

**PROVISION OF AGRICULTURAL INFORMATION SERVICES TO SMALL
SCALE CROP FARMERS IN RUKWA REGION, TANZANIA**

BY

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DEDICATION

I dedicate this thesis to my late father, Mr. Robert Kindole Ntulo who never lived to see his dream come true. To you father, all I can say is;

“Baba, Mwalemi Sitcho”

ABSTRACT

Rukwa region is widely known in Tanzania as one of the grain baskets of the nation. However, in recent years, crop production in the region has been on the decline. The decline has been attributed to poor market-orientation, inappropriate farming methods, products and inadequate processing facilities. This has resulted to high levels of produce wastage with majority of the population living under extreme poverty despite the government's green strategy to alleviate the problem. This situation is attributed to inadequate, uncoordinated and under-resourced information services that have failed to address the farming community's information needs. The aim of the study was to investigate the provision of agricultural information services to small scale crop farmers in Rukwa region with a view to proposing an appropriate model of information service provision to enhance crop production in the region. Specifically, the study endeavored to: determine the information needs and seeking habits of small scale crop farmers; establish the types and range of information services offered; examine the application of ICTs in the provision of information services; ascertain the challenges experienced by small scale farmers in accessing and using information services; and to propose a model to improve agricultural information service provision. The study was informed by the Information Seeking and Communication Model (ISCM). A combination of quantitative and qualitative research methods were employed in the study. Systematic sampling was used to select 150 small scale crop farmers. Purposeful sampling was used to select villages with field farm schools, 50 small scale crop farmers, 27 information service providers and six district agricultural and livestock officers as key informants. Questionnaires were used to collect data supplemented by interviews and non-participant observation. Quantitative data was analysed using descriptive statistics. Statistical measures were used to test the relationship between variables and presented using frequency distribution tables, bars, charts and figures. Qualitative data was thematically analyzed based on study objectives. The findings showed that small scale farmers have various unmet and dynamic information needs. They needed information on where and how to get market for their crops, credit and loan facilities, input subsidy and horticulture, among others. They sought information mostly from informal sources, preferably gatekeepers, church/mosque and village leaders. Among the information services provided included document delivery services, technical advice, and on farm reference services. ICT services were available but not accessible in most areas due to several challenges. The study concludes that despite the importance of agricultural information to small scale farmers, its availability is hampered by many obstacles. The study recommends that agricultural information needs should be assessed regularly and properly addressed; there should be a linkage between agricultural research institutions; information systems and services. A centralized agricultural database management system should be established to collect, organize, and disseminate agricultural information to small scale crop farmers to enhance crop productivity.

TABLE OF CONTENTS

DECLARATION	ii
DEDICATION	iii
ABSTRACT	iv
TABLE OF CONTENTS	v
LIST OF TABLES	xiii
LIST OF FIGURES	xiv
LIST OF ABBREVIATION AND ACRONYMS	xv
ACKNOWLEDGEMENT	xvii
CHAPTER ONE	1
INTRODUCTION AND BACKGROUND INFORMATION.....	1
1.1 Introduction.....	1
1.2 Rukwa Region.....	4
1.2.1 Background and Location	4
1.2.2 People and Culture	6
1.2.3 Climate	6
1.2.4 Productive Sectors	6
1.2.5 Challenges for Increased Farming Production in Rukwa Region	7
1.3 Statement of the Problem.....	8
1.4 Aim of the Study	10
1.5 Specific Objectives	11
1.6 Research Questions	11
1.7 Assumptions.....	12
1.8 Significance of the Study	12
1.9 Scope and Limitations of the Study	13
1.10 Definition of Key Terms	15
1.11 Thesis Layout and Presentation	17

CHAPTER TWO	20
AGRICULTURAL INFORMATION SYSTEMS, SOURCES AND SERVICES IN TANZANIA	20
2.1 Introduction.....	20
2.2 An overview of Agricultural Sector in Tanzania.....	20
2.3 Agricultural Information Systems in Tanzania.....	25
2.3.1 Research Institutions	26
2.3.2 Libraries.....	28
2.3.2.1 Academic Libraries	29
2.3.2.2 Public Libraries	31
2.4. The Contribution of Tanzania Public Libraries in Providing Agricultural Information Services.....	32
2.5 The Telecommunication Industry and Agricultural Information Service Provision ..	34
2.5.1 Mobile Phones.....	35
2.5.2 Radio	36
2.5.3 Television	36
2.6 The Internet.....	37
2.7 Agricultural Information Sources and Services.....	38
2.8 The Contribution of Agricultural Extension Services in Providing Information Services to Small Scale Farmers.....	41
2.8.1 Agricultural Extension Support Services	43
2.9 Chapter Summary	44
CHAPTER THREE	45
LITERATURE REVIEW	45
3.1 Introduction.....	45
3.2 Theoretical Framework.....	45
3.2.1 An Overview of Theories Related to the Study	46
3.2.1.1 Dervin’s Sense Making Theory	47
3.2.1.2 Kuhlthau’s Information Search Process Model (1991)	48
3.2.1.3 Wilson’s Model.....	49

3.2.2 Theoretical Framework Underpinning the Study	52
3.2.2.1 Relevance of ISCM to the Study	58
3.3 Review of Previous Studies	66
3.3.1 Information Needs and Seeking Behaviour.....	66
3.3.1.1 Information Needs of Small Scale Farmers	68
3.3.1.2 Information Seeking Behaviour of Small Scale Farmers	70
3.3.2 Sources of Agricultural Information	74
3.4 Information as a Resource to Small Scale Crop Farmers	81
3.5 Libraries and Information Service Provision to Farmers.....	87
3.6 Agricultural Information Service Provision.....	89
3.6.1 Agricultural Reference Services.....	91
3.6.2 Selective Dissemination of Agricultural Information	93
3.6.3 Information Referral Services	93
3.6.4 Translation Services	94
3.7 The Use of Information and Communication Technologies in Providing Agricultural Information Services.....	94
3.8 Challenges Facing Agricultural Information Service Provision in Developing Countries.....	99
3.9 A Review of Related Empirical Studies from Tanzania	105
3.10 Chapter Summary	112
CHAPTER FOUR.....	113
RESEARCH METHODOLOGY	113
4.1 Introduction.....	113
4.2 Research Methodology	113
4.2.1 Research Paradigm	114
4.2.1.1 Positivists, Constructivists and Pragmatic Paradigms.....	116
4.3 Research Design.....	122
4.3.1 The Quantitative Approach	124
4.3.2 The Qualitative Research Approach.....	125
4.3.3 Rationale for Using Qualitative and Quantitative Research Approaches	126

4.4 Research Method	128
4.5 Population and Study Setting.....	131
4.6 Sampling and Sampling Techniques.....	132
4.6.1 Sampling Frame	133
4.6.2 Sample Size	134
4.6.3 Sampling Procedure	137
4.6.3.1 Probability Sampling.....	138
4.6.3.2 Non-Probability Sampling.....	139
4.7 Data Collection Methods	139
4.7.1 Questionnaires	140
4.7.1.1 Questionnaire Design and Administration	141
4.7.2 Interview.....	144
4.7.3 Observation Method	145
4.8 Validity and Reliability of Research Instruments.....	146
4.8.1 Pretesting of Research Instruments	147
4.8.2 Triangulation	148
4.9 Data Analysis and Presentation	149
4.9.1 Types of Data Collected	149
4.9.2 Quantitative and Qualitative Data Analysis	150
4.10 Ethical Considerations	151
4.11 Chapter Summary	152
CHAPTER FIVE	153
DATA PRESENTATION, ANALYSIS AND INTERPRETATION	153
5.1 Introduction.....	153
5.2 Response Rate.....	154
5.3 Demographic Characteristics of the Respondents	154
5.3.1 Age Distribution of Respondents	155
5.3.2 Education Level Attained by Respondents	156
5.3.3 Average Age, Land Cultivated, Yield and Income per Year: Data from Key Informants.....	157

5.4 Farming Activities and Performance	159
5.4.1 Crop Farming Activities	159
5.4.2 Duration in Farming Activities.....	161
5.4.4 Relationship Between Crop Yield and Education.....	164
5.4.5 Factors Contributing to Low Yields	165
5.5 Information Needs and Seeking Habits	166
5.5.1 Information Needs	167
5.5.1.1 Information Needed by Gender	171
5.5.1.2 Information Needed by Age	172
5.5.1.3 Variation of Information Needs Across Villages	174
5.5.2 Purpose for Seeking Information	175
5.5.3 Agricultural Information Seeking Habits	176
5.5.3.1 Sources of Information Consulted.....	176
5.5.4 Frequently Used Sources of Information	180
5.5.4.1 Frequently Used Sources of Information by Age.....	180
5.5.4.2 Frequently Used Sources of Information by Gender.....	182
5.5.5 Reasons for Selecting Information Sources	184
5.5.6 Satisfaction from the Sources Used.....	188
5.5.7 Format Preferred by Respondents	191
5.5.8 Language of Preference.....	192
5.6 Types and Range of Information Services Offered to Small-Scale Farmers.....	192
5.6.1 Agricultural Information Services Offered to Small Scale Farmers	193
5.6.2 Frequency of Receiving Agricultural Information Services	199
5.6.3 Skills and Competence of Information Service Providers	200
5.6.4 Quality of Information Provided to Farmers	201
5.6.5 Effectiveness of Information Services Provided	203
5.7 Application of ICTs in the Provision of Information Services	204
5.7.1 ICTs Owned by Respondents	205
5.7.2 Availability of ICTs Tools and Services	208
5.7.3 Accessibility of ICTs Tools and Services	209

5.7.4 Use of ICTs Tools and Services	211
5.7.5. Frequency of Using ICTs	213
5.7.6 Effectiveness of ICTs in Proving Agricultural Information Services	214
5.8 Challenges Experienced by Small Scale Crop Farmers in Accessing and Using Agricultural Information Services	216
5.8.1 Challenges Relating to Information Needs and Seeking Habits	216
5.8.2 Challenges Related to the Application of ICTs in Information Service Provision.	218
5.9 Strategies Proposed by Small Scale Crop Farmers to Improve Provision of Agricultural Information Services.	220
5.10 Chapter Summary	221
CHAPTER SIX	222
DISCUSSION OF THE FINDINGS.....	222
6.1 Introduction.....	222
6.2 Characteristics of the Respondents	222
6.2.1 Age of Respondents.....	223
6.2.2 Gender and Education Level of Respondents	224
6.2.3 Average Crop Production and Income per Year	226
6.3 Farming Activities, Information Needs and Seeking Habits	228
6.3.1 Farming Activities.....	228
6.3.2 Agricultural Information Needs	231
6.3.3 Agricultural Information Seeking Behavior.....	235
6.4 Types and Range of Information Services Offered to Small Scale Farmers.	241
6.4.1 Competence of Information Service Providers	245
6.5 Application of ICTs in Information Service Provision.....	249
6.5.1 Availability and Accessibility of ICTs	251
6.5.2 Use of ICTs Tools and Services	253
6.5.3 Effectiveness of ICTs in Providing Agricultural Information Services	255
6.6 Challenges Experienced by Small Scale Farmers in Accessing and Using Agricultural Information	258

6.7 Strategies Proposed by Small Scale Farmers to Improve the Provision of agricultural Information Services	263
6.7.1 Establishment of Agricultural Information Centres	263
6.7.2 Awareness Creation.....	264
6.7.3 Information Needs Identification	264
6.7.4 Emploment of Information Service Providers.....	265
6.7.4 Time for Broadcasting and Information Packaging	265
6.8 Chapter Summary	266
CHAPTER SEVEN.....	268
SUMMARY, CONCLUSION AND RECOMMENDATIONS	268
7.1 Introduction.....	268
7.2 Summary of the Findings.....	269
7.2.1 Characteristics of the Respondents.....	269
7.2.2 Information Needs and Seeking Habits.....	270
7.2.2.1 Agricultural Information Needs	270
7.2.2.2 Agricultural Information Seeking Behavior.....	271
7.2.3 Types and Range of Information Services Offered to Small Scale Crop Farmers	273
7.2.4 Application of ICTs in Information Service Provision	275
7.2.4.1 Use of ICT Tools and Services.....	276
7.2.4.2 Effectiveness of ICTs in Providing Agricultural Information services.....	276
7.2.5 Challenges Experienced by Small Scale Crop Farmers in Accessing and Using Agricultural Information.....	277
7.2.6 Strategies Proposed by Small Scale Crop Farmers to Improve Provision of Agricultural Information Services	278
7.3 Conclusion	278
7.4 Recommendations.....	280
7.4.1 Recommendations to Small Scale Crop Farmers	280
7.4.2 Recommendations to Policy Makers.....	281
7.4.3 Recommendations to Agricultural Stakeholders.....	283

7.4.4 Recommendations to Agricultural Information Service Providers	284
7.5 Proposed Model for Agricultural Information Service Provision.....	285
7.6 Suggestions for Further Studies	293
REFERENCES	295
APPENDICES	314

LIST OF TABLES

Table 1: A List of Wards in Selected District.....	134
Table 2: Selected Villages, FFSs and People Involved	136
Table 3: Age Distribution of Respondents.....	156
Table 4: Education Level Attained by Respondents	157
Table 5: Average Age, Land Cultivated, Yield and Income per Year: Data from Key Informants	158
Table 6: Respondents' Information Needs	168
Table 7: Relationship between Crop Production per Year and Information Needs	170
Table 8: Relationship between Gender of Respondents and Information Needs	172
Table 9: Relationship between Age of Respondents and Information Needs	173
Table 10: Sources of Information Used by Respondents.....	178
Table 11: Relationship between Age of Respondents and Frequently Used Sources of Information	182
Table 12: Reasons for Selecting Information Sources.....	185
Table 13: Relationship between Age and Reasons for Choosing Information Sources .	186
Table 14: Relationship between Gender and Reasons for Choosing Information.....	188
Table 15: Respondent's Level of Satisfaction on the Sources of Information Used	190
Table 16: Agricultural Information Services Offered to Farmers.	194
Table 17: Relationship between Crop Production and Agricultural Information Services Provided	198
Table 18: Skills and Competence of Information Service Providers.....	200
Table 19: Quality of Information Provided as Rated by Respondents	203
Table 20: Age of Respondents and ICTs Ownership.....	207
Table 21: Availability of ICTs Tools and Services to Small Scale Crop Farmers	209
Table 22: Accessibility of ICT Tools and Services	211
Table 23: Information Received Through ICTs.....	213
Table 24: Frequency of Using ICTs.....	214
Table 25: Effectiveness of ICTs in Proving Agricultural Information Services	216

LIST OF FIGURES

Figure 1: Rukwa Region Map Showing the Area of Study	5
Figure 2: Information Seeking and Communication Model.....	65
Figure 3: Type of Crops Grown.....	160
Figure 4: Duration in Farming Activities.....	162
Figure 5: Respondents' Maize Yield in Bags per Acre	163
Figure 6: Size of Land and Maize Yield in Bags per Acre	164
Figure 7: Respondents Level of Education and Farm Yields per Acre	165
Figure 8: Reasons for Low Crop Yields	166
Figure 9: Variation of Information Needs Across Villages	175
Figure 10: Purpose for Seeking Information	176
Figure 11: Frequently Used Sources of Information by Gender.....	183
Figure 12: Relevance of the Content Obtained from Information Sources	191
Figure: 13 Format Preferred by Respondents	192
Figure 14: Vegetable Garden	195
Figure 15 (a): Beans Plot at Msanzi Village.....	196
Figure 15 (b): Beans Plot at Mtimbwa Village.....	196
Figure 16: Frequency of Receiving Information Services	199
Figure 17: Effectiveness of Agricultural Information Services Provided	204
Figure 18: ICTs Owned by Respondents	206
Figure 19: Proposed Agricultural Information Service Provision Model.....	290

LIST OF ABBREVIATION AND ACRONYMS

ACT	Agricultural Council of Tanzania
ASDP	Agricultural Sector Development Programme
ASLMs	Agricultural Sector Lead Ministries
CAMARTEC	Center for Agricultural mechanization and Rural Technology
CAS	Current Awareness Services
COSTECH	Commission for Science and Technology
CUTS	Consumer Unit and Trust Society
DADP	District Agricultural Development Plan
DLRTE	Department of Livestock Research, Training and Extension
FAIDA-MALI	Finance and Advice in Development Assistance and Marketing Linkage
FAO	Food and Agriculture Organization
FFSs	Field Farm Schools
GDP	Gross Domestic Product
ICTs	Information and Communication Technologies
INASP	International Access to Scientific Publications
ISCM	Information Seeking and Communication Model
IRA	Institute of Research Assessment
MAFC	Ministry of Agriculture Food Security and Cooperatives
MARI	Mikocheni Agricultural Research Institute
NAFIS	National Farmers Information Service
NARS	National Agricultural Research System
NBS	National Bureau of Statistics of Tanzania

NGOs	Non-Governmental Organisations
NSGRP	National Strategy for Growth and Reduction of Poverty
NRI	Natural Resources Institute
PMO-RALG	Prime Minister's Office – Regional Administration and Local Government
REPOA	Research for Poverty Alleviation
SADC	Southern African Development Community
SIDO	Small Industries Development Organisation
SUA	Sokoine University Of Agriculture
SPSS	Statistical Package for Social Scientists
TBC	Tanzania Broadcasting Cooperation
TBS	Tanzania Bureau of Standards
TCRA	Tanzania Communications Regulatory Authority
TIRDO	Tanzania Industrial Research and Development Organization
TLS	Tanzania Library Service
TLSB	Tanzania Library Services Board
SDI	Selective Dissemination of Information
SNAL	Sokoine National Agricultural Library
SSCF	Small Scale Crop Farmers
SUA	Sokoine University of Agriculture
UDSM	University of Dar es Salaam
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation
URT	United Republic of Tanzania
WRS	Warehouse Receipt System

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CHAPTER ONE

INTRODUCTION AND BACKGROUND INFORMATION

1.1 Introduction

This chapter provides background information on the provision of agricultural information to small scale farmers to enhance crop production in Rukwa region, Tanzania. It presents the statement of the problem, the aim of the study, objectives of the study and key research questions. It further explains the significance of the study, scope and limitations and finally defines important terms used in the study.

Agriculture has been in existence since time immemorial. It is as old as the human race itself, so is agricultural information. Literature shows that agricultural information was found in the encryptions in Babylonian clay tablets and the Great Alexandrian papyrus library (Aina, 2004a). Agricultural information continues to grow and change in its format and content as the human civilization grows, that is, from clay tablets and papyrus to modern libraries equipped with internet services and new information creation, processing, organization, storage and dissemination technologies (Aina, 2007). Kaniki (2003) states that agricultural information form an important ingredient in any agricultural development and is measured in terms of increase in production which is brought about by the adoption of new technologies and innovations. An effective information service provision is expected to facilitate the adoption of new technologies and innovations, promote agricultural production and contribute to improved living conditions of farmers. Several scholars in Africa including Makotjo and Kalusopa (2010), Mtega (2012), Alemna (1995) and Ojiambo (1989) agree that in order to improve

agricultural production, farmers must be well informed of the various agricultural issues and factors that influence production to enable them make good informed decisions. To achieve this, farmers must be provided with relevant information in appropriate format, user friendly technology and from skilled information service providers.

Tanzania has enormous arable land of about 94 million hectares, of which 44 million hectares are good for crop farming while 50 million hectares are suitable for livestock rearing (URT, 2012). About 93 percent of arable land is dominated by small scale farmers. However, only 10 million hectares are under cultivation and they are not fully exploited for maximum crop production (URT, 2012). According to Manda (2002), a number of factors conspire to prevent full exploitation of this arable land, including: hostile climate which leads to crop failure, soil degradation, lack of fertilizers and pesticides, poor infrastructure, expensive agricultural equipment and credit facilities to farmers. The impact of most of these constraints is often aggravated by a serious inadequate and relevant agricultural information service provision (Lwoga, 2010; URT, 2011).

According to United Republic of Tanzania (URT, 2011), the agricultural sector in Tanzania employs 70-80 percent of the country's labour force and generates about 70% of rural household income. Moreover, the sector accounts for 25.8% of Gross Domestic Product and about 66% of merchandise export (URT, 2011). More importantly, it accounts for 45% of the total foreign earnings and the sector provides raw materials to domestic agro-based industries (URT, 2006 and World Bank, 2008).

Despite this significant contribution, it has been observed that the agricultural sector has not been doing well in recent past partly because of the inability of the government and associated authorities to provide relevant and timely information services/resources to farmers and other stakeholders in agriculture (URT, 2011).

In developing countries like Tanzania, improvement of agricultural production, profitability, and sustainability depends on the farmers who in turn depend on the quality and effectiveness of information services provided to them, among other factors. Observations show that in Tanzania, there is a gap between agricultural technologies, new agricultural innovations and information provision for sustainable agricultural development, in particular crop production. This has been attributed to poor information infrastructure, information delivery services as well as limited interaction between the government, information service providers and small scale farmers who form 80 percent of the country's population who reside in rural areas (Mtega and Msungu, 2013).

In an increasingly globalized world characterized by knowledge and information-driven economy, information is needed in all spheres of life including agriculture to facilitate decision making and enhance production. Farmers need information about new developments and techniques in farming, pesticides, capital, as well as markets for their products so that they can improve on existing practices and better their lives. Mchombu (2007) states that, the biggest weakness of the agriculture sector in African countries including Tanzania is the poor transfer of information and knowledge to farmers and other agricultural stakeholders by information service providers, researchers and agricultural innovation centres. According to Mchombu (2007), it is estimated that, in most parts of Africa, productivity in crop production in experimental research centres is

ten times higher than the productivity of ordinary farmers just outside the gates of the centres. The problem is that the new information and knowledge being developed in the research centres is inefficiently delivered to farmers; often, the centres act as silos for hoarding information and knowledge rather than sharing it with farmers (Mchombu, 2007). This might be attributed to lack of proper information service delivery strategies to farmers, poor information infrastructure, improper addressing of the immediate farming needs of farmers or lack of skills among information service providers as it was also observed by Aina (1995), Rosenberg (1993) and UNESCO (1992). Thus, information service providers, the government and other associated stakeholders must have effective and efficient information delivery strategies to deliver information in appropriate formats and use appropriate languages. This is because well developed information service provision strategies in a developing country like Tanzania can stimulate grassroots agricultural development. Furthermore, today, more than ever, a wide range of information sources on new or innovative farming practices is available to farmers. However, there is little evidence that the increased availability of information sources has been effectively used by farmers. Thus, this study was intended to investigate information service provision to small scale crop farmers with a view of suggesting a relevant model for effective information service provision to farmers in the country.

1.2 Rukwa Region

1.2.1 Background and Location

Rukwa Region came into being in 1974 when parts of Mbeya and Tabora Regions were divided to form Region. The region is located in the southwestern part of Tanzania between 05° and 90° S and 30° – 33° E. Originally, Rukwa region occupied 75,240

kilometer square, but following the recent formation of Katavi region, Rukwa Region is now left with an area of 27,765 km² of which 21,160 km² is land area and the remaining 6,605 km² is covered with water. The Region is divided into three (3) districts, namely Kalambo, Nkasi and Sumbawanga; four (4) local government authorities, namely Sumbawanga Municipal Council, Sumbawanga District Council, Kalambo District Council and Nkasi District Council; 16 divisions, 64 wards and 282 villages (Rukwa Investment Profile, 2013). The Region borders Zambia to the southwest, the Democratic Republic of Congo to the west of Lake Tanganyika, Katavi Region in the north and Mbeya to the southeast. The highest point of the region is at Malonje in the Ufipa plateau at 2,461 meters above sea level and the lowest point is Lake Tanganyika at 773 meters above sea level. It is one of the remotest parts of the country, being 800 kilometers from Dar es Salaam (NBS, 2011).

