to be trained on information literacy skills. It could also be helpful for a future similar study to be conducted in a different region to allow for generalizing of the findings reported in this study.

6.4.1 Printed resources

Most of the farmers in Bungoma County do not have access to printed resources like books, newspapers, brochures and pamphlets and therefore it is suggested that:

- The County Government of Bungoma, in partnership with other development partners, consider building libraries in the rural regions in order to increase farmers' access to printed

resources.

- Extension agents should use posters and farming guides in the local markets to pass on agricultural information.
- There is need for extension agents to use creative ways of getting agricultural information to the farmers. This could include the use of notice boards at village level where farmers can easily access them.
- Brochures and pamphlets should be written in local languages to communicate more effectively to the rural farmers.

6.4.2 Electronic resources

Although most farmers in Bungoma County have access to radio, information access from televisions, mobile phones and the Internet was not readily available to most farmers because they do not own them. There is need therefore to improve on the availability and affordability of these resources in order to improve farmers' access to information. This could be done through efforts to lower the cost of airing agricultural programmes in radios and television in order to encourage stakeholders to use these platforms to reach more farmers. Other suggestions for consideration include:

- Proper timing of radio and television programmes to come at night or at a time when most farmers are not working in their fields.
- There is need for the government of Kenya to expand the rural electrification programme in order to enable rural farmers to access electricity that is necessary to power Television sets and other electronic resources.
- Extension agents could consider using video-assisted dissemination methods and upload them in YouTube to encourage youthful farmers who own smart phones to access information whenever needed.
- There is a need to build the capacity of farmers in ICT in order to improve on timeliness of information delivery

6.4.3 Verbal resources

Verbal resources were the most common sources of agricultural information and therefore the

following suggestions are made in order to capitalize on their potential for improving reaching mass numbers of farmers with agricultural information.

- More training sessions can be planned to be conducted during public meetings that are normally attended by most farmers.
- County Government of Bungoma should find innovative ways to enable farmers to attend field days, exchange visits and agricultural shows.
- The County Government should also explore provision of SMART subsidies to enable farmers access to expensive yet profitable agricultural technologies.
- The County Government should consider opening call centres and sub-centres to bring extension services closer to farmers.
- The County Government should provide transport and communication means to extension agents to disseminate agricultural information to rural farmers.
- Scale out the dissemination of agricultural information in local languages that can be easily understood by farmers.

6.5 FUTURE RESEARCH

Future studies should look into the importance of the following farmers' social networks in the dissemination and sharing of agricultural information.

6.5.1 Fellow farmers

Almost all the respondents said they access agricultural information from fellow farmers when they gather in FFS or other social groups. Little information is known on the importance of this resource. Future research in this area could expand the findings of this study and determine why farmers really prefer this resource and what could be done to build the capacity of the farmers in order to make the information they provide more valid.

6.5.2 Local market traders

Generally all the responding FFS leaders said that they access vital information relating to the prices of farm products from the local markets. This study could be expanded to determine the validity of information given to farmers by the local market traders who are driven largely by the

desire to make profits by selling more of the products that they are trading.

6.5.3 Relatives and friends

A significant proportion of the responding FFS leaders said they source pertinent information from relatives and friends. It is necessary to expand this study and determine the importance of this resource in sourcing for cheaper transport services of farm produce to the markets, discovering emerging networks for enhancing farm productivity, knowing the availability of off-takers for contract farming, discovering emerging new ICT for agriculture technologies and their profitability, and exchange of indigenous ideas and general market information.

6.6 VALUE OF THE STUDY

This study was able to establish that farmers in Bungoma County prefer verbal resources for accessing agricultural information to any other resource. It also established the need for exploring the potential of social networks as sources of information since the FFS leaders confessed that they get pertinent agricultural information from fellow farmers, local market traders, relatives and friends. The County Government of Bungoma could use this information to improve farmers' access to agricultural information so that farmers can improve crop productivity to achieve sustainable food security and income.

