

**PROVISION OF INFORMATION TO SMALL SCALE
VEGETABLE FARMERS IN WARENG DISTRICT OF UASIN
GISHU COUNTY, KENYA**

BY

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INFORMATION SCIENCES (Library and Information Studies)**

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DECLARATION

DECLARATION BY THE CANDIDATE

This thesis is my original work and has not been presented for a degree in any other University. No part of this thesis may be produced without prior permission of the author and / or Moi University.

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DEDICATION

This thesis is dedicated to my family. My loving husband Sammy, our children Kiprono, Kirwa, Chepkemboi and Cheptoo who all stood by me during my studies. You endured my absence and attention as a wife and a mother on many occasions. Guys thank you for your patience. I love you all!

To my parents who planted the seed of education and instilled in me its values. To my brother and my sisters. Thank you very much. May God bless you always.

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ABSTRACT

Agriculture remains the most important economic activity in Kenya. Efficient and effective provision of information is essential to the success of agriculture. It improves decision making, enhances and provides competitive edge to all sectors of economies. Provision of information to vegetable farmers in Wareng district is not up to the expected standards. The information materials generated are not in line with information needs of vegetable farmers. The aim of this study was to investigate the provision of information to small scale vegetable farmers of Wareng District, with a view of establishing challenges and proposing a model for effective and efficient improved information flow to the vegetable farmers in the district. The specific objectives of the study were to identify information needs of small scale vegetable farmers in Wareng District; assess the effectiveness of extension services in dissemination of information to vegetable farmers; determine communication channels through which agricultural information is disseminated to small-scale vegetable farmer ; accessibility and usefulness of the information channels, sources, services and systems that provide information to vegetable farmers; identify the factors that hinder agricultural information and suggest ways of improving communication of agricultural information to small scale vegetable farmers in Wareng District. This study was informed by the Wilson's theory of Information behavior (1996) and Niedzwiedzka's (2003) new model of Information Behaviour. Data was collected with the aid of semi-structured interview schedule. The study found out that vegetable farmers lack timely information specific to their needs of farmers. The existing information systems and services were inadequate in satisfying the information needs. Access to information is hampered by inadequate resources to facilitate access. Data presentation is mainly qualitative with some aspects of quantitative approach using tables, percentages and figures. The study recommends improvement of the existing information services, systems and channels in disseminating information to vegetable farmers. The proposed model if adopted will enhance efficiency in disseminating agricultural information to small scale vegetable farmers in Kenya.

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CHAPTER ONE

INTRODUCTION

1.1 Introduction to the study

Kenya's agricultural system has undergone tremendous evolution over the last eight decades. In the colonial era (1920-1963), commercial agriculture was limited to white settler farmers. With political independence in 1963, the policy focus was expanded to include participation by indigenous Africans in commercial agriculture. There was also increased state control on production and marketing of commodities. Specific measures and strategies for agricultural development have clearly been defined in various policy documents such as Sessional Paper No. 4 of 1981 (National Food policy, Sessional Paper No. 1 of 1986 (Economic Management for Renewed Growth), Sessional Paper No. 1 of 1992 (Development and Employment in Kenya and the National Development Plans (various issues).

In spite of high and stable agricultural growth up to 1986, various problems relating to rigid policies, high control of the sector and changes in the external economic environment began to impact on agriculture sector performance and thus, a felt need for major structural change. The core functions of the Ministry of Agriculture include: to collect, maintain and manage information on the agricultural sector and to provide agricultural extension services. This is basically the subject area in which this study is based on, that is, provision of information to small-scale vegetable farmers in Wareng District of Uasin Gishu County.

Most farmers would agree that relevant information is essential to the success of farming and food production in general. It is important to note that today information services in general are a vital resource for national development. Provision of right and timely information improves crop yields, enhances economic growth and encourages adoption of new agricultural technologies.

Information services in any field require management and support in its dissemination. The challenge being faced is to transfer information from the creator to the consumer. The transfer of information from the producer to the consumer needs to be accelerated with a view to reaching the user at the right time and in the appropriate form.

1.2 Background to the Study

Information plays a pivotal role in economic and cultural development of a country. Information is the core of all development and supports all sectors of an economy. In this regard, the organizations and individuals both in the public and private sectors should ensure access to and use of information by different user groups. Both sectors should also ensure that the information disseminated to specific user communities is timely and relevant to their needs.

Odini (1997) opines that the kind of information system and services available in Kenya are not effective and efficient. He attributes this to various factors such as prevalence of information services which have been designed without proper analysis of the information needs of users, high levels of illiteracy and language barrier.

Odini suggests that this situation calls for an intervention by information professional who should encourage the use of information by carrying out in depth studies to determine information needs of the various users. Ozowa (1995) adds that African governments have failed to integrate agricultural information delivery or dissemination with other development programmes to address the numerous related problems that face small scale farmers. Information is an essential ingredient in agricultural development programmes.

However, smallholder farmers in Kenya seldom feel the impact of agricultural innovations since they have no access to such vital information due to ineffective information dissemination systems. The information provided is exclusively focused on policy makers, researchers, and those who manage policy decisions with scant attention paid to the information needs of the targeted beneficiaries of the policy decisions. According to Ozowa (1995), the non-provision of agricultural information is a key factor that has greatly limited agricultural development in most Sub-Saharan African countries.

1.2.1 Agricultural activities in Kenya

Agriculture is the mainstay of the Kenya economy accounting for 60% of the national employment and earning 40% of government revenue. Agricultural information is therefore a critical ingredient for both sectoral development and national economy. Since independence, Kenya has relied heavily on the agricultural sector as a base for economic development, employment creation, food security and foreign exchange earnings. About 80% of Kenya's population lives in the rural areas and most of them depend on agriculture for their livelihoods. Kenya is Africa's leading tea producer, and was fourth in the world in 1999, behind India, China, and Sri Lanka. Black tea is

Kenya's leading agricultural foreign exchange earner. Production in 1999 reached 220,000 tons. Tea exports were valued at \$404.1 million in 2001, or nearly 18% of total exports. The tea industry is divided between small scale farms and large estates. The small-scale sector, with more than 260,000 farmers, is controlled by the Kenya Tea Development Authority parastatal. The estates, consisting of 60–75 private companies, operate on their own.

Coffee is Kenya's third leading foreign exchange earner, after tourism and tea. In 2001, coffee earnings totaled \$91.8 million. Production in 2001/02 amounted to 52,140 tons. Similar to the tea sector, coffee is produced mainly for small farms and a few large estates. All coffee is marketed through the parastatal Coffee Board of Kenya. The suspension of the economic provisions of the International Coffee Agreement in July 1989 disrupted markets temporarily, driving coffee prices to historical lows.

Kenyan horticulture has become prominent in recent years, and is now the third leading agricultural export, following tea and coffee. Fresh produce accounted for about 30% of horticultural exports, and included green beans, onions, cabbages, snow peas, avocados, mangoes, and passion fruit. Flowers exported include roses, carnations, statice, astromeria, and lilies.

Kenya is the world's largest producer and exporter of pyrethrum, a flower that contains a substance used in pesticides. The pyrethrum extract, known as pyrethrin, is derived from the flower's petals. A drop in production during the mid-1990s was due to increasing production costs, disease damage, and slow payment by the parastatal Pyrethrum Board of Kenya. The growing demand for "organic" and "natural" pesticides has increased international demand for pyrethrin, despite the existence of

synthetic chemical substitutes. Kenya also produces sisal, tobacco, and bixa annatto (a natural food coloring agent) for export.

Other important crops in 1999 were sugarcane, 5,200,000 tons; corn, 2,110,000 tons; wheat, 135,000 tons; rice, 40,000 tons; and cotton, 5,000 tons. Smallholder farmers grow most of the corn and also produce significant quantities of potatoes, beans, peas, sorghum, sweet potatoes, cassava, bananas, and oilseeds.

Kenya is blessed with resources that contribute to agricultural success. First and foremost, the climatic conditions are favourable; the soils are well drained and rich in minerals. Kenya also has adequate infrastructure for instance, roads and transport system. There are credit facilities and ready markets for farmers to enhance agricultural activities.

1.2.2 Farming Activities in Uasin Gishu County

Uasin Gishu County is basically an agricultural district, producing more than a third of the total national wheat production in the country. Second to wheat production is maize which is planted both as a food and cash crop. Agriculture thus forms the main driving force for industrialization in the county. Most of the industries in Eldoret town are agro-based industries, which utilize the raw materials from the agricultural sector. The main crops that are produced in the small farm sector include maize, beans, wheat, vegetables, pyrethrum and horticulture.

The entire Uasin Gishu is classified as arable land with substantial proportion being classified as high potential agricultural land. The major farm activities are in the areas of crop production and livestock rearing. The crops grown include maize,

wheat, barley, pyrethrum, coffee, beans, horticulture, and vegetables. The district has a highland equatorial climate whose rainfall is considered sufficient by most farmers. The highlands receive heavier rainfall than the lowlands with two rain patterns in a year. The long rains usually start in April and end in August while the short intermittent rains are experienced from November through December. Average temperatures are classified as moderate and are favourable for farming.

There are both small scale and large scale farming activities in Uasin Gishu County. Large scale farmers usually grow maize, wheat, coffee and pyrethrum while the small scale farmers grow vegetables, potatoes and maize for subsistence. Small scale farmers in Uasin Gishu County make up 90% of the county's farming population. They are engaged in cultivation as well as dairy production on a small scale. Thus their survival depends on good weather patterns availability of affordable farm inputs as well as relevant agricultural information.

According to the Uasin Gishu District Development Plan 2002-2008, the optimum utilization and production by small scale farmers is hindered by poorly organized marketing channels, high costs of farm inputs, unaffordable agricultural credit, poor infrastructure, inadequate extension services (poor provision of information services), and adverse weather conditions. Uasin Gishu County has been sub-divided into three districts namely: Wareng, Eldoret East and Eldoret West.

1.2.3 Vegetable Farming in Wareng District

The new Wareng District is carved out of the larger Uasin Gishu County. It has two Divisions namely Kesses and Kapseret with its proposed headquarters at Kesses Centre.

Farmers in Wareng District are preoccupied with small scale vegetable farming in addition to maize and wheat production. The moderate climate and ample rain which abound in the entire district have given rise to vegetable farming. The district has natural water dams which ensure that water is available round the year. Vegetable farmers of this district have taken advantage of the presence of the dams and where possible carry out their farming activities around the dam. The dams therefore provide water to the farmers round the year.

The vegetables that are commonly grown in Wareng District include: Kales or sukuma wiki, cabbages, carrots, garden peas, spinach, tomatoes, potatoes, spring onions and beans among others. Other continental vegetables include French beans, snow peas, snap peas, butter nuts, baby corns, baby carrots and corgettes among others. Traditional vegetables include black night shade (sucha), spider leaves (isagek), pumpkins, cow peas and amaranthus and other assortments.

1.3 Role of information in vegetable farming

Vegetable farmers require information to enable them carry out farming in a modern and cost effective way. Critical information required include those pest control as well as know when pests pose an economic threat.

These farmers also require information on the best weather conditions for each crop. Climate constitutes an important factor for the success of vegetable farming.

Vegetable farmers also need information on the types of soils and their suitability for different types of vegetables and also availability of water during dry spells. There

are four types of soil found in Wareng District notably loam, clay, red and brown. All these are generally suitable for the growing of vegetables.

Vegetable farmers also require information on the availability of water resources such as rivers, dams, swamps and streams. Wareng District is endowed with a water dam and an outlet stream that flows through a swamp which favours vegetable growth especially during the dry seasons. However, farmers have been experiencing challenges in the use of river water especially during the dry season as any diversion means less flow of water downstream. Popular irrigation machines that are used include the moneymaker which pumps water from the streams and rivers to irrigate vegetable during the dry season.

Vegetable farmers require information on the market prices for their produce. A number of upcoming markets for vegetable produce include: Kesses, Moi University, Kapseret, Langas, Simat, Ngeria, and Cheptiret among others.

However, farmers have been experiencing challenges in the use of chemicals on their crops and therefore require more information on how to apply the chemicals on the vegetables. Farmers acquire chemicals from agricultural outlets or stores to spur growth of vegetables to meet demand. These chemicals pose a danger to health of the consumers of these vegetables. Pesticide chemicals pose certain hazards to users when handling, mixing and applying on the vegetable farms. Pesticides can enter the human body through inhalation, by ingestion and through the skin or dermal penetration or through cuts, abrasions and rashes of the skin. Pesticides are available in different formulation such as 'wet' (liquid) or 'dry' (powder, dust). Formulations of pesticides often determine the risks involved in the use and safety measures to be taken.

The major sources of chemical information are the chemical companies and their representatives. The level of advice provided by these companies needs to be quality controlled so that farmers are given objective information on potential or actual impact both positive and negative. The challenges related to agro chemicals include non-availability of registered products, economies in unit size for purchase and quite possibly at times, due to non-comprehension of the information on labels on. There is also the concern with the lack of labelling that specifies use of specific groupings and on specific species.

Wareng district is in close proximity to Eldoret International Airport. Small scale farmers often need information on export processes for fresh farm produce in order to earn from international markets. The airport service has installed a cooling system for fresh farm produce to facilitate fresh exports.

The other information required by vegetable farmers includes availability of loan and credit facilities. Many small and medium size enterprises (SMEs) and banks offer loans to agribusinesses. These banks include K-REP, Faulu Kenya, Cooperative Societies, Youth fund (by the government), Women fund, and Constituency Development Fund. The availability of loan and credit facilities enables vegetable farmers to purchase seeds, chemicals and fertilizers. All these information require basic knowledge of pest biology and ecology control as well as reasonable understanding of consequences of potential impacts of control methods.

No one can categorically claim to know all the information needs of farmers especially in an information dependent sector like agriculture where there are new and complex problems facing farmers every day.

1.4 Information Systems and Services in Wareng District

1.4.1 Moi University Library Services

Wareng district is endowed with a wide range of information systems and services though their usage cannot be ascertained. Moi University for example is located within Wareng district and has a large academic library which boasts of a collection of information resources such as books and journals that vegetable farmers may benefit from. Although the library is meant to support academic programmes in the university, the local community can access the resources at a fee. As stated in the university library rules and regulations bulletin, non-members may use the library by permission of the University librarian whereupon a fee shall be charged for registration.

1.4.2 The Kenya National Library Services (KNLS)

The Kenya National Library Services has a well established public library in Eldoret town which is in Uasin Gishu County. KNLS provides a crucial gateway to the much needed information in various forms and means. Like other public libraries worldwide KNLS branches serve as focal points for community activities. KNLS also provides outreach services to ensure that many Kenyans have access to information concerning their daily activities. Public libraries promote social inclusion from among different

communities irrespective of age, gender, level of education and economic backgrounds. The KNLS is an information system and service to vegetable farmers in Wareng district where they visit in search of information. The services are within their reach and could take advantage to gain new knowledge.

1.4.3 District Information and Documentation Centre (DIDC)

In the early 1980s the government of Kenya developed a programme called the District Focus for Rural Development which was aimed at promoting development programmes and projects from the central government's headquarters in Nairobi to the rural areas. Public participation in support of rural development requires an informed citizenry. District Development Committees were established to maintain a programme of public information and to explain the district focus strategy to the general population. The public information programme should be based on the experiences gained in various rural development activities around the district and elsewhere in the country. Knowledge generated through general research should be disseminated to the public as soon as possible.

This led to the establishment of District Information and Documentation Centres in several districts in the country including Uasin Gishu County. Each DIDC was expected to maintain a public display of district maps and project implementation charts and reports various rural development projects in a district. The services provided in the DIDC include:

- ✓ Resource and reference service centre for development information on the district

- ✓ Statistical information, National and District Plans, Technical information for each sector as an input to the planning monitoring and evaluation of development projects and activities in the district.
- ✓ Services for the public to accessing research documents relevant to the public.

The need for reliable and up-to-date information is becoming increasingly important as every district assumes greater responsibility for planning and implementing development activities. The development of DIDC is a key element in strengthening the capacity of districts to manage their development activities.

1.4.4 Agricultural Information Centres

The Ministry of agriculture has a well established structure from the head office in Nairobi down to the divisional and location levels. At each level there are information centres where farmers obtain information from agricultural officers. In these centres agricultural information resources accessible to farmers include annual reports for the district, newsletters, agricultural policies and research reports.. Besides the publications, farmers also use information systems such as local NGOs and Community Based Organizations (CBOs) based in the district where they are active. There are agricultural information centres in Wareng district based at the district head office and also at divisional offices. Active NGOs and CBOs are also present in the district.

1.4.5 Agricultural Information Networks

Within the framework of the broader agricultural sector, it is important to include information landscape with respect to the existing policies, structures and information flow mechanisms from policy research level through extension to the farmer level. KARI (Kenya Agricultural Research Institute) initiated information networks for efficient dissemination of agricultural information to farmers. Among other networks is KAINet (Kenya Agricultural Information Network) which was initiated in 2006 as a response to demand from the national and international communities in the agricultural sector, including researchers, extension workers and others in order to support decision-making, promote innovation in agriculture and improve livelihoods. KAINet aims at building capacities in information management, dissemination and exchange in network members in Kenya. The objectives include establishing institutional repositories of agricultural information, facilitating the development of institutional and national informational and communication management.

1.5 Statement of the Problem

Kenya's Ministry of Agriculture Strategic Plan for 2008-2012 states that agricultural sector extension service plays a vital role in sharing of knowledge, technologies, agricultural information and also linking the farmer to other sectors in the economy. The extension service is therefore, one of the critical change agents required in the transformation of subsistence farming to modern and commercial agriculture. This is critically important in promoting household food security, improving incomes and reducing poverty. The need for information therefore arises at all levels from that strategic plan at the national levels and to the grass-root level.

One of the core functions of the Ministry as outlined in the Strategic Plan is to “collect, maintain and manage information on the agriculture sector”. Information generation and dissemination on all aspects of agriculture is key to the success of this sector. This information should embrace the totality of the value chain from the farm to the market. To enable access and to an integrated source of agricultural information system, a Ministerial ICT strategy is being developed as a roadmap to the envisioned ‘e-agriculture. This will entail the development of essential ICT infrastructure and information delivery mechanism.

Today, users of agricultural information in Kenya are increasing by the day. These users or farmers depend on information generated by the Ministry of Agriculture and its research institutions to cater for their information needs. In Wareng district however, provision of information to vegetable farmers is not up to the expected standard. The information materials generated are not linked to the information needs of vegetable farmers. It is thus necessary to enhance the provision of information and the related information services to these users which formed the basis for this study. The accuracy, timeliness and format of the information provided to vegetable farmers in Wareng district cannot be compromised if the satisfaction of these users will be guaranteed. In addition, there is no significant link between these materials and the local information needs of vegetable farmers in Wareng district since no study has been done before to address their information needs. The information needs of vegetable farmers in Wareng district require a thorough understanding in order that the information resources and extension services are relevant to these needs. This study examined agricultural information systems and services in Wareng District and found to be inadequate. There is need to develop appropriate systems and services to

enhance access for the agricultural information that is timely, accurate and relevant to the vegetable farmers in the district.

1.6 Aim of the study

The aim of the study was to investigate the provision of information to small scale vegetable farmers in Wareng District, with a view to establishing challenges and proposing a model for effective and efficient information flow to the vegetable farmers in the district.

1.7 Objectives of the study

The specific objectives of the study were to:

1. Identify information needs of small –scale vegetable farmers in Wareng District.
2. Determine the sources of information available to small scale vegetable farmers in Wareng District.
3. Assess the effectiveness of extension services in dissemination of information to vegetable farmers.
4. Determine communication channels through which agricultural information is disseminated to small –scale vegetable farmers in Wareng District.
5. Find out the accessibility and usefulness of the information channels, sources, services and systems that provide information to vegetable farmers.
6. Identify factors that hinder accessibility to agriculture information by small-scale vegetable farmers in Wareng District.
7. Suggest ways of improving communication of agricultural information to small scale vegetable farmers in Wareng District.