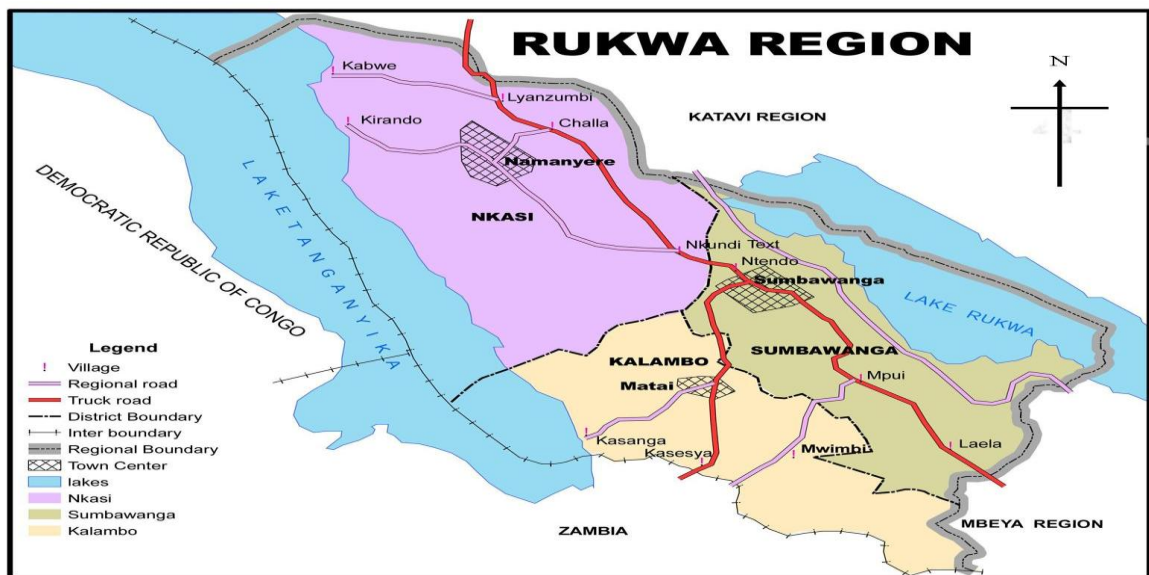


Figure 1: Rukwa Region Map Showing the Area of Study

Source: Rukwa Investment Profile (2013)

1.2.2 People and Culture

The Region had a population of 1,037,196 people with 508,225 male and 528,971 female. The major languages spoken in this region are Swahili, Fipa, Mambwe, Lungu, Konongo and Nyamwanga. With the exception of Swahili, the other languages are specific to a particular ethnic group. The staple foods are mainly maize, rice and beans. In some parts of Lake Tanganyika and Lake Rukwa, cassava, fish and rice are the main foods. Other food crops widely available include groundnuts, finger millet, sweet potatoes, irish potatoes, sorghum, wheat and sugarcane. Meat is easily available from the pastoral community who traditionally keep varieties of domestic animals such as cattle, goats, chicken, pigs, rabbits and pigeons.

1.2.3 Climate

Rukwa Region enjoys tropical climate with mean temperatures ranging between 13⁰C in some places for the months of June and July to 27⁰C in the hottest months of October to December. Rainfall has been reliable for many years. However, the region has in recent years, been receiving low rainfall due to environmental destruction currently occurring globally and in some localized parts of Rukwa Region.

1.2.4 Productive Sectors

The main productive sectors in the region are crop production, livestock keeping, fisheries and forestry; tourism and mining. Majority of Rukwa population depend on agriculture, mostly cultivation of food crops mainly maize, paddy, potatoes, beans and groundnuts. Major cash crops are maize, paddy, beans, millet, sunflower, groundnuts, wheat and simsim (Rukwa Investment Profile, 2013). These seven (7) crops contribute

significantly to the income of the people as well as GDP. Farming activities are conducted through the use of modern and traditional implements such as tractors, ox-plough and hand hoes. However, it is majorly dependent on family labour which results into low yields per area, hence the need for appropriate measures to combat the situation. Just like in many other regions in Tanzania Mainland, agriculture in Rukwa region is dominated by small-scale subsistence farming who operate between 0.5 and 2.0 ha (Rukwa Investment Profile, 2013). The area cultivated is one of the limitations to increased crop production and hence a challenge to achievement of food security and poverty reduction.

1.2.5 Challenges to Increased Farming Production in Rukwa Region

For many years, poor infrastructure especially roads have been a major limitation to increased agricultural production and development in the region as well as at national level. Efforts have been made to connect the region to other regions and districts through tarmac roads. Most of the roads in the region are seasonal earth roads which limit transport and transportation within and to other regions.

Limited capital and access to financial services is another challenge. Just like in other regions in Tanzania, many agricultural producers in Rukwa region lack capital necessary for agricultural production. They can hardly afford to hire additional labor and purchase inputs. Commercial banks and financial institutions find it risky to lend to small-holder farmers and small scale agribusiness. Most households can neither save nor access loans from commercial banks and financial institutions. The government's extension services workforce to support agriculture in the region is 172 against the required 322, a shortage of 150 workers (47%). The shortage of transport facilities especially motorcycles for

extension services have a negative impact on their performance and farming production in general (Rukwa Investment Profile, 2013). Given the high potentials in the region, investment in agro-processing such as milling and packing maize, rice and finger millet and on production of oil crops (sunflower, sesame, groundnuts and soybeans) could boost the sector in the region.

Despite the high potential of the region, agricultural performance is adversely affected by poor agro-industries, marketing, crop processing and storage facilities leading to high levels of produce wastage. These challenges particularly those which contribute to poor farming methods and crop production can be attributed to poor agricultural information service provision. This situation calls for an empirical study that will unveil the current problems and suggest proper measures to overcome the problems for sustainable crop production and agricultural development in the region.

1.3 Statement of the Problem

Rukwa region is blessed with 1,424,893 ha of arable land of which only 447,079 ha, approximately 32% of arable land is under cultivation (NBS, 2012). Agriculture in the region is dominated by small-scale subsistence farming in which approximately 68% of the cultivated land is used by small-scale farmers who operate between 0.5 ha and 2.0 ha. About 90% of the population in the region earns their living from agricultural activities (Rukwa Investment Profile, 2013). Although the region is widely known in Tanzania as one of the grain baskets of the nation, majority of people are living under extreme poverty of below one USD per day (Rukwa Investment Profile, 2013).

In recent years, production in the region has been on the decline mainly due to weak agro-industries, poor linkages within the marketing, processing and production chains, poor market-orientation and inadequate processing facilities leading to high levels of produce wastage (Rukwa Investment Profile, 2013). These challenges, namely, poor farming methods, poor processing, poor products, lack of markets and financial facilities to boost the sector in the region can be attributed to lack of coordinated, timely and relevant information services that properly address the farming community's information needs. Recent studies show that despite the region having enormous and varied information needs, the needs have not been met and for decades information service providers have failed to provide effective information services to farmers (Siyao, 2012; Rukwa Investment Profile, 2013). This situation is attributed to inadequate flexible information service provision strategies and appropriate technologies to facilitate information service provision (Lwoga, Ngulube and Stilwell, 2010 and Mtega 2012).

Agriculture is the backbone of the country's economy. To boost the sector; the government has introduced various strategies such as Agricultural Sector Development Plan, Economic and Social Action Plan, Rural Development Strategy, Tanzania Development Vision 2025 and the recent "Agriculture First" popularly known as *Kilimo Kwanza*; Warehouse Receipt System (WRS) and Input Subsidy to facilitate agricultural development. However, despite having these strategies to facilitate agricultural development, their general performance is unsatisfactory (URT, 2011). Tanzanian farmers particularly those in Rukwa region are not benefiting from these agricultural innovations. This is probably because the farmers do not know where to get vital information or because information is not properly and adequately disseminated; it is

uncoordinated and fragmented which lacks focus and proper strategies in addressing small scale farmers' information requirements (URT, 2011). In addition, information available to small scale farmers in Rukwa region is largely undocumented with no empirical evidence to rely on.

Farmers need information to make informed decisions and address their daily social and economic needs. Well informed and information-conscious small scale farmers are a road-map to sustainable crop production. Although information is recognized as an important resource in agricultural development and crop production in general, the extent to which information services are provided to small scale farmers to enhance crop production in the country and Rukwa region in particular is not clearly demonstrated with very few studies that focus on it. This situation calls for an empirical study to unveil the current problems and suggest proper measures to overcome the problems relating to sustainable crop production in the region. This study therefore endeavored to investigate agricultural information services provided to small scale crop farmers with a view to enhancing crop production in the region.

1.4 Aim of the Study

The aim of this study was to investigate the provision of agricultural information services to small scale crop farmers in Rukwa region with a view to proposing an appropriate model of information service provision to enhance crop production in the region

1.5 Specific Objectives

The study sought to achieve the following objectives;-

1. To determine the information needs and seeking habits of small scale crop farmers in Rukwa region.
2. To establish the types and range of information services offered to small scale farmers in the study area to enhance crop production.
3. To examine the application of ICTs in the provision of information services to small scale crop farmers in the region.
4. To ascertain the challenges experienced by small scale farmers in accessing and using information services.
5. To propose an appropriate model to improve provision of information services to small scale farmers in the region.

1.6 Research Questions

The study endeavoured to address the following research questions;

1. What are the information needs of small scale crop farmers in the region? How do they seek information to meet their information needs and facilitate crop production?
2. Which sources of information do they frequently use and why?
3. What are the types and range of information services provided to small scale crop farmers? Do these services meet their information requirements?
4. Which ICT tools and services used to provide information services to small scale crop farmers to enhance crop production?

5. What factors hinder small scale crop farmers from effectively accessing and using information services provided to them?
6. What should be done to improve provision of information services to enhance agricultural production in the region?

1.7 Assumptions

This study was based on the following assumptions:

1. Information service provision to small scale crop farmers in Rukwa Region remains ineffective and inefficient because it does not focus on their information needs.
2. Access to and use of agricultural information with high utility and credibility is vital for enhancing crop production in the region.
3. There are ample opportunities for improving information service provision to small scale crop farmers and enhance crop production if proper information provision strategies that address farmers' information needs are put in place.

1.8 Significance of the Study

A worthy research undertaking should be of significance to the community. It should contribute to scholarly research and literature in the field, improve methodologies relevant to the study, improve policies and provide solutions to problems being addressed. It is therefore hoped that from the empirical findings of this study; the government will be acquainted with the constraints facing information service provision to small scale crop farmers in rural areas and the recommendations made will assist the government in formulating policies and strategies to promote sustainable, well organized

and coordinated agricultural information systems and research support in agriculture and its related fields.

It is also hoped that the study findings will help agricultural institutions in the country with the help of information specialists to develop course(s) in agricultural information management to equip graduates with the necessary skills for providing information services to small-scale crop farmers in rural areas.

The study will also enlighten the information sector, particularly public libraries on their crucial role of being the heart of social economic development and in particular, agricultural development. Through effective user focused information service provision, they will be able to convince government authorities, development agents, policy makers and other stakeholders involved in agricultural development on the importance of information.

It is also hoped that the study will contribute to the existing body of knowledge on information service provision to small scale crop farmers and reveal new dimensions requiring further research. This information will provide new ground for scholars and researchers to conduct further research in the area.

Finally the study findings are expected to serve as a useful reference tool for scholars, researchers and other interested parties.

1.9 Scope and Limitations of the Study

Scope of the study comprises the coverage of the study and its boundaries such as the study setting and people to be studied while limitations of the study consist of the

potential threats or challenges which might occur in the course of the study or affect the study either directly or indirectly. The challenges might be internal or external (Creswell, 2014).

This study confined itself to investigating information service provision to small scale crop farmers in Rukwa region, Tanzania. Since it was not possible to cover all information provision agents in the country, this study focused on public libraries and extension officers in the region. The study did not include other government institutions responsible for providing information to farmers as highlighted in section 2.2 nor did it include Non- Governmental Organizations and associations responsible for information provision to farmers. Also the study focused only on villages and wards with Field School Farms (“*shamba darasa*”) because it was not possible to study all wards and villages in the region.

Any research undertaking is not a smooth journey, limitations always exist. This study was limited by the busy schedule of small scale farmers as data was collected during farming season. To curb this problem there was constant communication between the researcher, village leaders and extension officers so as to get the farmers during market days and during field school farm meetings. Another limitation was illiteracy. Eighteen (12.7%) respondents did not attend any form of schooling nor did they know how to read and write (See section 5.3.2). In such cases, semi-structured interview was used to collect data. Care was taken to avoid bias and not to affect validity and reliability of the study.

1.10 Definition of Key Terms

In this study, there are terms that were used throughout that need to be explained or defined so that the reader and the researcher may attach the same meaning to them. According to Busher and Harter (1980), terms to be defined should be from the title, statement of the problem, objectives, literature review, theory base or the methodology section. In order to clearly understand the problem at hand and its significance to the body of scientific knowledge, it is imperative that certain concepts are defined, reviewed and explored further using scholarly publications. Below is an alphabetical list of these key terms and their applicable definition in the study.

Agriculture

In this study agriculture has been used to mean the science, art, or occupation concerned with cultivating land, raising crops and crop breeding.

Agricultural Development

Agricultural development is an aggregate increase in agricultural output. In this study, agricultural development means the process that creates the conditions for the fulfillment of agricultural potential. These conditions include the accumulation and effective access and utilization of available information which leads to the increase in crop production and productivity to enhance the livelihood of small scale farmers.

Agricultural Information

This study adopted Aina's (1990) definition of agricultural information which means: "all published or unpublished knowledge on all aspects of agriculture, which has been categorized as technical/scientific, commercial, social/cultural and legal information".

Information

This study adopted a definition by Feather and Sturges (2003) who defined information as data that has been organized or processed meaningfully to give meaning that can be communicated and interpreted by the recipient (small scale farmers) in order to draw conclusions or making decisions to improve crop production.

Information Infrastructure

The study used Harris's (1990) definition of information infrastructure which means: a complex set of institutions that include agricultural research institutions, libraries, the internet, databases, computers, telecommunications and other elements essential to the generation and dissemination of information.

Information Provider

Information provider refers to librarians and extension officers who are responsible for the acquisition, processing, organizing, conserving and disseminating agricultural information to small scale farmers. They are also responsible for providing agricultural information services.

Information Need

Information need has been variously defined. For the purpose of this study, information need means a recognition that personal knowledge is inadequate to satisfy a goal that needs to be achieved and in this case improved crop production. It is a realization by a person that he/she lacks certain information to enable him/her to make good informed decision to fulfill his/her daily farming activity.

Information Service

In this study information service is used to mean a product of public libraries or extension agents which provides information to small scale farmers whether directly and indirectly. Information services can comprise any of these: On farm reference service, enquiry work, Agricultural document provision, SDI, CAS, online searching, translation services, Information repackaging, photocopies, abstracting, indexing, outreach services, agricultural information literacy training, research, agricultural information consultancy among others.

ICTs

ICTs relate to information handling tools that are used to access, gather, produce, organize process, store and disseminate or exchange agricultural information. They may include a variety of hardware, software applications and associated services.

Reference Service

Is personal assistance provided to information users by librarians or extension officers in pursuit of information.

1.11 Thesis Layout and Presentation

This thesis is divided into seven chapters. Details of each chapter are provided below. Chapter one introduces the background of the study and the study's problem, aim, objectives, research questions and assumptions which forms the building blocks of this study. It also presents the scope and limitations of the study, significance of the study and definition of terms used in the study.

Chapter two presents the agricultural information infrastructure in Tanzania. It highlights available information systems, resources and services in the country and their contribution in addressing the farming community information needs.

Chapter three focuses on literature review. It discusses the theoretical undertakings and conceptual frameworks that underpin the study. They form the pillars and blocks upon which the study was based. Related studies from Africa, Tanzania and other countries have been reviewed and analyzed so as to come up with a theoretical, literature and methodological gap that this study addresses. The literature review is presented thematically, divided into several topics and subtopics. Existing literature related to the study were reviewed from both printed and electronic sources of information.

Chapter four presents the research methodology. It presents specific philosophical approaches of research, specific design, methods, target population, sampling techniques, and instruments used in the study. This chapter provided a framework that explains how the study was conducted.

Chapter five presents and analyzes data/findings as obtained from the field of study. Data is presented focusing on the research aim, objectives and research questions. The findings are presented thematically based on objectives and the Information Seeking and Communication Model (ISCM) which cement the study.

Chapter six interprets and discusses the findings in order to address the initial research objectives and questions of the study. The findings are discussed by comparing and collating them with previous studies.

Chapter seven summarizes the key findings, provides conclusion of the study, recommendations and a way forward with respect to the research problem. Areas for further research are also provided.

CHAPTER TWO

AGRICULTURAL INFORMATION SYSTEMS, SOURCES AND SERVICES IN TANZANIA

2.1 Introduction

This chapter presents agricultural information systems, sources and services. Since very little has been done in Rukwa region much of the coverage will be confined to Tanzania. The purpose is to highlight available agricultural information systems, sources and services in the country. Additionally, the chapter provides background information and highlights their contribution in addressing the farming community information needs and in enhancing crop production in the country. The chapter also highlights ICTs used in the provision of agricultural information services.

2.2 An overview of Agricultural Sector in Tanzania

Agriculture forms the backbone of the economy of the country, reduces food insecurity, and accelerates poverty reduction, particularly in rural areas. It also sustains 80 percent of people living in rural areas (URT, 2011). There is also high potential for irrigation in Tanzania, for which 29.4 million ha are suitable for irrigation and about 289,245 ha are under irrigation (URT 2009b). Further, about 70 percent of Tanzania's crop area is cultivated by hand hoe, 20 percent by ox plough and 10 percent by tractor and women. Despite the importance of the agricultural sector for economic development, low agricultural growth has been a major factor in the Tanzania's slow progress towards poverty reduction.

Studies by Sife, Lwoga and Chilimo (2004), Ramonyai and Konstant (2006) and URT (2005a) show that there is generally low agricultural productivity caused by several

factors including: impediments to food market access, limited capital and access to financial services, inadequate technical support services, poor rural infrastructure, infectious and outbreaks of plant and animal pests and diseases and poor, fragmented and uncoordinated information service provision. To curb these problems, the government initiated several programmes and structural adjustments, including: “*Ukulima wa Kisasa*” (Modern Agriculture); “*Vijiji vya Ujamaa*” (Villagelization); “*Siasa ni Kilimo*” (Politics is Agriculture) “*Chakula ni Uhai*” (Food is Life) ; “*Kilimo cha Kufa na kupona*” (Life and Death to Improve Agriculture); The Iringa Declaration and the Arusha Declaration (URT, 2006). Nevertheless these initiatives did not meet all of the intended objectives due to the fact that they were not well planned; they faced shortage of man power and financial constraints among other things.

The Arusha Declaration under the leadership of the late Mwalimu Nyerere committed the country to a policy of socialism and self-reliance, (“*Ujamaa na Kujitegemea*”) (Fair, 2000). Socialism and self-reliance policy as described in the Arusha Declaration had a number of resolutions to improve the country’s economy and well being of the Tanzanian community at large. They included an increase in agricultural production, improving health, education, public ownership of the means of production, ownership of resources by the poor and pioneering the freedom of Africans. However, the Arusha Declaration was not successful in improving the country’s economy and agricultural development. The government efforts to address the challenge did not end there; several other efforts and structural adjustments were made. According to URT (2006), these strategies include the Economic and Social Action Plan of 1990, the Agricultural Sector Development Strategy of 2001, the Poverty Reduction Strategy Programme of 2001; Rural

Development Strategy of 2002 and Agricultural Sector Development Programme (ASDP) Other initiatives included the Tanzania's Development Vision 2025 of 1998; the National Strategy for Growth and Reduction of Poverty (NSGRP) of 2005 and, currently, *Kilimo Kwanza*, meaning Agriculture First (URT 1998; URT 2005b; URT 2009a).

The ASDP Framework and Process Document was developed by the Agricultural Sector Lead ministries (ASLMs) namely, the Ministry of Agriculture Food Security and Cooperatives (MAFC), Ministry of Livestock Development and Fisheries, Ministry of Industry, Trade and Marketing, Ministry of Water and Irrigation and the Prime Minister's Office – Regional Administration and Local Government (PMO-RALG) in early 2003 and was adopted in 2006 (Shetto, 2008). The Programme's main objectives are, first to increase farm profitability and incomes through better access to and use of agricultural knowledge, technologies and market infrastructure. Second, to promote agricultural private sector investment based on an improved regulatory and policy environment. The vision of the Agriculture First (*Kilimo Kwanza*) program aims at promoting private-public sector partnerships for enhanced agricultural productivity in the country. The *Kilimo Kwanza* government initiative has ten pillars which strive towards improving farmers' welfare by modernising agriculture and assimilating more of the private sector in the agricultural sector. The programme aims at eradicating poverty by increasing the agricultural production from 4% to 10% by 2015 (Ngaiza, 2012; URT, 2012). Despite all these efforts to improve the agricultural sector, recent studies show that the performance is unsatisfactory, a situation attributed to lack of strong well coordinated information service provision (Mtega and Msungu, 2013).

Agricultural development is brought about by providing farmers with knowledge, information, experiences and technologies needed to increase their crop production and for improved wellbeing and livelihoods (NRI, 2011). The agricultural authorities in the country have emphasized the flow of information from laboratories and research centers to the end users-the farmers. In facilitating information service provision to all agricultural stakeholders, the Government has adopted the Agricultural Sector Development Strategy which sets the framework for achieving the sector's objectives and targets (Shetto, 2008). According to URT (2002), the five Agricultural Sector Lead Ministries (ASLMs) provide the overall framework and processes for implementing the agricultural development strategy which includes, among other things, the acquisition, processing and dissemination of agricultural information in the country. ASDP insists that development activities including information service programmes for farmers at national level are to be based on the strategic plans of the line ministries while activities at district level should be implemented by Local Government Authorities, based on District Agricultural Development Plans (DADPs).

Currently, there are few active institutions which provide agricultural information in Tanzania, including Sokoine University of Agriculture (SUA) and the Department for Research and Training in the ministry. Other institutions include: Moshi University College of Cooperatives and Business Studies, Participatory Ecological Land Use Management, Commission for Science and Technology (COSTECH), Tropical Pesticide Research Institute, Tanzania Association of Non-governmental Organizations and Tanzania Forest Research Institute, Institute of Rural Development Planning, Tanzania Meteorological Agency, Agricultural Council of Tanzania (ACT), Tanzania Fishery

Research Institute, Finance and Advice in Development Assistance and Marketing Linkage (FAIDA-MALI), Tanzania Irrigation and Environment Development Organization. Additionally, the Agricultural Sector Lead Ministries (ASLMs) have a mandate for conducting research and developing technologies, knowledge and information for dissemination to the public, particularly agricultural stakeholders.

The structure of information and communication management in agricultural sector requires an understanding of the National Agricultural Research System (NARS). According to Shetto (2008), institutions in the NARS can be classified into three main categories, namely public sector institutions falling under the ASLMs, for example, Department of Agricultural Research and Training (DRT) and Tropical Pesticide Research Institute in the Ministry of Agriculture, Food Security and Cooperatives (MAFC); Department of Livestock Research, Training and Extension (DLRTE).

The Prime Minister's Office Regional Administration and Local Government (PMO-RALG) is responsible for coordinating all extension services at regional to village level. The second category according to Shetto (2008), is public sector bodies falling outside the Agricultural Sector Lead Ministries, these include academic institutions, mainly the Sokoine University of Agriculture (SUA), the University of Dar es Salaam (UDSM) and the Tanzania Forest Research Institute under the Ministry of Natural Resources and Tourism. These institutions have the mandate to conduct agricultural research, training and disseminate new innovations to farmers in the country.

The third category involves private sector research organizations (Shetto, 2008). Private sector research institutes include Tanzania Coffee Research Institute, Tea Research

Institute of Tanzania and Tobacco Research Institute of Tanzania. There are also several NGOs that are involved in small research projects at district level, with interactions with researchers in the zones. For example, Agricultural Development Programs Mbozi and Isangati are conducting research on maize and coffee in the Southern Highlands in collaboration with the Uyole Agricultural Research Institute. However, the NARS institutions have not really been formally organized into a cohesive body (Shetto, 2008). Each institution operates independently, a situation which impedes effective information service provision for sustainable crop production and agricultural development in the country.