6.7 SUMMARY AND COMMENTS

The purpose of this case study was to acquire an understanding of the information needs of rural farmers residing in the Bungoma County and to establish which agricultural information resources are available to these farmers and used by them. The findings from the case study revealed that verbal resources were the most common information sources for farmers in Bungoma County. These include the use of Extension Officers from the Ministry of Agriculture and county agricultural office, public meetings organized by the local administration, agricultural shows and farmers' field days, NGO staff promoting different technologies, farm input and produce dealers, research institutes/organizations and social networks like fellow farmers, local market traders and relatives and friends. Extension staff mainly visits farmers in their FFS groups but individual extension is demand driven and not easy to come by due to availability of adequate extension staff.

It was also revealed that Extension Officers are the main link between farmers in Bungoma

County and other agricultural stakeholders. The Extension Officers play a crucial role in evaluations of the different technologies exhibited by different stakeholders. Targeted government programmes are also implemented by engaging the Extension Officers who help farmers to access information necessary for increasing food security and incomes. Since the agricultural sector in Kenya was in 2013 devolved to the County Government level, there is a need to strengthen the extension services department in Bungoma County, hire more Extension Officers and build the capacity of farmers to enable them work closely with county extension officers for increased food security and incomes. There is also need to use mass media to disseminate agricultural information in order to scale out modern agricultural technologies in Bungoma County.

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APPENDICES

Appendix A: Introduction and permission letter

PARTICIPANT INFORMATION SHEET

June 20, 2017

TITLE: INFORMATION NEEDS OF RURAL FARMERS IN BUNGOMA COUNTY, KENYA

Dear Prospective Participant

My name is *Judith Tamnai Naibei* and I am doing research with Dr Madely du Preez (Department of Information Science) and Prof Patrick Ngulube (Directorate of Graduate Studies) towards a Master of Information Science at the University of South Africa. We are inviting you to participate in a study entitled "Information Needs and Use of Rural Farmers in Bungoma County, Kenya"

I am conducting this research to find out the information needs of rural farmers in Bungoma County, Western Kenya. This study could support extension officers in acquiring an understanding of the information needs of farmers in Bungoma County, and to acquire an idea of what agricultural information sources they use. Furthermore, extension officers will learn more about the challenges the farmers face when accessing the desired type of agricultural information and the necessary measures to address the challenges.

You were selected to participate in this study because you are a leader of a Farmers' Field School (FFS). You were selected randomly from many other leaders of FFS across five Sub-Counties in Bungoma County. The five Sub-Counties selected for this study are Kambuchai, Kanduyi, Kimilili, Sirisia and Webuye West. Your participation in this will involve face to face interviews using a semi-structured guide and will be audio recorded for the purpose of data transcription during data analysis.

Your participation in this study is on voluntary basis and you are under no obligation to consent to participation. If you do decide to take part, you will be given this information sheet to keep and be asked to sign a written consent form. You are free to withdraw at any time and without

giving a reason.

There is no financial gain as a result of participating in this study but the information collected from the study might be implemented and you may benefit indirectly. Please note that for you to participate in this study we do not envisage any harm or risks. Your answers will be given a code number or a pseudonym and you will be referred to in this way in the study data, any publications, or other research reporting methods such as conference proceedings.

Hard copies of your answers will be stored by the researcher for a period of five years in a locked cupboard/filing cabinet for future research or academic purposes. The electronic information of the study will be stored on a password-protected computer. Future use of the stored data will be subject to further Research Ethics Review and approval if applicable. After five years hard copies will be shredded and/or electronic copies will be permanently deleted from the hard drive of the computer through the use of a relevant software programme.

Please note that by consenting to participate in this research you also agree that you will not receive any payment for provision of data and neither will you get any incentive for participating in this study. This study has received written approval from the Research Ethics Review Committee of the HIGHER DEGREES COMMITTEE of the Department of Information Science, University of South Africa (UNISA). A copy of the approval letter can be obtained from the researcher if you so wish.

If you would like to be informed of the final research findings, please contact Judith Tamnai Naibei on telephone number, +254734266980. The findings of the study are accessible from December 2018.

Should you have concerns about the way in which the research has been conducted, you may contact my university promoter Dr. Madely Du Preez on e-mail PREEZM@unisa.ac.za.

Thank you for taking time to read this information sheet and for participating in this study.

Judith Tamnai Naibei

Appendix B: Consent to participate in this study

I, _____, confirm that the person asking my consent to take part in this research has told me about the nature, procedure, potential benefits and anticipated inconvenience of participation.