1.8 Research Questions

The study was guided by the following research questions:

1. What is the nature, range and types of information that small-scale vegetable farmers in Wareng District need?
2. How useful are the sources, services and systems of information in meeting the identified information needs?
3. What is the extent of use of different types of communication channels in disseminating information to small –scale vegetables farmers in Wareng District are used?
4. What factors hinder the dissemination of information to small scale vegetable farmers?
5. What challenges are faced by extension officers in disseminating information to small scale vegetable farmers?
6. What suggestions can be offered to address the challenges identified in providing information to vegetable farmers?
7. What model can be proposed to enhance provision of information to vegetable farmers in Wareng District?

1.9 Assumptions of the study

The study was carried out based on the following assumptions:

1. The existing information sources, services and systems hardly satisfy the information needs of small-scale vegetable farmers in Wareng District. This is because the information needs of vegetable farmers have not been adequately addressed.
2. The information systems and services have not been developed in the district

3. There is need for improved approach of information provision in terms of accessibility and dissemination of information to vegetable farmers in Wareng District.
4. There is a possibility to improve accessibility to information by redesigning of information systems and services in Wareng district.

1.10 Significance of the study

The study is important because there has not been much research done on farmers' information needs in vegetable farming. Due to the increase in population there is urgent need for increased food production which can be made possible through the use of timely and relevant information. The results of this study may be used to foster relationship between farmers, extension officers, consumers and their environment.

The study will form the basis for awareness campaigns on vegetable farming information hence boosts the economic and health status of rural population in Wareng District.

The study is also important not only to farmers but also to policy makers and future researchers on agriculture for the country. The findings emanating from this study are expected to assist farmers to improve and modernize farming activities hence contribute to food security in the country.

1.11 Scope and limitations of the study

The study was carried out in Wareng District of Uasin Gishu County of Rift Valley Province. The conclusion is therefore based on the information provided by vegetable farmers in the district. The time and financial resources available did not enable the researcher to cover the entire Uasin Gishu County.

1.12 Definition of Operational Terms

The following terms were defined in accordance with the context in which they were used throughout the study:

Agricultural Information – is information that is needed by small-scale farmers for carrying out their farming activities.

Agricultural Information Systems – is a system in which information on agriculture is generated and packaged, disseminated, received and adopted. Feedback is relayed between extension officers and small-scale vegetable farmers.

Channel – refers to the medium used to convey agricultural information to small-scale farmers.

Communication – refers to any oral or written exchange of ideas and information between agricultural extension officers and farmers in Wareng district.

Extension Officer – refers to the disseminator of agricultural information linking the small-scale farmer and the formal agricultural institutions that generate agricultural information.

Feedback – refers to the responses relayed back as a result of agricultural information received by either extension officers or small-scale farmers.

Information – is data that has been analyzed and synthesized to produce meaning and whose continuous use by small-scale vegetable farmers will improve their knowledge in farming.

Information Needs – refers to the information requirements of small-scale farmers that is essential in carrying out their day to day farming activities.

Information users – refers to small-scale farmers, agricultural officers who assimilate and use agricultural information.

Small-scale vegetable farmer – refers to a group of farmers in rural Wareng district who grow on small-scale farms as their economic activity.

Small-scale vegetable farm – in Kenya it refers to a farm with an average area spanning 0.1 to 2.0. Acres.

Technology – refers in broad sense to ideas, practices and tools in agricultural activities for use by small-scale farmers in Wareng district.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The previous chapter introduced the topic giving the aims and objectives of the study and the preceding research questions. This chapter reviews the literature related to the study. In particular it focuses on information needs of farmers, sources of information, extension services and channels of disseminating information to vegetable farmers. The chapter also discusses communication theory and its applicability to this study.

According to Hart (2006) literature review is done to find out what already exists in the area in which the study is being researched on. The review forms the foundation for research and the researcher needs to know about the contributions others have made to the knowledge pool relevant to the topic. Furthermore, quality review means appropriate breadth and depth of the subject, the rigour and consistency, clarity and brevity, and effective analysis and synthesis. In other words, the use of the ideas in the literature is to justify the particular approach to the topic, the selection of methods, and the demonstration that this research contributes something new.

2.2 Theoretical Framework

Theoretically, information behaviour is one of the richest research areas in the field of libraries and information science. Since calls for conceptual enrichment within the field of information behaviour in the post 1978 literature, much effort has been expended to generate new theories and develop new models of human information behaviour. There has been a paradigm shift from focus on the system to focus on the

user. During the 1960s and 1970s the focus of the studies was on the system and the researchers tried to understand the users and their needs through the study of the system or the resources used. Since the paradigm shift, researchers have paid more attention to the user and their characteristics. Different approaches have been adopted for the study of information behaviour of users and the new methodologies have been developed or adopted from other fields such as social sciences.

In this study the researcher has mainly applied the theory of information behaviour as advocated by Garbner's theory of communication, Wilson's model of information and the new improved Wilson's model of information behaviour by Niedwiedzka (2003).

During the last decades, relations between communication studies and information science has become close. The concepts of information and communication studies are spreading more and widely. Garbner (1962) defines communication as a social interaction through messages. Information is defined as interpretation of message that reduces uncertainty. This shows a link between the two concepts.

Communication tailored to the audience's background and experience can improve people's participation in development. Through communication people get information that influences their decision as well as limiting their ignorance and thus making them aware of issues touching their daily activities (Waswa, 1998). Communication is the process of conveying information from source to a receiver through a predetermined channel. According to Maceviciute (1999) communication is a very broad term encompassing different messages, media, and goals. It includes interpersonal dialogue, formal message and instructions.

2.2.1 Concept of Information

The concept of information is between data and knowledge which is communicated or received concerning a particular fact or circumstance in order to reduce the users uncertainty. Information is also defined as that which reduces uncertainty. Information is prima facie something that flows between a sender and a receiver. The concept of information is embedded in more or less explicit theoretical structures. In studying information it is easy to be one's orientation. According to Capurro (2005), the most important distinction is that between information as an object or a thing (e.g. number of bits) and information as a subjective concept, information as a sign; that is depending on the interpretation of a cognitive agent.

2.2.2 Information Needs

In day to day work, lack of self sufficiency constitutes information needs. This information needs represent gaps in the current knowledge of the user. Apart from the expressed or articulated needs, there are unexpressed needs which the user is aware of but does not like to express. The third category of need is the deliquescent or dormant need which the user is unaware of. But the information services provider may be able to bring to light these needs.

Information need is defined by Ojiambo and Ocholla (1993) as "a value judgment that some group has a problem that can be solved. The value judgment exists due to differences in need requirements by individuals or groups of people. A need therefore has to be discovered and attempts made to satisfy that need".

Odini (1993) says an information need as “a concept difficult to define, to isolate and especially to measure. This is because users do not specify what is needed under defined conditions. If a user could specify what is needed under defined conditions his/her problem might well be on the way towards solution.”

For this study, it is important to understand the nature and work of small-scale vegetable farmers in Wareng district. This will then point out the problems that exist and the needs to be addressed. The success of any information service is to address and meet the information needs of an individual or group. A needs analysis which involves the identification and evaluation of needs will assist in establishing appropriate collection of resources to satisfy these needs. The analysis may also help to point out the kind of improvement needed for effective utilization of existing information services.

A need is specific and generally time bound, either immediate or deferred. The information provided for a need will be used. In the case of interest, the information provided may be used or may not be used. According to Crawford (1978), information needs depend on:

- Work activity
- Discipline/ Field / Area of interest
- Availability of facilities
- Hierarchical position of individuals
- Motivation factors for information needs
- Need to take a decision
- Need to seek new ideas

- Need to validate the correct ones
- Need to make professional contributions
- Need to establish priority for discovery etc.

Information needs are affected by a variety of factors such as:

- The range of information sources available;
- . The uses to which the information will be put;
- The background, motivation, professional orientation and other individual characteristics of the user;
- The social, political, economic, legal and regulatory systems surrounding the user; and
- The consequences of information use.

A model may be described as a framework for thinking about a problem and may evolve into a statement of the relationships among theoretical propositions. Most models in the general field of information behaviour are of the former variety: they are statements, often in the form of diagrams that attempt to describe an information-seeking activity, the causes and consequences of that activity, or the relationships among stages in information-seeking behaviour. Rarely do such models advance to the stage of specifying relationships among theoretical propositions: rather, they are at a pre-theoretical stage, but may suggest relationships that might be fruitful to explore or test.

This study is based on the Defleur's communication, Wilson's information behaviour model which was later improved by Barbara Niedzwiedzka's model of information behaviour. Shannon and Weaver (1949) developed general model of communication

at Bell telephone laboratory. Shannon's model describes communication as a linear one way process.

This model states the functions to be performed and notes one dysfunctional factor, noise. First in the process of the information source, producing a message or a chain of messages to be communicated. In the next step the message is formed into signals by transmitter. The signals should be adapted to the channel leading to the receiver. The receiver reconstructs the message from the signal. The received message reaches the destination.

The signal is vulnerable to disturbances or noise as indicated by Shannon. This may result in difference between transmitted and received signals which means that the message produced by the source and reconstructed by the receiver may not have the same meaning at the destination. Shannon's model being linear or one way process. Defleur's (1970) developed it further in a discussion about the correspondent between the meaning of the produced and the receiver message. Delfeur notes that in the communication process 'meaning' is transformed into 'message' and describes how the transmitter transforms 'message' into information which then passes through channel.

The receiver decodes the 'information' into a message which is in turn transformed at the destination into meaning. Defleur added another element to Shannon's model of feedback. This gives the source the possibility of adapting more effectively its way of communicating to the destination.

For the communication to be effective the theory takes into consideration the following variables:

- the image the sender has of the receiver and vice versa
- the personal experiences values and expectations of both the source and the receivers.
- the variations of meaning that symbols and situations have
- the many and varying aspects of the art of context within which the art of communication is taking place.

2.1.5 Relevance of Defleuers' theory to the study

Source

The 'source' in this study is the originator of the message. The source encodes the message in a language that can be understood by the receiver in a channel which the receiver can use. This includes libraries, information centers, ministry of agriculture; agro-chemical companies, farmer's associations and societies etc. The above sources of information provide information of vegetable farmers of Wareng district.

Channel

The channel is the formal medium of communication between the originators of information to the receiver who is the vegetable farmer. The channels includes agricultural extension services, seminars, workshops, agricultural shows, exhibitions, demonstrations, print media, electronic media, computer databases, internet, agricultural networks, farmers field schools, field days.

Transmitter

Transmission takes place at the 'source' which could be a library or agricultural extension services. The message is transferred into information. The recipient of the information is the vegetable farmer.

Destination/Receiver

The destination is the vegetable farmers of Wareng district. The receiver decodes the message in order to extract meaning.

Noise

According to Shannon and Weaver noise is a factor which interferes with the message. It is any interference with the success of the communication process thereby distorting the message so that the meaning intended is not achieved. Noise may originate in the source, channel, receiver or the context within which participants interact. Noise includes such aspects as language barrier, busy schedules, form presentation and accessibility to information, educational levels of vegetables farmers, the technical nature of the information, illiteracy among others.

Feedback

This refers to any process by which the communicator obtains information and whether the intended receiver has received the message. By way of feedback, the sender is able to fudge the extent to which the message has been successfully received and its impact. This enables the communication act to adapted be and regulated to achieve is desired effect.

2.1.6 Wilson's Information Behaviour Model

The aim of this model is to outline the various areas covered as information-seeking behaviour, as an alternative to the then common information needs, but it is clear that the scope of the diagram is much greater and that it attempts to cover most of what is included here as information behaviour.

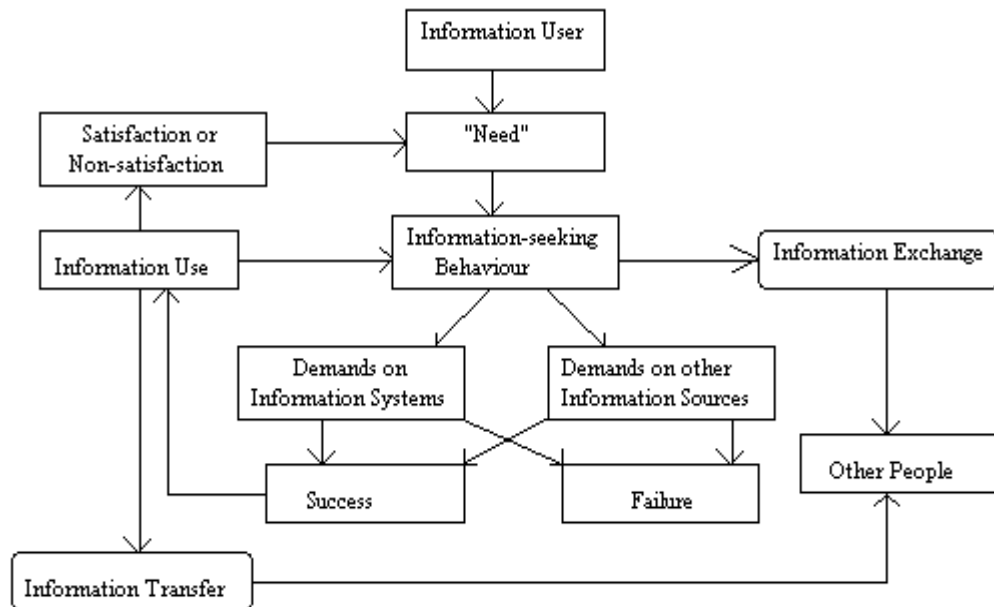


Figure 1: Wilson's information behaviour model

2.1.7 Relevance of Wilson's model to the study

The model suggests that information-seeking behaviour arises as a consequence of a need perceived by an information user, who, in order to satisfy that need, makes demands upon formal or informal information sources or services, which result in success or failure to find relevant information. If successful, the individual then makes use of the information found and may either fully or partially satisfy the perceived need - or, indeed, fail to satisfy the need and have to reiterate the search process.

The model also shows that part of the information-seeking behaviour may involve other people through information exchange and that information perceived as useful may be passed to other people, as well as being used (or instead of being used) by the person himself or herself.

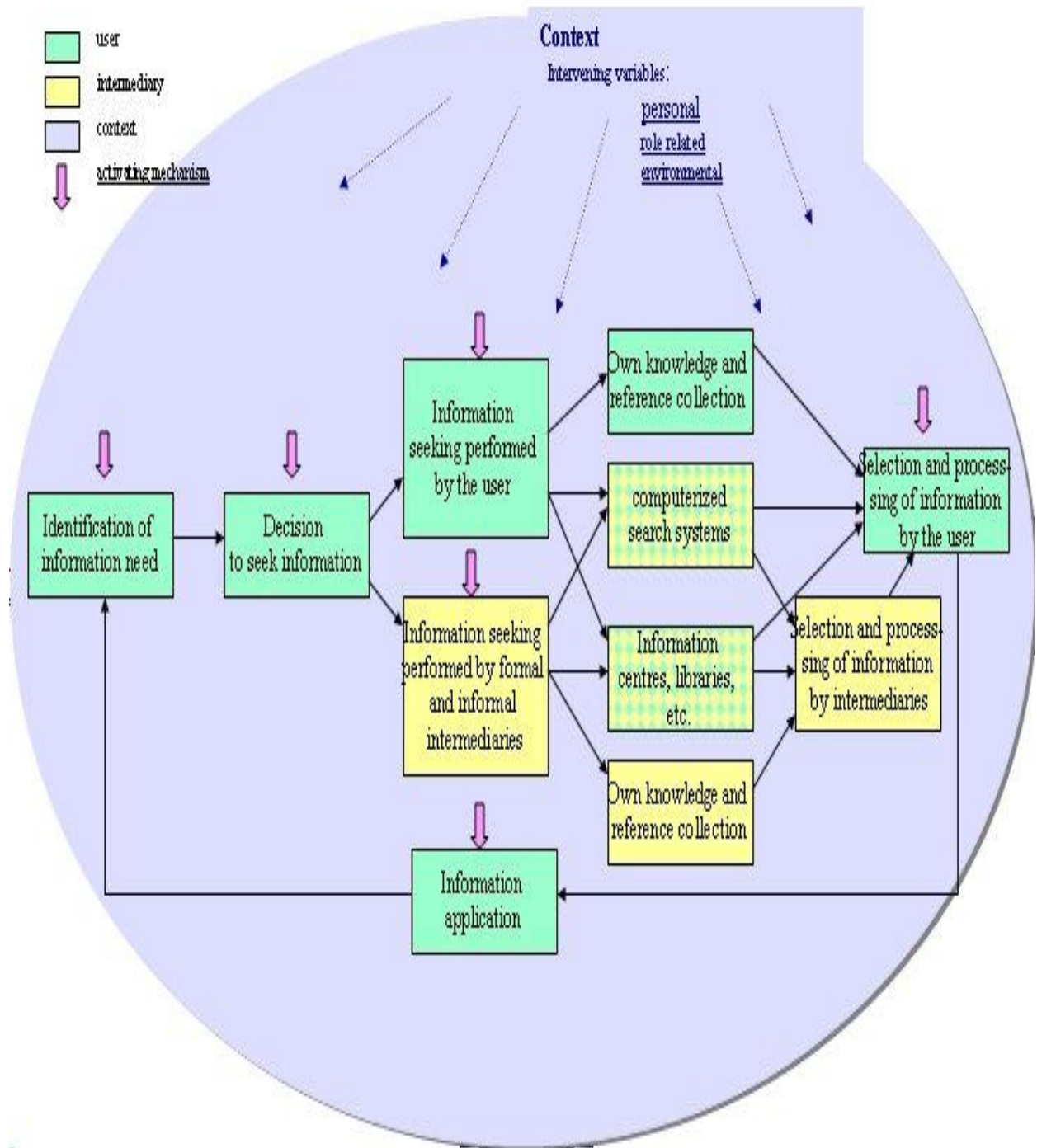
One of the results of the analysis that led to the diagram was the recognition that information use had received little attention and, within information science, that statement is still relatively true today. Nor has much attention been devoted to the

phenomenon of the informal transfer of information between individuals since Allen's pioneering work on transferring to the research laboratory the 'two-step' flow of communication model of the 'gatekeeper'. The identification of these areas as relatively lacking in research attention demonstrates one of the functions of these models. From Wilson's model, one can deduce that in spite of individual features; the information needs of the same person can vary depending on the changes in the environment. The features of the roles a person plays in life including professional roles are the effect of the behaviour patterns established in a society for that particular role. Examples are leaders, managers, farmers, teachers or members of a group. Certain roles indicate specific information needs.

2.1.8 Barbara Niedzwiedzka Model of Information Behaviour

In this study the researcher has mainly applied the theory of information behaviour from the Defleur's communication model and to the Wilson (1996) model of information. The new model of information behaviour as designed and modified by Barbara Niedzewiedzka (2003) is also applied. This new model notes that Wilson's model assumes two propositions; first that information needs are secondary needs, caused by primary needs, which accordance with definitions in psychology can be defined as physiological, cognitive or affective. Cognitive needs arise as an attempt to find sense and order in the world, and are the realization of a need to explain and make sense out of phenomena. The rise of a particular need is influenced by the context, which can be the person, the role the person plays in work and life, or the environment (social, political, economical, technological etc). This is an ideal situation among vegetable farmers in Wareng district whereby the primary need for farmers is appropriate information which helps them in production of high yield vegetables with good value.

Niedzewiedzka's new proposed model criticizes Wilson's model in that it cannot be used to describe agricultural officers' information behaviour since these officers basically are not the end users of external information from organizations or computerized information services as they also acquire information through various intermediaries. Therefore, the model cannot be considered as a general model applicable to every category of information users. This is true with vegetable farmers in Wareng district because not all farmers go out to seek for information on their own but some depend on their fellow farmers or neighbours to get information.