Although the government resources and services are directed towards the improvement of crop production to meet the growing need of the population, attention has been focused on the provision of fertilizer, improved seeds and other farm implements. Meyer and Boon (2003), opined that in most cases information provision in rural areas takes place through social economic development projects and agricultural information is always not their first priority.

Siyao (2012) noted that the provision of agricultural information to small scale farmers receives little attention. This situation hinders increased agricultural production in the country, particularly Rukwa region which is predominantly rural and which suffers from poor roads and information and communication infrastructure.

2.3 Agricultural Information Systems in Tanzania

Tanzania has accumulated a vast amount of agricultural information over the years. The increase of new technology and innovation has greatly contributed to massive production

of agricultural information through research conducted by various institutions countrywide. According to Odi (1993), the national information systems comprise of the nation's libraries, documentation centres, archives, records centres and learning resource centres. These systems are supported and made effective by other agencies dealing with the generation, enumeration, and transfer of information such as the publishing industry, statistical bureaux, telecommunications, informatics and the mass media. Britz, Boon and De Lange (1993) classified information systems, sources and services into four broad categories: The first category is based on research institutions which are concerned with inventing, generating and collecting information. Research institutions under this category have the mandate to coordinate and promote research and new technological innovations in all aspects of development including agriculture. The second category according to Britz, Boon and De Lange (1993), are the institutions concerned with the packaging, storage, organization, processing and dissemination of information. For the purpose of this study they include public libraries, research libraries and agricultural research institutions. The third category comprise institutions concerned with the dissemination of information, for example, the mass media, including radio, television and newspapers, books, journals, and information brokers. Lastly, are the institutions concerned with information technology, for example, computers and telecommunications infrastructure. This study will discuss these institutions in relation to the provision of information services to small scale farmers in the country.

2.3.1 Research Institutions

Research and publication are indispensable for the development of any country. For the country to properly utilize knowledge and the potential intellectual capital developed

from research there should be institutions responsible for managing, organizing, coordinating and disseminating the findings to the community. Research institutions play a central role in updating and imparting knowledge and skills to farmers on better farming techniques to improve productivity. It is remarkable that the government already has established institutions and organizations in this area in order to facilitate social economic development, particularly agricultural sector development.

Tanzania Commission for Science and Technology (COSTECH) is a parastatal organization with the responsibility of coordinating and promoting research and technology development activities in the country. COSTECH has the mandate to advise the government on all matters relating to science and technology, including but not limited to the formulation of science and technology policy, priority setting for research and development, allocation and utilization of resources (Wangwe and Diyamett, 1998). It also promotes, coordinates, monitors and evaluates agricultural scientific research, technology development and technology transfer activities in the country. It facilitates national, regional and international cooperation in scientific research and technology development transfer. Additionally, COSTECH has a major role of acquiring, storing, and disseminating agricultural and technological information and popularizing science and technology in the country.

A number of research institutions are coordinated by COSTECH. Agricultural and livestock research institutions include but not limited to Mkotheni Agricultural Research Institute (MARI) and Tobacco Research Institute of Tanzania. Research institutions under industry and energy institutions include the Tanzania Bureau of Standards, Center for Agricultural Mechanization and Rural Technology (CAMARTEC), Tanzania

Industrial Research and Development Organization (TIRDO) and Small Industries Development Organisation (SIDO). Another research institution is REPOA. REPOA's main objectives are to strengthen the capacity of the intellectual resource that is both producers and users of knowledge; to undertake, facilitate and encourage strategic resource to influence policy and to facilitate and inspire stakeholders to utilize research findings (REPOA, 2013). To ensure that there is maximum utilization and diffusion of new innovations including agricultural innovations, knowledge is shared and disseminated.

These research institutions are linked to small scale farmers and affect their farming activities and production whether directly or indirectly depending on their access and usage of information disseminated. However, it is not clearly known as to how small scale farmers in the country and particularly in rural areas like Rukwa region benefit from research output from these research institutions. It is also uncertain as to whether small scale farmers, extension officers, librarians and other stakeholders in the agricultural sector are aware of their existence, information services and products produced from these potential think tanks of agricultural research conducted in the country.

2.3.2 Libraries

Libraries are a source of information, a source of knowledge, a source of wisdom; hence they are a source of intellectual ability, for they contain the source and the unity of knowledge (Lance, 1994). Libraries have always been central to the socio-economic development of any country. For the purpose of this study, only public and academic libraries and their contribution on agricultural information service provision are discussed.

2.3.2.1 Academic Libraries

An academic library forms an integral part of a college, university or other institution of post-secondary education. It is always regarded as the heart or the engine of any tertiary level learning institution. With the current mushrooming of both colleges and universities in the country, the number of academic libraries has also increased to reflect the number of universities and colleges themselves. For the purpose of this study, the University of Dar es Salaam and the Sokoine University of Agriculture libraries are briefly discussed.

The University of Dar es Salaam Library is a National Depository of materials published in Tanzania which are acquired through the Library Legal Deposit Act of 1962. In terms of the Act, all publishers in Tanzania are required by the Act to deposit with the library two copies of all documents published or printed by them (University of Dar es Salaam 2013) and has a rich collection of Tanzanian publication materials which are housed in the East Africana Collection, including agricultural materials. Apart from collection of books and periodicals, the library has a growing number of local collections and database services which include manuscripts, micro materials, maps and Compact Disc Read Only Memory (CD-ROM) sources. The collection also includes theses and dissertations. Despite the fact that the University of Dar es Salaam library has a big collection of publications from the country acquired through its legal deposit Act, it is not clearly established how extension officers, librarians and other stakeholders responsible for providing information to small scale crop farmers access and use this collection to facilitate the agricultural industry in the country.

Another academic library which is of interest in this study is the Sokoine National Agricultural Library (SNAL). This library was established by Parliamentary Act No. 21 of 1991, which elevated the former University Library to a national agricultural library. This was one of the government's efforts to promote agricultural research and agricultural development in the country. The Sokoine National Agricultural Library (SNAL) was given the overall mandate to coordinate, organize, store and disseminate agricultural information in the country. It has been strategically placed under the only university of agriculture in the country (SUA) to co-ordinate other agricultural libraries and documentation centers. SNAL is one of the subject-specific libraries in the country. Its collection is narrow in scope focusing on agricultural sciences but deeply covers agriculture-related sciences such as forestry, veterinary sciences, human nutrition, soil science, environment, animal science, crop production, agricultural economics and many more (Sife and Chilimo, 2009).

SNAL serves both as a University Library as well as a national agricultural library. SNAL's overall goal is to develop and maintain library and information services in agricultural sciences and related disciplines. However, the effectiveness of SNAL in performing its dual role as a university library and a national agricultural library at the same time is questionable. Additionally, the current status of agricultural libraries and the potential of electronic communications in disseminating agricultural information in Tanzania have been affected by poor communications resulting in provision of inferior information services to users, particularly in remote rural areas which are affected by digital divide and other social economic constraints such as poverty, ignorance, illiteracy and lack of information exposure.

2.3.2.2 Public Libraries

The public library system in Tanzania is managed by the Tanzania Library Service Board (TLSB), which is a government agency under the Ministry of Education and Culture established in 1975 by an Act of Parliament. The Act requires the board to promote, establish, equip and develop libraries, information centers and documentation centers in Tanzania. It provides access to knowledge, information and works of the imagination through a range of resources and services and is equally available to all members of the community regardless of race, nationality, age, gender, religion, language, disability, economic and employment status and educational attainment.

The Tanzania Library Service Board is a legal depository operating under the 1962 Legal Deposit Act. The Act requires that every publication produced in the country should be deposited in TSLB. However, the provisions for legal deposit have been found to be rather inadequate (Manda, 2002).

Currently, TLSB has extended its services to 42 centers in 22 regions, 19 districts and 2 wards. It holds a collection of over 1,300,000 library books on different subjects acquired through ordinary purchase, donations and through legal deposit (TLSB, 2011). Although there are good achievements made by TLSB since independence, there are still several challenges that hamper the full utilization of library resources and services to the community and in particular to small scale crop producers. Scholars such as Nawe (2001) and Manda (2002) observed that major problems that public libraries in Tanzania are facing are similar to those found in other parts of Africa which includes inadequate current and relevant materials, financial constraints, inadequate buildings and poor

motivation among library professionals, who abandon libraries in search of better job opportunities. This era is dominated by information processing through computerized services; however, the situation is unsatisfactory at TLSB.

2.4 The Contribution of Tanzania Public Libraries in Providing Agricultural Information Services

The rural communities depend on the public library system to access information and knowledge services in the country (Manda, 2002). The public libraries are organised under the Tanzania Library Services Board (TLSB), which is a national institution that operates under the Ministry of Education and Vocational Training. The TLSB has a mandate to promote, establish, equip and develop libraries, information centres, and documentation centres in Tanzania (TLSB, 2009). However, these public libraries are located in regional and district headquarters, and thus the target group is still the urban or peri-urban communities and not the rural communities (Manda, 2002). Originally, bookmobiles provided library services to rural areas; however, the services were halted due to inadequate resources in terms of finance, human resources, information materials, and negligence of the rural borrowers to return books (Ilomo 1985; Kaungamno 1985). Inadequate funds have also limited TLSB to establish a public library at every region and district within the country. Librarians throughout public libraries in the country receive centralized technical and bibliographical services from TLSB.

The late Julius Nyerere opened the National Central Library in Dar es Salaam in 1967, saying that;

“the real importance to our nation of this Central Library derives from the fact that it is the hub of a wheel, from which spokes will reach out to towns and villages throughout mainland Tanzania.” Dahlgren (1994).

The late president was an enthusiastic advocate of the Tanzania Library Service (TLS) and envisioned it as a great umbrella under which all types of libraries would be encompassed. He also wanted libraries to be educational and cultural centers: places where both readers and writers could be nurtured (Dahlgren, 1994; World Guide to Libraries, 1989). Although TLSB facilitates information service provision to the community and in particular to farmers, it is still inefficient as most of the public libraries are located in regional and district centres where most rural dwellers, who are farmers, cannot easily access the resources as they have to travel long distances using their own resources. Information service provision in particular has the potential to bridge the gap by ensuring that people from all sectors and settings of society and the economy across the country have easy access to information and knowledge they seek.

The agricultural sector in the country has a variety of information user community. It was observed by Lwoga, Stilwell and Ngulube (2011) that agricultural information user populations are basically researchers, extension workers, farmers, educators, students, agribusiness personnel, bankers, industrialists, policy makers and agricultural librarians/documentalists. Several scholars including Aina (1990), Malhan and Rao (2007) and Oduwale and Okorie (2010) are all of the view that agricultural stakeholders have different types of information needs that should be addressed by public library services. Aina (1991a) asserts that a successful delivery strategy for agricultural development information must include: empowerment of communities through their full participation to articulate their information needs and local information delivery that is accessible to communities. However, the extent to which TLSB facilitates information service provision particularly to small scale crop farmers in the region is still

questionable. It is not clearly known whether librarians in public libraries in the country get outside the four walls of the library to reach the community and particularly rural farmers who form the backbone of the country's economy. It is not clearly established whether they identify small scale crop farmers' information needs and try to address it or they are bounded by the economic crisis and shrinking budget. Do they have alternative means of making sure that they maximally utilize the little resources they have to promote crop production in the country through information service provision? Several questions remain unanswered. The present study examined information service provision to small scale crop farmers in Rukwa region. The role played by information service providers, in this case, the public librarians in providing information services to small scale farmers was also considered. The findings are presented in chapter five of the study.

2.5 The Telecommunication Industry and Agricultural Information Service Provision

Access to agricultural information services and utilization by the farming community needs to be practiced in the country. This should be facilitated by information and communication technologies. Modern technologies have changed the way information is created, processed, organized and communicated. Through the use of modern communication technologies, information can be widely disseminated to and reach most people at the same time. Recently, the country witnessed tremendous growth of information and communication technologies and its application in daily lives of people throughout the country.

The network infrastructure for fixed telephones is at present, limited to urban areas, with very minimal coverage in rural areas. Lack of telecommunication infrastructure in rural

areas remains a basic impediment to the provision of ICT services, such as the internet, in rural areas of Tanzania (Murthy and InterMedia 2011; Sife, Kiondo and Macha-Lyimo, 2010; Mtega 2012).

2.5.1 Mobile Phones

Mobile phone technology in Tanzania has been growing at a very rapid pace, in terms of, both the number of service providers as well as that of the users. The ESRF in collaboration with the government and UNDP launched a mobile platform called *Mobile Kilimo* (Mobile Agriculture) where farmers all over the country can communicate, advertise and sell their crops or farm produce to potential buyers all over the country (ESRF, 2014). Mobile Kilimo has been established with three main objectives, namely: to coordinate farmers and potential buyers of their products; to provide education to farmers on proper methods of farming and livestock keeping; and to provide advice on how to overcome challenges faced by farmers in their farms. The establishment of mobile banking and mobile money services has provided farmers with an excellent opportunity to prosper in their crop marketing and in identifying potential customers. This is a very good opportunity to farmers in the country, particularly from Rukwa region where they are always at a loss when it comes to the selling of their crops because of the roles played by middlemen who always set a very low buying price for crops which is less than the crop production cost. However, the challenge remains to be how aware are the farmers of the mobile platform and how effective is it in addressing the information requirements and problems faced by farmers in the country.

2.5.2 Radio

In recent years there has been mushrooming of radio stations in the country with more than 47 FM radio stations, some of which have national coverage while others have regional coverage. Those with national coverage include TBC Taifa, TBC FM, Radio Free Africa, Radio One and Clouds FM. Radio is the mostly used source of agricultural information in most rural parts of the country (Mtega and Ronald, 2013). However, radio broadcasts are still a challenge as not all parts of rural areas are covered and the content do not fully address the needs of rural communities most of whom are farmers. The survey done by Africa Media Barometer (2010) reported that, despite having numerous radio and television stations, the media content largely fails to effectively meet the agricultural needs. This situation calls for a joint effort between the government, farmers, agricultural stakeholders and the media fraternity to consider how to produce programmes which reflects the needs of the community and in particular the farming community in the country.

2.5.3 Television

Television is an effective means of agricultural information service provision which has provision for hearing and viewing and therefore easily understood. Currently, there are several television stations in Tanzania with some stations based in some regions and districts. For example, Abood TV and SUA TV are based in Morogoro Town (Murthy and InterMedia, 2011). However, most viewers are based in urban and peri-urban areas and some pockets in the rural areas which have access to electricity. Though television viewing involves seeing and listening, there are several challenges that limit its use by most of rural people, most of whom are farmers. There is high cost of buying television

sets which makes them unaffordable to some households. In addition, the introduction of digital television gadgets has doubled the expenses because one must be on monthly subscription to be able to use the television sets. Other challenges include high production of local television programmes and broadcasting which leads to lack of local content to suit the needs of the farming community.

2.6 The Internet

The internet consists of a huge amount of information with thousands of libraries and thousands of agricultural books, journals, newspapers, magazines, government documents, and reference sources like encyclopedia, dictionaries and indexes. It also provides access to thousands of agricultural and research center databases from experts in different fields worldwide. The growth of the internet has facilitated communication of knowledge and information via e-mails, mailing lists, newsgroup, teleconferencing, face book, twitter, linked in, research gate among others. The introduction of the first international submarine fiber optic in 2009 provided a relief on internet tariffs and facilitated the growth of internet services in the country (Materu-Behitsa and Diyamett, 2010). The introduction of mobile network operators plays a key role in providing internet services to most of mobile users following the introduction of mobile data and 3G broadband services at a low cost. As a result there is increased use of email and internet in the public (Wachira, 2010).

The recent past has experienced an increase in the number of local websites and portals. There are several websites of government ministries, departments and agencies and other public and private organizations. These websites include the national website (www.tanzania.go.tz); the Tanzania Online Gateway (www.tzonline.org); the Tanzania

Development Gateway (www.tanzaniagateway.org) among others. (Wachira, 2010). These websites and increased internet use provide considerable information on different development issues including agriculture. The question is, to what extent does small scale crop farmers in Rukwa region benefit from these potential information portals? How do information service providers utilize them in facilitating agricultural information service provision? Much needs to be done to enhance crop production in the region.

2.7 Agricultural Information Sources and Services

An ideal agricultural information source, system and service should be able to provide a wide range of information to researchers, trainers, trainees, extension workers, consultants, donor community, farmers, policy makers and information specialists. Aina (1990) classified agricultural information into four major categories. First, technical information generated by research institutions and universities. This information might be from the Division of Research and Development in the Ministry of Agriculture and Food Cooperatives, COSTECH coordinated research institutions, REPOA, ESRF, among others. The Sokoine National Agricultural Library (SNAL) and the Institute of Research Assessment at the University of Dar es salaam play a key role in agricultural research and development in the country. However, this information can only be meaningful if it is interpreted, organized, packaged and effectively disseminated to farmers who are the end users using appropriate channels and sources.

The second category of agricultural information according to Aina (1990), is commercial information which is often for farmers who are producers of export crops. This information assists farmers in their decisions on the increase and decrease of their production depending on the market price and the cost of inputs. Commercial agricultural

information is a major problem for small scale farmers in the country and in particular in rural areas like Rukwa region where the current study was conducted. Small scale farmers do not have enough information on where, when and how to sell their farm produce to make profits, they normally end up in the hands of unfaithful middle men who buy their crops at a very low price which is not even enough to cover the production cost. As a result, most small scale farmers end up being poor without much to celebrate from their farming activities. Other categories of agricultural information according to Aina (1990), involve the information resulting from the impact of local and cultural settings on agricultural practices and the last one is legal information which is concerned with all legislations and policy issues. This information in the Tanzanian context may be obtained from a variety of sources ranging from oral to printed and electronic sources of information.

A survey conducted by Murthy and InterMedia (2011) observed that 83% of Tanzanians get news and information from radio, making it the leader among both media and non-media sources. Word of mouth networks (among friends and family) is the second most important source of information. It was also revealed that television is a credible source of information although only few people can afford to buy it and in most cases it is in urban areas. Studies by Sife, Kiondo and Macha-Lyimo (2010), Mtega (2012), Chillimo (2008) and Kimaro, Mukandiwa and Mario, (2010) observed a similar trend on the sources of information utilized by farmers in various parts of the country. The variation on preference of the utilization was influenced by social economic status of individual farmers like age, gender, education and economic status. Electronic sources which may be used to provide information to small scale farmers include electronic books, journals,

brochures, email, text messages, verbal communication through telephone calls and video, YouTube, tele/video conferencing; mass media (television and radio); Web 2.0 tools such as Blogs, D-groups, Google docs and wikis among others. Any media or source of information selected for providing information services to farmers in rural areas must have wide coverage, be accessible, user friendly, credible and relevant to the targeted audience.

Other sources of agricultural information which are overlooked are maps and atlases though they provide unique and readily comprehensible information on soils, water, vegetation, desertification, climate, disease, and pest distribution (Kimaro, Mukandiwa and Mario, 2010). Another unique source of agricultural information is the patent, an increasingly important component in technology transfer (Chilimo, 2008).

Kimaro, Mukandiwa and Mario (2010) are of the view that information sources provided to farmers always determine the effectiveness of the information service used to address the information needs. Based on the sources provided to farmers, information services may include but not limited to reference services including on farm reference services where farmers may be provided with information on how to access and use available resources, current awareness services, and selective dissemination of information based on user's request for information. Information service providers may also provide quick answers to farmers on any topic of interest.

Other services may include translation services of the technical information contained in some reports for easy absorption by users; abstracting and indexing services; agricultural information literacy training and provision of various documents which contain

agricultural information such as books, journals, brochures, agricultural magazines and newspaper clippings on agricultural issues. Despite the availability of information services and sources ranging from print to electronic to small scale farmers in rural areas particularly in Rukwa region, their use is still questionable. The current study was set to establish the range and type of information services provided to small scale crop farmers in Rukwa region. It also examined whether these services address the needs of the crop farmers to enhance crop production in the region. The findings are presented in chapter five.

2.8 The Contribution of Agricultural Extension Services in Providing Information Services to Small Scale Farmers

Agriculture extension services in Tanzania were designed to facilitate technology transfer from agricultural research institutes to the farmers. Extension services consist of advice, technology transfer as well as input provision directly to farmers, the provision of farmers with knowledge, information, experiences and technologies needed to increase and sustain productivity and for improved wellbeing and livelihoods. Main inputs provided include seeds, fertilizers, and pesticides (CUTS, 2011; Kimaro, Mukandiwa and Mario, 2010; NRI, 2011). Given the fact that agriculture is the backbone of the country's economy, extension services have always been a center of agricultural information dissemination for a long time. Currently, agricultural extension services in Tanzania have been vested in local government authorities to ensure effective participation of beneficiaries and motivate private sector involvement in service delivery (Kimaro, Mukandiwa and Mario, 2010). The idea is to have extension service administered at the lowest level of the government for better accountability where active participation of

beneficiaries and other actors can be more effective. The private sector is expected to increase its role in the provision of agricultural services to farmers, while the public sector will gradually limit its role to policy formulation, financing and regulating the provision of public goods and services. Approaches used by extension officers in providing information services to small scale farmers include farmers field schools, farming systems approach, training and visit, contract farming, participatory extension and farmer to farmer extension (Kimaro, Mukandiwa and Mario, 2010).

Extension services and rural information service provision enhance the productivity and sustainability of production systems. The absence or inefficiencies of extension services can however leave the agriculture sector underdeveloped and the rural farmers in chronic poverty (CUTS, 2011). Extension services are crucial in enabling producers to realize the increased production and productivity in accessing information for marketing and other support services essential for agricultural development and poverty reduction. Additionally, extension aims at empowering farmers to identify and analyze their agricultural problems, and gives the right decisions on matters pertaining to profitable and sustainable agriculture. Extension services also play a big role in the provision of information services to farmers in the country. The mandate of managing extension services in the country has been left to local authorities. However, it seems that smallholder farmers have not substantially improved their agricultural and livestock production. Studies in the country by Isinika *et al.*, (2005), Mattee and Mvena (1988) and World Bank (2008), have pointed out that extension services are ineffective. The issue of concern in this case is why. There are many reasons which need to be explored. In view of the above, this study explored whether information needs of small scale crop farmers

are met as well as to investigate whether the information sources, channels and technologies used to provide information services are effective and efficient. The study also probed on the challenges small scale crop farmers face in accessing and using agricultural information with a view of proposing an appropriate model for information service provision to small scale crop farmers in the country and other developing world.

2.8.1 Agricultural Extension Support Services

The Government of Tanzania started providing fertilizer (urea and minjingu phosphate) subsidy (100%) in 2003/04 as well as maize seeds to farmers, Urea and Minjingu Phosphate fertilizers. The government extended the subsidy to fertilizer and improved seed (maize and paddy) using vouchers, where farmers are required to pay 50% of the price of fertilizer and the remaining 50% is paid by the government. In 2010/2011 more than 2,000,000 farmers benefited (URT, 2011). The aim of the voucher system is to facilitate farmers to get inputs at a subsidized price and thus realized increased productivity and hence economic returns. The government also provides input loans through the Agricultural Input Trust Fund for purchasing farm implements like power tillers, tractors and animal drawn implements. Warehouse Receipt System allows farmers to sell their produce at a better price and access credit from financial institutions. Normally, the farmers' produce is used as collateral and stored in a legally selected warehouse under an agreement between the farmer, financial institution, and Agricultural Marketing Cooperative Society which operates the Warehouse Receipt system (WRS). However, the extent to which small scale crop farmers in Rukwa Region benefit from these agricultural extension services is still uncertain.

2.9 Chapter Summary

This chapter discussed the existing agricultural information systems, sources and services in the country. It is obvious that an agricultural information infrastructure is in place. Although Tanzania's current information infrastructure has been improved than it was five decades ago, a lot needs to be done to address various technical and socio-economic challenges which in turn affect the agricultural sector development particularly crop production. Some of the challenges which have affected both agricultural research and dissemination of agricultural findings include inadequate funding, poor extension services, poor inter-institutional linkage and inadequate government support for agricultural libraries and documentation units.