I have read and understood the study as explained in the information sheet. I have had sufficient opportunity to ask questions and am prepared to participate in the study.

I understand that my participation is voluntary and that I am free to withdraw at any time without penalty (if applicable).

I am aware that the findings of this study will be processed into a research report, journal publications and/or conference proceedings, but that my participation will be kept confidential unless otherwise specified.

I agree to the recording of the interview.

I have received a signed copy of the informed consent agreement.

Participant Name & Surname …….----------

Participant Signature……..Date……

Researcher's Name & Surname……----------

Researcher's signature……..Date……

Appendix C: Template permission letter

Request for permission to conduct research in Bungoma County

Title: Information Needs of Rural Farmers in Bungoma County, Kenya

Judith T.Naibei

West End Towers, Westlands, Nairobi

Email: jtamnai@yahoo.com

Tel: +254734366980

Dear Participant

I, Judith Naibei, am doing research with Dr. Madely Du Preez and Prof. Patrick Ngulube in the Department of Information Science towards a Masters of Information Science at the University of South Africa. We are inviting you to participate in a study entitled "Information Needs of Rural Farmers in Bungoma County, Kenya ".

The aim of the study is to find out the information needs of rural farmers in Bungoma County and how do they access and use agricultural information. Your Farmers' Field School was selected to participate in this study because of your activities in agriculture. The study will entail face to face interviews and we will also audio tape for later transcription. This study will inform the County Government of Bungoma on how to use this information to improve farmers' access to agricultural information so that farmers can improve crop productivity to achieve sustainable food security and income. There is no anticipated risks that will suffer by participating in this study because the data you will provide will be held confidentially and will be used entirely for this study.

Feedback procedure will entail contacting me via the phone number +254-734366980

Yours sincerely

Judith T.Naibei

Masters Student

Appendix D: Interview Guide

Interview Guide: BUNGOMA County

Introduction:

The purpose of the study is to understand the information needs of rural farmers and the factors influencing their access to information. The information obtained will be used for future planning.

Thank you for participating in this information needs assessment.

If you have any questions regarding the completion of this questionnaire please contact Judith Tamnai Naive (Principle Investigator) on +254-734366980

A: General

1.1. Date of interview: _____

1.2. Name of enumerator _____

1.3. Farmer identity: _____

1.4. Gender: _____

1.5. Education Level: _____

1.6 Location: ---------- Subcounty:----------

1.6. No. of years of farming experience:____ _____

1.7. Age (yrs): _____

1.8. Division: _____

Village:_____

B: Farmers associations/Field Schools

2.1. How many farmers attend the same farmer field school as you do?

2.2. What is the main farming system practiced by members of your field school?

2.3. Why do you think it is important to belong to these associations?

2.4. Has an extension staff member visited you?

2.5. What were your experiences of the extension staffs' visit?

2.6 How useful was the information that the extension staff provided you with? Were you able to apply it to your farming practices?

2.7. Have you been visited by a researcher? If yes, what information was the researcher looking for?

2.6 Have you ever been to agricultural shows?

C: Agricultural Information Sources to Farmers in Bungoma County

1. What are the main types of information that you require? How often do you use them? How important is the information?

2. Do you regularly use the following sources of information? What information do you look for from each of the sources provided below?

Information sources	**Please provide more details on how you use the information sources provided**
Newspapers/other print media	
Books	
Internet	
Farm output buyers	
MOA offices	
Libraries	
Agricultural extension	
Agro-input suppliers	
The market	
Relatives/friends	
Research institutes	
NGOs	
Other farmers	

TV	
Radio	

3. What are the reasons for your preferences?

-

_____

_____

_____

_____

_____

_____

D: Role of Agricultural Information to Farmers in Bungoma County

1. What is the role of agricultural information to you?

_____

_____

_____

2. Is there anything that can be done to improve access to information?

(If you say 'yes', list them)

_____

_____

_____

E: CHALLENGES EXPERIENCED BY FARMERS IN THEIR QUEST TO ACCESS AGRICLTURAL INFORMATION

1. What problems do you experience when you are looking for agricultural information? Please explain the problems you encounter.

_____

_____

_____

2. Are you able to use the information you have found? Please explain your answer.

_____

_____

_____

3. Is there anything that can be done to make your use of information easier and more understandable?

_____

_____

_____