Figures 2: Niedzewiedzka's model of 2003

Niedzwiedzka's model proposed model encompasses the main concepts of Wilson's model such as: person in context, three categories of intervening variables (individual, social and environmental), activating mechanisms, cyclic character of information behaviour and the adoption of multidisciplinary approach to explain them.

This new model shows two basic strategies of information seeking:

- a) a user seeks information personally, or
- b) a user uses the help or services of other people.

According to Niedzwiedzka a user can choose one, the other or both of the strategies. A fully independent user applies his/her knowledge, available sources and interacts with search systems and information services (uses databases, catalogues, search engines etc). Such a rare user also selects and processes the acquitted information personally. Probably much often people use various intermediaries and their services (information specialists, agricultural extension officers, co-farmers) and utilize the effects of their information seeking and processing. A user can also almost entirely depend upon intermediaries, and he/she acts independently only at the stage of mental processing information. It was said 'almost' because economics of information behaviour probably makes an individual use sources that are at hand appropriate without using a mediator. But usually it is an intermediary who engages in systematic information activities: asking, seeking and searching, for this kind of user.

Managers according to Niedzwiedzka belong to the second category. They predominantly turn to the various intermediaries to obtain necessary data and evidence. They usually do use the time to do the information seeking, and thus prefer to get the final product while the process is done by the intermediaries.

In conclusion, Defleurs, Wilson's and Niedzwiedzka's models are 'important to this study because they outline all players in the information needs and communication process. Information reaches the vegetable farmers from the source through a medium to its destination'. The use of timely information in farming results in good field hence, the impact of the 'message' or information.

2.3 Review of Literature related to the study as per the objectives

Data is a Latin word used to describe a collection of natural phenomena descriptors including the results of experience, observation or experiment, a set of premises or information within a computer system. This may consist of numbers, words, or images, particularly as measurement or observations of a set of variables (Wikipedia, 2008).

Information is perceived as something between data and knowledge which is communicated or received concerning a particular fact of circumstance in order to reduce uncertainty.

In the course of seeking information, there is the concept of an information need. (Ojiambo, 1993) defines an information need as a value judgment that group has a problem that can be solved. The value judgment exists due to differences in need requirements by individuals or groups. One farmer may regard information as vital and another may not. The recognition of need is therefore one's judgment. A need can only be discovered. Information therefore is sought to meet a need.

A broad range of control approaches is open to the farmer, each approach with its own set of implications for the kind of information that should be available (Midmore,

2005). Integrated pest management requires the farmer to be knowledgeable about the identity and role of beneficial insects and other biological control agents, about the role of potential disadvantages of pesticides use and abuse and a wide range of cultural and crop sanitation practices that reduce pest incidences, (Wellings 2007). Vegetable farmers also require information on the nature of the soil suitable for vegetable farming and also the rainfall patterns that favour vegetables.

These and other information requirements depend on access to comprehensive support services, able to identify and diagnose pest to allow the farmer to make immediate decisions about control. The information that support on farm pest management decision making should be easily accessible and with clear understanding of instructions.

The bulk of farming population in Wareng District are peasant farmers who mainly produce staple food for subsistence and very little surplus for marketing.

Vegetables are grown in this District to supplement maize, wheat and livestock products. Vegetables mainly grown in the division includes Kales (Sukuma wiki), cabbages, carrots, tomatoes, onions, peas etc. other traditional vegetables include black night or (isochek) in the local language), isagek, (spider leaves) pumpkin leaves and fruits, and others with local names.

The cultivation of vegetables has become increasingly important because of the rapid growth of towns and urban centres in the new Wareng district and by extension to the larger Uasin Gishu County. Most of the people in urban require regular supplies from the market. In vegetable growing, pesticides are major control agents.

These are frequently supplied by organizations such as cooperatives or sales agents for major pesticide companies and are often applied as calendar prophylactic treatments. In such cases, one frequently observes a spillover effect for pesticide application on food crops grown for home consumption (Arusei, 2000).

In most countries such as Kenya there is an acute shortage of adequately trained plant protection specialists, a lack of well-organised plant protection service and generally poor linkages between agricultural research, extension agents and farmers. This lack of guidance presents severe problems for farmers in particular when it comes to chemical control, Mengech and Saxena (1995).

Leslie(1993) notes that most vegetable growers have responded to consumer and industry demands and increased pest pressure by using pesticides. Pesticides are not applied maliciously to poison the environment or people, and certainly producers must live with the consequences of their agricultural practices more closely than most sectors of the society. Most recently food safety has focused on the public attention on pesticide use in vegetables. It is therefore, necessary that producers, regulators, and researchers respond to consumer concerns with consumer education and approaches that are environmentally and socially acceptable.

2.3 .1 Farming in Africa

Over the years, deliberate, though ineffective efforts have been made by donors and African countries to bring about agricultural development without much to show for it. Much of the failure can be attributed to the adapted transformation approach to agriculture which is characterized by the introduction of a wide variety of large scale farming and processing technologies.

It is however gratifying to note that there is a new shift in emphasis from the big scale transformation approaches to the small scale improvement strategy approach which is attuned to African age-long farm practice.

The failure can also be attributed to the treatment of information delivery as a matter of course by most African governments. As often happens, agricultural information is not integrated with other development programmes to address the numerous related problems that face farmers.

If the approaches to agricultural development programmes are to work, African governments need to take new approaches to information dissemination and management that grow out from a clear understanding of what farmers' information needs are.

Many governments in Africa still favour subsidizing pesticides which may lead to overuse in particular when proper extensions services are lacking or weak. Certain donor countries add to this problem when supplying large amounts of pesticides as part of an aid package without targeting these pesticides properly and without giving enough assistance to ensure their proper use. The seriousness of the situation is illustrated by a survey carried out by FAO. According to this, fewer than half of the countries of Africa including those North of the Sahara appear to have legislation on pesticides, (FAO (1987).

Most countries are not yet able to comply with all the provisions of the international code of conduct on the distribution and use of pesticides adopted by the FAO conference in 1986. The code is an agreement between member countries and the

International Group of National Associations of Manufacturer of Agrochemical products (GIFAP) on procedures to be followed in relation to import/export distribution and use of pesticides (Schulten, 1989).

Agriculture in Kenya

Agriculture remains the most important economic activity in Kenya, although less than 8% of the land is used for crop and feed production. Less than 20% of the land is suitable for cultivation, of which only 12% is classified as high potential (adequate rainfall) agricultural land and about 8% is medium potential land. The rest of the land is arid or semiarid. About 80% of the work force engages in agriculture or food processing. Farming in Kenya is typically carried out by small producers who usually cultivate no more than two hectares (about five acres) using limited technology. These small farms, operated by about three million farming families, account for 75% of total production. Although there are still important European-owned coffee, tea, and sisal plantations, an increasing number of peasant farmers grow cash crops.

From independence in 1963 to the oil crisis in 1973, the agricultural sector expanded by undergoing two basic changes: first, widespread acceptance of private ownership (replacing community ownership) and cash crop farming; second, the success of intensive nationwide efforts to expand and upgrade the production of African smallholders. Before World War II (1939–45) ended, agricultural development occurred almost exclusively in the "White Highlands," an area of some 31,000 sq km (12,000 sq mi) allocated to immigrant white settlers and plantation companies. Since independence, as part of a land consolidation and resettlement policy, the Kenya government, with financial aid from the United Kingdom, has gradually transferred large areas to African ownership. European-owned agriculture remains generally large-scale and almost entirely commercial.

After the 1973 oil crisis, agricultural growth slowed as less untapped land became available. Government involvement in marketing coupled with inefficient trade and exchange rate policies discouraged production during the 1970s. Coffee production boomed in the late 1970s and in 1986 temporarily helped the economy in its struggle away from deficit spending and monetary expansion. Although the expansion of agricultural export crops has been the most important factor in stimulating economic development, much agricultural activity is also directed toward providing food for domestic consumption. Kenya's agriculture is sufficiently diversified to produce nearly all of the nation's basic foodstuffs. To some extent, Kenya also helps feed neighboring countries.

In Kenya agriculture is an important sector to the national economy. It contributes 26% of Gross Domestic Product (GDP). In addition the sector is estimated to have indirect contribution of about 27% GDP through linkages with the manufacturing, distribution and other service related sectors. The sector also accounts for 60% of the national employment mainly in rural areas, 60% of the export earning, and 45% of the government revenue. It is therefore evident that the sector plays a critical role in addressing the national goals of poverty eradication, increasing rural incomes, creating employment and guaranteeing food security, (Republic of Kenya, 2004).

2.3.2 History of Agriculture in Wareng District

Wareng district lies between the highland plateaus with varying altitude. It forms an undulating plateau from east to west. The district landform therefore makes Wareng a high potential agricultural area. The District also has high equatorial climate with a mean annual rainfall of 1,124mm. The rainfall is fairly distributed with one long wet season and a short dry spell.

Average temperature is favourable for agricultural activities. The types of soils in Wareng district vary with altitude, temperature and the underlying rocks. The district is endowed with brown loamy soil which is good for horticultural activities such as vegetable farming.

The above climatic conditions that describes the coverage in Wareng district makes it a highly potential agricultural district where growth of vegetables and other crops is done.

2.3.3 Role of Extension Workers in the Dissemination of Information

Extension is prerequisite to widespread and sustained agriculture development. Benor, (1984) notes that extension services in Kenya is a Training and Visit system that aims to improve the management and efficiency of the entire extension system. It is time bound and is designed to deliver selected, timely and relevant information about farming in general with minimal delay.

Extension staff are responsible to farmers to explain the most important farming technologies, application and the various uses they have on the farmers. This should enable the farmers to make decisions to adopt better farming methods and improve production. Extension personnel are people whose work is to pass information directly to the farmers, (Ngetich, 2005).

The farmers are responsible for agricultural degradation. Extension services are needed to explain new technology to the farmers and teach them to adopt improved production practices in order to increase their production and income. Extension services has a vital role in ensuring that the agro-economic and social environment of

farmers and the day to day production problems that farmers face are appreciated by research. Without extension guidance farmers often are unable to fully exploit opportunities available to them (Benar and Baxter, 1989).

The extension service workers should be knowledgeable about the latest scientific knowledge on sustainable practices. According to the National Development Plan 2000-2008 on “Effective Management for Sustainable Economic Growth and Poverty Reduction” the GOK indicated that it would continue to play a crucial role in the dissemination of relevant information to farmers through extension and training services. Information pertaining to the use of agricultural inputs market prices; efficient land use etc. will be disseminated to farmers.

Through extension the government intends to continue to emphasize awareness and adoption for new technologies which can enable farmers to achieve greater yields, (Gok, 1996:5).

The main objectives of Kenya’s agricultural extension policy are:-

Education of farmers mainly the spatial diffusion of new technologies and information in agriculture by the simplification of reporting procedure and reaching many farmers.

- c) Development of linkages between farmers and agricultural research stations, researchers, agricultural staff, NGO’s.
- d) Provision of additional transport facilities to agriculture staff to enable them reach farmers.
- e) Improvement in the training for extension staff.

- f) Development of more demonstration plots to illustrate the effectiveness and profitability of improved production techniques.
- g) Improvement in the dissemination of information using farming guides and other materials to farmers.

2.3.4 Agricultural Information Services

Agricultural information services aims at making sure that farmers can find the precise information they need, when they need it and in forms which the farmers can understand. For vegetable farmers in Wareng district, farmers seek new information to improve productivity and overcome poverty and food security.

The farmers who are rural based require information which is powerful tool in addressing agricultural needs and when used appropriately can radically change a nation's economy. Kizilaslan (2006). There is a widespread belief that information is vital for rural development and Munyua (2000) regards information as the least expensive input for rural development and it can also be viewed as a basic, necessary ingredient for bringing about social and economic change of a country.

As noted above vegetable farmers in Wareng district require information on inter-alia that supply of agricultural inputs (seed, fertilizer) new technologies and innovations, early warning mechanisms (for pests, drought, diseases) credit facilities, markets and such like.

Vegetable farmers require information on certified seeds for planting. The KEPHIS and Kenya Seed Company and KARI are the research organizations that sell certified seeds. The quality of the seeds yields quality products for harvest. The research

institutions ensure that certified seed reach farmers through outlets and selected stockists. These organizations also provide instructions on the seed containers and issue leaflets on the best ways of planting the seeds.

Use of fertilizer by vegetable farmers is an information need. Soils are fragile. To give the best output soils need to be regularly nourished and cared for, and allowed to rest from time to time. When soils are used for intense cultivation soils quickly become degraded hence low productivity.

Restoring and maintaining soil fertility is a vital prerequisite for increasing output. Therefore, chemical fertilizer remains essential .CTA (2009). Vegetable farmers apply chemical fertilizer and compost, manure, etc. Fertilizers alone do not make soils fertile. Fertilizers is a highly carbon intensive acidic nutrient source.

Farmers need to be educated on good agricultural practicals such as intercropping legumes (beans, groundnuts, pigeon pea) with cereals (maize, millets, sorghum)... Motivating and encouraging small-scale farmers to use manure, crop residues and compost to enrich their fields” CTA (2009)

Vegetable farmers require information on new technologies and their adoption. Introduction of modern irrigation systems enable vegetable farmers to produce vegetable all year round.

Farmers using drip and sprinkler irrigation mechanisms results in quality vegetables enough for local consumption and sales. Extension services provide training using micro-irrigation systems. The training involves choosing durable materials technical

know-how and use of equipment. The introduction of money-maker irrigation equipment which has revolutionarized vegetable farming among small-scale farmers. The money-maker is a manual machine that uses pedals and hose pipes to draw water from the river, stream or well and use sprinklers to water plants. It is mechanical equipment which has provided useful and popular with small-scale vegetable farmers of Wareng district.

Vegetable farmer require access to basic training. The information disseminated increases their output. Massive financial support to buy seed and fertilizer is not enough to help producers (farmers) undertake structural reforms and significantly increase productivity. There can be no sustainable improvement unless farmers require solid foundation, Spore No. 136 (2008).

For a long time agricultural extension officers were there to teach farmers improved productivity techniques. CTA 2008 notes that there is need to put in place mass professional training programmes aimed at all farmers in a country if results are to be swift and far reaching. It adds that villagers are to be persuaded to stay where there are rather than leave for urban areas, it is important to view rural as a whole and not first focus on agricultural production. Additionally, farmers must learn how to press for their rights and take part in the disinfectant of policies that affect them.

To achieve such results expert in education for Rural People (ERP) programme stress the need to create national strategies involving ministries of Education, Agricultural, natural Resources and Health. The training strategy should however be part of a wider framework tailored to answer the needs of a country. In order to produce results, it

should go hand in hand with services to farmers such as organizing markets, securing supplies of inputs, maintaining infrastructure and ensuring land tenure.

Vegetable farmers also required information on selling products or markets. As noted by CTA (2005) “farming is fraught with uncertainty. The risks starts from the moment a farmer plants a crop, and ends only when solve of harvest is completed.” As any farmer knows, making a living from the land is a risky business. “First there is the weather. At any point, the harvest can be compromised or damaged. Then there are pests, and diseases. A plague of locusts can strip a field in minutes. Last, but not least, is the uncertainty of the marketplace. Will the farmer find a buyer? How much will the fruits of labour fetch? It is hardly a recipe for a good night’s sleep. Today one of the biggest threats facing farmers if the risk of falling crop prices. Since the beginning of the 1990’s the liberalization of commodity trading and pricing in developing countries has shifted the burden of risk from governments to farmer. As bad luck would have it, price volatility is greater for commodities traded by poor country. Thus vegetable farmers face competition from liberalized market for their produce. Otieno, (2009)

Vegetable farmers require information on credit facilities to enable them buy quality seeds which yields quality harvests. Traditionally, the major banks have been reluctant to extend their services to rural communities. Problems such as remoteness, low population densities in rural areas, and the small size of most transactions are compounded by the lack of roads, postal services and fixed telephone services.

It is not profitable enough for banks to set up branches “in the middle of nowhere.” As a result so many people remain ‘unbanked’ i.e. they have no bank account and no access to financial services, CTA (2007)

However, recently a number of micro-finances have begun to reach out to the farmers and offer financial services. Information technology such as mobile banking services has been enhanced and is becoming widespread in rural areas. Farmers therefore can access credit facilities from micro-finances and boost their productivity. The risks involved arise from the fact that farmers are dependent on agriculture for their livelihoods. Natural disasters such as drought or floods can affect the entire community.

2.3.5 The types of communication channels used to disseminate information

The majority of farmers live in rural areas where infrastructure necessary for accessing information is poor. Electricity supply, telephone services and poor road network adds to challenges farmers face in accessing information. In addition literacy levels rules out the use of print media.

Aina (1995) observes that the level of ICT is still low in Africa, the provision of agricultural information through electronic media is not common.

Because of this scenario, it has been difficult for researchers, extension officers, planners and decision markers to access information. It has also been difficult to share information amongst the farming community.

However, the current introduction of ICT to the rural areas through use of mobile phones, short messaging (SMS) radio, television and even web-based programmes on

internet has changed the lives of farmers. This is the case in Wareng district where farmers access agricultural information with the help of ICT to rural based farmers.

2.3.5.1 The Radio

Radio is the most widely used medium in dissemination of agricultural information. Also within the district farmers also share information among themselves via formal networks such as cooperatives and associations. Informal networks are also useful, although resources are often limited to the immediate area. For many vegetable farmers in Wareng district the only source of information outside the community is the radio.

Radio sets are relatively inexpensive and can be used in remote areas where electricity supply is non-existent. Local radio also gives farmers a voice, enabling them to share their knowledge and experiences and to acquire practical information that they can use to improve their livelihoods.

Traditionally, radio has been a one-way communication medium, where the programme makers deliver information to the listeners. But in recent years the number of FM radio stations has increased and new information technologies have become more accessible providing many possibilities for development of more interactive two way communication for farmers.

Farmers ask questions to the experts on agricultural services and instant answers are provided. Mali Shambani is an interactive radio programme initiated by FIT Resources-Kenya, a non-profit company offering business development services, which is designed to increase access to farming information for smallholder farmers and the fishing community in Kenya. Launched in 2006, the radio programme, which

in Kiswahili means "wealth in the farms", is broadcast throughout the country with information adapted to local languages, issues, and needs. The programme is an activity of Agricultural Cooperative Development International/Volunteers in Overseas Cooperative Assistance (ACDI/VOCA)'s United States Agency for International Development (USAID)-funded Kenya Maize Development Project.

According to the organisers, the radio shows are developed with farmers' needs in mind, and content is driven by what the farmers themselves want to hear and learn about. The programme provides information on farming techniques, inputs, quality standards, weather and seasonal issues, market prices and trends, business tips, land use, and financing opportunities.

Each programme also features a question-and-answer segment, where listeners can call (or text-message/use short messaging service (SMS) to communicate with) the radio station and interact live with a featured panel of experts. In order to fulfil the aim of providing relevant information to farmers, the programme strategy involves bringing together radio station producers, agriculture information content providers, advertisers, and farmers.

The Mali Shambani programme was piloted in Kiswahili on the Kenya Broadcasting Corporation (KBC), but subsequently expanded to vernacular stations, allowing issues and topics to not only be broadcast in local languages, but also to be localised to the specific agricultural or aquacultural needs of that region. For example, Radio Salaam will broadcast in Kiswahili about fisheries and fruit farming in the coastal areas where this kind of farming activity is most practised. On the other hand, Coro FM will broadcast in Kikuyu, and will cover dairy farming, which is popular in Central Kenya region.

2.3.5.2 Mobile phones

At the same time, use of mobile phones throughout the country has surged, changing the way people communicate. Users can easily receive and send information, images and even money anywhere in the world. Used in combination with radio stations, mobile technology has also brought a new dimension to radio programming. For starters, listeners call the radio stations to request information or advice, question guest speakers or talk to other callers. Presenters may also encourage listeners to send text messages (SMS) with requests to answers questions and participate in contests, ICT Update (2009). Since 2007 African Farm Radio Research Initiative (AFRRI) has been studying the effectiveness of radio in supporting agricultural of radio in supporting agricultural development and improved food production.