CHAPTER THREE

LITERATURE REVIEW

3.1 Introduction

This chapter reviewed previous studies and the underlying theories pertinent to this study. Literature was thematically arranged into topics and subtopics based on the research objectives, research questions and study assumptions which formed the basis of this study. Although several theories were reviewed, this study was informed by a recent Robson and Robinson Information Seeking and Communication Model (ISCM) (2013). The study also reviewed previous studies in Tanzania and other parts of the world to establish strengths, weaknesses and contributions to the current study on agricultural information service provision to small scale crop farmers.

3.2 Theoretical Framework

In an applied context, theories can be understood as interrelated ideas about various patterns, concepts, processes, relationships, or events (Silvern, 2008). In a formal sense, social scientists usually define theory as a system of logical statements or propositions that explain the relationship between two or more objects, concepts, phenomena, or characteristics of humans what are sometimes called variables (Nachmias and Nachmias, 1992). Theories play a vital and central role in research processes because they are the cornerstone for generating research problems, hypotheses and meaning. The significance of key concepts can only be interpreted within the context of a theory (Nachmias and Nachmias, 1996). Furthermore, the theory-construction process serves to differentiate science from common sense, whatever question we ask, whatever data we collect thus reflects the impact of theory. Whenever we collect and analyse data, we are doing so in

the light of underlying theories translated into frameworks, models or concepts (Thomas, 2004).

A conceptual framework on the other hand, establishes a vantage point, a perspective, a set of lenses through which the researcher views the problem (Fowler, 2006). Thus, selecting a framework is both a clarifying and exclusionary step in the research process. The choice of framework contributes to new understandings or problem solutions by some researchers or to inadequate inquiry or false conclusions by others (Fink, 2010). The theoretical foundation of this study was based on information seeking and communication theory by Robson and Robinson's, the Information Seeking and Communication Model (ISCM) (2013).

3.2.1 An Overview of Theories Related to the Study

Different models have been developed to help researchers and information providers to clearly articulate information needs and provide proper measures to address them through information service provision. They include Wilson's 1981, 1996 and 1999 models; Ellis, 1989 and Ellis, Cox and Hall, 1993; Darvin's Sense-Making 1986; Kuhlthau's 1991 and Robson and Robinson 2013.

Although the study was informed by the recent Robson and Robinson's, the Information Seeking and Communication Model (ISCM) (2013)., several other theories/models on information seeking and communication were reviewed. They include; Dervin's sense making theory (1993); Kuhlthau's information search process model (1991) and Wilson's, (1996) model.

3.2.1.1 Dervin's Sense Making Theory

Dervin (1993) defined a sense making theory as the process by which individuals (or organizations) create an understanding of the relationship between communication, information, and meaning so that they can act in a principled and informed manner. Sense making theory is an improvement of the communication theory which shifts from only transmitting a message to the intended destination to giving meaning and interpretation of the transmitted message to the intended recipient. The aim of sense making is to give meaning and interpretation to bring impact (Munyua, 2011).

Dervin's sense making process is represented in a form of a triad consisting of three elements, namely; situation, gap/bridge, and outcome. A *situation* in time and space, which defines the context in which information problems arise; a *gap*, which identifies the difference between the contextual situation and the desired situation (e.g. uncertainty); an *outcome*, that is, the consequences of the sense-making process, and a *bridge*, that is, some means of closing the gap between situation and outcome (Robison and Robinson, 2013). Despite its relevance in information and communication studies, sense-making theory has been criticized for its reliance on memory. Authors have demonstrated that sense-making has a high degree of overlap of micro moment steps and that respondents may not recall aspects that happened in the past (Munyua, 2011). The theory can also be applied in studies related to agriculture. For example, Munyua (2011) applied Sense Making theory to identify the information and knowledge needs of small-scale farmers in Kirinyaga district, Kenya. The theory was used to inform the study on issues related to farmer's information seeking behaviour, linkages and flows of knowledge and information between agricultural actors and use of ICTs for sharing and

exchanging knowledge and information. It was also used to investigate the usage of agricultural knowledge and information, and how agricultural innovation, best practices and knowledge (local and external) and information was captured and shared among key agricultural actors (Munyua, 2011). Despite its applicability to Munyua's study, this study found it to be inadequate because it does not show the activities and roles played by information service providers nor does it consider individual's information needs in the context, such as, work environment or activities in which those needs arise. Due to this reason, it was found to be insufficient to inform the current study.

3.2.1.2 Kuhlthau's Information Search Process Model (1991)

Kuhlthau's (1991) model comprises of several stages of the information search process. The stages involved in Kuhlthau's model are: Initiation, Selection, Exploration, Formulation, Collection and Presentation (Kuhlthau, 1999). In the first stage which is initiation, the information user becomes aware of the information need, but she/ he is not certain of what exactly is needed so he/she begins to seek background information. Thereafter, the user identifies a general topic to investigate. In the process of doing it, she/he becomes less uncertain and continues to seek more information. Another stage according to Kuhlthau (1991) is exploration where the information user's uncertainty raises again. A feeling of confusion and doubt arises as one closely explores the general topic. Thus, one starts to look for information that will help her/him to address the need. Formulation involves the turning point of information searching process where the information user starts to have a clear understanding of what is needed. Uncertainty slowly diminishes and confidence increases as she/he continues to search for relevant information. Collection is the next step according to Kuhlthau, where the information

user interacts efficiently and effectively with the information system; she/he has a clear sense of direction and has narrowed the topic sufficiently to allow her/him to gather the necessary information. The last stage is presentation where the information user feels relief if the search has gone well or disappointment if it has failed. At this stage, the individual attempts to put all the information together for presentation.

Although the model seems to be relevant in information searching, it is limited in studying small scale farmers as most of them are not even aware of their information needs and they cannot clearly articulate what they need (Elly and Silayo, 2013; Bachhav, 2012). Furthermore, the model is linear without feedback which is an essential component of information service provision. Another limitation is that, information service providers are not considered in the whole process of information searching. The model does not consider individual's information needs or the context in which they arise. It is confined to the information user and the processes associated in information searching thus inadequate in addressing the current study.

3.2.1.3 Wilson's Model

Wilson's 1996 model is a major revision of the 1981 model, drawing upon research from a variety of fields other than information science, including decision making, psychology, innovation, health communication and consumer research (Wilson, 1999). According to Wilson's (1981), model of information behavior, a particular need perceived by the user, leads a user into information-seeking activities that may take various forms. Robson (2013), citing Wilson (1981), observed that, a person seeking information uses information systems or other information sources. If information is found it can be used and may fully or partially satisfy the perceived need, or it may fail to do so, in which case

the user may look for further information (Robson and Robinson, 2013; Wilson, 1999). The model also shows that part of the information seeking behavior may involve other people through information exchange and that information perceived as useful may be shared with other people as well as being used by the person him/ herself.

Wilson's model comprises five main components. These are the context of information need, the activating mechanism, intervening variables, information seeking behavior and information processing and use (Elia, 2013). According to Wilson (1996), information need by itself is not a need, but rather it is trying to address one of the basic human needs. Referring to Maslow's hierarchy of needs, Wilson identifies three basic needs which trigger information seeking behavior. These are physiological needs such as food and shelter; emotional or affective needs such as needs for achievement and cognitive needs such as a need to learn new skills. These three basic needs are interrelated, affect each other and may arise from the roles that individuals have in their social life. These roles and needs activate one's information seeking behavior.

Activating mechanisms act as catalyst which stimulate and motivate the information seeking process. These are explained by the stress/coping theory, the risk/reward theory and the social learning theory (Elia, 2013). Stress/coping theory explains why some needs result in information seeking while others do not. For example, a farmer may seek agricultural information or may not and use his/ her own experience instead. Robson and Robinson (2013) argue that, in risk and reward theory, a person may be motivated to search for information if the risk of not having it seems high. Information seeking process may face some barriers which Wilson (1996) termed as intervening variables. They include psychological, demographic, environmental, role related/interpersonal and

characteristics of a source. The intervening variables are deemed to be supportive as well as preventive to a person seeking information (Elia, 2013; Robson, 2013).

The information acquisition process involves three categories, passive search, the active search, and the ongoing search. In the first category which is the passive search, the information user acquires information unintentionally. For example, in the course of watching television programmes or listening to radio programmes, a farmer may acquire important and relevant information for his/her farming activities. In the second category, the active search, the information user actively searches for specific information from different sources. Ongoing search occurs when the user has already found relevant information, but he/she continues to search for information to update or broaden his/her knowledge base. The last category is information processing and use. After acquiring relevant information, the information user processes it and applies it to address the information need.

Literature shows that many research-based models of information-seeking behavior are limited in their ability to describe everyday life information-seeking. Such models tend to focus on active information-seeking, to the neglect of less-directed practices (Ganaiel and Khazer, 2014). Additionally, Robson and Robinson (2013) assert that the existing information seeking models have elements in common and most models in library and information science focus on information-seeking and the information user, ignoring other aspects of information communication like the role played by information service providers. Similarly, Wilson's (1996) model focuses on the user, showing a logical, sequential process, whereas information behavior in reality may be a back-and-forth, non-sequential process (Robson and Robinson, 2013). Furthermore, the role of

information service providers is neglected. Thus, the current study found it to be inadequate.

Although Darwin's sense making theory (1993), Kuhlthau's information search process (1991) and Wilson's Model (1996), model provide a good insight in information needs identification and in studying information seeking behavior of users, they all lack an important element in information service provision, the information service provider. These models do not include activities done by information service provider in the process of providing information to users, in this case the farmers, hence inadequate in informing the current study.

The current study was on agricultural information service provision to small scale crop farmers in Rukwa Region. Based on the nature of the problem at hand, and the environment where the study was conducted, a model which combines both, the elements of information seeking and communication was considered to be suitable for the study. Thus, the current study was therefore underpinned by Robson and Robinson's Information Seeking and Communication Model (2013).

3.2.2 Theoretical Framework Underpinning the Study

Library and information studies are among the fastest growing disciplines in the academic world. This is evidenced by the recent increased number of research activities, theories and models which explain various aspects of the field. Many research activities in Library and information studies have been carried out and many models are developed focusing information need identification and information seeking behavior (Fisher et. al. 2005; Case, 2007; and McQuail and Windahl, 1993). However, the aspect of information

seeking behavior is always overlooked particularly in the aspect of information communication and information service provision as it was observed by Robson and Robinson (2013). Although there are other models which discuss both, the information user and provider or both information seeking and communication, for example Wilson's (1999) model, none of them provides much details as Robson and Robinson's model did. Based on these weaknesses, this study was therefore informed by Robson and Robinson (2013), model which is a combination of information seeking and information communication/ provision.

The Information Seeking and Communication Model (ISCM) provide more detailed insights into information behavior and communication than previous models. The model shows both the information user and the information provider in their respective contexts. It explicitly includes their separate needs, wants, goals and perceptions and inhibiting factors in information seeking or communication. None of the other models explicitly includes all these elements (Robson and Robinson, 2013). It also indicates that their roles are interchangeable in that an information seeker may also be a provider or communicator and vice versa. In addition, it includes elements such as utility, credibility, feedback and assessment of the information provided and the sources used which are essential in the process of information service provision. These elements are overlooked by previous models. Furthermore, it starts with the user of information, a push factor in information service provision. This situation makes the user push for information and request the information that he/she exactly wants, thus making him/her active and not passive in the process of information exchange. On the other hand, information service providers are expected to be proactive and provide information both on demand and in

anticipation through Selective Dissemination of Information and Current Awareness Services (SDI and CAS respectively).

Robson and Robinson (2013) assert that identifying information needs and information communication is a complex process that requires the use of both communication and information seeking models. Robson and Robinson (2013) model is a blend of some important elements from different information seeking and communication models. For example, the ISCM includes active searching and concepts of feedback, channels of communication, person in context and the communicator of information from Wilson's (1999) model. It also includes elements from Elli's and Kuhlthau's models where information searching is broken down into individual activities. Thoughts and feelings associated with those activities are described as in the Kuhlthau model. In addition, many of the activating mechanisms and intervening variables are from Wilson (1996, 1999) models.

Additionally, the ISCM model includes two important characteristics of information and sources which are utility and credibility. Utility refers to the usefulness, relevance, timeliness, accessibility and ease-of-use of information or of a source. Credibility refers to the perceived trustworthiness, authority, reliability and lack of bias of information or the source of information (Robson and Robinson, 2013). Borrowing ideas from other information behavior and information communication, Robson and Robinson (2013), identifies the following ISCM features; information user, information provider, context of the information user and provider, needs, goals and perceptions, information searching process, information products/ sources, information utility and credibility. It also

includes; information processing and use, communication channels, feedback and inhibiting factors/noise.

According to ISCM as proposed by Robson and Robinson (2013), information users may be an individual, group or organization that: has information needs, seeks information, uses information, for instance, take a decision or action to utilize the information acquired. Information users also receive information communicated and provide feedback to the information provider. On the other hand information providers are individuals, groups or organizations that produce, supply/ disseminate and communicate information to users. Additionally, information providers facilitate, organize, coordinate and control information access (Robson and Robinson, 2013).

Robson and Robinson (2013), identify the features involved in the context of both, the information user and provider as the working environment which the user or the information provider exist. It also involves culture (working activities; knowledge, expertise, experience, resources such as finances); technology and psychological factors. The authors also include demographic characteristics such as age, sex, ethnicity, education, training and social –economic status as features under the context. Technologies as described by the authors include a user's access to radio, telephone, television as well as computer, which are available and accessible to the user. Another feature of the ISCM according to Robson and Robinson (2013), involves information needs, wants and goals of both the information user and the information provider. The information needs of the user prompt him/ her to seek for information. The information need may be recognized or unrecognized, anticipated or unexpected, internal or external, cognitive or affective (Robson and Robinson, 2013).

These information needs may lead the user into information seeking process in order to fulfill a desired goal. On the other hand, the information service provider may need and seek information for the purpose of communicating it to information users. Perception involves information user's self efficacy, perception of knowledge gap, sources and information service providers.

In the process of pursuing the information need, the user is involved in active, ongoing or passive information searching as observed by Wilson (1999). The information user may consult various sources or information products. They may include printed, electronic or human sources of information such as information service providers or their fellow colleagues. In the course of selecting information sources/ products, two important characteristics of information and sources which are involved: utility and credibility. Robson and Robinson (2013), further argue that utility and credibility may vary depending on the perception and environment of different information users.

Utility and credibility are key elements that influence the information user to choose or not to choose a certain information, information source or product. If users find information from a source, they can assess it based on its characteristics such as utility and credibility and, if it meets their needs, use it or make decisions and take action. Alternatively, they may dismiss the information or the source (Robson and Robinson, 2013). For example, if the information or the information sources obtained are not trustworthy or reliable, they may be dismissed. If the users do not find adequate information they can undertake further information seeking, or they can make decisions and take action (or decide to take no action) on the basis of their existing knowledge. Again, the situation may subsequently be reviewed depending on changes in needs,

perceptions, motivating or inhibiting factors (Robson and Robinson, 2013). In the process of searching for relevant information, thoughts and feelings of confusion may arise as observed in Kuhlathu's model. However, as the searching activity goes on, and the user starts to get relevant information with high utility and credibility, the feelings of uncertainty slowly diminishes. The user becomes comfortable with the information retrieved, and he/she can therefore make a decision or take an action. After obtaining relevant information, the user processes it by analyzing, evaluating, interpreting and organizing it before using it for decision making or communicating it. This is also applied to information service providers (Robson, 2013).

The process of information communication takes place between the user and the information provider, between one user and another or between one information service provider and another. Information communication can be done proactively, for example, when the information provider uses meetings, seminar presentation or issuing other information products to users. Communication can also be done reactively, for example, when libraries and information centers respond to enquiries from users (Robson and Robinson, 2013). Just like in the process of information seeking, in information communication also, the information user and providers assess, use or ignore the information communicated or the channels/ sources used based on their perceived utility and credibility. The authors further argue that an information user may communicate with an information provider. Again, this may be done proactively, for example, when a user asks for information. Alternatively it may be done reactively such as when a provider requests feedback on an information product or service (Robson and Robinson, 2013).

In communication, various channels may be used. They include printed documents such as books, journals, brochures, guidelines and handbooks. They may also be electronic such as e-mails, websites and blogs. Various inhibiting factors may hinder the process of information seeking and communication. Robson and Robinson (2013), identifies the following inhibiting factors: technical or pragmatic barriers such as lack of information searching skills, poor access to information resources, language and time. Other barriers as described by Robson and Robinson are cultural barriers. They may include the values, traditions, social and political relationships and believes. Psychological factors include: self-perception and self-efficacy, perceptions of others, including an information user's perception of a source and an information provider's perception of a user; perception of the knowledge gap, thoughts and feelings while searching for information (Robson and Robinson, 2013).

3.2.2.1 Relevance of ISCM to the Study

The ISCM model is relevant in informing the current study on information service provision to small scale crop farmers (SSCF) to enhance crop production. The model involves a variety of elements applicable to the study. They include the information user, information provider, context, information needs, goals and information searching process. Other relevant elements include information products/sources, information utility and credibility of information, the source or information service. They further include assessing, processing and using information, communication channels, feedback and inhibiting factors/ noise.

Information Users and Information Providers

In the context of this study, information users were individual or groups of small scale crop farmers, who have agricultural information needs, seek and use agricultural information and its associated information services. They also included groups of small scale crop farmers (SSCF) involved in field farm schools popularly known as “*shamba darasa*”. Information users were also those who were actively involved in the process of agricultural information communication and agricultural information service provision.

According to Robson and Robinson (2013), information providers are individuals, groups or organizations that produce, supply/ disseminate or communicate information to users. They also facilitate, organize, coordinate and control information access. In the context of this study, information providers included the public library, Ministry of Agriculture and Food Cooperatives and the Agricultural Sector Lead Ministries through extension officers and librarians.

Context

In this study, context involved the physical, psychological and socio-economic environment of both, SSCF and information service providers, in this case, the librarians and extension officers. The environment included SSCF’s and information service provider’s daily working activities, their knowledge and skills, experience and culture. It also included their socio-economic status, demography, and technology and information exposure. The study took into account these environmental factors and how they affect information service provision in the study area.

Information Needs, Goals and Perceptions

Small scale crop farmers and information service providers have goals which need to be fulfilled. For example, for SSCF, their goal is to improve crop production in order to enhance their socio- economic life. In the process of fulfilling this crucial goal, they need information and information services with high utility and credibility in order to make informed decisions. On the other hand, information service providers have important goal of communication agricultural information and its associated information services to SSCF. They also need to find information from various sources to be able to address small scale crop farmers' information requirements. Information obtained may be perceived differently depending on its utility and credibility.

Several studies conducted worldwide on information needs of farmers show that, farmers have as varied information needs as their varied farming activities. For example, Agyei and Osman (2014) in Ghana, Bachhav (2012) in India, Bernad, Dulle and Ngalapa (2014) and Elly and Silayo (2013) from Tanzania. Scholars come into consensus that information needs have to be identified individually and that they should not be generalized as farmers' information needs differ from one place to another depending on their farming activities, information environment, education, age, gender, exposure to information and their socio- economic background. The current study took into account these variations in order to come up with specific information needs of small scale crop farmers. The identified information needs were useful in proposing information service provision strategies with high utility and credibility suitable in addressing the information needs of small scale farmers to enhance crop production in the region.

Information Searching

In trying to address the need, SSCF seek information either actively or passively. Identified information may be selected, processed and used based on the perceived utility, that is, its usefulness, relevance, timeliness, accessibility and ease of use. It may also be selected from a trustworthy, authoritative and reliable information source or information service provider. Assessment of the sources will help both SSCF and the information service provider to make informed decisions based on the information obtained and whether to continue looking for information or to utilize available information.

Information service providers may be active, passive or proactive in the process of information service provision as observed by Gwang (2011) and Ochugwu (2009). Passive information service providers concentrate on the acquisition of information and other information materials as a routine work without focusing on the usage and as to whether the materials are addressing the needs of information users or not. Reactive information service providers respond to queries only and they don't take into consideration potential users who don't ask questions. Proactive information service providers are few, who care and analyze the information needs of users (Ochugwu, 2009). In the context of this study active, passive, proactive and reactive information service providers were considered. This is because all of them have a role to play in the process of information service provision to SSCF. However, efforts were made to educate information service providers to think outside the box and be proactive in information service provision. They were advised not to be enclosed by the four walls of their information centers; instead they should justify their existence to the community through

effective information service provision to enhance farming activities and crop production in the region.

Communication Channels

Communication channels are essential in every communication process. A two way traffic communication process from SSCF to information service providers and back to SSCF ensures effective information service provision. Every element of communication has a role to play in the communication process because they determine the quality of communication (Keyton, 2011; Folarin, 2012). In the process of providing information services to SSCF, the channel plays an important role of transmitting the message to farmers.

The current study involved different channels such as radio and television programmes, the internet, workshops, conferences and committees, face to face interaction with farmers, public address systems, market days popularly known as “*gulio*” in Swahili, traditional dances and National Farmer’s day, among others. Both SSCF and information service providers communicate with each other or with their colleagues in trying to identify relevant information. Responsible institutions should ensure that the channels used to communicate information to farmers are effective with high utility and credibility to facilitate crop production in the region. This is because people decode and perceive information selectively. Individuals are more likely to perceive information favorably and use it when it conforms to their own beliefs, values, and needs (Keyton, 2011; Summers, 2010 and Antos, 2011).

Information Sources/ Products

The information sources that may be utilized by farmers include books, journals, brochures, newspapers, agricultural magazines, newsletters, technical reports, conference proceedings, official publications, reference sources and CD-ROMS. They may also include agricultural databases, websites, blogs, presentations, educational materials, and television and radio programmes.

The Feedback

For effective information service provision, the element of feedback is very important. Keyton (2011) noted that in the absence of feedback from the receiver, in this case the SSCF, no communication takes place. A feedback will help information service providers to be certain that the information provided is clear, relevant and is useful in addressing the information requirements of the farming community. A clear message influences the way the received information is used since it can lead to a behavioral change. For example, the greater the signal transmitted and received, the greater the impact and vice versa. Through feedback mechanism information service providers will be able to know the impact of the transmitted information in facilitating crop production in the region.

It is through feedback mechanism that information service providers would know whether the information service provided, the channels and sources used to provide information to farmers addresses their information requirements. This is in line with Keyton (2011), and Summers (2010), who opine that feedback ensures effective and continued interaction between the source, the channel and the receiver.

Inhibiting Factors

Inhibiting factors/noise constitutes any barrier or factor that may affect the effective information communication process. Barriers can be internal and/or external, verbal and non-verbal as asserted by Lehman and DuFrene (2008). Other scholars, for example, Keyton (2011), Antos (2011) and Cheney (2011) have classified barriers into the following broad categories: (a) Sender-oriented barriers i.e lack of planning, lack of clarity about the purpose of communication, improper choice of words resulting in a badly encoded message, difference in perception, wrong choice of the channel, unjustified presumptions, among others. (b) Receiver-oriented barriers i.e poor listening, lack of interest, difference in perception, biased attitude, among others. (c) Channel-oriented barriers i.e noise, wrong selection of medium, technical defects in the address system or the medium of communication chosen by the sender, time and distance.

The current study took into consideration the above information and communication barriers. Other barriers include, lack of education, technophobia, computer illiteracy, differences in perception which are influenced by age, socio-economic background, culture, educational background, and experiences, long distance travel to library and information centres; technical jargons used by information service providers, inadequate and ineffective information access tools like indexes, abstracts, farmers digestives and bibliographies. Other barriers/ inhibiting factors to information service provision include unavailability and poor access to information resources, uncoordinated information service provision, lack of awareness on information and lack of skills to access or provide information and poor economic condition facing the users. A summary of Information seeking and communication process is presented in Figure 2.