An example of its implementations is radio stations in Ghana, Malawi Uganda and Tanzania. AFRRI regularly receives feedback from small-scale farmers in the 5 countries. Farmers often ask for copies of programmes for neighbours who missed the initial broadcast and listen to them again in their own time. Recordings of programmes are done using MP3 players.

2.3.5.3 Safaricom Mobile text messaging

Safaricom mobile network services have introduced a mobile texting service called agricultural produce uploaded on its network. Farmers are able to access such as agricultural produce information such as market prices of maize, beans, potatoes, cabbages, beans etc. the service also offers buying and selling prices according to market prices. A request is made through the mobile free of charge and the answer is given promptly.

2.3.5.4 Voice

Agricultural extension officers have given farmers mobile numbers to call for help. The phone line would guide the farmers by providing all the information needed. The farmers call using the number and voice officers the choice of listening in Kiswahili or English. The current FM stations broadcast in local languages such that farmers understand the advice and first hand information in their local languages.

2.3.5.5 Wireless Network

Another method of disseminating agricultural information to farmers is via wireless networks. An example is in Ghana where a community started a project spanning 20 KM radius. The network offers connectivity to schools, businesses and community activity centres. Each node has an antenna, a router and various cables. The community has realized economic gains and can access information especially farmers searching for tips on rural agricultural processes to improve their harvests and discover new markets for their crop, ICT update (2008).

2.3.5.6 Pod casting

A pod cast is a radio-style programme that can be downloaded from the internet and listened to on a computer or an Mp3 player or burned onto a CD. The growing demand for information about all aspects of farming whereby farmers want to know where they can obtain new and improved seeds for the next planting season, where to market their crops, and what better farming practices will help to maintain soil fertility, conserve water and improve output is relayed to the farmer through pod casting.

2.3.5.7 Web 2.0

This is known as participatory web. Some call it user-generated or user-centered web. It covers such a wide range of applications including blogs, and feeds to social book markings, social networking and media sharing sites. This is being applied to rural settings. This ability to connect and exchange information offers many new opportunities especially for small –scale farmers. They can link up with each other on social. Networking sites such as face book.

An example is a case of a village in Bungoma, Kenya named Lwanda where a Mbambe Rural Resource Management Programme was established, ICT update (2007). Community of Mbambe with the help of NGO'S purchased solar panels and a refurbished computer. The idea was to train farmers to use online integrated pest management tools. The project is a success since telecenters have been set up and farmers and all locals can access online information on education, child mortality, malnutrition and poverty and increasing agricultural crop yields in an environmentally sustainable manner. This clearly demonstrates how small-scale farmers can access information on the internet located in villages. Solar panels are used to supply power. This is possible with small-scale vegetable farmers in Wareng district.

Another example is the village of Kibae located 150 KM north of Nairobi on the slopes of Mt. Kenya, ICT Update (2008) . The fertile land here allows the small-scale farmers in the area to grow a wide range of fruit and vegetables. But like most people living in rural Kenya, those living around Kibae have no access to electricity from the main grid. In 2004 the community decided to use another of its local natural resources a 12M high waterfall to produce electricity. A community power centre project was established and the community can earn money from. The services at the Community

Project Centre include providing ICT services such as computer training, internet access and telephone kiosks (telecentres).

As the centre becomes more established within the community it can also become local trading centre offering mobile banking and market information services for farmers and buyers. Farmers can use the centre to access market information and to search for methods to improve crop productivity. The centre also has a satellite where people can pay to watch popular events or organizations can hire to show information videos.

2.4 Sources used by farmers in accessing information

Primary sources

Primary sources embrace those materials, which contain information that were initially derived from recording of insights, discoveries, accounts of experiments, findings and conclusion. They are normally the latest information in the field.

Okwilagwe (1995) asserts that primary sources of information are original by nature as a result of the fact that they have not been condensed or evaluated by somebody else.

Primary source constitutes the most current materials in the library. They help the users to be current and be well informed about new discoveries in the various fields.

Examples of primary sources used in agricultural information include periodicals, research journals, reports, conference proceedings, trade, literature, laboratory note, patents standards, theses/dissertations and government publications. In most Kenyan Libraries, science and technological periodicals are very important primary sources of information.

Secondary sources

The secondary sources include those whose information is organized from primary sources thereby making such concepts idea/information to appear at another level or form. In other words, they are primary sources repackaged or organized in more usable or convenient forms. The republication or repackaging is often done after a considerable period of time has passed. Examples include textbooks, reference encyclopedia, dictionaries, handbooks, bibliographies, abstracting and indexing journals and other reference materials.

Tertiary sources

Tertiary sources of information refer to information which is removed from primary and secondary sources. In this direction, tertiary sources aid clientele in using primary and secondary sources. Following the exponential growth of knowledge, there are varieties of scientific and technological materials in this source. Examples include: directories, bibliographies of science and technology, reviews, list of research in progress etc. Tertiary sources are therefore collections of primary and secondary that have been distilled or filtered from either primary or secondary sources.

Non-documentary sources

This refers to oral discussions on science and technology. Information in this form enhances concentration and they can be tailored to match the actual participants with instantaneous feedback. Meetings of specialists such as scientists and technologists offer the possibility of spontaneous reciprocal exchanges. However, their growing number and the fact that they are increasingly becoming scattered geographically, makes it impossible for specialists to participate in as many of them as they would like. Examples of non-documentary sources include farmers' field and demonstration days, barazas and also extension officer's visitations to group farmers.

Scientific and technical information (STI)

It should be mentioned here that STI sources are ever increasing and growing more diverse and so it is the responsibility of the library to adequately capture (acquire) them and make them available to users.

CD-ROM technology and STI

CD-ROM is a veritable medium of storing and disseminating STI in the developed and developing world. CD-ROMs are very durable, they are scratch resistant, do not warp, and are not susceptible to erasure from electric current or magnetic fields. They are a high-density storage medium offering rapid search response time in respect to the size of the databases. CD-ROM is ideal to mail from a central reference service for frequent extended use; it does not take up much space, is fast to access and provides similar sophisticated access paths to those obtained most presently with computer-database and online searching using remote hosts (Adesanya, 2002).

Oduwole (2000) notes that the advent of CD-ROM technology in the early 1980s has been a tremendous blessing to the libraries and information centers in developing countries. The introduction of CD-ROM has made a great impression on users who are able to search data spanning many years at their own convenience and with minimal charge. CD-ROM has increased substantially the use of journal collections and enhanced their image.

Other Sources of Information

To build a stable business farmers regularly need information on a wide range of subjects. They need long and short term weather reports to choose the best time to plant and harvest. They need current information on the spread of pests and diseases

that might threaten their crops. They need to get the latest tips and advice to make the most of their available land. They also need market data to find the right buyers at exactly the right time. Farmers do not want to all the information; they only want what is relevant to their specific needs.

Much of this information is gathered from different sources but the farmer only has to deal with one point of delivery. From the literature reviewed, most vegetable farmers depend on the radio as the main source of accessing information. The radio being the cheapest and is a popular method of communicating and distributing agricultural information. The radio is cheap to maintain and reaches wide geographical locations.

The other source of accessing information is through extension officers who disseminate to small – scale farmers during demonstrations and field days. Personal visits by the farmers to agricultural offices are yet another source. Other sources include printed materials such as books, periodicals, agriculture libraries and documentation centres; agricultural research centres e.g. KARI KEPHIS, Kenya seed etc, audio – visual sources, universities, market boards, posters in agricultural offices, baraza's and such like.

Similarly, agricultural information is disseminated to small – scale vegetable farmers through direct and indirect communication sources.

However, the entry of ICT and mobile phones industry has changed the scenario.

Farmers access agricultural information on their mobile phones services such as SMS (Short Messaging Service).

This is done in collaboration with radio stations and research centres e.g. Kenya seed. Internet is another source of accessing information on agriculture. Though this is not widespread, ICT infrastructure enables access to websites, blogs and social networks on the internet and farmers can share information.

Modern mobile phones have internet connections and farmers can browse agricultural information.

2.5 Factors that Hinder Dissemination of information to small – scale vegetable farmers

There are various factors that hinder dissemination of agricultural information to vegetable farmers of Wareng district such as:

- Extension officers are few and the farming community has a high population level. Hence, extension officers cannot match the number of farmers and disseminate information effectively.
- There is lack of resources and facilitation from the ministry of agriculture in terms of finances and transport.
- Poor infrastructure i.e. road networks, telecommunication, ICT which plague the country hinders dissemination of information.
- Literacy levels of farmers another impediment in dissemination of agricultural information. Most farmers are illiterate and require a translator to access information during field days and demonstrations.

When accessing information via SMS, which is proving to be a very useful and cost effective method of providing market information and crop data, it also requires that users have some level of literacy, and sometimes knowledge of a language that is not their mother tongue. Complex and detailed crop production methods or pest control

procedures for example cannot be explained in the short space available in a typical SMS message. More detailed information has to be delivered in other ways such as the radio.

- Rural areas in Kenya are often poorly served by communication networks of any kind, ICT Update (2008). Phone coverage whether mobile or landline is often patchy, if it exists at all. Television and even radio reception fades over long distances if there are too few transmitters to carry the signal. Connections to the internet are rare and practically non-existent. The main reason for this poor coverage is lack of investment by telecommunication companies and even the government. This in turn makes it difficult for small-scale farmers who live in the rural to access agricultural information on time and hence develop economically.
- Kenya's farmers' organizations or cooperation associations have failed to support farmers. The umbrella associations such as Kenya Farmers Association, Kenya National Farmers Union, HCDA (Horticultural Crop Development Authority). These organizations charged with disseminating information to small scale farmers on the quality standards of the crop essential for international market. These organization have been grounded hence cannot be effective in giving farmers the required services. These organizations need to participate in giving extension services and to coordinate efforts in extensions so as to harmonize through an umbrella consisting of government and NGO extension system.

These organizations play an important role in information dissemination by facilitating and conducting farm visits, educational tours and training forums. They can also help in financing information dissemination activities by providing

communication equipment and giving loans to farmers to develop agricultural activities, Ngetich (2005).

2.6 Agricultural Information Policy

Thapisa (1997) gives the following recommendations on agricultural information policy that also applies to our Kenyan case in the provision of information.

An agricultural information policy for the delivery of library and documentation services should address the following:

- An extension service which is an intermediary between the farmers and researchers should be established to provide feedback (information) to the scientists concerning the problems, expectations and the motivation of the farmers. Agricultural research should be client-oriented rather than output-oriented, emphasis of which is on user-participation research. Research reports and repackaged information materials for dissemination to the farmers should be made available for future reference in libraries and documentation centres.
- Information flow should be promoted in such a way that it is not only “trickling down” from agriculture extension officers to the farmers but also “trickling across” from farmer to farmer. In other words, multimedia approaches to information dissemination are required that are based on the existing agricultural information systems.
- An information system should be developed with powerful databases to monitor and forecast contribution of the agricultural sector, in terms of both income generation. Such a system should have the capacity to assess the impact of agricultural production on the environment.

- Sustainable and specialized activities for the production and dissemination of agricultural information such as budgets for information activities, CD-ROM, e-mail, journals, databases, equipment, libraries and information centres, should be established in the ministry of agriculture and agricultural research institutions.
- The management should train skilled personnel in the areas of information processing and management, database management, data handling and presentation, informatics, telecommunications, information marketing, indexing and abstracting.

2.7 Summary

In conclusion, it should be noted that effective dissemination of agricultural information to small-scale vegetable farmers largely depends on determination of the actual information needs of the farming community. In reviewing the literature, it has been observed that no information user study has been done on vegetable farming and their information needs.

The existing literature reveals that vegetable farmers of Wareng district prefer using informal and formal channels of communication as a source of information. The radio seems to be their favourite channel. Factors that hinder them in accessing agricultural information include literacy level, distance from information centers, and lack of finances, poor communication infrastructure and personal commitments.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the research methodology that was used in this study. It discusses research design, study population, sampling, data collection methods, reliability and validity, data analysis and ethical considerations.

Research methodology is a systematic procedure used in conducting research. This chapter presents research methods that the study adopted. In particular, it presents a detailed description of the selected design, study population, sample procedures and methods of data collection. The methodology adopted was qualitative with some aspects of quantitative. Qualitative methodology measures information based on opinions, attitudes and values as opposed to established data.

On the other hand quantitative research is concerned with the tabulation of numeric relevance and behaviour of various kinds of variables hence examine phenomenon through the numerical representation of observation and statistical analysis. That notwithstanding, the study employed semi-structured interviews to gather data on issues which needed numerical tabulation. This type of research aimed at discovering the underlying motives and desires using in depth interviews for the purpose.

3.2 Research Design

The study used mixed methods approach combining qualitative and some aspects of quantitative approaches. Qualitative researchers are found in many disciplines and fields using a variety of approaches, methods and techniques.

This study mainly used conducted through survey method. It investigated provision of information to small-scale vegetable farmers in Wareng District, with a view to establishing challenges and proposing a model for improved access to information. Such issues are usually best investigated using a survey method which often uses a sample of selected respondents but generalizes the results to the entire population being studied.

According to Busha and Harter (1980) survey research is characterized by a selection of random samples from large and small populations to obtain empirical knowledge of a contemporary nature. This knowledge allows generalizations to be made about characteristics, opinions, beliefs and attitudes of the entire population being studied. Survey is also a technique of gathering information by questioning individuals, who are the object of the research and who belong to a representative sample, through a standardized questioning procedure, with the aim of knowing the relationships among the variables (Corbetta, 2003). The purpose of survey is to generalize from a sample to a population so that inferences can be made about the characteristics, attitudes or behaviour of a population. This survey design was deemed most suitable for this study because it enabled the researcher to undertake a breath of observations and phenomenon under study. Also the rural farming community selected in this study was large and therefore collecting data from every vegetable farmer would be time consuming and not cost-effective.

The survey methods allow researchers to gather information about target populations without undertaking a complete enumeration. The survey method was used in studying the following categories of people:

- Agricultural officers
- Agricultural extension officers
- Vegetable farmers
- Key informants

3.3 Study Area

The study was conducted in Wareng District of the larger Uasin Gishu County. The new Wareng district is in the Rift Valley Province in the North Rift region. It was carved out of the larger Uasin Gishu District and has two divisions namely Kapseret and Kesses.

3.4 Study Population

In this study population was defined in terms of occupation, that is, vegetable farmers in Wareng district. According to the 2009 Kenya Population and Housing Census, Wareng district has population of 261,073 in which the rural population is 120,607. Majority of the small scale vegetable farmers are based in the rural areas. Wareng district having formerly been a division therefore has about 10,000 farm holdings from the greater Uasin Gishu.

The population of the study comprised small scale vegetable farmers in Wareng District. The study targeted population of 88 respondents. These comprised 75 vegetable farmers and 13 agricultural officers and extension officers in the district.

3.5 Sampling Design

It is not always possible for a researcher to study an entire population, so one must draw a sample size from the target population. According to Baily (1994), a sample is a finite part of a statistical population whose properties are studied to gain information

about a whole population. A sample is therefore, a portion of the total population. Sampling involves selecting some elements of a population, having similar features to the underlying population, as representative of the total population so as to make certain observations of these elements and make conclusions regarding the entire population.

According to Busha (1980) in survey research, a good sample resembles its parent population; it is also large enough to allow generalizations within measurable limits of accuracy, to the subject group from which it was selected.

The researcher used simple random sampling and purposive sampling techniques to select the respondents. A piece of paper was used to write down the locations in a division. Each location was assigned a number written on each piece of paper and then were folded. In Kesses Division five locations were picked for this study out of ten. For Kapseret Division two out of the four locations were chosen for the study. From the identified locations, two were purposively picked from Kesses namely Kesses and Chuiyat locations and one namely Kapseret from Kapseret location. The locations chosen were spread across the entire divisions to cover different features. The sample population in each location used was purposively picked for the study.

The study also used snowball sampling method. This method is also called network, chain or reputational sampling. The method begins with a few people who meet the criteria for inclusion into the sample and then gradually increases the sample size as new contacts are mentioned by the people you started out with. Snowballing methodology was best suited for the study because one vegetable farmer referred the researcher to another vegetable farmer and the chain continued to link one vegetable

farmer to the next one. This was a simple and cost-effective method that enabled the researcher to reach populations that seemed inaccessible.

3.5.1 Sample size

Category	Location	Population	Sample Size	Percentage
Vegetable Farmers	Kesses	103		30
	Chuiyat	105	30	28
	Kapseret	92	30	28
Totals		300	90	100

In Wareng district, the respondents were vegetable farmers and agricultural officers were informants. The vegetable farmers are located along rivers and wetlands or swamps that cut across the district to access water for their farms.

In each location 30 respondents of vegetable farmers and 15 agricultural officers were selected for the study. The respondents were spread across the locations identified. A total of 75 vegetable farmers were interviewed and 13 agricultural and extension officers were the informants for the study.

3.6 Data collection methods

Data was collected through a variety of methods: questionnaires and semi-structured interviews as well as secondary sources. The study used the following instruments in collecting data:-

3.6.1 Questionnaires

The study used questionnaires to gather information from agricultural officers who were based in Wareng district. These were the key informants for the study and their response formed the primary data for the study.

Questionnaires are commonly used to obtain important information about the population. Each item in the questionnaire is developed to address a specific objective and research questions. A questionnaire interview schedule was developed containing semi-structured questions to gather data from the respondents. These semi-structured or open ended questionnaires enabled the respondents to determine their own answers and opinions as they permit a greater depth of response.

3.6.2 Interviews

Face to face interviews was used as the main instrument in collecting data. The data collection instrument tool was used since the researcher thought it would provide not only high response rate but also high quality data. The response rate was good. The interviews explored a respondent's point of view, feelings and perspectives. In this sense, in-depth interviews yield information. Through interviews, one can gather information that is not available through observation or by reading the literature; capitalize on people's knowledge, skills and expertise, and ascertain opinions, attitudes, perceptions and facts. The interview method of collecting data involves presentation of oral-verbal communication. An interview also reveals construction of reality hence one of the main data collection tools in qualitative research.

In qualitative research, interview seeks to describe the meanings of central themes in life world of subjects. The main task in interviewing is to understand the meaning of what the interviewees say. A qualitative research interview seeks to cover both a factual and a meaning level, which was sought in this study. Interviews are particularly useful for getting the story behind a participant's experiences and since the experiences of vegetable farmers were required, then it was a good way of getting this vital information. Punch (1998) observes that interviews are one of the leading ways of assessing respondent's perceptions, attitudes, views and definitions.

In essence, in-depth interviews involved not only asking questions, but systematic recording and documenting of responses coupled with intense probing for deeper meaning and understanding the responses.

For this study, a semi- structured interview was also used to guide the researcher in asking the respondents questions. The respondents here were the vegetable farmers. An interview schedule was developed as data collection tool which had both open ended and close ended type of questions. The open ended questions enabled the researcher to probe further on opinions and views of the respondents. Open- ended questions also give the respondents opportunities to share their thoughts and in the end give more details of their farming activities and practices.

For the close-ended questions, the respondents were allowed to choose from among alternatives that were provided.

3.6.3 Documents review (Secondary Sources)

Ministry of Agriculture (MOA) being one of the well established ministries with a rich history dating back to the colonial era. Documentary evidence is one of the best

methods of collecting qualitative data. With this in mind, this technique of data collection was used to complement other research methods used in this study. The researcher reviewed the ministry's policy documents and its strategic plans to revitalize agriculture in Kenya in line with Vision 2030.