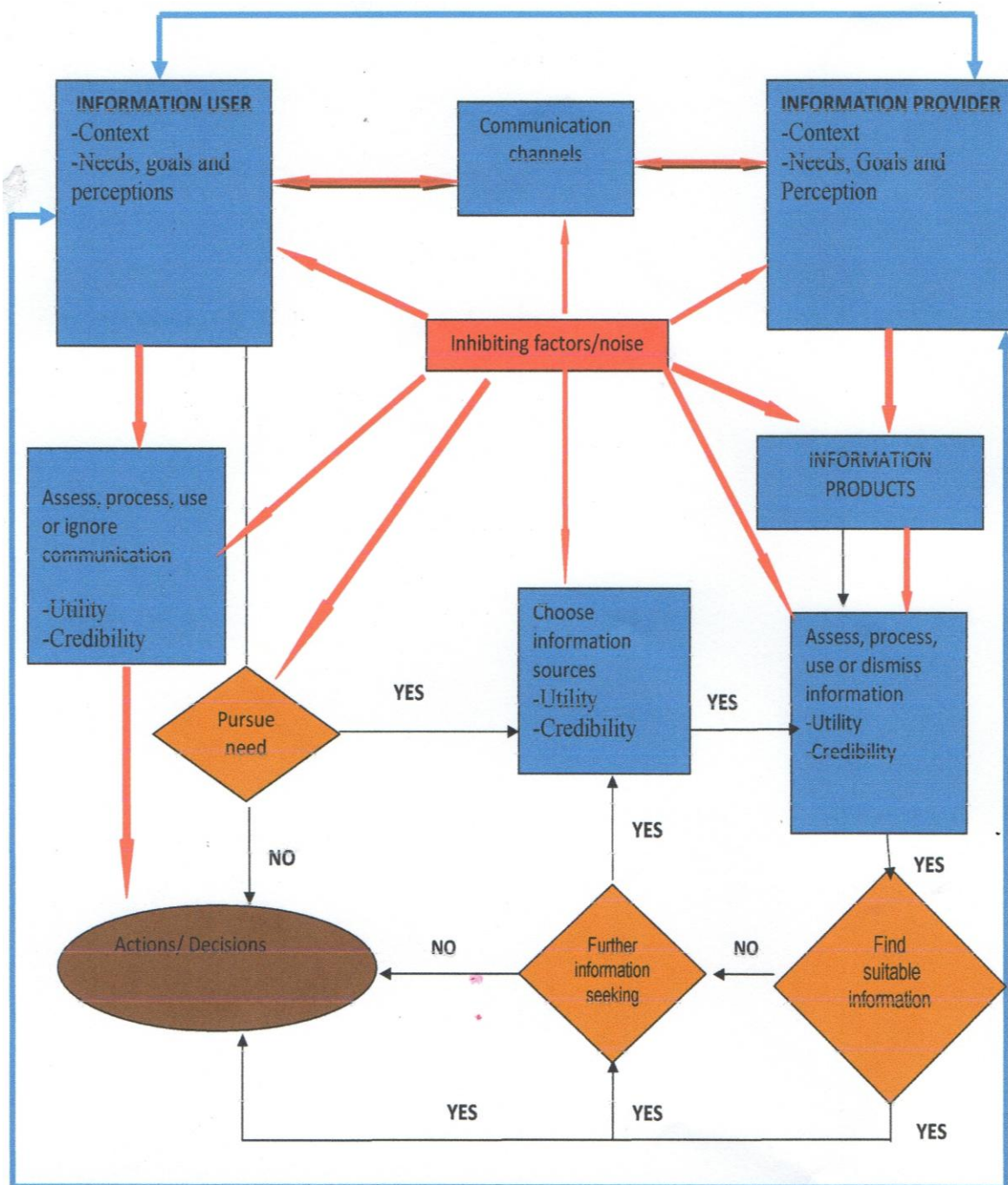
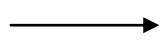




Figure 2: Information Seeking and Communication Model

Source: Adopted from Robson.A. and Robinson, L.(2013)Building on Model of Information Behaviours: Linking Information Seeking and Communication. *Journal of Documentation* ,69(2),169-193

Key

	Information Seeking Activities
	Information Communication
	Feedback Mechanism

3.3 Review of Previous Studies

This section reviewed various literature related to the study. The themes and sub-themes were arranged focusing on the study objectives and research questions.

3.3.1 Information Needs and Seeking Behaviour

Information is a basic necessity of everyday life, it is as important as the air we breathe in the success of every human endeavor including farming activities. Scholars all over the world agree that farmers have as varied information needs as their geographical and social economic activities. To understand their complex information needs and finding proper ways of addressing their information requirements, there is need for a thorough understanding of information needs and information seeking behavior.

According to Wilson and Walsh (1996), a need is a subjective experience, which occurs only in the mind of the person in need and, consequently, is not directly accessible to an observer. There must be subjective expression for a person to experience information need and to engage in information seeking behavior. On the other hand, Case (2007) concluded that a need is always instrumental, i.e. it involves reaching a desired goal, which may be to satisfy individual curiosity, or which may be based on some pre-existing need like increasing crop production; needs are usually contestable, which makes them differ from wants. Case (2007) further concluded that, a need is related to the concept of

necessity, in such a way as to carry more moral weight to the level of making a distinction between primary and secondary needs.

Information need is also defined as a recognition that personal knowledge is inadequate to satisfy a goal that needs to be achieved (Case, 2007). Information needs may be divided into physiological needs e.g. need for shelter, food, among others; affective or emotional needs, and cognitive needs e.g. need to learn a skill (Wilson, 2000). However, it is not necessary that information needs translate into information-seeking behaviour; several personal and contextual factors may enhance how an individual responds to information need (Case et al., 2005). Information needs are thus a requirement that may drive SSCF into an information-seeking process to meet their information gaps.

According to Singh (2012), people often talk about information needs when, in fact they are referring to want or use, both of which are primarily manifestations of need. Information needs arise out of a desire to meet one or other of three basic human needs i.e., physiological needs (need for food, shelter, among others), psychological needs (need for domination, security, among others) and cognitive needs (need to plan, learn a skill, among others). Chowdhury (2004) identifies the characteristics of an information need as follows:

- a) An information need is a relative concept that depends on numerous factors and does not remain constant but changes over a period of time.
- b) Information needs vary from person to person, from job to job, subject to subject, organisation to organisation, among others.

- c) Information needs are largely dependent on the environment, for example, the information needs of those in the academic environment may differ from those in business industry or agricultural sector.
- d) Information needs often remain unexpressed or are poorly expressed
- e) Information needs often change upon the receipt of some information

Kaniki (2003) argued that, farmer's information needs vary from one place to another and from one person to another depending on the farming activities of individuals and the agro-ecological environment. This situation makes the process of information needs identification to be a difficult task as most of the farmers are either aware of their information needs but they fail to express them, others are ignorant of their information needs and they confuse between needs and wants. Kaniki further argued that, in situations like this, information service providers need to be skillful and proactive in making sure that they identify the real information need and find ways of properly addressing these needs.

3.3.1.1 Information Needs of Small Scale Farmers

Small-scale farmers constitute a particular group of users whose information needs are very specific to their farming activities. Information needs of individuals vary according to their daily activities and exposure to new innovations. According to Hjørland (1997), and Kaniki (2003), individuals' information needs may be influenced by education, economic status, geographical location, availability of information systems and services. Kaniki (2003) further argued that, one's awareness of the availability of information

systems and services, research, personal role in social life and culture influences information needs and the sources used to address the need.

Studies show that the needs of the farmers are different according to the state of developments of the concerned rural areas. Information needs also vary from village to village. Alemna (1995) reports studies done in Tanzania (1984), Nigeria (1981), and Kenya (1984) that found a common pattern of information needs in rural areas. These needs included information related to agricultural skills, marketing of produce, and basic health information (services traditionally not provided in Western libraries).

Tologbonse, Fashola, Obadiah (2008) studied information needs of rice farmers' community in Niger and found that most farmers (89.9%) need information about the crop production among other information needs. The study found out that farmers did not have access to information on their activities. The situation was attributed to lack of awareness on the existence of information; improper identification of their information needs, and lack of coordination between the Niger government and information service providers.

Byamugisha, Ikoja-Odongo and Nasinyama (2010) conducted a study on information seeking and use of urban farmers in Uganda. The findings showed that, the information needs of the urban farmers in the study area varied from one urban farmer to another.

Studies by Malhan and Rao (2007), Akanda and Roknuzzaman (2012) and Siraji et al., (2013) in Pakistan, Agyei and Osman (2014) in Ghana, Bernard, Dulle and Ngalapa (2014) in Tanzania surveyed agricultural information needs of small scale farmers in their respective areas. The findings of these scholars show that, farmers' information needs

vary from one individual to another, village to village and from one farming activity to another. The surveys also show that small scale farmers need information for various purposes in the course of undertaking their agricultural activities. They also use different sources and media to access information.

Studies done in Tanzania by Lwoga, Ngulube and Stilwell (2010), Mtega (2012) and Matovero (2008) show a similar trend on information needs of farmers and rural communities in general. They also show that information needs of farmers differ from one geographical region to another depending on various factors such as socio-economic development, demography, availability and accessibility of information infrastructure and exposure to information environment. They also agree that information needs of farmers should not be generalized; instead they should be studied individually for information service providers to be able to address it effectively.

3.3.1.2 Information Seeking Behaviour of Small Scale Farmers

Information seeking behavior is complex which entails fulfilling a certain information requirement. Kiondo (1998) asserts that an understanding of information needs should go hand in hand with an understanding of the information-seeking behavior of users. She further defined information-seeking behavior as a process through which a person goes to identify and access information. Based on how that person perceives it, he/she may use it to satisfy a need or dismiss it. Such an understanding would enable information professionals not only to understand some of the needs but also to identify accessible sources of information (Kiondo, 1998). This understanding will also enable information professionals to chart out realistic strategies for providing rural communities with

relevant information. Fatima and Ahmad (2008), conceptualizes information seeking behavior as a broad term that encapsulates a set of actions that an individual takes to express information needs, seek information, evaluate and select information, and finally use this information to satisfy his/her information needs.

Studies all over the world have shown that small scale crop farmers have varied information seeking behavior. The behavior is influenced by several factors including demographic characteristics, social economic activities, financial status of individuals, information infrastructure, level of development and culture. The current study reviewed a number of studies on information seeking behavior of small scale farmers in developing countries. They include Murugan and Balasubrami (2011), Meitei and Devi (2009) in India, Siraji et al., (2013) in Pakistan, Agyei and Osman (2014) in selected communities in Ghana, Maepa (2000) in South Africa, Obidike (2011) in Nigeria, Benard, Dulle and Ngalapa (2014), Elly and Silayo (2013) and Lwoga, Ngulube and Stilwell (2010) in Tanzania.

Murugan and Balasubrami (2011) conducted a study on information seeking behavior of cassava growers in India. The study found out that, farmers mostly use radio, films, video and television programmes. Similarly, Hassan et al., (2010) observed that small scale farmers in Malaysia frequently utilize television programmes compared to other sources. Based on their findings, Murugan and Balasubrami suggested that, the telecasting time for agricultural related programmes should be convenient for farmers. They also suggested that the local library should be well equipped with materials pertaining to agricultural information and the farmers should be motivated to use these materials (Murugan and Balasubrami, 2011).

Most studies in developing countries, particularly Africa show that small scale farmers prefer informal verbal communication in accessing and sharing agricultural information. For example, studies by Agyei and Osman (2014), Lwoga, Ngulube and Stilwell (2010), Asenso-Okyere and Mekonnen (2012), Mwakaje, (2010) and Mtega, (2012) show that small scale farmers prefer their fellow farmers, neighbors and village leaders. Other informal sources utilized in the named studies include church leaders, traditional dances and experience which is shared among farmers orally. These findings differs from those of Murugan and Balasubrami (2011) and Hassan et al., (2010).

Another study was conducted by Agyei and Osman (2014), in selected communities in Ghana. It was found out that cocoa farmers had various information needs which depended on the level of their farming activities. Despite having such variations in information needs, the government and other stakeholders involved in information service provision to farmers have been unable to identify and meet the information needs of these farmers. Agyei and Osman (2014) observed that most of the respondents depended on informal sources and services for information. For example, it was found out that 96 (70.6%) respondents obtained their information by asking friends, relatives and neighbors. Other sources included personal experience, opinion leaders and role models. Only two (1.5%) of the cocoa farmers in the study used the internet, representing the means used the least by the cocoa farmers for obtaining information. It was also revealed that some formal resources and services like libraries and internet were used by very limited farmers in their effort to meet their information needs.

Agyei and Osman (2014) further found out that most of the farmers had less knowledge about formal resources and services available to them, for example, libraries and the

mass media. The authors also found out that in seeking for information from the extension officers, for instance, majority 84 (61.8%) farmers would approach the extension officers for help when they encountered a problem. Others did not make any effort to get information till they were approached by experts to help them.

A study conducted by Meitei and Devi (2009) on farmer's information needs in India established that farmers' information needs were not uniform amongst all rural areas. The needs were different according to the state of development of the concerned rural areas. It was noted that, those close to the urban areas had access to better information infrastructure and they easily accessed agricultural information. They were also in a better position to make good informed decision compared to those in rural areas.

Meitei and Devi (2009) further found out that farmers did not have access to most of the required agricultural information, and most of the time their information requirements were not met. These findings are in line with those of Agyei and Osman (2014), Lwoga, Ngulube and Stilwell (2010), Benard, Dulle and Ngalapa (2014) and Asenso-Okyere and Mekonnen (2012). Regarding the sources of information used by farmers, Meitei and Devi (2009) found out that radio was the most preferred source of information followed by television and newspapers. They further found that libraries were not used in all surveyed villages. This is similar to what Daudu and Mohammed (2013) found in Northern Nigeria. From the findings Meitei and Devi (2009) concluded that in rural areas, libraries and information centers are less significant in information provision to rural people. They recommended that ICT based agricultural support information system is much more important in disseminating agricultural information and technological knowhow to rural farming communities.

Maepa (2000) conducted a study on information needs and seeking patterns of Africans living in selected rural villages in Northern Province, South Africa. It was found out that there was a communication gap between the libraries and community information centers and the people they were intended to serve. There was also lack of awareness of rural villager's information needs and their inability to articulate the needs. Maepa further noted that there was a preference for informal, interpersonal and largely oral methods of information transfer than written formal methods of information transfer.

3.3.2 Sources of Agricultural Information

Information service provision is essential to any meaningful agricultural production. For information to be used by the intended audience, it has to be carried in a user friendly format which takes into consideration the user's literacy level, age, economic status, culture and above all, user's preference. Aina (2004a) categorized information sources as print media such as books, journals, pamphlets, magazines among others; cartographic materials such as maps, globes and plans. Other sources according to Aina (2004a), are graphic media which are materials that can be seen without a projector, for example, photographs, drawings, charts and post cards. They may also include materials that can be projected without motion by means of optical devices such as filmstrips, slides and transparencies. Another category involves audio recordings. These are equivalent to printed materials that can be recorded on a sound recording such as sound disc, sound cassette, tape reel and compact discs (Aina, 2004a). Another category includes audiovisual materials which can be seen and heard. They include motion pictures, video recordings, compact discs among others.

Craig and Stilwell (2003) noted that print agricultural materials are used extensively to provide information to farmers; they play a vital supportive role in information service provision especially to low –literate communities. Discussing the role of print agricultural information materials, Craig and Stilwell (2003) argued that, based on their primary purpose, print agricultural materials can be categorized into the following three groups: materials that broadcast news or notices of relevant agricultural and development activities; materials that disseminate information on agricultural technology and farming methodology, and materials that support farmer education and training programmes. The authors also argued that, printed materials have inherent attractive qualities that make it a suitable medium for information diffusion in rural areas. They are easily transported from place to place, require relatively simple and cheap technology to produce (relative to audio and visual media) and no equipment to transmit and decode the information content (Sturges and Neill 1998). Print can be used as many times as the user requires, to quickly look up some fact or to study its contents in-depth, and is easily stored for future reference (Craig and Stilwell, 2003). The authors further argued that, printed agricultural information material allows for greater accuracy of content and precision of expression than media where the message depends on oral transmission and the receiver's memory. However, print sources of information cannot be used by illiterate farmers who are scattered all over rural places in Africa.

Aina (2006) lamented that the role of extension officers in an African setting is crucial in increasing agricultural productivity. This is because; most Africans in rural areas who are also farmers are largely illiterate and incapacitated of benefitting from printed information. Aina (2006) argued that the major role of extension officers is to

disseminate agricultural information to farmers. He further suggested that information repackaging is a good method of providing information to farmers, thus librarians and extension officers should work hand in hand in information repackaging. He further suggested that printed information should be supplied to farmers in a format that would be comprehensible and user friendly to them.

Kaaya (1999) observed that in Tanzania several print agricultural sources of information are used to disseminate information to farmers. According to Kaaya (1999), the main avenues used are books, research reports, newsletters, handbooks, conference proceedings, journals, among others. Reports are produced annually by different research institutions such as Universities, COSTECH, REPOA, and not for profit agricultural organizations.

A study was conducted by Daudu and Mohammed (2013) on information dissemination, access and utilization for social- economic empowerment of rural people in Northern Nigeria. The study established that rural people have varied information needs and that they use various information resources in trying to address their information needs. Arranging the sources in order of preference Daudu and Mohammed (2013) found out that rural people utilized village heads (89.2%); Colleagues (84.4%); radio (80%) and market square (65%). They also found out that village libraries were very rarely used and sometimes not used at all because they contained outdated materials which did not fully address the needs of the farming community.

In another study, Meyer and Boon (2003) investigated how agriculture-related information from the developed world is transferred to small scale farmers in rural

community. The study established that most of the farmers were elderly, women and children who were poor, cultivating small plots of 0.5 to 2 acres. It was also established that farmers needed a variety of information most of which were not met. Meyer and Boon (2003) also found out that the methods used to transfer information involved storytelling, demonstration, acting, and traditional dances. Meyer and Boon (2003) further noted that every little information obtained by respondents was stored in their memory and could only be communicated through word of mouth.

Similarly, Uhegbu (1997) contended that, rural villagers prefer non-print materials because they are more accustomed to acquiring information through listening (audio) rather than reading. They also contend that, their information and communication channels are still deeply rooted in orality.

Obidike (2011) conducted a study in selected towns in Nigeria. It was established that farmers have varied information needs ranging from the best soil type for planting to new methods of crop preservation and marketing. In addressing their information requirements, the farmers used various source of information like radio, television, leaflets and extension workers. Further, Obidike (2011) noted that newsletters, posters, exhibition, visual aids and radio/television programmes were used in communicating agricultural information to towns and villages. Radio and television (though controlled by government) were popular organs in disseminating agricultural information to rural farmers. Obidike (2011) further found out that, of all the existing channels of agricultural communication, Nigerian farmers rank extension (extension services/agents) highest in terms of providing credible information and advice.

A study conducted by Mugwisi (2013) in Zimbabwe showed that researchers and extension workers appear to play a pivotal role in disseminating agricultural information to the farmers. Various channels also appear to be used to communicate agricultural information, including the media, pamphlets and posters, and public gatherings like field days and agricultural shows. Mugwisi (2013) further found out that, ICTs such as the radio, television, the internet, databases, and telephones were also being used to disseminate agricultural information, although databases were hampered by the lack of computers. Mobile phones, although not readily available as office equipment, were highly utilized in the communication process.

Discussing channels of information acquisition and dissemination among rural dwellers in Nigeria, Omogor (2013) noted that town-criers, marketplaces, socio-political meetings, traditional festivals, role play, songs and dance, demonstration, lecture and exhibition, mobile handsets, television, radio, and newspapers were channels of information used to acquire and disseminate information among rural dwellers. Omogor (2013) concluded that there are different methods of information acquisition and dissemination for rural dwellers. Omogor (2013) further concluded that there is lack of successful transfer of developmental information to rural areas. The channels of information communication that were used by various agents to disseminate information to rural dwellers were elitist and urban-centred.

A study by Rees et al., (2000) on agricultural knowledge and information systems in Kenya noted that the major sources of knowledge for smallholder farmers were local for example, neighbors, family, markets and community based organizations. It was also noted that, between 40 and 70 per cent of respondents reported government extension as

an important source of information, though both farmers and extension personnel themselves expressed dissatisfaction with the quality and frequency of their interactions. Farmers were not satisfied with skills demonstrated by extension officers in information service provision. Rees et al., (2000) further noted that farmers from different places differed in their preference of information sources. For example, churches, chief's barazas (community meetings) and agricultural companies were significant information sources in some locations, while Ethno-veterinarians were reported as major sources of information in West Pokot, where they receive support from World Vision and the Evangelical Church. Commercial banks were listed as important information sources in Kiambu (Rees et al, 2000).

A study conducted by Siraj et al., (2013) in Pakistan found out that the farmers expressed negative views on the use of TV, newspapers, and radio, as channels for agricultural information. Their main concerns were about scheduling of TV programmes and accessibility and knowledge of the existence of newspapers and other print delivery channels. They preferred the advice of field assistants/agriculture officers which was considered more reliable than that of input suppliers, but farmers also depended on the experience of their fellow farmers and the use of mobile phone services in sharing their agricultural experience.

Aina (2012) surveyed the information environment of agricultural stakeholders in Botswana. It was noted that in information provision to small scale farmers, information sources mostly consulted by agricultural researchers were journal articles, the internet, technical/annual reports and conference proceedings, but extension workers used annual

reports, Ministry of Agriculture publications and fairs and exhibitions. Aina (2013) also observed that libraries were hardly used by all the user populations.

Glendenning, Babu and Asenso-Okyere (2011) reviewed agricultural extension services in India. It was found out that, farmers utilized different information sources. For example, they noted that, of the 40 percent of farmers who had accessed information, smallholder farmers relied primarily on other progressive farmers, input dealers, and radio for information, while medium-size and large-scale farmers equally used radio, TV, and newspapers. These findings are similar to Bachhav (2012). It was further noted that, contact with extension workers for medium-size and large-scale farmers was almost double that of smallholder farmers. Despite the variety of agricultural extension approaches that operate in parallel and sometimes duplicate one another, the majority of farmers in India did not have access to any source of information. This severely limits their ability to increase their productivity and income and thereby reduce poverty (Glendenning, Babu and Asenso-Okyere, 2011).

Another study conducted by Hassan et al., (2010) in Malaysia established that, farmers used printed materials, radio, TV and the Internet in accessing information. Contrary to what was observed in other developing countries like Tanzania (Lwoga, Stilwell and Ngulube, 2011), Mwakaje (2010), Mtega (2012); Asenso-Okyere and Mekonnen (2012) in Ghana and Siraj et al., (2013) in Pakistan, the study revealed that farmers preferred, and relied more on TV and printed materials than radio, friends/colleagues and internet in accessing and using information. The authors also noted that farmers' preference for TV was based on the ability to observe how other farmers' practiced and applied the innovation which was being introduced. It was further observed that, farmers rarely used

radio to access information and many were not even aware of the agricultural programmes on radio. Print sources were preferred due to their acceptance and being familiar to farmers. Agricultural information was packaged and spread through extension officers.

3.4 Information as a Resource to Small Scale Crop Farmers

Information has been described as the fifth need of man ranking after air, water, food and shelter (Elly and Silayo, 2013). Everyone needs information about everything. It is increasingly being regarded as a crucial resource and an important commodity for development (Agboola and Hawwa, 2013; Nawe, 2000; Mchombu, 2007 and Bachhav, 2012).

As a resource, information does not have a sell by date, though its value may vary over time, neither is it used up when transmitted through the value chain (Taylor and Farrer 1992). According to Burk and Hurton (1998), information is regarded as a resource like other traditional resources because it possesses the following main characteristics;

- a) It is acquired at a cost in monetary terms like other resources.
- b) It has value, some quantifiable and others treated as an asset in a financial accounting sense.
- c) Information consumption can either be expensed or capitalized.
- d) Cost accounting techniques can be applied to help control other costs of information.
- e) Information has the capacity to be processed and refined where by raw materials i.e databases are transformed into finished goods i.e published indexes and directories
- f) Information has a life cycle: creation/collection, transmission, processing, storage, dissemination, use and disposition (Burk and Hurton, 1998; Aina, 2004a).

Burk and Hurton (1998) further assert that the difference with other resources is that information is intangible and expendable. Repo (1986) lists unique attributes that information possesses. According to him, information is human in the sense that it exists only through human perception. It is expandable in the sense that the free flow of information maximizes its use. Further, information is compressible and substitutable. It may save money by substituting the use of other resources. Information is easily transportable through new information technology. Repo (1986), states that information is diffusible. It tends to "leak" even if we try to contain it and is shareable; giving it away does not mean losing it.

Burk and Hurton (1998) argue that information as an important resource to the community including the farming community in this regard; it facilitates increased productivity. They further opine that information has identifiable and measurable characteristics that help to define its value as a resource. These measurable characteristics according to Burk and Hurton (1998), are as follows; Quality of the information itself: this refers to the degree of accuracy, comprehensiveness, reliability, relevance, simplicity and validity. These attributes are similar to what the ISCM used to inform this study termed as utility and credibility of the source or information provided. In every aspect of information service provisions to farmers, the quality of information should be considered to ensure that farmers get the right information at the right time to make informed decisions concerning their farming activities. Similarly Boon (1992) opines that information is an important element and a key to self determination within dependency and integrity of each culture. The prosperity of people in all nations depends on their accessibility to quality information. Information is necessary and inevitable for

sustainable agricultural development including crop production. It is effective for decision making, creativity, innovation, effective market positioning and long term planning. Burk and Hurton (1998) further argue that another characteristic of information as a measurable resource is the utility of information holdings: This is the degree of intellectual and physical accessibility, ease of use, flexibility and presentation of information.

The use of information in agricultural sector enhances farming productivity in a number of ways as it was noted by Burk and Hurton (1998). Providing information on weather trends, best practice in farming and timely access to market information helps farmer make correct decisions about what crops to plant and where to sell their produce and buy inputs. Information as a resource has an impact on financial position as per Burk and Hurton (1998). Information contributes to cost reduction or cost saving, substitution for more expensive resource inputs, increased profits and return on investment.

Information is a powerful intangible resource to the farming community. In an attempt to identify those attributes of information that focus on its intangibility, Eaton and Bawden (1991) provide the following key distinctions: Firstly, it is the value of information. Unlike other tangible resources, information is not readily quantifiable and has no intrinsic value. Its value depends on its context and its use by particular users on particular occasions. Eaton and Bawden (1991) further argued that the value of information to its users can not be determined in advance nor does it change over time in any predictable way. Arguing in similar lines, Aina (2004a) said that, information removes uncertainty, increase the state of knowledge of the recipient and more importantly it has value in decision making.

Another distinctive intangible attribute of information as a resource according to Eaton and Bawden (1991), is its self multiplicative quantity. Information is not lost when it is given to others. Neither does it diminish when "consumed". Instead, sharing it will almost always cause it to increase. In farming environment, information sharing among farmers on new agricultural innovations leads to more crop productivity among farmers who are informed. This is more productive when the information shared is timely, relevant valuable in decision making.

Further, Eaton and Bawden (1991) opined that information is a dynamic resource and not static to be accumulated and stored within the confines of a static system. It is a dynamic force for change to the system within which it operates. It adds value to an organization through encouraging innovation and change without being tangible. As a dynamic force, information is constantly altering and extending a store of knowledge of its recipients such as small scale crop farmers. It alters their understanding of certain practices, which in turn can help them to solve problems, for example, improving crop production. Additionally, agricultural information produced by different agricultural research organizations, ministries, individual researchers, national and international organizations and other stakeholders in the field need to be shared and provided to farmers, particularly those who are disadvantaged in rural areas. Agricultural information provided on new innovations is expected to help small scale farmers increase their crop production and boost their economy and the country's economy as well.

Another intangible attribute of information as a resource according to Eaton and Bawden (1991), is its individuality. According to Eaton and Bawden (1991), information comes in many forms and is expressed in different ways and formats. Information can take on any

value in the context of an individual situation. This proves that, as a resource, information is different from most other resources.

The last attribute that characterizes information as an intangible resource according to Eaton and Bawden (1991), is that information seems to have an unpredictable life-cycle. Aina (2004a) described several stages of information life cycle, each of which plays a vital role in agricultural information service provision to small scale farmers in developing countries, and Tanzania in particular. They include information creation, representation, searching, selection and acquisition. They also include organization of information, information analysis, storage, retrieval, preservation and information dissemination and communication.

When looked at from a business point of view, it is not a new idea that information is a crucial element of any successful market economy (Britz, Boon and De Lange, 1993). It is a major resource that businesses and in particular the farming community require for monitoring environmental trends, products, services, markets, regulations, customers, forecasting future events, countering competitors' strategies and in developing new products. It is used to gain competitive edge and make fortunes over other business. In the context of business management and commerce, information is valued as a corporate and a prime resource as it was observed by Agboola and Hawwa, (2013), Nawe (2000), World Bank (2008), Mchombu (1993, 2003) and Bachhav, 2012).

Gwang (2011), asserts that for every target user or user group, the information professionals should be armed with details of information needs as such as: type of information needed; packaging format; quantity required, for example, a simple fact

book, a book, an index, among others.; Level of sophistication of the sources required; purpose for which information will be used and when and for how long the information will be used. In addition, when information is used to plan and advance the future and to cope with the attendant uncertainties, it is referred to as strategic information (Ouma-Onyango, 1997). He argues that informed strategic decisions are founded on quality information about prevailing circumstances.

Small scale crop farmers need to acquire and use information in order to probe their environment, identify new threats and challenges, respond in a creative way to new circumstances and finally make a better informed decision to enhance their crop production. Information should be appreciated as a valuable strategic resource, in line with the huge investments that have been made to capture, process, transmit, store and utilize information. Briefly, it could be said that information has become the world's most powerful resource. It is a tradable commodity in every sphere of life and a leading resource in the current world economy and knowledge society. Small scale crop farmers should be facilitated with the necessary information infrastructure to fully utilize this silent yet, very crucial resource in their daily farming activities to enhance crop production. Taking into account farmers in rural areas most most of whom are busy with their activities and do not have much time for information acquisition, though they need it, information service providers should package information to facilitate easy accessibility and use. Information should be analyzed, digested, translated and repackaged to suit the information requirements of farmers. However, the extent to which information service providers accomplish this important task of making sure that information as a resource benefit small scale farmers in the country is not well

established and documented. Furthermore, it is not clearly known whether information service providers possess necessary skills to accomplish this task. The current study examined agricultural information service provision to small scale crop farmers. The Findings are presented in the data analysis and presentation chapter.

3.5 Libraries and Information Service Provision to Farmers

Scholars all around the globe recognize that access to information is fundamental to all aspects of development, particularly agricultural development and crop production in particular, which is the backbone of most developing countries including Tanzania. Though scholars agree that information is a crucial element in any development endeavor and that it is a constitutional right to have access to information and knowledge, libraries in many developing countries and Tanzania in particular are still lagging behind in information service provision to rural areas. This was also observed by Mchombu (1992, 1993, 1996), Nawe (2001), Sturges and Nail (1998) and Stilwell (1991). Kaungamno and Ilomo (1989) observed that the need to bring knowledge to rural people most of whom are farmers was long recognized by the Tanzania Library Service (TLS). TLS planned for rural library scheme and mobile libraries to serve farmers. The mobile library service and the rural library scheme did not last long enough to have their impact felt in rural areas due to a number of reasons, one being inadequate qualified personnel.

Similarly, Sturges and Nail (1998) lament that existing African libraries are foreign and were developed without modification or consultation with African communities, thus they lack awareness of information needs of rural communities, lack surveys for specific needs of community groups such as farmers. Consequently, libraries have inappropriate collections and services that do not address the information needs of communities. They

also have inadequate funds and lack cooperation with information related agencies and inadequate skilled librarians (Nawe, 2001 and Matare, 1998).

Alemna (1995) suggest repackaging of information to meet the oral culture of the African communities. Ideally, the library system should incorporate both oral and print-based modes of information transmission. It has been recommended that African librarians should think outside the Western model of librarianship when designing services for rural communities; consideration should be given to appropriate formats of delivery and sustainable technology. For example, print materials should be available for those who can read and these same materials should be translated orally for those who cannot read. Oral transmission can take the form of group discussions, workshops, person-to-person interaction, storytelling, as well as poetry and drama.

Dent (2006) suggest that information service of any type should be rooted in the community and for the most part, facilitated by members of that community. The services should be a channel for transferring information both to and from the local community. Dent (2006) further opines that no study of the rural library is complete without discussion of the role of the librarian or information service provider. Stilwell (1991) explains that the community librarian often lives in the community, is known and trusted by the community members, and is able to identify and meet the needs of the community. She states that community librarianship aims at information provision in the crucial areas of people's lives and at those who have limited access to other sources of help (Stilwell, 1991).

Although studies show that information provision through community libraries might be useful in rural areas, the extent to which these libraries collaborate with TLS to fulfill this crucial role to farmers is still not very well established in the country. Furthermore, it is not clearly documented whether there is a coordination or collaboration between the MOAFC, ASLM and Tanzania Library Service (TLS) in information service provision to farmers. The current study is trying to address this gap.

3.6 Agricultural Information Service Provision

The vast store of agricultural information has been built up in the world over many years since the ancient Babylonian time. The ultimate aim of agricultural information has always been to increase agricultural production. Thus improved information flow to, from and within the agricultural sector is a pre-requisite for effective and meaningful agricultural production and development. According to Kaaya (1999), the need for agricultural information is derived from the following crucial factors; the need to increase yields; the need to improve quality of production and the need to avoid costly mistakes in all agricultural practices. Information service provision is central to any meaningful socio-economic development. It acts as a fuel to propel agricultural innovation to enhance crop productivity. According to Salami et al., (2010) African smallholder farmers can be categorized on the basis of the agro-ecological zones in which they operate; the type and composition of their farm portfolio and landholding; or on the basis of annual revenue they generate from farming activities. Despite having several challenges that hinder crop production, small scale farmers in most part of Africa are suffering from information poverty. This situation is caused by poor planning, coordination and organization of information flow from research institutions, agricultural

ministries and other agencies involved in agricultural information production. In addition, the available agricultural information is usually fragmented, duplicated and sometimes do not focus on the needs of the farming community.

Information forms the basic recipe for the prosperity, progress, and development of any nation. This depends upon the nation's ability to acquire, produce, access, and use pertinent information. Similarly, the success of small scale farmers in Africa depends on effective use of information in their daily activities. Information services are multidimensional and serve socially as a binding thread among different groups of rural dwellers. Harande (2009) lamented that the rural populace in Africa suffers from acute low productivity, social and economic retrogression mainly due to ignorance, which is also a direct consequence of either inadequate or an acute shortage of information services provision to them. Information services that will greatly enhance their productivity, transform their community into a lively and enlightened one, and empower their economic base, is not effective and relevant, and the service is not fashioned towards addressing the needs of the rural community. This makes the rural community incapacitated and makes it difficult make good informed decision concerning their farming activities (Harande, 2009). A study conducted by FAO (2012) on information services in rural China showed that, information service provision had a tremendous impact on rural lives. The study observed increased farmer's income as the services provided promoted agricultural production. Information services provided helped farmers make use of new techniques and varieties. Information service providers helped farmers make use of new techniques and crop varieties to improve the quality of their produce and increase their income. FAO (2012) further observed that, information service

providers distributed production information and made field visits to introduce scientific and technical knowledge to farmers, give on-the-spot advice and technical training to popularize farming techniques and introduce new techniques to raise local production levels.

Another study was conducted by Arusei (2012) in Kenya to investigate the extent to which information services offered by the livestock extension workers meet the needs of smallholder dairy farmers. The findings indicate that smallholder dairy farmers have varied information needs but provision of extension information services was not satisfactory as most of the farmer's information needs were not met. Arusei (2012) also observed that, a majority of dairy farmers lack adequate information and they rarely receive any information. Those who receive information said they get after several months.

3.6.1 Agricultural Reference Services

Reference service provides the mechanism by which the user of agricultural information can interface with the larger body of knowledge to secure what they need for their daily farming activities. According to Fisher and Kinch (1990), the service may range from the provision of desired information to the training and educating of the user to identify and locate what he/ she needs from a larger body of agricultural knowledge. Aina (2004b) asserts that information users have different information queries that need to be solved by librarians or extension officers in the case of farmers. It is a person to person information service. Aina further asserts that, reference processes involve interviewing the reader, in order to articulate the problem of the user clearly. With the advent of ICTs, reference

services has been made easier, as most of the reference queries can easily be answered through surfing the internet or searching relevant databases like AGRICOLA, AGRINET, CABI or AGRIS. In addition, Fisher and Kinch (1990) asserts that ICTs advancement have greatly improved the accessibility of the broad range of information relevant to the field of agriculture. Fisher and Kinch (1990) identified the following roles of agricultural reference librarian/ person;

- a) Providing factual agricultural information
- b) Providing user education
- c) Providing advice or counseling on issues related to agricultural information as an information expert
- d) Doing Selective Dissemination of Information
- e) Liaison with user groups.

For a reference information service provider to perform his/her work properly, he/she should have the following qualities as proposed Fisher and Kinch (1990).

- a) Must have extensive agricultural knowledge
- b) Must have an understanding of agricultural librarianship
- c) Possession of interpersonal skills to deal successfully with clients.

Extensive agricultural knowledge is important in understanding and interpreting information needs of farmers. Interpersonal skills are important but are underrated (Fisher and Kinch, 1990). To perform reference services well, an agricultural information service provider should be a good listener and skilled, yet gentle, inquisitor in order to perform the reference interview, a brief but important consultation used to determine exactly what the patron needs.

3.6.2 Selective Dissemination of Agricultural Information

This type of information service aims at providing small scale crop farmers with information that will promote their enquiry for information on their daily farming activities. It helps information service providers to sieve information from a vast amount of documents and other relevant information for farmers. This helps to save the time of farmers and information service providers (Aina, 2004b). In the process of providing Selective Dissemination of Information (SDI), agricultural information service provider seeks information from a vast amount of literature and other related sources of information focusing on utility and credibility of information as proposed by ISCM used to inform this study. They select relevant information and provide it to small scale crop farmers to address their information needs. This process is done after processing it, for instance repackaging, organizing, abstracting and assessing it before making it useful to small scale farmers as proposed by ISCM. Selective Dissemination of Agricultural information is a personalized service (Aina, 2004b). Information service providers have to communicate with small scale crop farmers, interview them and set user profile in order to be able to provide specific and relevant information based on their information needs.

3.6.3 Information Referral Services

Aina (2004a) asserts that there are situations where information users are directed to another information source or alternative information resource centre. For example, small scale crop farmers might be directed to another agricultural expert, organization or a research institute which provide agricultural information. The role of agricultural information service providers is to search for, and maintain an updated list of experts,

researchers or organizations which produce and provide agricultural information. These organizations, experts or researchers where small scale crop farmers will be referred to in case of information needs should be reliable and trustworthy with high utility and credibility as proposed by ISCM which was used to inform the current study.

3.6.4 Translation Services

Agricultural information is always accompanied by technical jargons which are difficult for small scale farmers to digest. Studies by Elia (2013), Lwoga (2010), FAO (2012) and Agyei and Osman (2014) show that one of the challenges facing small scale farmers in accessing and using agricultural information is the presence of too many technical terms. Aina (2006) suggested agricultural information repackaging in a format that would be comprehensible to farmers i.e familiar language, is a good method of providing information service to farmers. He also suggested that, information service providers should be equipped with necessary skills that would help them in information repackaging. Various literatures show that farmers understand better and utilize information which is provided in a language which is familiar to them, that is their own local languages.

3.7 The Use of Information and Communication Technologies in Providing Agricultural Information Services

Information and communication technology and its diffusion to various parts of the world, reaching a wider farming community has influenced agricultural information service provision. The advent of personal computers, the internet and mobile telephone during the last two decades has provided a much wider choice in collection, storage,

processing, transmission and presentation of information in multiple formats to meet the diverse requirements and skills of people (Asenso-Okyere and Mekonnen, 2012). Information and communication technologies have the potential to increase agricultural productivity through communicating knowledge and information to rural agricultural communities (Munyua, Adera and Jensen, 2009).

Asenso-Okyere and Mekonnen (2012) have stated that ICTs have the potential to make agricultural extension reach a much bigger population of farmers using mobile telephony, innovative community radio and television programs, mobile phones in combination with radio, video shows, information kiosks, web portals, rural tele-centers, farmer call centers, video-conference and offline multimedia CDs. ICT-based agricultural extension brings incredible opportunities and has great potential to empower farming communities (Asenso-Okyere and Mekonnen, 2012). The authors also observed that in Ghana mobile phones are used by cocoa farmers to obtain production and marketing information. A pilot program called Cocolink, launched by the Ghana Cocoa Board, provides cocoa farmers with useful information about improving farming practices, farm safety, crop disease prevention, post-harvest production, and crop marketing. In this program farmers receive information and specific answers to questions at no charge through voice and short messages in their local language or English (Martiz, 2011).

Chavula (2013) conducted a study on the role of ICTs in agricultural production in Africa. The study established that ICTs play a significant role in enhancing agricultural production. The study also established that, mobile phones had a insignificant impact while telephone and lines remain a significant contributor to agricultural growth despite the wide proliferation of mobile technologies. The findings on mobile phone technologies

differ from what other studies in Africa and other developing world have established. For example studies by Munyua, Adera and Jensen (2009), Sife, Kiondo and Lyimo-Macha (2010), Mtega (2012), Payne, Woodard, and IRIS (2010) and Ganesan et al., (2013) found out that mobile telephones have impacts on improving crop production and socio-economic conditions of farmers. Chavula (2013) observed that socio-economic characteristics such as higher education levels and skills are pre-requisite for effective improvements in agricultural production due to the adoption and utilization of new agricultural technologies.

Olaniyi, Adetumbi and Adereti (2013) investigated the level of awareness, access and relevance of information and communication technology (ICT) tools among cassava farmers in Osun State, Nigeria. The study found out that, radio, television, video recorder, audio cassette, mobile phone, computer and camera were categorized into high level of access. The study further found out that, these ICT tools were also rated as highly relevant to cassava production activities in the area of cassava stem selection, land selection, land preparation, time of planting of cassava stem; and marketing of cassava produce (Olaniyi, Adetumbi and Adereti, 2013).

Büyükbay and Gündüz (2013) investigated computer and internet use in agricultural development in rural areas in Turkey. They established that most (98.51%) computer users also used internet. Although the purpose of use varied, the main purpose was internet access followed by information storage. The study further used chi-square test, which is one of the non-parametric tests, to determine the presence of relationships between computer and internet uses and some demographic and economic factors such as age, gender, marital status, education level and income level. Büyükbay and Gündüz

(2013) findings indicate that, the age of the sampled people was a very important factor in use of both technologies. The 18-28 years age group used computers and internet much more frequently than others. It was noted that, as people got older, they used these technologies less.

Büyükbay and Gündüz further noted that gender of the sampled people was not a significant factor in computer and internet use. Additionally as the level of education increased, the frequency of computer and internet use also increased.

Nyireza and Dick (2012) established that a community radio service was the most preferred medium of communication for rural peasant farmers in Zimbabwe. The reasons given by farmers for preferring the farming radio programs were relevance to their agricultural activities, language and accents used. The farmers also preferred the radio because they contributed to the program content, it disseminates information timely and issues affecting farmers were clearly elaborated. Nyireza and Dick (2012) further noted that the farmers claimed that extension service programs did not satisfy the agricultural information needs of peasant farmers because extension workers were not enough; they did not have the means of transport to reach all households; they lacked the communication skills to interact effectively with the peasant farmers; and they lacked the motivation to carry out their work.

Munyua, Adera and Jensen (2009) established that FM radio stations and the cellular phone have become important tools in improving small-scale agriculture in rural areas of Botswana, Ghana, Kenya and Uganda. They also found out that the internet was becoming increasingly important in sharing and disseminating agricultural information

and knowledge as well as marketing of goods and services. They also noted that during the time of study, Kenya with the collaboration of the National Agricultural and Livestock Extension Programme launched a telephony information service - National Farmers Information Service (NAFIS), which provided extension information to farmers using audio format in English and Kiswahili (Munyua, Adera and Jensen, 2009). Other cellular phone applications included the provision of market information and electronic trading platforms, where farmers and traders accessed information on commodities being sold, their prices and the identity of their buyers and extension messages, such as Tradenet.biz. The study suggested the creation of 'one-stop centres' for training and for linking farmers to markets and restructured extension services that target farmer groups to improve agricultural production and assist in the exchange of knowledge and information.

Sanga, Kalungwizi, and Msuya (2013) conducted a study on the effectiveness of an impact-driven, radio-based extension service delivery system used in some rural areas of Tanzania. The findings show that rural areas, farmers have started sharing agricultural information and best practices while some have even started to change their farming practices. However, the Farmer's Voice Radio is faced by many challenges (Sanga, Kalungwizi, and Msuya, 2013). The challenges include illiteracy, poor linkages between extension officers, researchers from higher learning institutes and farmers, lack of radio and other tools related to ICT (e.g. mobile phones and desktop computer) by some farmers due to poverty. They recommended that the Government of Tanzania to liaise with SUA and other research institutions and community radio station providers to

develop local agricultural radio programs for use by the community radio station and later aired / communicated to farmers in rural areas.

3.8 Challenges Facing Agricultural Information Service Provision in Developing Countries

Agriculture is the main contributor to the economy of many developing countries. It is the mainstay of many communities in developing countries and contributes significantly to their national GDP. Agricultural information service provision is central to any country and community which depends on agriculture. Most studies in developing countries have identified several challenges that hamper the provision of agricultural information services to farmers. Harris (1990) identified and categorized challenges affecting agricultural information transfer into three groups, namely intellectual, organizational and cultural. According to Harris (1990), intellectual problems are associated with academic issues including inadequate university and college programmes to train agricultural information service providers. Agricultural institutions responsible for training extension officers and librarians do not have tangible curriculum on information service provision. Harris (1990) further argues that the distance between different specialists within the agricultural information profession, poor coordination and communication among agricultural information professionals as characterized by overlap in service areas and information provided, hamper agricultural information transfer from research institutions to the farming community.

Organizational problems according to Harris (1990), are concerned with inter-institutional agricultural information management, from creation of the information to dissemination and storage. These challenges affect agricultural information dissemination

whether internally or externally. For example, libraries in most developing countries are located in urban areas away from rural users most of whom are farmers. Similarly, most information service providers and researchers are located in urban areas. Harris (1990) further lamented that usually, there is no coordination or communication between planners of agricultural development and information service providers. Sometimes, information service providers like librarians cannot explain the influence of library and information services in agricultural development. According to Harris, this is partly due to the fact that low status of libraries and librarians prohibit any meaningful conversation between librarians and decision makers.

Cultural problems according to Harris (1990), are concerned with the production of agricultural information sources. For example, agricultural research findings are commonly published in reports and occasional papers rather than in journals and books. This creates a situation in which information specialists must deal with the problem of collecting and disseminating non-conventional or grey literature. Harris further argues that, non-conventional literature is not accorded the status of full bibliographic treatment in some of the agricultural databases. Furthermore, the distribution of non-conventional literature at national level is inadequate. French (1990) argues that translating agricultural information into local languages for farmers presents another barrier to successful information service provision and application to farmers.

According to French (1990), agricultural information provision is complicated due to the nature of agriculture itself as a discipline. Unlike physical and chemical technologies, the practice of agriculture is highly dependent on location. Users of agricultural information are therefore extremely sensitive to their geographic differences. Issues of climate, soil,

economics, and national policy are critical to specific applications of information. According to French (1990), agricultural information is complicated because agriculture is interdisciplinary encompassing the life sciences, physical sciences, and engineering. Agriculture is much broader than the life sciences, intersecting social sciences. Second, agriculturists are dependent on tremendous amounts of non-bibliographic, non-research data, some of it of a very timely nature such as price and weather information. Lastly, French argues that, unlike medicine, for example, where the practitioners may be fairly conversant with the language of research, there are special requirements for the treatment and presentation of information to diverse groups of agriculturists. Information must even be packaged for illiterate practitioners.