3.7. Validity

Validity is the accuracy and meaningfulness of inferences which are based on the research results. Validity is the degree to which results obtained from the analysis of the data actually represent the phenomenon under study. Validity also refers to the degree to which study accurately reflects or assesses the specific concept that the researcher is attempting to measure. While reliability is concerned with the accuracy of the actual measuring instrument or procedure, validity is concerned with the study's successes at measuring what the researchers set out to measure. Validity was enhanced by the use of simple understandable language. Validity of the questionnaires were determined by use of experts and research supervisors.

3.8 Reliability

Reliability is the measure of the degree to which a researcher's instruments yields consistent results or data after repeated trials. Busha and Harter (1980) observes that reliability in research studies implies the stability, consistency and dependability of research methods and instruments used, data collected and results obtained after analysis. The questionnaires were open-ended and this facilitated the respondents to have an opportunity to give an insight to the research study.

Reliability is the extent to which an experiment, test, or any measuring procedure yields the same results on repeated trials. Without the agreement of independent observers able to replicate research procedures, or the ability to use research tools and procedures that yield consistent measurements, researchers would be unable to satisfactorily draw conclusions, formulate theories, or make claims about the generalizability of their research.

In order to check reliability and validity of the research instruments, the researcher pre-tested the interview schedule in order to check for vocabulary, language level and how well the questions were understood, Mugenda and Mugenda (2003).

Also the researcher refrained from asking leading questions or giving suggestions or disagreeing with answers given by the respondents. Another method employed was to ensure the respondents of the confidentiality of the answers given to the researcher. There was total privacy during the interview sessions by not allowing observers or listeners. Guba and Lincoln (1981) observe that this enhances confidentiality to the respondents and also creates a suitable atmosphere for the generation of valid and reliable data.

3.8.1 Data Collection Procedures

The process of conducting this research entails formulation and defense of the proposals at the School of Information Science. In conformity with research procedures in Kenya, the researcher obtained a research permit from the Office of the President to facilitate data collection in the field. The researcher introduced herself to the Ministry of Agriculture officials in Wareng district and explained the nature of the study, its purpose and value to their responses.

3.8.2 Data Analysis

This section dealt with organization, presentation and analysis of data collected. Since most of the data collected were of qualitative nature, qualitative data analysis was heavily applied. However, since there were some quantitative data being sought in the research, some quantitative analysis was done.

After the data was collected, it was analyzed based on the objectives and research questions of the study. The analyses data were presented in tables, descriptions of percentages where applicable.

Lewins et al (2005) points out that Qualitative Data Analysis (QDA) is the range of processes and procedures whereby we move into some form of explanation, understanding or interpretation of the people and situations we are investigated. The idea behind this was to examine the meaningful and symbolic content of qualitative data. During QDA, the process usually involves two things, writing and the identification of themes (coding) which was aptly applied in this research.

3.8.3 Writing

Writing involves presenting the data obtained and analyzed taking into consideration the following factors:

- a) Information provision
- b) Information needs of users
- c) Information sources
- d) Literacy levels
- e) Information services

3.8.4 Coding into themes

Looking for themes involve labels on themes coding. This is the identification of passages of texts (or other meaningful phenomena) and applying labels on them that indicate they are examples of some thematic idea. At its simplest, this labeling or coding process enabled the researcher to quickly retrieve and collect together all the text and other data that was associated with some thematic idea so that they can be examined together and different cases can be compared in that respect.

The researcher then evaluated the usefulness of this information against the objectives of the study and research questions. This was followed in this research as much as it was practically possible.

3.8.5 Ethical issues

The researcher adhered to the regulations and guidelines prescribed by Moi University for preparation of theses and dissertation. Apart from those related to content and organization of overall requirements, relevant regulations include those set by Moi University Information Policy, which concerns itself with the maintenance of ethical standards and protection of human research projects.

In this regard, the researcher weighed the sensitivity of the topic in designing the interview schedule and determined what was permissible. The respondents were told about the purpose of the study, the conditions under which data would be published and how the anonymity of the respondents would be preferred and also how the confidentiality of the final dataset will be safeguarded.

All participants of the study were assured that the information they would give would be held in private and would be used for academic purposes only. This assurance would enhance confidentiality and protect the respondents from any embarrassment or inconveniences. The study was also guided by the principle of informed consent. This provided that the persons who were invited to participate in research were free to choose whether to participate or not.

Summary

The foregoing chapter described the research methodology approach used and justification for its adoption. The data collection techniques that were used to collect data enabled the researcher to collect data which helped achieve the aim of the study. Tools used to collect data were found to be appropriate in enabling extensive and intensive data about each of the farmers to be collected. The chapter also discussed Qualitative Data Analysis (QDA) method as described Lewins et al (2005) and which is recommended for such kind of research. Qualitative data was analyzed and presented in the form of tables, figures, texts and percentages.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter presents the data collected in the study. It analyses and interprets the data collected using the techniques described in chapter three.

The study investigated provision of information services to small scale vegetable farmers of Wareng District of Uasin Gishu County. The data is presented in form of text, tables, figures and percentages. The data was collected through face to face interviews and questionnaires which were presented to the respondents.

4.2. Response rate

The researcher interviewed 75 vegetable farmers who were the main respondents. The seventy-five (75) active vegetable farmers using a semi-structured interview schedule. They came from the following locations: Kesses, Chuiyat, and Kapseret.

Others interviewed were thirteen (13) agricultural officers representing various fields such as horticulture, home economics, monitoring and evaluation, district environment, and agricultural extension officers. These were interviewed questionnaires.

The researcher read governments strategies to revitalize agriculture as the basis of ensuring provision of agricultural information services. According to the Ministry of Agriculture's Strategic Plan of 2008-2012 the following objectives were set out for implementation:

- Create enabling environment for agricultural development. This is a key responsibility of the Ministry to develop policies and propose legislations that will provide the right environment for the sector to thrive. Developing appropriate policy framework will promote a competitive agricultural sector and development of diversified products and market outlets.
- Increase agricultural productivity and outputs. Land is the basic factor of production and increasing productivity is the basic requirement for not only agricultural growth but also farming as a business. It is well known that requirements for agricultural productivity are: good choice of land, application of the right crop varieties, application of the right crop husbandry (planting, weeding, fertilizer, pest and disease control) and reduction of post-harvest losses or bad storage. These requirements are provided by a competent, efficient agricultural extension system, with a backup and support of highly and contemporary research system.
- Promote market access and product development. Market access is critical to the development of agriculture. The ministry is to provide market information by collating, processing and disseminating information on the domestic market to producers, exporters and service providers.
- Enhance accessibility to affordable inputs and credit. Access to inputs and credit are key to increasing agricultural productivity and farming as a business. It is therefore imperative that there is appropriate credit packages that are suitable for small scale farmers to enable them access key inputs such as fertilizer, agrochemicals, seeds, capital investment such as irrigation infrastructure, value addition technologies, compliance with food safety regulations and general farm development.

- Promote sustainable land use and environmental conservation. The ministry undertakes to promote soil and water management, agro forestry farming systems, mechanization and exploit the untapped agricultural potential areas.

The above mentioned strategies outlined are to be implemented by agricultural officers based at the local level in all districts in Kenya. The provision of information to small scale vegetable farmers in Wareng district is no exception to the aforementioned strategies. Agricultural extension officers who are mandated to disseminate information were the respondents that the researcher sought information from. The information gathered by the researcher includes their positions in service, educational and professional training, their technical training their duties and responsibilities. The above mentioned strategies outlined are to be implemented by agricultural officers based at the local level in all districts in Kenya. The provision of information to small scale vegetable farmers in Wareng district is no exception to the aforementioned strategies. Agricultural extension officers who are mandated to disseminate information were the respondents that the researcher sought information from. The information gathered by the researcher includes their positions in service, educational and professional training, their technical training their duties and responsibilities etc.

The provision of information to vegetable farmers in Wareng district largely depends on these variables because quality dissemination of information should be done by well trained and qualified personnel. Below is a summary of small-scale vegetable farmers' day to day activities such as forms of farming, how they irrigate their farms and the sources of water, the fertilizers that they use, markets for their produce, communication, challenges that they face in accessing information among others.

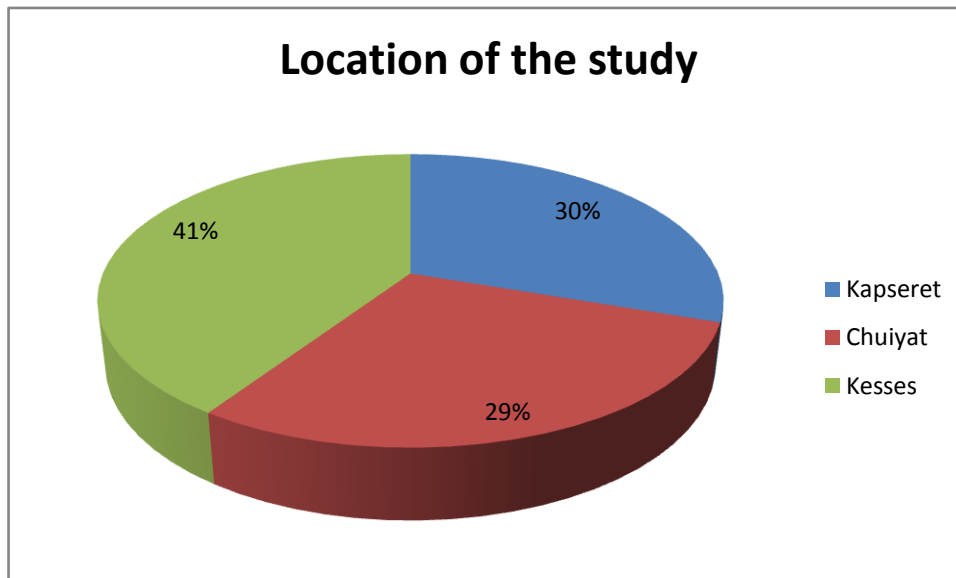
4.2.1 Characteristics of the vegetable farmers

Small-scale vegetable farmers in Wareng district who participated in the study were drawn from these locations: Kesses (26) Chuiyat (24) and Kapseret (25). All these respondents actively practiced vegetables farming for subsistence and commercial use.

Table 1 Location of the study

Location	Frequency	Percent
Kapseret	25	33.3
Chuiyat	24	32.0
Kesses	26	34.7
Total	75	100.0

Diagram 1: Location of the Study



4.2.2 Characteristics of the Key Informants / Agricultural officers

The information gathered showed that the personnel in the Wareng district are well trained in their respective fields. One officer (7.7%) has a Masters degree. Six (46.2%) have first degrees, while 3 (23.1%) are diploma holders and another 3 (23.1%) are certificate holders.

The above educational qualifications indicate that Wareng district has fairly well educated extension personnel. Their qualifications should enable them to search, retrieve, repackage and synthesize the relevant information to vegetable farmers in an effective way.

As observed above agricultural officers in Wareng district are technically well trained to handle vegetable farmers' information needs. Adoption of new agricultural technologies especially use of irrigation and drainage development equipment on farms is carried out by the technical personnel from these officers of Agriculture.

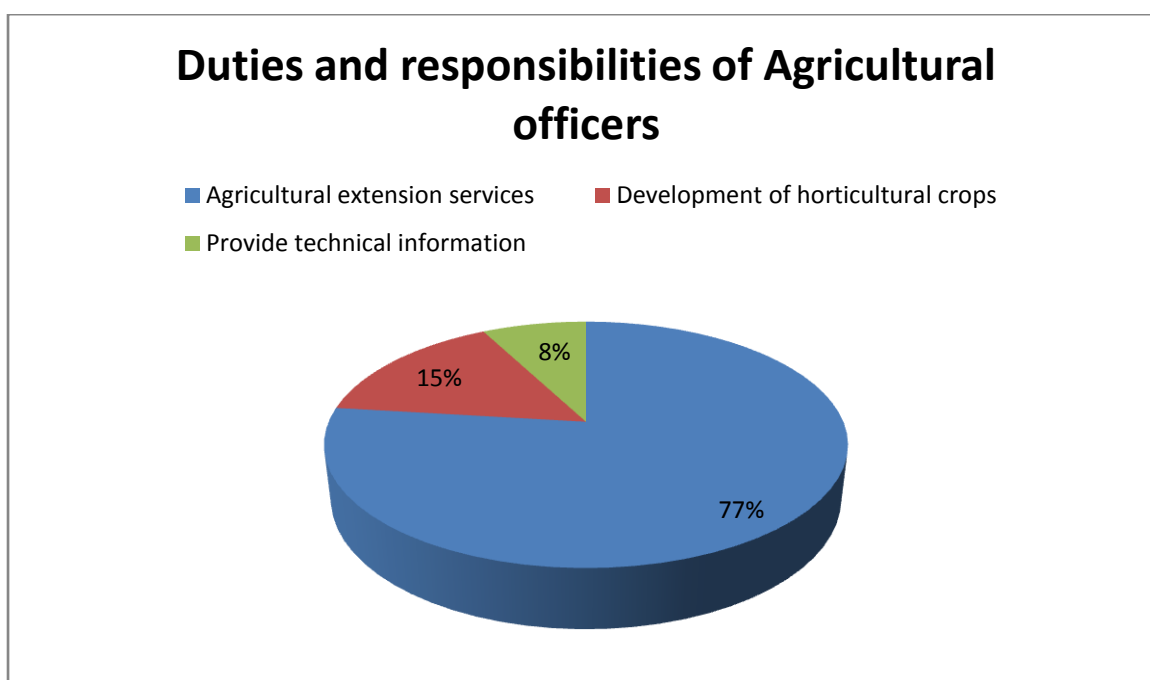
4.2.3 Profile of the organizations that the Key Informants work for

Agricultural officers in Wareng district have duties and responsibilities such as extension services, development projects, National Agricultural Livestock Extension Programme (NALEP), provision of technical information, consultancy services, farm visits, educational services such as field days, organize barazas, organize ASK shows, linkage, between farmers and information sources, workshops, and demonstrations . These duties overlap and the agricultural officers may be engaged in most of them. Ten (77%) agricultural officers were carrying out extension services. Two (15%) specialized in horticulture while 1 (7%) provides technical information.

As noted above the duties and responsibilities of the officers indicate that every sector is well catered for in terms of information dissemination. This is evident in the activities which are targeting agricultural information to farmers such as extension services.

The focus is on poverty reduction measures and empowerment of small-scale farmers (vegetable farmers). The activities are also aimed at strengthening the capacity of extension staff in meeting farmers' information needs.

Diagram 2: Duties and Responsibilities of Agricultural Officers



4.3. Role of the Ministry of Agriculture

The role of the Ministry of Agriculture in Wareng district is to coordinate all the activities pertaining to farming and also provide extension and technical services to vegetable farmers, to enhance food security, to ensure compliance with quality

standards of farm produce to alleviate poverty and to promote agri-business, sustainable utilization of natural resources, and agro-industrial development.

Table 2: Role of Ministry of Agriculture (MOA)

Role of MOA	Frequency	Percent
Provide extension services	3	23.1
Enhance food security	2	15.4
Ensure compliance to set up quality of farm produce	1	7.7
Food security and poverty reduction	3	23.1
Service delivery to farmers	4	30.8
Total	13	100.0

4.3.1 Services provided by the Agricultural Officers to the farming community

The type of information provided to the farmers in Wareng district includes project monitoring and evaluation (1) 7%, crop husbandry (5) 38%, diversification in production (2) 15%, value addition (1) 7% soil and water conservation (1) 7% crop pest and disease management (1) 7% technical and fertilizer information (2)15%.

Table 3: Types of agricultural information

Agricultural Information	Frequency	Percent
Project monitoring and evaluation	1	7.7
Crop husbandry	5	38.5
Diversify in production	2	15.4
Value addition	1	7.7
Soil conservation	1	7.7
Pest and disease management	1	7.7
Technical packages	2	15.4
Total	13	100.0

4.4 Information needs of small-scale vegetable farmers in Wareng District

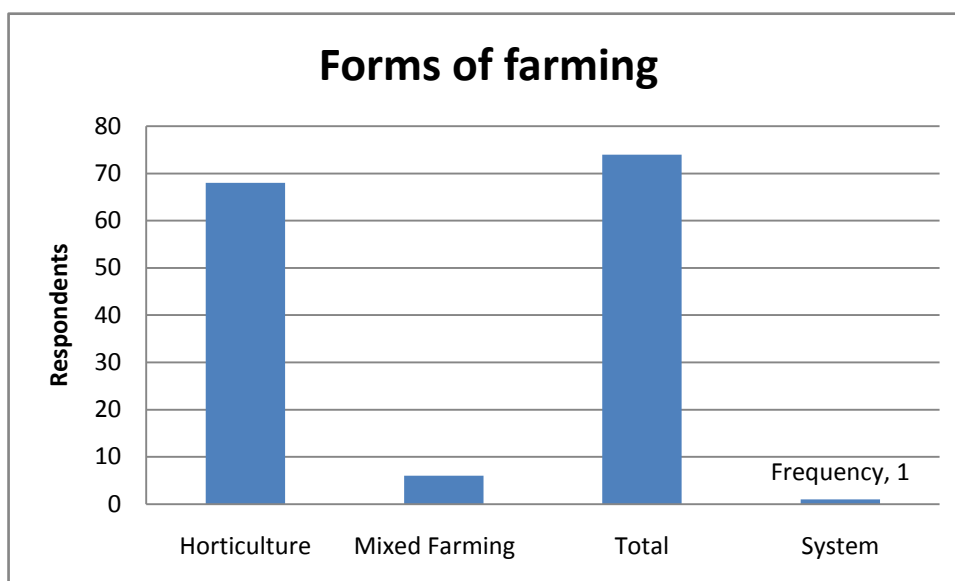
4.4.1 Forms of farming in Wareng District

In Wareng district farmers are involved in mixed farming whereby they cultivate cash crops such as maize, wheat, keep livestock, as well as horticulture and vegetables. The respondents that were contacted for this research were vegetable farmers only who represented 90% of them(86).

The vegetables farmers in Wareng district need information on better farming on better farming methods, improved farm implements, improved variety of seeds and seeking loans for farm resources. Information on the production of vegetables would include land preparation, acquiring quality seeds, transplanting, planting, irrigation, weeding and application of fertilizers and use of pesticides

Table 4: Forms of farming

Forms of farming	Frequency	Percent
Horticulture	68	90.7
Mixed Farming	6	8.0
Total	74	98.7
System	1	1.3
Total	75	100.0

Diagram 3: Forms of farming

4.4.2 Forms of irrigation

The vegetable farmers in Wareng district carry out irrigation on their farms. The source of water for irrigation were stream and river water (52%), well water (24%), and use of Borehole water (19%). The vegetable farmers live along streams and rivers, swamps or wetlands where they have access to water for their crops.

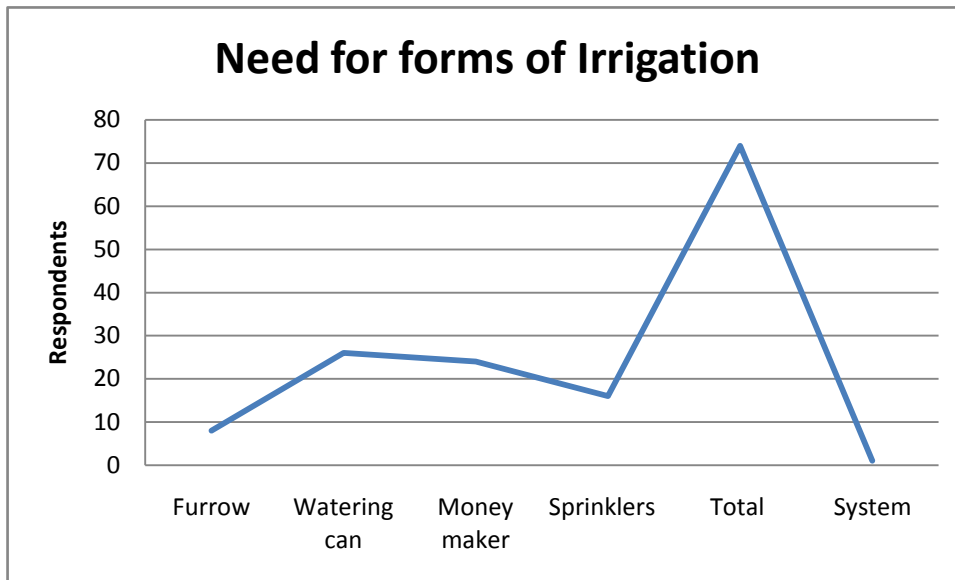
The forms of irrigation carried out by the farmers are furrow irrigation whereby canals are dug to allow stream water to flow to the farms freely. The use of watering cans is also another commonly used form of irrigation whereby farmers fetch water from wells and boreholes to irrigate their vegetables.

Another popular form is the use of money maker machines and sprinklers. This is a mechanical tool where farmers peddle and draw water from streams. They then use hose pipes and sprinklers to water their vegetables throughout the year.

The frequencies and percentages on the forms of irrigation range from furrow (8) 10%, watering can (26) 34% money makers (24) 32% sprinklers (16) 21%. The most popular forms of irrigation among vegetable farmers in Wareng district are use of watering cans and money maker machines. The Table 5 illustrates the forms and types of irrigation activities that vegetable farmers undertake.

Table 5: Need for forms of Irrigation

Forms of Irrigation	Frequency	Percent
Furrow	8	10.7
Watering can	26	34.7
Money maker	24	32.0
Sprinklers	16	21.3
Total	74	98.7
System	1	1.3
Total	75	100.0

Diagram 4: Needs for forms of Irrigation

Wareng district is endowed with rivers and streams that run through the district. Though some of these rivers are seasonal, constructed dams such as Kesses dam facilitate retention of water in the reservoirs where farmers use to irrigate their farms. These farmers have also dug wells and boreholes in their farms to supplement rainwater. These farmers also harvest rain water using plastic tanks and constructed water tanks which they use to irrigate vegetables during the dry season.

4.4.3 Information needs on the use of fertilizers and pest control

Vegetable farmers apply fertilizers to their crops to yield quality harvest. Fertilizers applied range from compost manure to conventional or manufactured fertilizers purchased from shops. Majority of them apply DAP (38) representing 50%. Others use foliar feed and SSP (8) representing 10%, CAN 13 representing 17%. Vegetable farmers also apply pesticides to their crops to prevent diseases which could wipe out their pesticides usage by 15 farmers represents 20%.

Vegetable farmers in this district use various types of fertilizers and pesticides the most common being DAP. The fertilizer is used when planting and also when top-dressing the vegetables for higher yields. Others use compost manure from animal droppings and foliar feeds.

Table 6: Use of Fertilizer and pest control

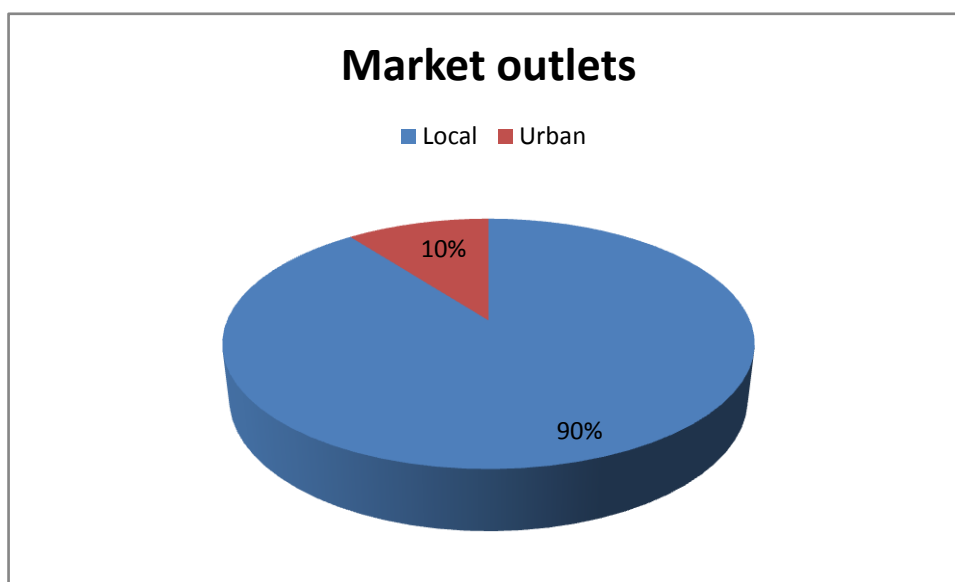
Types of fertilizer	Frequency	Percent
DAP	38	50.7
Foliar feed	2	2.7
SSP	6	8.0
CAN	13	17.3
Pesticides	15	20.0
Total	74	98.7
Total	75	100.00

4.4.4 Market outlets for vegetables

The growth of vegetables in Wareng district is mainly for local consumption and also sales to urban areas. The farmers usually sell the vegetables to traders who then transport them to urban areas such as Eldoret. Majority of the farmers sell their vegetables to the local communities around them and to traders in local centres. The sale is usually done on the farms where vegetable vendors go to the farms to purchase directly from the farmers.

Table 7: Market outlets

Markets	Frequency	Percent
Local	69	92.0
Urban	8.0	8.0
Total	75	100.0

Diagram 5: Market Outlets

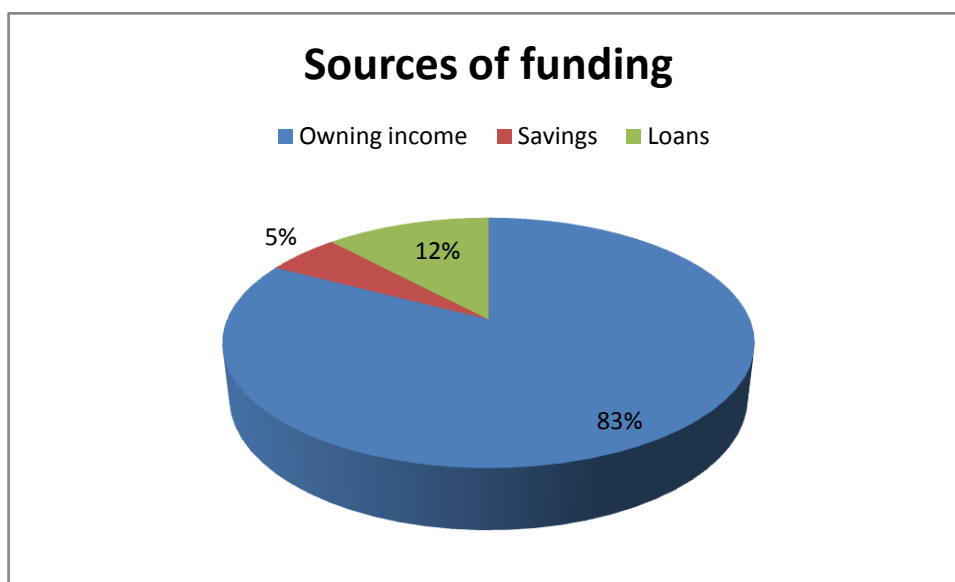
4.4.5 Sources of funding vegetable farming

Vegetable farmers in Wareng district use their own income to start farming. Some of them use their savings from other proceeds, while others acquire loans from Micro-finance institution to facilitate vegetable farming.

Most of them 62 (82%) use own income to start vegetable farming. 4 (5%) use their savings while 9 (12%) seek loans from banks. Table 8 below provides information on funding that vegetable farmer's use.

Table 8: Sources of funding

Source	Frequency	Percent
Own income	62	82.7
Savings	4	5.3
Loans	9	12.0
Total	75	100.0

Diagram 6: Sources of Funding

4.4.6 Information needs on the quality of seeds

Vegetable farmers require information on the available seed varieties. Agricultural extension officers need to address this need for quality seeds and resistance to pesticide attack.

4.4.7 Information need on ways of communication

Vegetable farmers communicate with agricultural officers in barazas forums, farmers' trainings on field days, seminars and workshops, farm visitations and occasionally

through the media such as radio programmes. A number of them also hardly communicate citing long distances between agricultural offices and their villages.

4.5 Sources of information available to and used by the small-scale vegetable farmers

4.5.1 Information resources and services used by farmers and agricultural officers

Agricultural officers in Wareng district use information resources from libraries (3) 23%, the Internet (2) 14%, and research institutions (4) 30%. Out of these (5) 38% consult reports from workshops, agricultural journals, field day reports, and other agricultural project reports from NALEP (National Agricultural and Livestock Extension Programme), ASK Shows and information centres.

Libraries and information centres can serve as good sources of information for vegetable farmers for improving agricultural technology. However, this is not the case in Wareng district since libraries and information centres are far from the potential users. This category of information users has been disadvantaged in that information units and libraries are often located in the urban centres hence has resulted in dichotomies in society of information rich and information poor. Most of the agricultural officers rely on documents and reports from agricultural research institutions. Other publications that they consult come from various workshops, seminars and trainings that The Ministry of agriculture conduct. A number of the do consult the internet

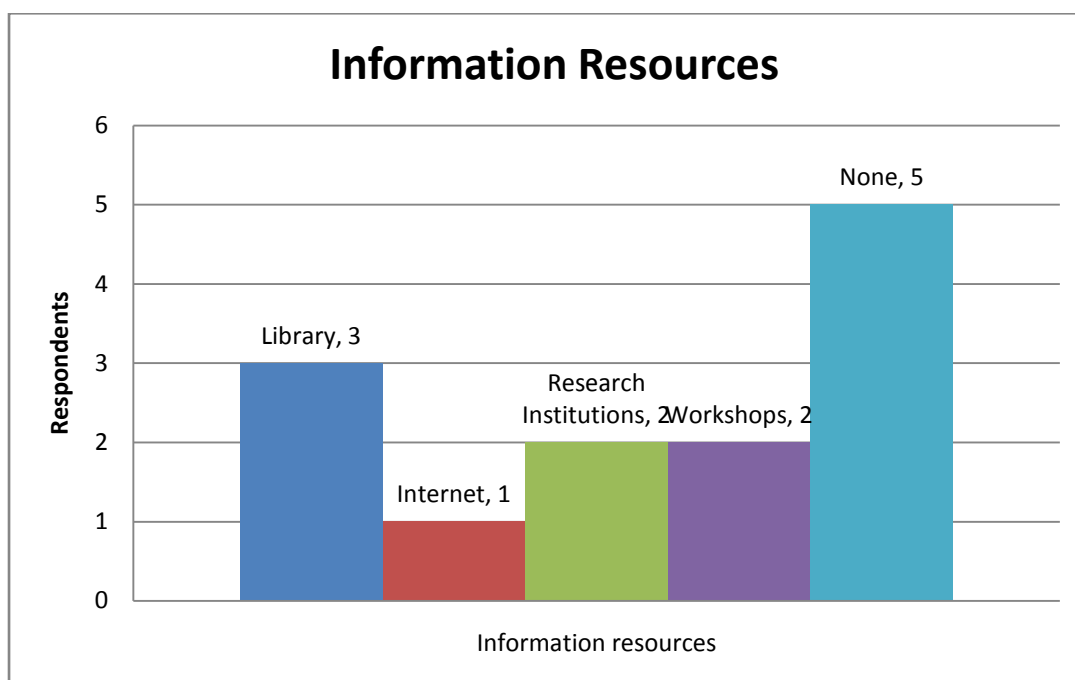
4.5.2 The frequency in which vegetable farmers contact Agricultural Officers for information

Farming gave rise to need for information. The information needs of vegetable farmers are best demonstrated by the frequency in which the farmers consult the agricultural officers. The majority of the farmers consult the nearest sources such as friends, relatives, neighbours and role models.

In Wareng district, vegetable farmers do contact agricultural officers for information on dail (5 (38%), weekly 3 (23%), monthly 1 (7%) and on demand driven instances 4 (30%). The agricultural officers obtain agricultural information given to the vegetable farmers from research findings, technical handbooks, workshops and training, seminars reports and publications such as newsletters and circulars.

Table 9: Information Resources services

Information Resources	Frequency	Percent
Library	3	23.1
Internet	1	7.7
Research Institutions	2	15.4
Workshops	2	15.4
None	5	38.8
Total	13	100.0

Diagram 7: Information Resources

Libraries and information centres can serve as good sources of information for vegetable farmers for improving agricultural technology. However this is not the case in Wareng district since libraries and information centres are far from the potential users. Most of the agricultural officers rely on documents from the research institutions under the Ministry of Agriculture and also from workshops and seminars. A number of them also use consult the internet.

4.6. Types of agricultural information provided to farmers

Agricultural officers in Wareng district mainly provide educational, training and extension services that promote crop production to the farming community. Technical service would include irrigation and drainage technologies, soil and water conservation, efficient land use and crop disease surveillance to the farming community.

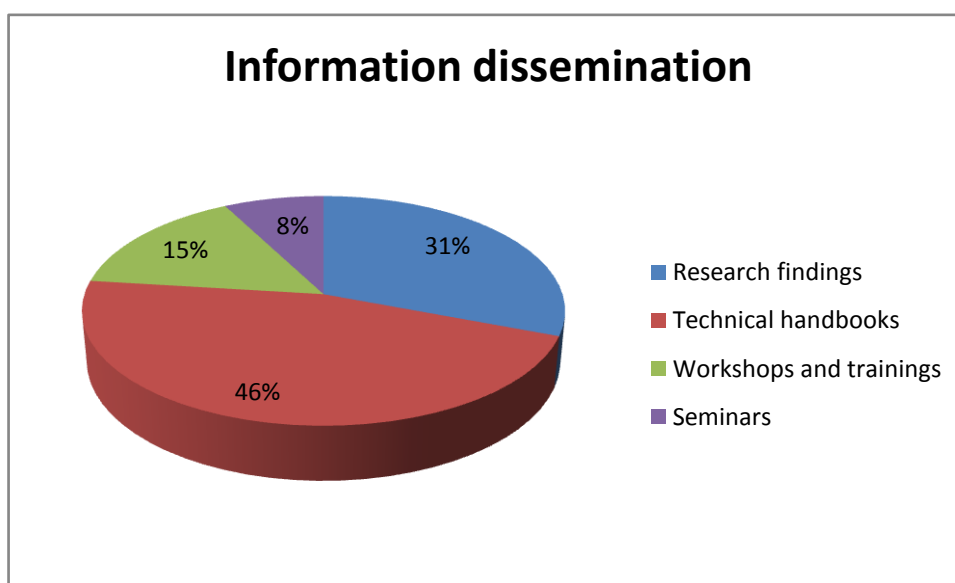
Other services include information on weather forecasting, soil composition, quality seeds, fertilizers, pesticides, markets, harvesting and storing. The clients for the ministry are small-scale vegetable farmers, large scale farmers, youth groups, women groups, Non-Governmental Organizations and Community Based Organizations among others.

4.7 Communication channels through which agricultural information is disseminated

4.7.1 Communication channels through which Agricultural Officers disseminate information to small-scale vegetable farmers

Agricultural officers in Wareng district disseminate agricultural information to vegetable farmers through various means such as farm visits, barazas or open day activities, field day demonstrations, common interest groups, and agricultural shows. Individual farmers also make visits to agricultural offices nearer to their home and make inquiries.

Diagram 8: Information Dissemination



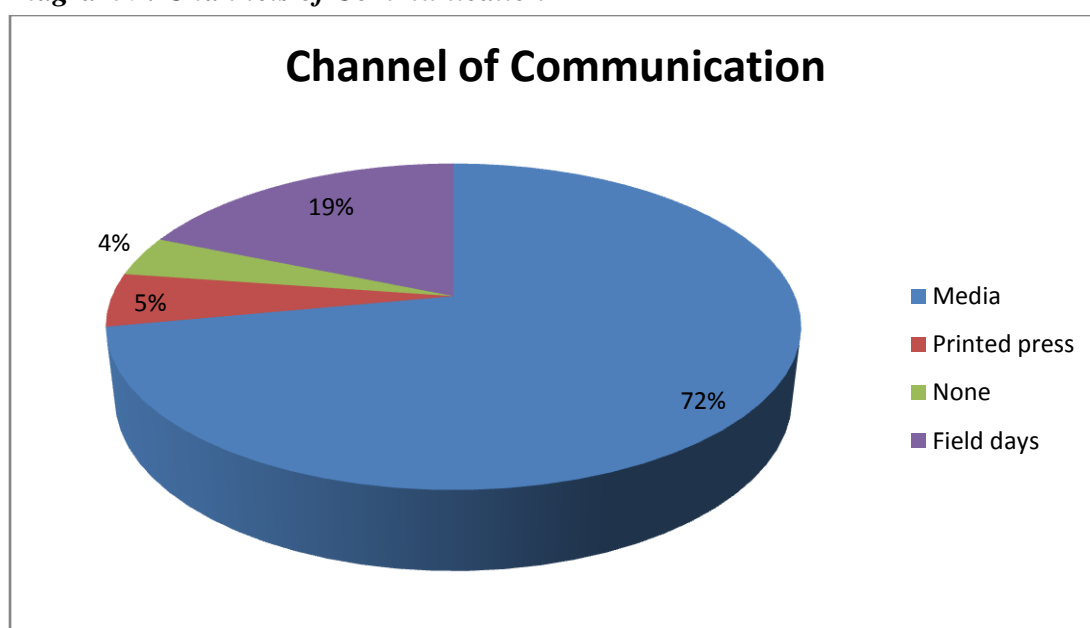
4.7.2 Channels through which farmers communicate with the Agricultural Officers

Farmers receive agricultural information from various media channels. Most of them 54 (72%) listen to the radio programmes especially Kass FM and KBC which regularly air programmes that target farmers. 4 (5%) read from printed journals and magazines. 14 (18%) receive information from field days and farm visitations. Others share information amongst themselves i.e. fellow vegetable farmers.

Table 10: Channels of communication

Channel	Frequency	Percentage
Media	54	72.0
Printed press	4	5.3
None	3	4.0
Field days	14	18.7
Total	75	100.0

Diagram 9: Channels of Communication



4.7.3 Communication channels through which farmers received agricultural information

Farmers receive agricultural information from various media channels. Most of them 54 representing (72%) listen to the radio programmes especially Kass FM and KBC who regularly air programmes that target farmers. 4 (5%) read from printed journals and magazines. 14 (18%) receive information from field days and farm visitations. Others share information amongst themselves i.e. fellow vegetable farmers.

4.7.4 Farmers' preferred channels for receiving agricultural information

Most vegetable farmers in Wareng district use the radio as the preferred channel of communication. 43 (57%) listen to radio programmes that broadcast agricultural information especially Kass FM and KBC broadcasts 6 (8%) use television broadcasts also KBC and Citizen TV. 17 (22%) read newspapers and magazines while 9 (12%) use oral information from fellow vegetable farmers. Channels of media preferred.