Discussing factors hindering agricultural information service provision in the Southern African Development Community (SADC) region, Thapisa (1997) argued that agricultural information provision is characterized by inadequately developed and poorly stocked libraries and documentation centres, shortage of qualified and trained information professionals and lack of clarity about the status of library staff working in agricultural information services, particularly in the structure of agricultural information. Arguing in the same line, Aina (1991b) commented on the perennial challenge of skilled library personnel, arguing that in order for agricultural librarians to function effectively in the provision of information to user populations, they need to possess skills in agricultural information handling.

A study conducted in Tanzania by Dulle et al., (2001), revealed that the majority of agricultural researchers felt that information provision by many agricultural libraries in Tanzania was inadequate. Among the challenges faced by libraries were: inadequate

comprehensive journal collections; outdated information; inadequate information technology facilities (internet, CD-ROMs); poor information access skills and book mutilation. Due to the poor collections, Dulle, et al., (2001) found that the respondents (researchers) resorted to libraries outside the country or international organizations to address their information needs.

Meyer and Boon (2003) noted that information service provision through public extension offices in South Africa was neither focused nor targeted in addressing farmer's information needs. They further noted that extension staffs were generally not well trained in agricultural information service provision. As a result, these important channels of providing agricultural information to farmers prove to be the weakest link in agricultural information dissemination (Mchombu, 1993).

Aina (2007) summarized the following problems facing agricultural information dissemination in Africa: Inadequate financial power of farmers, illiteracy and majority of the farmers cannot read or write in any language, farmers in Africa live in areas where there is lack of basic infrastructure, such as telephone, electricity, good road network, pipe borne water among others. Aina further noted that, few extension workers, for instance, the ratio of agricultural extension workers to farmers is low, poor radio and television reception signals in most village communities in Africa. These problems were also observed by Munyua, Adera and Jensen (2009), Siyao (2013), Lwoga, Ngulube and Stilwell (2010) and Elly and Silayo (2013).

Aina (2007) also noted that some rural farmers interviewed frowned at the attitude of some extension workers who visit their area. According to these rural farmers'

interviewees, some extension workers demand some money before they can give out vital agricultural information. Aina lamented that, this attitude of some extension staff will never help the rural farmers to achieve optimal farm yield. The ISCM used to inform the current study also show that, information users, in this case small scale crop farmers and information service provider's feelings and attitude may affect agricultural information communication between the two parties.

Rees et al., (2000) noted that inadequate human resources and poor local leadership were seen as the most serious barriers to effective information flow by farmers in Kenya. The extension officers reported lack of resources to mobilize communities, and poor communications with researchers leading to information distortion. Rees and others further noted that neither the communities nor the extension personnel themselves were satisfied with the quality or frequency of interactions. The main problem perceived by farmers in information flow was inadequate human resources, both in terms of numbers and knowledge/ skills. Similar observation was made by Sanga, Kalungwizi, and Msuya (2013) and Siyao (2012) in Tanzania.

Although agricultural information service provision in Africa is challenging, some of the problems may be eliminated or completely removed. Deliberate efforts should be made by all stakeholders involved in agricultural information service provision. Obidike (2011) suggested that; to overcome the problems; good access roads connecting rural areas should be constructed, radio and television antennas should be installed at strategic positions for better radio and television signal receptions, Obidike further suggested that, electric transformers should be mounted in villages/communities, agricultural information programmes on radio should be aired between 2pm and 3 pm when the

farmers would have come back from their farms, provision of community rural electrification. Obidike (2011) went further and suggested that agricultural information programmes on radio and television should be broadcasted in local languages and building of community libraries in towns and villages.

Omogor (2013) suggested that information agents and information service providers should study the users in order to discover their information needs and use the best acceptable method to disseminate information to their audience. Omogor also suggested that, functional literacy should be encouraged among rural people. This will enable them learn how to read, write and acquire information using multi-channels. Information providers should recognize the services of libraries and Librarians, and engage them in the dissemination of information in rural areas. Rural libraries should be furnished with radios, television and standby generators for the use of electronics. This will enable librarians to acquire and disseminate current information for rural people (Omogor, 2013).

Harris (1990) summarizes the challenges facing agricultural information service provision in developing countries and in particular sub-Saharan Africa as follows; manpower inadequacy, low working morale, inadequate training in information service provision, inadequate information dissemination equipments, agricultural information service providers are geographically isolated by long distances and territorial borders, poorly developed information infrastructure , agricultural information acquisition tools such as directories, indexes and abstracts are not widely available, when there is free or highly subsidized agricultural publications like the INASP courtesy, there is lack of information about where and how to obtain these information. Another problem is

information illiteracy among information service providers themselves and their users (Harris, 1990).

3.9 A Review of Related Empirical Studies from Tanzania

Agricultural research activities and innovations have been conducted over the years leading to the generation of more and more agricultural information. This situation has contributed to an overflow of agricultural information without ensuring that the information generated reaches the targeted audience. Several researches have been conducted worldwide on different aspects in the agricultural sector. This section will review empirical studies conducted in Tanzania which are related to the current study. They include studies done by Chillimo (2008), Mtega (2012), Elly and Silayo (2013), Mwakaje (2010), Mtega and Ronald (2013), Lwoga, Stilwell and Ngulube (2011) Lwoga (2010), Matovero (2008) and Elia (2013).

Elly and Silayo (2013) studied agricultural information needs and sources of rural farmers in Iringa, Tanzania. The findings showed heterogeneity within farming communities in terms of information needs and information sources which requires a consideration by intervention programs. For example, the study found out that there was a significant difference between the two wards involved in information needs on crop and livestock husbandry as well as information on value addition. Although studies by Lwoga, Stilwell and Ngulube (2011), Mwakaje (2010) and Mtega (2012) established that there is a knowledge gap with regard to the rural farmers' information needs and their sources. These studies also found out that rural farmers' information needs were not met.

Small-scale farmers' information needs are dynamic in terms of time and space. As internal and external environmental variables change, so are the information needs of farmers. For example, farmers may change crop types, land for cultivation, fertilizers, and market for crop products, these new changes requires current information to make good informed decisions. Furthermore, the agricultural sector in Tanzania has and is still undergoing changes associated with agricultural policies and programmes. These changes affect farmer's information needs, seeking behavior and the sources used in trying to address the information gap directly or indirectly. Several studies have been conducted in the country on farmers information needs. The scholars agree that, farmer's information needs are not met and that most often farmers fail to make good informed decisions due to inadequate information (Lwoga, Stilwell and Ngulube, (2011), Mwakaje (2010) and Mtega (2012).

Elly and Silayo (2013) recommended that the information producers should identify proper mechanisms to disseminate information among rural farmers. Due to the dynamic nature of the information needs of farmers, Elly and Silayo (2013) called for a continuous process of research to identify them.

Mtega and Ronald (2013) conducted a study on the state of rural information and communication services in Tanzania using a meta-analysis methodology where studies on information services in rural areas in Tanzania were analyzed, compared and contrasted. The findings indicated that, rural people need different types of information for their day to day activities. Information needs varied from one individual to another due to different social economic profiles and demographic characteristics. They also found out that, information needs vary from one time (season) to another, depending on economic or

social activities being undertaken. Mtega and Ronald (2013) further noted that information was provided through village leaders, agricultural extension officers, neighbors and friends, family/parents, radio, TV and internet. Other sources were books, brochures, films, leaflets, newspapers and magazines. These findings concur with those found by Sanga, Kalungwizi, and Msuya (2013). Mtega and Ronald also noted that non-governmental organizations, farmers groups, personal experience, agricultural inputs supplier, posters and agricultural shows were used as agricultural information sources in rural areas. These findings concur with studies by Lwoga (2009), Shetto (2008), Mtega (2012) and Bernad, Dule and Ngalapa (2014). It was further noted by Mtega and Ronald (2013) that, social group gatherings, religious leaders, women's meeting, livestock headers, researchers, churches and mosques were used in the provision of information services.

Despite having various information needs and using various sources of information, Mtega and Ronald (2013) and Bernad, Dule and Ngalapa (2014) observed that, information provided did not meet the needs of rural communities. It was further noted that, most rural areas in Tanzania had inadequate information services. In case information services were provided, they were delivered late or irrelevant information was provided (Mtega and Ronald, 2013).

Elia (2013) investigated how access to and use of agricultural information contributed to farmers' adaptation to climate change and variability in the semi-arid Maluga and Chibelela villages of central Tanzania. The study found out that farmers had a problem with accessing and using climate information. They perceived scientific information on weather as unreliable and untimely and were turning to indigenous knowledge (IK) to

predict weather patterns. Elia further found out that there was inadequate and inaccurate information supplied to farmers on agricultural inputs. Farmers also criticized the inaccurate information they received from the Tanzania Meteorological Agency. Elia further found out that, information on climate change and variability was not packaged well for the farmers.

A study by Mtega (2012) in Kilosa district, Morogoro region found out that there was a strong need for information of all types. Most of the information needed was related to day-to-day problems. It was also found out that each individual respondent had specific information needs related to specific individual problem. Mtega also found out that radio, mobile phones, television sets and face-to-face communication were frequently consulted sources of information. Mtega (2012) further noted that despite the availability of such information sources, information accessibility was not reliable, and in most cases the sources provided information that was inadequate for decision-making and consequently information needs of the rural communities were not met. The study recommends frequent rural information needs assessments before providing information services to rural areas.

Another study conducted by Lwoga, Stilwell and Ngulube (2011) on access and use of agricultural information and knowledge in Tanzania found out that the information needs and information seeking patterns of farmers were location specific due to slight variations in development, agricultural activities and agro-ecological conditions in the surveyed communities. The major sources of information for farmers were predominantly local such as neighbours, friends and family, followed by public extension services. Lwoga, Stilwell and Ngulube (2011), also observed that apart from radio and cell phones,

advanced technologies (i.e. internet and email) were used at a low rate despite their existence in the communities. They also found out that extension officers were important sources of information and knowledge, though farmers were dissatisfied with the frequency of their interactions.

Lwoga, Stilwell and Ngulube (2011) also noted that, sources of knowledge varied across the districts. For instance, public extension officers were main sources of agricultural information and knowledge in Songea Rural (15.5%;28), Mpwapwa (14.9%;27) and Moshi Rural (14.4%; 26). Cooperative unions were important sources of knowledge in Kasulu (11.6%; 21), Songea Rural (10.5%; 19) and Moshi Rural (8.8%; 16). Agricultural input suppliers were important sources of knowledge in Moshi Rural (12.7%; 23) and Kasulu (11.6%; 21), while farmer groups and NGOs were significant in Songea Rural and Moshi Rural. However, despite having these sources of information, it was found out that, only a small amount of agricultural information was accessible to rural farmers, despite the large body of knowledge that exists in research institutions, universities, public offices and libraries. This situation was largely attributed to the weak linkages between research, extension, not for profit organizations, libraries and farmers and thus these technologies have neither reached nor been adopted by their intended beneficiaries to improve their farming activities in developing countries including Tanzania (Lwoga, Stilwell and Ngulube 2011).

Lwoga (2010) conducted a study on bridging the agricultural knowledge and information divide in selected telecenters and rural radio in Tanzania. The study found out that the use of internet across the country is very low as compared to mobile phones. For example, it was found out that, there was low use of internet and e-mails for agricultural knowledge

acquisition and dissemination. It was also found out that, cell phones were becoming popular among farmers in communicating with telecenter operators and rural radio in case of emergency or advice regarding farming activities. She further observed that few telecenters and community radio stations had specified services that focused on meeting farmers' information and knowledge needs. Lwoga further noted that, despite the fact that almost all telecenters provided internet services, few of them used internet to deliver agricultural knowledge and information to farmers. The study findings showed that out of eight surveyed telecenters, two used internet to deliver agricultural knowledge and information to farmers across the surveyed districts.

Mwakaje (2010) studied the impact of information and communication technology (ICT) on rural farmers' market information access in Rungwe District. The findings show that market information sources were still dominated by the farmers themselves, relatives and traders. The findings further show that, a considerable number of farmers (23%) used ICT to access market information. The study further established that, the use of ICT by farmers was significantly related to the quantity of crops produced ($P < 1\%$), income level ($P < 1\%$), type of crop marketed ($P < 5\%$) and gender ($P < 5\%$). The findings further show that, farmers who used ICT obtained higher prices ($P < 1\%$) than farmers who did not use ICT for accessing market information. The use of ICT was constrained by costs, accessibility and reliability.

Chillimo (2008) examined the relationship between ICTs and sustainable livelihoods in selected rural areas of Tanzania where most small-scale crop farmers reside. The study established that, there was greater uniformity across socio-economic groups and gender on the use of mobile phones while telecenter users were generally young. The findings

further show that telecentre managers were not aware of the information needs of the communities they serve and therefore they were not in a position to meet such information needs.

Chilimo (2008) found out that old ICTs such as radio and television were not universally available among surveyed respondents as sources of information. Several challenges were identified, for example, there was inadequate road infrastructure which makes it difficult for farmers to transport their produce to markets outside the districts, even in cases where farmers were provided with information on the availability of those markets. Inadequate electricity supply hindered large-scale uptake of ICTs in rural areas leading to urban rural digital divide. The current study was on agricultural information service provision to small scale farmers in Rukwa region. Various studies reviewed focused on information needs and seeking behavior of various groups of farmers giving much emphasis on sources used to access information. Reviewed studies on the aspects of information needs and seeking behavior of farmers reveal that, agricultural information needs were unmet.

Despite having a vast amount of agricultural information, studies have shown that, it is scattered, undocumented, uncoordinated and most of the time unnecessarily duplicated. This is probably because information service provision was undermined and given very little substantial and detailed study attention. This study therefore breaks the ground by providing a link between agricultural information and its associated information services for enhancing crop production to small scale farmers.

3.10 Chapter Summary

This chapter reviewed several theories / models and studies related to the current study. The ISCM which combines the aspects of information seeking and communication seemed to be appropriate for the current study and it was therefore adopted. Reviewed literature was arranged thematically into various theme and subthemes focusing on research objectives, research questions and study assumptions. Reviewed studies have shown that farmers are still lagging behind in their crop production and most of them in developing countries and are still extremely poor despite their lifetime hard work in farming activities. Literature show that their information needs were not met probably due to lack of consistency and appropriate information service provision strategies. This study tried to fill the gap by investigating agricultural information service provision to small scale farmers with a view to proposing a model for effective information provision to facilitate crop production.

CHAPTER FOUR

RESEARCH METHODOLOGY

4.1 Introduction

This chapter describes the research methodology used in this study. The research approach for the study is described followed by the presentation of the design appropriate for the study. Specifically, the section outlines the research paradigm, methodology, design, the study population, sampling procedure, data collection procedure and instruments, data analysis, validity, reliability, and research ethics.

4.2 Research Methodology

Research methodology and research methods are two distinctive concepts. Analogically, a methodology is a domain or map (Wahyuni, 2012). It refers to a model to conduct a research within the context of a particular paradigm. According to Teddlie and Tashakkori (2009), research methodology refers to a broad approach to scientific enquiry specifying how research questions should be asked and answered. It comprises the underlying sets of beliefs that guide a researcher to choose one set of research method or another (Wahyuni, 2012). On the other hand, research methods refer to a set of specific strategies, procedures, tools and techniques to gather and analyze data. They are specific strategies and procedures for implementing research design including sampling, data collection, analysis and interpretation of the findings (Teddlie and Tashakkori, 2009). The most common definitions suggest that methodology is the overall approach to research linked to the paradigm or theoretical framework while the method refers to systematic modes, procedures or tools used for collection and analysis of data (Teddlie

and Tashakkori, 2009). Research methods are independent from research methodologies and research paradigms, for instance one method can be used in different research methodologies.

4.2.1 Research Paradigm

Various scholars worldwide have defined the paradigm concept differently with overlapping meanings. For example, Neuman (2014) defines it as a general organizing framework for theory and research that includes basic assumptions, key issues, models of quality research, and methods for seeking answers. It is a set of beliefs, rules and standards, procedures and practices that guide the world view of a group of researchers. Guba (1990) defines it as a perspective about research held by a community of researchers that is based on a set of shared assumptions, concepts, values, and practices. More simply, it is an approach to thinking about and doing research. The term has also been used to describe how scientists in a particular discipline determine what should be studied, how it should be studied, how it should be done, and how the attained findings and meaning are assigned to them. In a nutshell, a research paradigm is a comprehensive belief system, world view, or framework that guides research and practice in a field (Guba and Linkoln, 1994; Teddlie and Tashakkori, 2009). Paradigm differs from one researcher to another on the basis of ontology, epistemology, axiology or methodology (Krauss, 2005).

Ontology concerns the nature of reality and being. More specifically, ontology addresses the following question: What is the form and nature of reality and what can be known about that reality? (Krauss, 2005). For example, if a real world is assumed, then what can

be known about it? How things real are and how things real work? (Guba and Lincoln 1994) *Axiology* concerns the role of researcher values in the scientific process. The term *epistemology* comes from the Greek word *epistêmê*, their term for knowledge. In simple terms, epistemology is the philosophy of knowledge or how we come to know (Troachin, 2000). Epistemology poses questions such as: What is the relationship between the knower and what is known? How do we know what we know? What counts as knowledge? Creswell (2014) adds that epistemology is concerned with the relationship between the “knower” (the research participant), the “would-be knower” (the researcher) and what can be known (The research topic) (Guba and Lincoln, 1994). It is the beliefs on the way to generate understand and use the knowledge that is deemed to be acceptable and valid (Wahyuni, 2012). *Methodology* refers to strategies for gathering, collecting, and analyzing data (Tracy, 2013; Newman, 2014). It seeks to answer questions like, how can the inquirer (would be knower/ researcher) go about finding out whatever he/she believes can be known? (Guba and Lincoln, 1994).

Different paradigms lead researchers to ask different questions, use different methods to study those questions, analyse data in different ways and draw different types of conclusions from the data. For many decades scholars have been debating on which paradigm to adopt or which one is the best among positivists, post-positivists, constructivists, critical analysts and pragmatists. The next subsection briefly discusses the positivist, constructivists and pragmatists. It will then discuss the paradigm adopted for this study.

4.2.1.1 Positivists, Constructivists and Pragmatic Paradigms

The approach to thinking about and doing research differs on the basis of the opposing worldviews or belief systems that are reflected and chosen to guide the decisions that researchers make. Philosophically, researchers make claims about what is knowledge (ontology), how we know it (epistemology), what values go into it (axiology), and the processes for studying it (methodology). Based on these knowledge claims, there are various paradigms evolved like positivists/scientific, post-positivists, constructivist/interpretivist, advocacy participatory, critical analysts, pragmatism among others. (Creswell, 2003).

Positivists emphasize that there is an objective, external world that exists independently of human perception and are concerned with facts and thorough empiricism, that is checking ideas against the world (Creswell, 2002). They maintain that there is a separate and distinct social reality out there, separated from those who experience it and waiting to be discovered and reported (a position known as *naïve realism*). They also claim that, knowledge consists of verified hypotheses that can be accepted as facts or laws (Guba and Lincoln, 1994; Creswell, 2003; Teddlie and Tashakkori, 2009). In the positivist paradigm, the object of study is independent of researchers; knowledge is discovered and verified through direct observations or measurements of phenomena; facts are established by taking apart a phenomenon to examine its component parts (Creswell, 2014). Positivists emphasize dualism and objectivism. That is, the researcher/ would be knower, the research participant / knower and topic/ what can be known are assumed to be independent of one another (dualism), and by following rigorous, standard procedures, the participant and topic can be studied by the researcher without bias (objectivism).

Furthermore, positivists hold that the investigator can study her or his research participants without influencing them and vice versa (Guba and Lincoln, 1994; Creswell, 2003; Teddlie and Tashakkori, 2009). Finally, replicated findings are considered “true” and enhance theory verification evidence. Positivists are generally quantitative in nature applying close-ended questionnaires, structured interviews and systematic observation as tools for data collection. In most cases positivists use large sample size with multiple cases to generalize their findings (Symonds and Gorard, 2011). Creswell (2002) further asserts that this approach is inclined towards analytical statistical analysis such as hypothesis testing, random sampling, aggregation, precision and measurement.

The constructivist/ interpretivists approach has been developed from constructivism, which is a philosophy of learning. According to interpretivists, there is no one reality; it is considered that there are multiple realities. Reality, according to the constructivist position, is subjective and influenced by the context of the situation, namely the individual’s varied backgrounds, assumptions, experience and perceptions, the social environment, economic condition, political and the interaction between the individual and the researcher (Teddlie and Tashakkori, 2009; Symonds and Gorard, 2011; Tracy, 2013). Because these human perspectives and experiences are subjective, social reality may change and can have multiple perspectives (Neuman, 2011). To understand the social world from the experiences and subjective meanings that people attach to it, interpretivist researchers favor to interact and to have a dialogue with the studied participants (Guba and Lincoln, 1994), hence qualitative in nature. Constructivists/ interpretivists maintain that the researcher’s values and lived experience cannot be divorced from the research process. Values are seen as ineluctable in shaping inquiry outcomes (Tracy, 2013).

Because meanings are constructed by human beings as they engage with the world they are interpreting, constructivists use qualitative methods with open-ended questions so that participants can express their views. They also use interviews, observation and focus group discussion (Creswell, 2003). They seek to understand the context or setting of the participants through visiting this context using a small sample size with a single or small case study in gathering information.

The dominance of the mono method era during the 1960s and the paradigm wars as termed by Teddlie and Tashakkori (2009) resulted into the new era in which researchers were able to use both qualitative and quantitative research methods in 1990s. This led to the emergence of a third set of beliefs (the third way), the pragmatic paradigm. This research paradigm refuses to join the 'paradigm war' between the positivist and interpretivist research philosophies (Tashakkori and Teddlie, 2009). Hence, a mixture of ontology, epistemology and axiology is acceptable to approach and understand social phenomena (Tashakkori and Teddlie, 2009; Johnson and Onwuegbuzie, 2004). The pragmatic rule posits that the value of any given research methodology is based solely on its empirical and practical efficacy (Johnson and Onwuegbuzie, 2004). Under this framework, researchers should choose methods that offer the best opportunities for answering the research question(s) under investigation.

According to pragmatists, what is ultimately important is what works and solution to the problem. Thus, the research design should be planned and conducted based on what will best help to answer the research questions. According to pragmatists, theories, programs or actions that are demonstrated to work for particular groups of people are the ones that we should view as currently being the most valid for those people. They advocate the use

all approaches available to understand the problem (Creswell, 2009; Teddlie and Tashakkori, 2009; Johnson and Onwuegbuzie, 2004). Pragmatic stance distinguishes the approach from purely quantitative approaches that are based on positivists paradigm and purely qualitative approaches that are based on interpretivism or constructivism paradigm (Johnson and Onwuegbuzie, 2004; Denscombe, 2008; Feilzer, 2010). Considering the arguments from Cherryholmes (1992), Morgan (2007), and his own arguments, Cresswell (2014), summarizes the pragmatic assumptions as follows;

- a) Pragmatism is not committed to any one system of philosophy and reality. Individual researchers have a freedom of choice. The researcher is free to choose the methods, techniques, and procedures of research that best meet the needs and objectives of the study.
- b) Researchers are not bounded to only quantitative (positivists paradigm) or qualitative (Constructivist paradigm). Instead, they can use both, quantitative and qualitative methods to best answer research inquiry.
- c) Pragmatists do not see the world as an absolute unity. In a similar way, researchers look to many approaches to collecting and analyzing data rather than subscribing to only one way (e.g., quantitative or qualitative).
- d) Truth is what works at the time; it is not based in a dualism between reality independent of the mind or within the mind. Therefore researchers may use both quantitative and qualitative data because they work to provide the best understanding of a research problem. In doing so, researchers need to justify why they are using both quantitative and qualitative methods in the first place (Creswell, 2003).

- e) Pragmatists agree that, research always occurs in social, historical, political and other contexts. To understand the insights of what happens in these contexts, researchers need to use both quantitative and qualitative research methods.
- f) Lastly, Pragmatic research paradigm opens doors for multiple methods, different world views, assumptions as well as different forms of data collection and analysis.