Table 11: Preferred Channels of communication

Channels	Frequency	Percent
Radio	43	57.3
Television	6	8.0
Newspapers	3	4.0
Magazines	14	18.7
Total	66	88.0
System	9	12.0
Total	75	100.0

4.7.5 Educational levels of the Agricultural Officers' clients

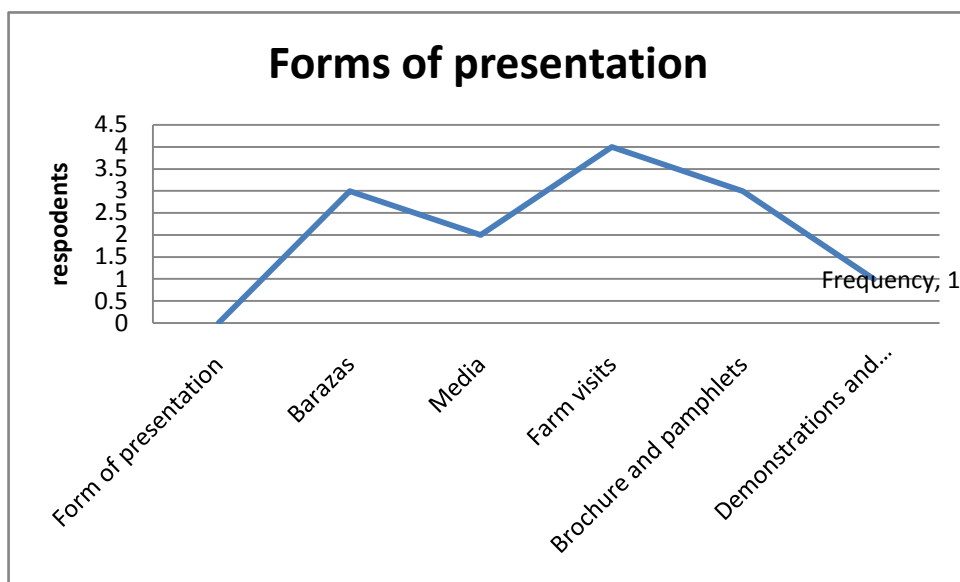
According to agricultural officer most of vegetable farmers in Wareng district are literate varying from primary school leavers to secondary level leavers. They are well versed in reading and writing in English Kiswahili and local languages, Nandi.

Most of the farmers in Wareng district attended primary and secondary schools. A good number of them having dropped out of primary level and a few proceeded to secondary school. Accordingly, the level of education for those who have attained primary education are 42 (56%), while 33 (44%) have attained secondary education. Generally it can be said that most vegetable farmers are literate.

The vegetable farmers can access information due to literacy. Although most of them are semi-illiterate, it is hard for them to access and are ignorant of agricultural information sources and systems.

4.7.6 Formats of presentation of agricultural information

Format of presentation in the dissemination of agricultural information is carried out by use of verbal communication, especially during field days, demonstrations and training. This is aided by the use of posters, demonstrations, pamphlets, brochures and other printed materials. Another medium of communication that is evident is through radio programmes using local languages such as Kass Fm, Changei Fm stations, Radio Citizen and KBC.

Diagram 10: Forms of Presentation

4.7.7 Language used to disseminate agricultural information

Agricultural officers disseminate agricultural information to vegetable farmers of Wareng district using Kiswahili, English and local languages such as Nandi. The most common medium used is Kiswahili which everyone understands.

4.8. Factors that hinder accessibility and dissemination of agricultural information by small-scale vegetable farmers in Wareng District

4.8.1 Problems faced by farmers in searching and accessing agricultural information

Challenges facing vegetable farmers in accessing agricultural information include transport costs while traveling from their homes to agricultural offices which are located far from them. Another major challenge is the inaccessibility of the information vegetable farmers cited cases where the agricultural officers are not accessible to them whenever they visit. The other challenge is the long distances between officers and farmers.

For instance Kesses location is very wide in Km² thus farmers live far from these officers. Kapseret agricultural divisional officers are located in town whereas the farmers live in rural areas. Chuiyat location farmers can be contacted at Kesses divisional headquarters thus the distance is enormous.

Another challenge is the poor roads infrastructure where roads are impassable during wet seasons when information on agriculture is highly demanded. Limited literacy is another challenge that farmers face in accessing agricultural information for those who cannot read or write.

Table 12: Challenges in Information dissemination faced by farmers

Challenges	Frequency	Percent
Transport cost	4	5.3
Illiteracy	10	13.3
Inaccessibility of the information	38	52.8
Long distance	12	16.0
Poor infrastructure	8	10.7
Total	72	96.0
System	3	4.0
Total	75	100.0

4.8.2 Effects of farmers' inaccessibility to agricultural information

Vegetable farmers in Wareng district expressed low/poor yield from their farms when they do not access timely agricultural information. The quality of vegetable also will be low if information pertaining to growth, management fertilizers, pesticides, market

etc is not given to the farmer on time. Vegetables are delicate and failure to disseminate timely information leads to losses which the farmers cannot incur.

Table 13: Effects of not accessing agricultural information

Results of Effects	Frequency	Percent
Low yield	42	56.0
Poor quality	32	42.7
Total	74	98.7
System	1	1.3
Total	75	100.0

4.8.3. Challenges faced by agricultural officers in disseminating information to farmers

Agricultural officers encounter certain problems in disseminating of information to vegetable farmers. Majority of them only understand Kiswahili and local languages but cannot read or write; thus illiteracy and ignorance of new farming methods and how to obtain quality seeds. The poor turn up of farmers during demonstrations and field days leaves them out on new information that is being disseminated.

The officers often lack demonstration and teaching materials in disseminating information. Additionally, there is lack of transport to reach farmers in various parts of the entire district. The division has only one vehicles (an old one) in which agricultural officers are assigned. A number of motor cycles have mechanical problems which the ministry has not repaired.

Another problem is agricultural officers were few compared to the geographic distance that they cover during farm visits. Each location has an average of 10,000 farmers and the officers are about 5 in every location. This means that dissemination of timely information cannot be achieved with a widely distributed population of vegetable farmers.

As suggested by the respondents the vegetable farmers in Wareng district prefer use of electronic media or mass media such as radio to air agricultural information to them. The programmes that are broadcasted to them in their local languages have proved to be more efficient than actual visitations by agricultural officers. They also suggested a demand-driven extension services to be adopted by the agricultural officers. There is need to provide interpreters during field days and demonstrations to enable farmers to understand the information.

Additionally information should be repackaged in local languages and Kiswahili for easy understanding. There is need to create awareness about the benefits of vegetable farming as opposed to cultivation of other crops. The economic value of vegetables and time it takes before maturity is shorter than growth of maize or wheat. An awareness campaign should be mounted by the officers in the district. Also use of incentives should be promoted to encourage farmers to diversify from the traditional farming to modern farming or agri-business.

Table 14: Challenges in information dissemination

Challenges in information dissemination	Frequency	Percent
Language barrier	1	7.7
Poor turn up of farmers	3	23.1
High illiteracy levels	1	7.7
Ignorance of farmers	1	7.7
Lack of demonstration and teaching materials	3	23.1
Few Agricultural extension staff	1	7.7
	12	92.3
Total	13	100.0

4.9 Ways of improving the communication and dissemination of agricultural information to small-scale vegetable farmers in Wareng District

4.9.1 Possible solutions to accessing information

Agricultural officers require capacity building so that they are able to reach farmers with information. Extension officers should be based in centralized locations so that farmers can easily access them.

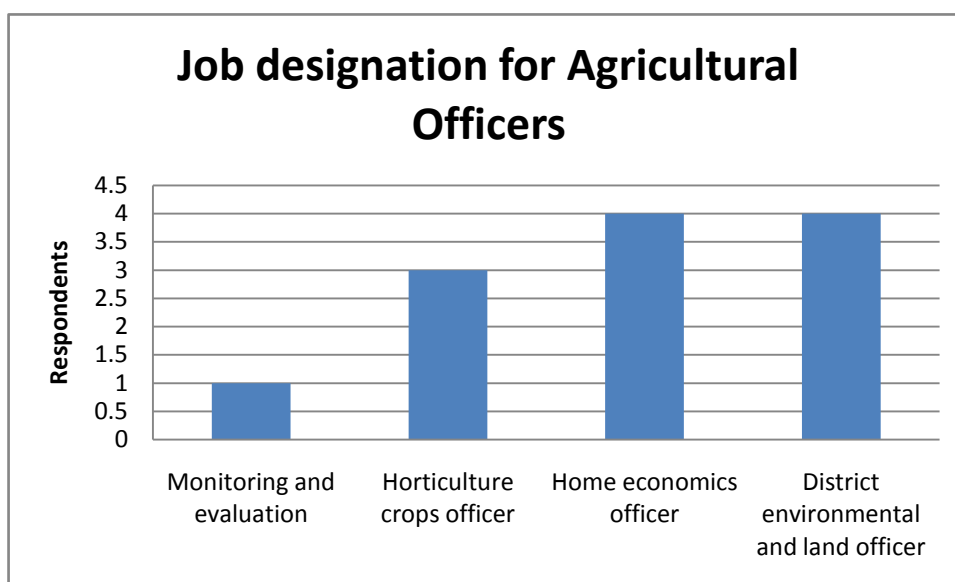
The ministry should decentralize their offices and move them to the rural area. The Ministry should also equip the officers with heavy duty vehicles to enable mobility of officers. Regular visitations and field days to be held to encourage growth. Marketing of the vegetable growth. Marketing of the products for local, urban and even export should be done.

Libraries and information centres to be located in urban and rural centres to allow farmers to access information whenever they require. The Ministry concerned with social services to revive district information and documentation centres (DIDC) which used to function to enhance information dissemination to farmers. Train farmers on appropriate markets for their vegetables and the use of modern technologies in agriculture which will spur growth in the farming.

Having discussed the activities of vegetable farmers in Wareng district, the researcher gathered pertinent information from informants who were the agricultural officers in the district charged with the responsibility of dissemination information, their job descriptions followed closely with their duties and responsibilities in line with the Ministry's Strategic Plan.

Table 15: Job designation for Agricultural Officers

Agricultural officers	Frequency	Percent
Monitoring and evaluation	1	7.7
Horticulture crops officer	3	23.1
Home economics officer	4	30.8
District environmental and land officer	4	30.8
LEO	1	7.7
Total	13	100.0

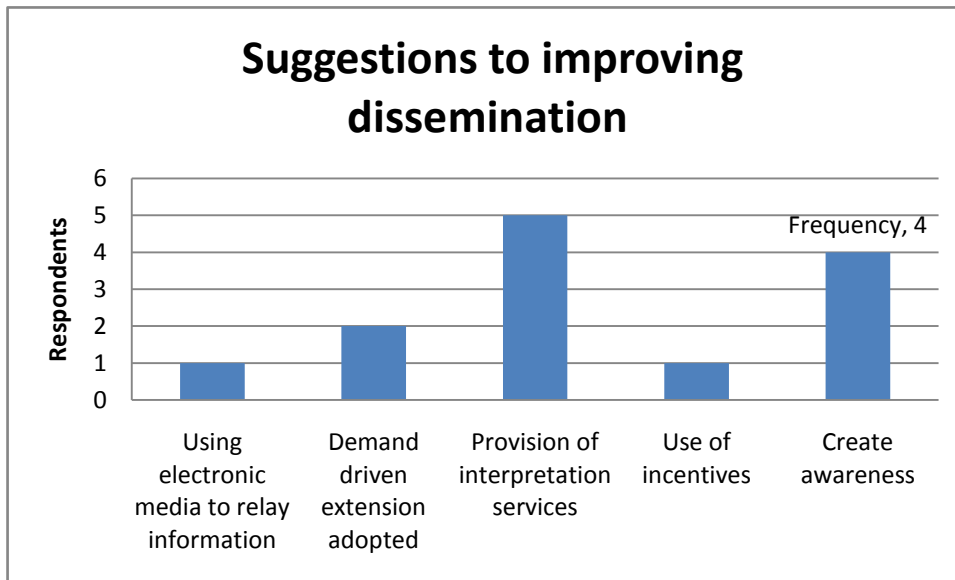
Diagram 11: Job Designation for Agricultural Officers

4.9.2 Suggestions on how to improve dissemination of information to vegetable farmers

In an attempt to disseminate information to vegetable farmers, education programmes and meetings should be organized by agricultural officers targeting vegetable farmers. Information should be adopted on a demand driven basis and officers should be proactive in disseminating timely information.

The Ministry should also organize and fund audio-visual shows in the rural areas through which videos and films on successful vegetable farming using modern technology is shown. Use of posters and print media should be encouraged since "a picture tells a thousand words". In addition, leaflets and pamphlets containing agricultural information should be in local languages to enable farmers who are semi-illiterate to access information. Alternatively, provision of interpretation services should be encouraged. An awareness campaign should be mounted frequently and regularly to sensitize farmers on new technologies.

Diagram 12: Suggestions to improve Dissemination



4.10 Conclusion

The foregoing chapter analysed, interpreted and presented the data that was collected in the field. The research findings revealed that indeed vegetable farmers in Wareng district have information needs that are unique to their day to day activities. The needs highlighted would help them in managing and solving problems related to vegetable farming. The study showed that the farmers obtain information from friends, relatives and neighbours who also grow vegetables. A number of them use electronic devices such as the radio, television and in the recent past mobile phones (text messaging services). Other channels that farmers use to receive information were through print media and also through field and demonstration days organized by agricultural extension officers in the district. The study also revealed impediments that hinder accessibility to agricultural information such as illiteracy among the farming community, costs incurred, poor information services infrastructural systems among others. The vegetable farmers made suggestions on how to improve information dissemination to the farming community in Wareng district.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter presents the summary of the findings, conclusions and recommendations. Recommendations and a model have been proposed to facilitate improved access to information by small-scale vegetable farmers in Wareng district.

The purpose of this study was to examine the provision of information to small-scale vegetable farmers in Wareng district and to propose a model for improved access to information by vegetable farmers. The salient findings are summarized according to the respective research objectives and questions as follows:

5.1.1 Information needs of small-scale vegetable farmers in Wareng district

The study identified information needs of small-scale vegetable farmers as that which are closely linked with their day to day activities of farming. Farmers need information to access regular support services that provide identification of unusual problems that are difficult to diagnose during routine plant health control. Farmers also require appropriate information to access agricultural inputs such as quality seeds, fertilizers, pesticides etc.

The study also identified information needs regarding markets and prices for their produce and also favourable prices in the market. The other information needs expressed by farmers include that of soils and weather conditions that favour vegetables farming as well as technologies especially in irrigation practices and

better farming methods. Other information needs include access to credit facilities and loans from SMEs, local banks and cooperative societies.

Farmers also require information on post-harvest and storage of vegetables as well as transportation facilities including cold temperatures to facilitate freshness for export produce.

5.1.2 Sources of Information available to small-scale vegetable farmers in Wareng district

Vegetable farmers in Wareng rely on oral channels of information from neighbours, friends, relatives and fellow farmers. However, some of them heavily rely on the radio which broadcasts, especially local FM stations that broadcasts using local languages.

Extension officers play a big role in the dissemination of agricultural information to farmers. This was evident during field days, barazas, agricultural seminars and workshops, and trainings which are conducted by extension officers during farm visits. For the agricultural officers their sources of information are from research organizations e.g. KARI, Technical handbooks supplied by the government (MOA), agricultural Journals, workshops, seminars and trainings regularly conducted.

Agricultural officers also consult the worldwide web and agricultural databases in the internet for information. Agricultural databases from KARI as well as newsletters and regular reports and networks such as KAINET (Kenya agricultural Information Networks) are important sources of agricultural information. Other farmers utilize ICTs such as mobile phone calling and texting.

5.1.3 Effectiveness of extension services in the dissemination of information to vegetable farmers

Findings revealed that extension services are essential used in dissemination of information through forums such as farm visits, field days, demonstration days, exhibitions during ASK shows, and personal visits. The frequency in which the agricultural extension officers and the farmers interact is an indicator of the effectiveness of extension officers in dissemination of agricultural information. Additionally, the adoption of new technologies by vegetable farmers especially in irrigation using the money- maker peddling machine popular with farmers and also improvement in vegetable yields or output shows that information dissemination is effective. The study also revealed that vegetable farmers were gaining profits from their products by striving to meet the growing demand. The findings also showed that there is an increase in acreage of market vegetables in the district and that the demand for interactive participation by farmers through media (radio) and visits to agricultural offices also shows the effectiveness of information dissemination. Findings also show that there is continued monitoring of farming activities by extension officers throughout the various stages of farming such as planting (provision of quality seeds), weeding, top-dressing (provision of fertilizers and pesticides), harvesting, post-harvesting and selling. These activities carried out by extension service officers indicate the positive impact and effectiveness in dissemination of information.

5.1.4 Communication channels through which agricultural information is dissemination

Findings reveal that farmers use oral channels of communication with agricultural extension officers and amongst themselves. They also use other channels in the media such as radio, television and print media (journal publications, reports, and newsletters). Others utilize ICTs such as mobile phones and electronic databases and

the internet. It was established that demonstration activities such as field days and ASK shows are powerful channels of communication and as the saying goes “seeing is believing”.

5.1.5 Accessibility and usefulness of information channels, sources, services and systems that provide information to vegetable farmers

The study revealed that the information sources, channels, services and systems were found to be useful to vegetable farmers, in satisfying their information needs. However, the media such as the radio and ICTs were accessible to most farmers though they have to spend money on airtime. Other accessible sources include agricultural extension officers who disseminate information and demonstrations. The government through the Ministry of Agriculture should undertake assessment of the agricultural information needs and resources and make appropriate recommendations. The study revealed that there has not been an assessment of information needs or development of an efficient and effective information network system. The study also found out that there was no subscription to scientific journals for the agricultural officers and the farmers to be able to access current information. There was need for creation of current awareness services to sensitize farmers on new information technologies and innovations. There was also need to compile a directory of agricultural information services and an evaluation of ongoing information programmes in the district. This was not going on in Wareng district.

5.1.6 Factors that hinder accessibility to agricultural information by small scale vegetable farmers in Wareng district

Farmers require information for their day to day activities. However, literacy levels may hinder them from accessing timely and relevant information which would increase crop yields. The available printed information sources were available in

English or Kiswahili but those farmers who were barely literate could not benefit from the literature.

Farmers are busy people with little time for themselves. Moreover, whereas good information comes at a cost, most farmers lacked time to seeking information and cannot afford the cost of travel from their homes to agricultural offices to seek information. Thus, distance, time and cost were obstacles farmers face in trying to obtain information. The long distance between agricultural offices and the farmers in rural areas is a hindrance in accessing information.

The information infrastructure in the district was found to be an impediment in accessing agricultural information. Information centres and information resources were located in urban centres and towns such as Eldoret town where Kenya National Library Services and District Information and Documentation Centres were based. The offices of the Ministry of Agricultural were also located in town and divisional headquarters. Farmers who live and work in the rural areas could not afford travel expenses in search of information.

5.1.7 Ways and means of improving communication of agricultural information to small scale vegetable farmers

It was established that information could empower farmers to improve farming activities. When accessed and used appropriately information can lead to economic development which will contribute to food security and improved health among farmers and consumers of vegetables. It was found out that providers of information and policy makers should take appropriate measures to improve access and use of information.

The many gaps that exist in the provision of information to vegetable farmers were directly linked to the poor understanding of their needs. The information systems and services available in Wareng district have been designed without proper analysis of the needs of users. Meeting the information needs of various categories of farmers depends much on the help they received from agricultural extension officers based in the district. There is a need for the government to develop an agricultural information policy to guide the dissemination of agricultural information to the various categories of farmers.

To be able to provide information to vegetable farmers, the following needs to be done:

- To educate farmers on the sources of information so as to empower them and reduce illiteracy and ignorance.
- To conduct regular and frequent field days and seminars and to allow agricultural officers to disseminate information.
- To develop methodologies for documenting and disseminating information to farmers and to improve existing ones.
- Information providers such as extension officers should repackage information in formats suitable to the farming community; for instance using audio and visual technology in form of videos, tapes, cine films, PowerPoint during demonstrations among others.
- To encourage agricultural extension officers and other government officers to conduct research on the information needs of the farming community.

- To establish agricultural information centres in the entire district so as to collect information needs of farmers. This should be done by setting up help desks at the market centres especially during market days.
- To conduct awareness campaigns through publicity, workshops, and seminars using the media to sensitize farmers on the importance agricultural information.
- To encourage farmers to visit information centres and to regularly attend workshops and seminars to be kept abreast with new information and emerging technologies.

5.2 CONCLUSION

The study set out to examine the provision of information to small scale farmers in Wareng district and to propose a model for improved access to information. It is concluded that farmers have information needs in the field of vegetable farming. They lack relevant and timely information specific to vegetable farming. They also lack information on appropriate emerging technologies to spur growth of vegetable farming.

Farmers in Wareng district rely on each other in seeking information hence oral transfer of information is the most preferred form of communication. However, the use of mass media and farm visitation by agricultural officers is insignificant because access is hampered by lack of resources to facilitate access; also the distance that farmers cover to reach the agricultural offices for information is a hindrance.

This also means that the information systems and services are inadequate to satisfy the information needs of farmers. The agricultural extension officers should use other channels of communication such as videos, mobile cinemas, films, powerpoint presentations among others to disseminate information.

Awareness campaigns should be made especially during market days in the district so as to reach a good number of parents and to encourage them to attend regular seminars and workshops organized by the Ministry of Agriculture.

The findings also indicated that information centres were situated far from the farmers hence inaccessible to them. The information resources are based in urban towns and centres such as Eldoret. The Kenya National Library Services and the District Information and Documentation Centres were found to be the information resources where farmers would seek information. Unfortunately, they are based in town and have no branches elsewhere in the district. Farmers who live in the rural areas have no access to the service since they cannot afford fare to travel and seek for information. The information resources were not equipped enough to satisfy the farmers' information needs. Public libraries should improve their services to the farming community in Wareng district. The Ministry of Agriculture should also establish information centres in the agricultural offices spread in the district.

The findings also concluded that employing the use of ICTs could change the face of farming in wareng district. ICT services were found to be the fastest and easiest means of communication given the laid down infrastructure networks. Mobile phone linked to radio stations disseminates timely information effectively. Farmers need

information on the right seeds to plant, weather patterns, harvest and post-harvest activities, correct use of pesticides, market prices among others.

There is the need for policy makers and other stakeholders to develop strategies such as educational programmes in villages and urban centres to sensitize farmers on appropriate technologies to adopt in vegetable farming. This will enhance development in the agricultural sector and promote food production.

In conclusion, farmers in Wareng district lack information resource and technology to assist them increase food productivity. This is also hampered by illiteracy as most of the printed information resources are written in English or Kiswahili. Research has demonstrated that information is a basic need that requires timeliness and appropriateness to the agricultural community. Information requires a deeper understanding both to the agricultural officers and other stakeholders in order to accelerate the dissemination of relevant information. In order to enhance the standards of information provision to vegetable farmers, agricultural officers should invest on the needs of users and this will bridge the existing information gap. Equipping the agricultural information workers with adequate skills will help achieve more in satisfying user needs. They will also be able to offer excellent information services according to expectations of users. Findings have also shown that where the correct procedures of identifying the information needs of users were taken into considerations, the results were positive.

5.3 RECOMMENDATIONS

The government of Kenya should formulate agricultural information policy that will provide for and seek to integrate an information network involving personnel (policy makers, information specialists, researchers, extension officers etc), hardware and software, data and practices aimed at supporting efficient and effective agricultural decision making. The government should recognize that information is an essential input for an effective agricultural system and as such, contributes in a positive way to agricultural development.

A number of recommendations have been made with a view improving provision of information services to small-scale vegetable farmers in Wareng district. These are:

5.3.1 Increase of Extension Officers

Wareng district has many vegetable farmers who live in a diverse area compared to the number of agricultural officers. Additionally, there was only one vehicle in every division assigned to agricultural department. The vehicles were old and not able to withstand the bad roads during the wet season hence movement of officers was limited. The agricultural extension officers are few relative to the population of vegetable farmers. Therefore, it is recommended that more extension officers should be posted to the district This will enable frequent interactions between vegetable farmers and the extension officers.

5.3.2 Proximity of Agricultural Officers

Accessibility and use of agricultural information by small-scale vegetable farmers was adversely affected by distance the farmers cover to reach agricultural officers' offices for help. The study indicated that the farmers incur relatively significant costs in

order to access information. This hinders farmers from accessing the required information. The Ministry of Agriculture should therefore establish offices closer to the farmers and extension officers be posted close to them. This will minimize costs and enhance access to timely information regarding vegetable farming. The findings also showed that farmers had to walk long distances to the agricultural offices hence cutting on their time.

5.3.3 Establishment of information centres

This study recommends that the Ministry of Agriculture should establish information centres and improve on the existing ones. The Kenya National Library Services in Eldoret town should introduce mobile libraries so that farmers can access agricultural information without spending money. The collection in the library should be developed to have a bias towards agriculture. Uasin Gishu is known as the bread basket of Kenya hence agricultural information should be readily available to farmers in Wareng district. The findings indicated that the few information systems and services were located far from farmers.

5.3.4 Linkages with agricultural Research Institutions

There are weak linkages between farmers and agricultural research institutions. It is therefore recommended that agricultural based research institutions such as KARI, KEPHIS, and Kenya Seed Company should disseminate their research findings and new innovations to farmers through regular open field and demonstration days. Published materials such as handbooks, magazines, journals, booklets, brochures and leaflets should also be available in the information centres and libraries. This enhances current awareness services in information provision, and hence provision of timely information required in vegetable farming. The limited access to information systems and services within Wareng district hampers awareness of the existence of

other agricultural information databases from KARI e.g KAINet. The dissemination that they seemed to enjoy was the radio programmes broadcasting through the national and local language stations.

5.3.5 Packaging and Repackaging of Agricultural information

This study indicated that most small-scale farmers are semi-illiterate and would prefer to be communicated mainly in Kiswahili and vernacular languages. A small number of them do understand English. In view of this, the study recommends that information producers should package and repackage information in these popular languages both in print and electronic formats. Extension officers should also use the languages or use translators to disseminate information to farmers.

5.3.6 Facilitation of Agricultural Extension Officers

It is recommended that the Ministry of Agriculture should provide the officers with good vehicles and motorbikes to enable them visit farmers during all the times. The vehicles that were grounded should be repaired so that extension officers can reach farmers in good time. The study found that extension officers lack efficient transport systems to enable them visit the farmers.

5.3.7 Use of ICT in Disseminating Information

ICT infrastructure in Wareng district is wanting. Farmers did not use ICT due to the absence of digital village connectivity where relevant information on vegetable farming is provided. This calls the Ministry of Agriculture and other policy makers to invest in ICT services so that agricultural information is quickly disseminated to farmers. There is need to encourage farmers and extension officers to use ICTs in promoting agricultural information. Such information can promote local

entrepreneurship among farmers who connect to international markets for their vegetables. Vegetable farmers can also connect to financial services such as loans from SMEs and banks through ATMs.

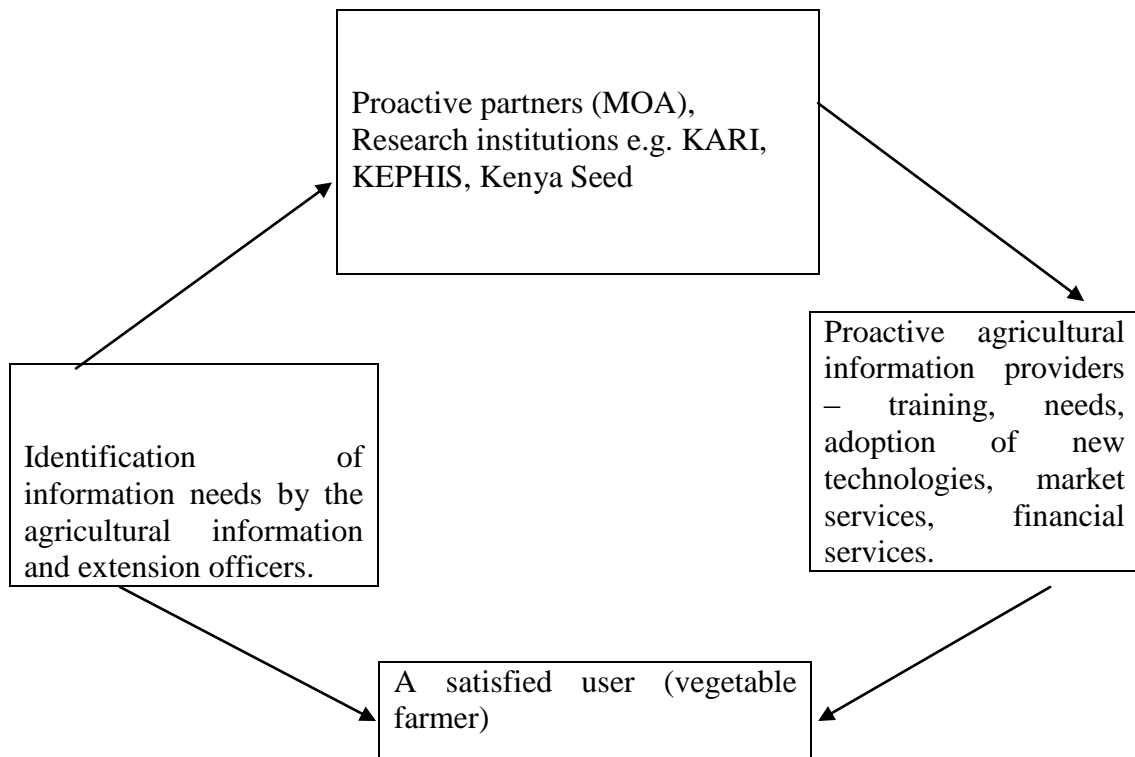
Information disseminators should also utilize ICTs through E-mail and SMS (short text messages), CD-ROMs, fax, and also printed materials. The radio is also a powerful ICT tool which when connected to mobile telephone services can be used to air agricultural programmes and also interactive conversation with experts in farming.

The provision of information services to vegetable farmers in Wareng district could be achieved through a series of activities such as:

- Provide physical locations for agricultural libraries
- Upgrade and modernize existing libraries and information centres
- Budget for libraries and information centres
- Acquire improved technology for the efficient and effective management of information
- Make information available and accessible to end-users
- Enhance the capacity for producing, capturing, processing and disseminating information
- Encourage the use of information as a factor in development
- Capture both indigenous knowledge and grey literature in the national databases.
- Repackage information in forms most appropriate to the needs of different groups of end-users

5.4 Proposed Model for Provision of Information to Vegetable Farmers in Wareng District

Given the various challenges that have been identified in the provision of information to vegetable farmers in Wareng district, the following model if adopted would enhance efficient and effective flow of information to the user community. The suggested model has the following components:



5.4.1 Identification of Information needs

Song (2009) says proactive information services require careful examination of current user needs, new technologies and innovations and the direction for the future. Agricultural information officers should know the needs of the various farmers in the district and seek to identify their needs bearing in mind the emerging technologies in farming.

5.4.2 Proactive partner

The Ministry of Agriculture and its partner research institutions such as KARI, KEPHIS, and Kenya Seed etc. should disseminate information to vegetable farmers proactively. Research findings that have been undertaken should be communicated to the farmers through the normal channels of communication. Agricultural information centres spread around the country then collate, repackage and disseminate information to the farmers. Information systems and services should be developed in Wareng district to facilitate dissemination of agricultural information.

5.4.3 Proactive Agricultural Information Services

These are the providers of agricultural information. They should be proactive in dissemination of information and seek the needs of users. The officers should also market their services in emerging fields such as new technologies, new seed varieties, new trends in farming etc. The officers should be conversant with the internet as an information resource that they consult. Information resource databases such as KAIInet, AGORA, AGRIS and others are rich resources that carry information on agriculture. Research institutions also upload information for easy access.

5.4.4 Selection and use of Information

The end result of having proactive partners and proactive agricultural information officers is a satisfied vegetable farmer. When farmers receive timely and accurate information about their daily farming activities will result in high yields and hence economic stability and prosperity.

5.5 Suggestions for Further Research

This study examined the provision of information to small-scale vegetable farmers in Wareng district, Kenya and proposes a model for improved access to information by vegetable farmers.

This study concentrated on provision of information to vegetable farmers in Wareng district. A study should be carried on provision of information to fruit farmers in Wareng district.

There is also the need for a study to investigate the information needs of fruit farmers and opportunities for export since fruits do well in Wareng district.

REFERENCES

- Arusei, E.J. (2000) The awareness of farmers on the dangers associated with the use and application of farm chemicals on wheat and maize, M.Phil Thesis unpublished.
- Benor, D. & Baxter, M.A. Agricultural Extension: The Training and visit system.
- Bailey, K.D. (1994) Methods of Social Research, 4th ed. LA, Free Press
- Bosire, E. M. (2002) Information needs of the floriculture farming community in Kenya: a case study of Uasin-Gishu District, Thesis Unpublished.
- CTA (1998) Promoting the exchange of information, Wagenigen, Technical Centre for Agricultural and rural cooperation
- Debons et al (1981), The information professional: Survey of an emerging field, Marcel Dekker, new York.
- Harris, K.M. and Scott, P.R. (1989). Crop protection information: An International Perspective.
- Hart, C. (2006) Doing a literature review: releasing the social science research imagination, Sage, London
- ICT update No. 133 (2008), Web. 2.0 ICT tools in action.
- ICT update No. 133 June (2007), Podcasting
- ICT update No. 36 April (2007), Mobile Financial Services
- ICT update No. 36 April (2007), Mobile wallets and virtual currencies
- ICT update No. 39 October (2007), Sharing Information
- ICT update No. 40 December (2007), Language Technology – Accessing information by voice
- ICT update No. 41 February (2008), Wireless internet: Spreading from the centre
- ICT update No. 46 December (2008), Rural Energy Supply
- ICT update No. 47 February (2009), Market and Export Information
- ICT update No. 49 June (2009), Radio – talking back to radio the centre of information
- ICT update No. 50 August (2009), Mobile and ICT services
- ICT update No. 53 February (2010), Farmers services (Direct Data on Demand)

ICT update No. 51 October (2009), Mobile Telephone Services

Kenya Agricultural Research Institute (KARI), 2000 www.kari.org,
www.erails.net?KE

Kothari, C.R. (1990) Research methodology: methods and techniques, Delhi, Wiley Eastern.

Kullthau, C.C. (1991), Inside the search process: Information seeking from user's perspective journal of American Society of Information Science, Vol. 42

Lewins, A. (2005) Qualitative data analysis, London, Sage.

Macevicuite Elena A parallel between the models of communication and the models in information behaviour research. Online <http://emeraldinsight.com> A parallel between the models of communication and the models in information behavior research

McQuail, D. & Windah. S. (1993) Communication models for the study of mass communication, London, Longman.

Mengech, a. and Saxena, K. (1995) Integrated pest management in the tropics: Current status and future prospects. New York, Wiley & Sons.

Midmore, D.J., Parker, J. & Clark, J. (2005) Crop protection: An issue of the Asian vegetables and herbs and spices industry

Ministry of Finance and Planning Uasin Gishu District Development Plan 2002-2008, Government Press.

Ministry of Planning and National Development, National Development Plan 2002-2008, Government Press.

Ministry of Planning and National Development, Sessional Paper No.1 (1986) Economic management for renewed growth, Government Press, Nairobi.

Ministry of Planning and National Development, Sessional Paper No.2 (1992) Development and Employment in Kenya, Government Press, Nairobi

Mugenda, O.M and Mugenda, A.G. (2003) Research methodology: quantitative and qualitative approaches, Nairobi, ACTS Press.

Munyua, (2000), ICT for rural development and food security: Lessons from field experiences in developed countries Online [http:// knowledge information and communication](http://knowledgeinformationandcommunication.com).

Munyua, H. (2009) A study of the agricultural knowledge and information in systems of small-scale farmers in Kirinyaga, district, Kenya, <http://emeraldinsight.com>.

- National Development Plan 2002 – 2008 (2002), Effective management for sustainable economic growth and poverty reduction, GOK
- Ngetich, F.K. (2005) Provision of agricultural information to small scale tea growers in Kenya: A case study of Bureti District, Thesis unpublished.
- Niedzwiedzka, Barbara (2003), <http://www.informatik.uni.trier.de>.
- Odero, D.O. (2001) Strengthening community organizations information systems for improved environmental management; the case of Uasin Gishu District, Unpublished M.Phil Thesis.
- Odini C. (1993) Trends in information needs and use Research, Library Review 42(7).
- Ojiambo, J.B. (1993), Odini, C. (1993) & Crawford (1978) Issues in Library user studies: Trends in information needs and use research library review 42 (7)
- Ojiambo, J.B. and D.N. Ocholla (1993) Information user studies: Issues in Library and information studies, Nairobi, JKF
- Sustainable network of agricultural information sharing and dissemination through ICT for improving sustainable livelihoods, Online <http://www.stockholmchallenge>: (Accessed 2009)
- Otieno, David et al (2009), Market participation by vegetable farmers in Kenya: a comparison of rural and peri-urban areas African Journal of Agricultural Research Vol. 4 No. 5 2009
- Ozowa, (1995), Information needs of small scale farmers in Africa: the Nigerian example, IAALD / CABI Vol. 4 No. 1 1995
- Rege, R. A. (2006) Agricultural information resources in Kenya: generation, access and management frameworks, KARI research paper, Nairobi
- Rogers, E.M. (1995) Diffusion of Innovations. New York, Free Press.
- Song Y. (2009) Designing library services based on user needs: new opportunities to reposition the library, World Library and Information Congress: 75th IFLA Conference and Council, Milan, Italy.
- Spore No. 103 February (2003), Knowledge Banks
- Spore No. 115 February (2005), Weather risks in farming: Weathering times of boom and burst
- Spore No. 134 April (2008), SMS alerts
- Spore No. 136 August (2008), Agricultural training: An imperative need
- Spore No. 137 October (2008), Irrigation- Water powered pump

Spore No. 139 February (2009), Soil fertility: Feed the land

Sturges, P. and Feather (2003) International Encyclopaedia of information and library science, London Routledge.

Thapisa APN (1997), A quest for an agricultural information programme for Southern Africa, Library Management Vol. 18 No. 4 online emeraldinsight.com. Accessed (2008).

Wambugu, M. (2008), Eight million adults are illiterate, survey shows, the Standard Monday September 8th 2008

Wellings, H. (2007) The hidden chemicals in fruit and vegetables

Willis, Yuko Oso and David Owen (2008) A general guide to writing research proposal report: a handbook for beginning researchers, 2nd ed. Makerere University, Kampala

Wilson, T.D. (1999), Models on information seeking behaviour research Journal of information documentation Vol. 55 No. 3

APPENDICES**APPENDIX 1****INTERVIEW SCHEDULE FOR VEGETABLE FARMERS****1. General Information**

a) Occupation

b) Village

c) Location

d) District

2. What is the level of education that you have attained?

3. What form of farming do you carry out?

4. Do you carry out irrigation?

If yes, what source of water do you use to irrigate?

5. What forms of irrigation systems do you use?

6. Do you use fertilizers on your farms?

7. What type of chemicals/ fertilizers do you apply in your farm?

8. Where do you sell your vegetables?

9. How do you communicate with agricultural officers?

10. What are your sources of funds?

11. Through what channels do you receive the information that you need?

Which of these channels do you prefer?

12. What problems do you face in searching and accessing agricultural information?

(a) How do these problems affect your work?

(b) Suggest ways to overcome these problems.

APPENDIX II**INTERVIEW SCHEDULE FOR AGRICULTURAL OFFICERS****RESPONDENT'S DATA**

a) Position

b) Educational/Professional Level

c) Technical Level

d) Duties and Responsibilities

Profile of organization

1. Name of Organization

2. Tel. No./ Address

Fax

3. Role of Organization

4. What are the services you provide to the farming community?

5. Who are your clients?

6. Any information Resources and Services e.g. Library?

7. Do you provide agricultural information to small-scale vegetable farmers of Wareng district?

If Yes, what type of agricultural information do you provide to them?

If no, explain further

8. Do your clients come to you for information?

If yes, how often do they contact your office? -

If no, explain further.

9. Where do you obtain agricultural information that you give to vegetable farmers?

10. How do you disseminate the information to vegetable farmers?

11. What are educational levels of your clients?

12. What formats do you present information?

13. How do you communicate this information to the farming community?

14. What language do you use to disseminate the information to farmers?

15. What problems do you encounter in disseminating the information to the farmers?

16. Suggest ways of solving these problems