Based on the above arguments, this study adopted a pragmatic paradigm in studying agricultural information service provision to small scale crop farmers. Pragmatic paradigm has been chosen because it sidesteps the controversial issues of truth and reality, accepts philosophically, that there are singular and multiple realities that are open to empirical inquiry and orients itself toward solving practical problems in the “real world” (Creswell and Plano Clark, 2007). It allows the researcher to be free of mental and practical constraints imposed by the forced choice dichotomy between positivism and constructivism and researchers do not have to be the prisoner of a particular research method or technique. Most importantly, pragmatic researchers are more likely to be cognizant of all available research techniques and to select methods with respect to their value for addressing the underlying research questions, rather than with regard to some preconceived biases about which paradigm is hegemony in social science research (Onwuegbuzie and Leech, 2004). The pragmatic paradigm puts the research problem as central and applies all approaches to understanding the problem (Creswell, 2003). With the research questions as the central focus, data collection and analysis methods which are most likely to provide insights into the question were chosen.

Despite the fact that some scholars are still skeptical in adopting the pragmatic research paradigm, and the fact that it has some weaknesses just like other research paradigms, this study found it appropriate in studying agricultural information service provision to small scale crop farmers in Rukwa region. Pragmatic approach helped the researcher to use both quantitative and qualitative methods to the study and use the combination of methods and ideas that helped to best frame, address, and provide answers to research question (Creswell & Plano Clark, 2007; Onwuegbuzie and Leech, 2004). Pragmatism also focus on what works best in finding the reality of research questions and bringing out what will be useful and beneficial with high utility to the society being studied. Feilzer (2010) insists that pragmatism does not require a particular method or methods mix and does not exclude others. It aims to interrogate a particular question, theory, or phenomenon with the most appropriate research method (Onwuegbuzie and Leech, 2004).

By using both quantitative and qualitative methods this study considered multiple viewpoints, perspectives, positions, and standpoints with regard to agricultural information service provision to small scale crop farmers. The use of quantitative and qualitative research helped to develop a conceptual framework, to validate quantitative findings obtained from questionnaire by referring to information extracted from the qualitative findings obtained from interviews and observation. Quantitative research typically is motivated by the researcher's concerns, where as qualitative research is often driven by a desire to capture the participant's voice (Onwuegbuzie and Leech, 2004). The current study was able to merge these two emphases within a single investigation. Creswell (2009) is of the view that, the inclusion of quantitative data can help

compensate for the fact that qualitative data typically cannot be generalized. Similarly, the inclusion of qualitative data can help explain relationships discovered by quantitative data. In the context of this study, quantitative techniques were used in sampling the population, data collection using questionnaires and in data analysis using statistical measurements. Statistical tests were carried out to test the relationships between different variables and how these variables affected agricultural information service provision to small scale crop farmers in the region. The findings were presented in frequencies, tables and figures in chapter five of this study. In trying to understand the real world in which information is provided to small scale crop farmers in Rukwa region, interviews and non-participant observation were used to collect qualitative data. Observation was made on aspects of information provision and sought to discover patterns that were used to explain the study at hand. Various interpretations relating to the provision of information to farmers in their setting were analyzed, the gaps were identified which were then used to propose proper a model of effective information service provision to small scale crop farmers in Rukwa region.

4.3 Research Design

While many scholars acknowledge three types of research design namely, quantitative, qualitative and mixed research design, the widely acceptable research designs revolve around quantitative and qualitative (Cresswell, 2014; Teddlie and Tashakkori, 2009). According to Denzin and Lincoln (2005), a research design describes a flexible set of guidelines that connect theoretical paradigms first to strategies of inquiry and second to methods for collecting empirical materials. It provides the plan of action that links the philosophical assumptions, strategies of inquiry, and specific methods (Creswell, 2003).

It also represents a structure that guides the execution of a research method and the analysis of the subsequent data with a view to reaching conclusions about the research problem (Bryman, 2004).

Most studies tend to use quantitative or qualitative approaches to explore the unexplained phenomena as well as those which were previously explained but misunderstood (Welman, Kruger and Mitchel 2005; Creswell 2003). However, it is argued that to use only a quantitative or a qualitative approach falls short of major approaches being used in the social and human sciences. In studying agricultural information service provision to small scale crop farmers to enhance crop productivity, the use of both quantitative and qualitative research methods was found suitable. Although both quantitative and qualitative methods were employed in the current study, quantitative methods were taken as a dominant research approach. Creswell and Plano Clark (2007) argue that one may use both quantitative and qualitative approaches equally or one research approach may be dominant over the other depending on the nature of the study and the instruments used to collect data. Feilzer (2010) emphasizes the use of both qualitative and quantitative approaches for the purpose of understanding a particular research area. Since there is no single method without weaknesses, the two methods were used. This helped to neutralize the possibilities of flaws of one method and strengthening the benefits of the other for the better research results.

The two paradigms were also used so as to achieve convergence of the results obtained on issues related to information provision to small scale crop farmers. As advocated by the research paradigm (Pragmatism), considerations were on what worked best to answer the study objectives and research questions. The ultimate aim was to come up with the

findings which were fruitful, useful, and applicable with high utility to small scale crop farmers as advocated by ISCM used to inform this study.

4.3.1 The Quantitative Approach

Quantitative approach underlies the natural-scientific method in human behavioral research and holds that research must be limited to what can be observed and measured objectively (Welman, Kruger and Mitchel, 2005). Given the nature of this study, research objectives, research questions and the pragmatic stance adopted by this study, the quantitative approach was found to be more appropriate and consequently become the dominant research approach. The current study assessed the provision of agricultural information services to small scale crop farmers in Rukwa region with a view to proposing a suitable model for information service provision to farmers particularly in rural areas in African countries. Quantitative approach was selected to be the dominant research approach because it focuses on quantification of data, uses large sample size and stresses the measurement and analysis of casual or correlation among variables (Creswell, 2009).

This study employed quantitative approach in sampling techniques as well as in data analysis and presentation. Quantitative approach was also used to cross tabulate variables such as the education level, age, occupation, income level and gender and determine the correlation among variables related to information provision. The quantitative approach was useful in answering questions about the relationships among measured variables and the statistical analysis of relationships between these variables with the purpose of explaining and predicting phenomenon related to agricultural information service provision. Quantitative techniques were also employed in this study because they add

precision in measurements; facilitate economy of description, validate statements; explain causality and explain relationship among variables and increase accuracy in prediction and objectivity in social research as observed by Mwanje (2001). However, quantitative approach has been criticised by scholars that when one tries to elicit an in-depth understanding of a problem the use of a quantitative approach may not be suitable. Similarly, quantitative research continues to be criticized for difficulties in randomly assigning participants into experimental conditions and consequently is not considered an appropriate method in studying human behavior. However, these weaknesses were minimized by the use of some aspects of qualitative research methods.

4.3.2 The Qualitative Research Approach

Qualitative research focuses on naturally occurring ordinary events in natural settings reflecting real life situations and data is collected in close proximity to a specific situation. Qualitative researchers are more concerned about issues of richness, texture and feeling of raw data because their inductive approach emphasizes developing insights and generalizations out of data collection (Neuman, 2011). A Qualitative method encompasses use of data collection techniques that include observation, interviews and documentary review (Mugenda and Mugenda, 1999). Cresswell (2014) asserts that descriptive research design (interpretivist) or in other words qualitative research approach is used when data collected describes persons, organizations, settings or phenomena. It refers to what, how, when, and where of things – its essence and ambience. He adds that qualitative research refers to the meanings, concepts, definitions, characteristics, metaphors, symbols, and descriptions of things.

Qualitative research design was used to collect data that established small scale crop farmer's opinions, attitudes and perception towards information service provision and the existing information systems/ sources and whether these systems/ services address their information requirements. To obtain the above information from small scale crop farmers, open ended questions were used. In-depth interviews were used to solicit information from the key informants. The data collection instruments (interviews and questionnaire) were supplemented by observations and reviewing of relevant documents. However, qualitative research approach is criticized by scholars for lack of objectivity, scientific rigor and if not well planned may hinder the generalizability of the findings and hence affecting validity and reliability of the study. Due to these weaknesses, research objectives, research questions, and research paradigm adopted for the study, the dominant quantitative method with some aspects of qualitative research methods were used in the current study.

4.3.3 Rationale for Using Qualitative and Quantitative Research Approaches

This study adopted the dominant-less-dominant (embedded) design as described by Creswell (2014). In this design, the researcher conducts the study within a single dominant approach, with a small component of the overall study playing a secondary role (Creswell, 2014; Creswell and Plano Clark, 2007). The quantitative research paradigm was dominant for the overall design of the study, while the qualitative research paradigm was used as the less dominant design. According to Creswell and Plano Clark (2007), the dominant-less-dominant model can be carried out sequentially or concurrently.

In the present study, both quantitative and qualitative data were collected concurrently in a single phase of data collection. A quantitative approach through the use of questionnaires was employed to collect large amounts of quantitative data from small scale crop farmers, while qualitative data was collected through interviews conducted to key informants, who were selected small scale farmers, information service providers (extension officers and librarians), and DALDOs. Non-participant observation technique was used to supplement data collected from both approaches.

The use of quantitative and qualitative approach in this study enabled the researcher to build a more holistic picture of agricultural information service provision to small scale crop farmers. It was also useful when comparatively little research has been conducted on the phenomenon of study. This study was on the provision of agricultural information services to small scale crop farmers in Rukwa region where very little or no studies have been done on the same issue in the region. Thus, pragmatic approach, using a dominant quantitative and a less dominant qualitative research approach seemed to be relevant to the current study. This approach ensured that the results were not methodological artifacts and allowed the researcher to compensate for the weaknesses of one method with the strengths of another as suggested by Mills, Durepos and Wiebe (2010).

The other rationale is based on the fact that quantitative approaches are best suited for explanatory research, while qualitative approaches are more appropriate for descriptive oriented studies (Mwanje, 2001; Kothari, 2004). The quantitative approach was used to gather data for quantification of variables, to explain causal relationships, to permit generalization, and to enable predictions about information service provision to small scale crop farmers. The qualitative research approach was applied to identify and explain

the farmers' behavior, attitude, feelings and opinions regarding various aspects of information service provision. It uncovers small scale crop farmers' information needs and seeking behavior. It also enabled the researcher to understand how small scale crop farmers in the region make sense of their experience to agricultural information and how they use it to improve crop production. Additionally, the complexity of societies cannot be understood from a single perspective, this is the reason why multiple perspectives have become important elements in modern social science inquiry.

4.4 Research Method

This study adopted a survey research method. Survey research method is the most widely used data gathering technique in sociology and the social sciences (Sarantakos, 1998; Mills, Durepos and Wiebe, 2010). Surveys are mainly used in studies that have individual people as units of analysis (Babbie, 2004). The current study involved small scale crop farmers, information service providers (Extension officers and Librarians) and District Agricultural and Livestock Development Officers (DALDOs) as units of analysis. Creswell (2014) describes a survey as a set of orderly procedures specifying what information is to be obtained, from whom and how. It provides a quantitative or numeric description of trends, attitudes, or opinions of a population by studying a sample of the population. The purpose of survey research is to gather and analyze information by questioning the entire research population or individuals who are representative of the research population, to assess the relative incidence, distribution, and interrelationships of naturally occurring variables (Pickard 2007; Powell, Connaway and Silipigni, 2004).

Surveys are characterized as either cross-sectional, longitudinal and trend or prediction studies (Cohen, Manion and Morrison, 2007; Leedy and Omrod, 2005). Collectively,

longitudinal, cross-sectional and trend studies are sometimes termed developmental research because they are concerned both in describing what the present relationships are among variables in a given situation and accounting for changes occurring in those relationship over time. Longitudinal studies are difficult to carry out as they demand substantial resources and time since the same set of variables have to be studied over a period of time (Robson, 2002). Trend studies essentially look at how concepts change over time; cohort studies are concerned with how historical periods change over time; and panel studies at how people change over time (Cohen, Manion and Morrison, 2007).

Given the nature of this study, pragmatic approach adopted for the study, research objectives, questions and assumptions, the survey method seemed to be appropriate. This study adopted a descriptive cross-sectional approach. The attraction of the method lies in the possibility of scanning a wide spectrum of issues. The cross sectional descriptive survey was found to be useful as it; provides descriptive, inferential and explanatory information; gathers standardized information using the same instruments and questions for all participants and usually relies on large-scale data gathering from a wide population in order to enable generalizations to be made about given factors or variables as observed by Cohen, Manion and Morrison (2007). In addition, it gathers data on a one-shot basis as it was in the case of this study where both quantitative and qualitative data were concurrently collected, and hence it is economical and efficient. Furthermore, when it is compared to other research approaches, the survey method is the best means available for describing personal characteristics that people provide about themselves, how they feel, what they think, what they know, and how they act. Thus, it was found to be effective in

collecting qualitative data related to agricultural information service provision to small sale crop farmers.

It allowed the researcher to gather data from a sample drawn from the predetermined population on a once off basis. It also allowed the collection of data on the prevalence of a phenomenon, situation, problem, attitude or issues related to information provision. It further allowed the researcher to make specific predictions, and test associational relationships by taking a cross-section of the population. Furthermore, a cross sectional survey was adopted because it allowed the researcher to use different data collection tools namely questionnaires, interviews and observation method as observed by Singh (2012).

Since it was not possible to involve all the respondents due to their large number, the survey method allowed the researcher to sample the population using appropriate sampling techniques and obtained a representative sample. This way, the results can be reliably projected from the sample to the larger population.

The study had many variables to test and the survey research method was found to be appropriate. Independent variables included age, gender, and education level, crop yield per year and income level. Dependent variables on the other hand involved information needs, information sources consulted, information services provided and ICTs used in information service provision. Neuman (2011) asserts that survey research allows many variables to be tested. Furthermore, a survey method has been adopted because it was successfully used by other related studies in Tanzania and other parts of the world, for example, studies done by Lwoga (2009), Matovero and Chailla (1999), Kiplang'at (2004) and Uganneya (2013).

4.5 Population and Study Setting

Population refers to an entire group of individuals, events or objects having common observable characteristics (Neuman, 2014). It also refers to a set of objects whether animate or inanimate which are to be included in a study to determine some characteristics or the universe of units from which the sample is to be selected. To define a population, a researcher specifies the unit being sampled, the geographical location and temporal boundaries of populations (Neuman, 2014). The term unit is applied because it is not necessarily people who are being sampled, but also a sample may include a universe of nations, cities, regions, firms and so on (Bryman, 2004).

For the purpose of this study, three districts in Rukwa region were involved namely; Sumbawanga Municipal, Sumbawanga Rural, and Kalambo district. Rukwa region was selected based on the fact that it is considered as one of the country's grain basket. However, in recent years there has been a decline in crop production with majority of its people living in poor economic conditions. The three districts were involved in the study based on data availability and crop production trends. The study involved different wards and villages from which Field Farm Schools (*shamba darasa*) were obtained.

In the context of this study, the population involved a total of 300 respondents, including 250 small scale crop farmers and 50 key informants (44 information service providers and six District Agricultural and Livestock Development Officers (DALDOs). Small scale crop farmers were from the villages where Field Farm Schools (FFS) were located. The assumption was that, in villages with FFSs extension services were frequently provided by information service providers and the villagers have more access to agricultural information services compared to other villages. Small-scale crop farmers

were targeted because they depend on agriculture to sustain their livelihood, and thus they were in need of agricultural information services. They were the ones whose information needs were to be addressed by information service providers. They were also primary consumers of information services provided. By involving small scale crop farmers, the study gained a great insight on how agricultural information services were provided in the region and how small scale crop farmers used information services provided to enhance crop production.

Information service providers were involved because they were responsible for providing information services to farmers. They were responsible for information needs identification and making sure that small scale agricultural information needs were met through information service provision. DALDOs were involved in the study because they coordinate and supervise all matters related to agriculture including information related issues at district levels.

4.6 Sampling and Sampling Techniques

Sampling is a powerful technique used in survey research. According to Neuman (2014), it is not always necessary to study the whole population in order to draw valid conclusions. Neuman (2014) argues that the results of a well designed, carefully executed sample can produce results that are equally, if not more, accurate than those produced by reaching everyone in an entire population. The common practice in social research is to get a representative sample, or a small collection of cases, from a much larger collection or population, and by studying the smaller group, produce accurate generalizations about

the larger group. The following subsections discuss the sampling frame, sample size, and sampling procedures.

4.6.1 Sampling Frame

A sampling frame is the list of elements from which the sample is actually drawn (Creswell, 2014). It is the actual form in which the population becomes accessible. Sampling frame for this study was drawn from a list of wards which was obtained from each district involved in the study. The sampling frame from Sumbawanga Rural district consisted of 15 wards and 101 villages. Sumbawanga Municipality consisted of 15 wards and 24 villages. Kalambo district consisted of 17 wards and 101 villages.

Both quantitative and qualitative sampling techniques were used. Neuman (2014) is of the view that quantitative sampling aim at getting a representative sample using probability sampling techniques. On the other hand qualitative sampling primarily aims at collecting specific cases, events or actions that can clarify and deepen understanding. Qualitative sampling usually uses non- probability sampling techniques.

From the sampling frame of each district, a multistage sampling was used to select five wards from each district. Firstly, a random probability sampling was used to select wards to be involved in the study. From Sumbawanga Rural the following wards were selected Ilemba, Muze, Mtowisa, Sandulula and Milepa. Selected wards from Sumbawanga Municipality were Senga, Milanzi, Pito, Kasense, and Ntendo. Selected wards from Kalambo district were Matai, Kisumba, Msanzi, Sopa and Ulumi. Random probability sampling was used in selecting wards with the assumption that the population was homogeneous and that every ward had an equal chance of being involved in the study.

Secondly, from selected wards, one village was purposely selected to be involved in the study. Villages with Field Farm Schools (FFSs/ *Shamba Darasa*) were purposely selected with the assumption that they were frequently visited by information service providers compared to other villages which did not have FFSs. A list of selected wards in each district is presented in Table 1.

Table 1: A List of Wards in Selected District

SN	SUMBAWANGA RURAL DISTRICT WARDS	SUMBAWANGA MUNICIPALITY WARDS	KALAMBO DISTRICT WARDS
1.	Mfinga	Malangali	Kasanga
2.	Muze	Mazwi	Mkowe
3.	Mtowisa	Izia	Msanzi
4.	Milepa	Katandala	Matai
5.	Sandulula	Old Sumbawanga	Sopa
6.	Kaengesa	Kizwite	Mwazyze
7.	Mpui	Ntendo	Katazi
8.	Msanda Muungano	Senga	Mwimbi
9.	Iemba	Mollo	Mambwekenya
10.	Kipeta	Pito	Mwembenkoswe
11.	Kaoze	Milanzi	Legeza mwendo
12.	Miangalua	Matanga	Ulumi
13.	Kalambanzite	Kasense	Mnamba
14.	Lusaka	Majengo	Katete
15.	Laela	Chanji	Kisumba
16.	-	-	Mkali
17.	-	-	Kileshe

Source: URT, (2012) Population and Housing Census (PHC)

4.6.2 Sample Size

Sample size refers to the number of items to be selected from the universe or population to constitute a sample (Kothari, 2004). According to Neuman (2006), a researcher's decision about the best sample size depends on three issues: the degree of accuracy required; the degree of variability or diversity in the population; and the number of

variables examined simultaneously. This study examined the provision of agricultural information services to small scale crop farmers in Rukwa region. The sample size was selected with the assumption that it fulfills the requirements of efficiency, representativeness, reliability and flexibility.

Sample size can be addressed in two ways (Neuman, 2014); one can take a total population and use statistical equations about sampling processes, while the second method is a rule of thumb. The former method requires the researcher to make assumptions about the degree of confidence that is acceptable and the degree of variation in the population. The latter method is based on the commonly accepted amount provided that the study reaches theoretical saturation. Based on the rule of thumb, for a smaller population (under 500), a researcher needs a larger sampling ratio (about 30 percent), while for moderate populations (10,000), a smaller sampling ratio (about 10%) is recommended for equal accuracy (Neuman, 2014). According to Gay (1996) the larger the population size, the smaller the percentage of the population required to get a representative sample. For smaller populations, for instance, $N < 100$ there is little point in sampling. Leedy (1997) supports Gay's argument. Gay further asserts that if the population size is around 1500, 20% should be sampled; and beyond 5000, the population size is irrelevant and a sample size of 400 is adequate.

Given the pragmatic stance adopted for this study, it was imperative to get a representative sample from a much larger collection or population to be able to make generalization about the larger group as proposed by Neuman (2014). Thus, the process of sampling was important. From a list of selected villages, a number of FFSs were identified with a total number of people involved in each. It is from this population of

people involved in FFSs where a representative sample to be studied was obtained. A list of selected villages, FFSs and people involved in FFSs is presented in Table 2.

Table 2: Selected Villages, FFSs and People Involved

District	Selected Villages	No. of FFSs	Total No. of People Involved in FFSs	Systematically Selected Respondents	Purposely Selected Respondents
Sumbawanga Municipality	Milanzi	2	50	20	5
	Ntendo	3	70	20	5
	Mtimbwa	3	72	20	5
	Kasense	4	78	20	5
Sumbawanga Rural	Katuka	4	80	20	5
	Msanzi	3	68	20	5
	Kizombwe	4	82	20	5
Kalambo	Muze	3	70	20	5
	Kalumbaleza	4	82	20	5
	Mtowisa	3	65	20	5
TOTAL		33	717	250	

Guided by the pragmatic approach the study applied Cochran's formula in selecting a representative sample for small scale crop farmers. The required sample size of the study was calculated based on Cochran's sample size formula. The alpha level was set at .05 (1.96) with the acceptable margin of error 5%, proportional variable of .50 and standard deviation of the scale as .50 (Mwantimwa, 2012; Kothari, 2004). Thus the following formula was used to calculate the final sample size.

$$n1 = \frac{n0}{1 + \left(\frac{n0}{N}\right)}$$

Where N= Population size of people involved in FFSs = 717

n1 = Sample size

n0 Is a required return sample size, which according to Cochran's formula = 384 (Cochran, 1977 cited in Mwantimwa, 2012)

$$n1 = 384 / 1 + (384/717)$$

$$n1 = 384 / 1 + (0.536)$$

$$n1 = 384 / 1.5$$

$$\mathbf{n1 = 250.07 \approx 250 \text{ people.}}$$

From the formula, a total of 250 small scale crop farmers were selected. The sample size was deemed suitable because it approximated the qualities and characteristics of the general population. In addition, the sample deemed to provide an acceptable degree of accuracy, variability and variables would adequately address the study objectives, research questions and assumptions.

4.6.3 Sampling Procedure

According to Creswell (2009), sampling refers to specific ways of selecting subjects, or simply who will be studied. The primary purpose of sampling is to get a representative sample from a much larger population, study it and produce accurate generalizations about the larger group (Neuman, 2006). Sampling enables one to achieve the same

research objectives with reduced resources in terms of personnel, time and costs (Tracy, 2013). This study used both probability (primarily quantitative) and purposive (primarily qualitative) procedures.

4.6.3.1 Probability Sampling

According to Neuman (2014), the probability sampling approach relies on random processes such that each element has an equal probability of being selected. Examples of probability sampling are simple random sampling, systematic random sampling and stratified random sampling. The current study employed a simple random sampling to select 10 Wards (See section 4.6.1) to be involved in the study. Simple random sampling gave each ward an equal chance of being involved in the study. A discussion was made with village leaders and extension officers before selecting villages with FFSs. The aim was to select villages with active FFS participants. From a list of randomly selected wards, five villages with FFSs were purposely selected from each district, thus making a total of 33 FFSs. On average, every FFS had 20-25 participants, thus making a total of 717 FFS participants from all selected villages (See Table 2). From a list of 717 small scale crop farmers participating in FFSs, a total of 200 small scale crop farmers were systematically selected to obtain 20 respondents from each village. A list of FFS participants was obtained from each selected village, and then systematic sampling was applied to obtain 20 participants from each village. A systematic random sampling according to Neuman (2006) provides a convenient way to draw a sample from a large identified population where every n^{th} name is selected from the list. The interval between names on the list is determined by dividing the number of persons desired in the sample into the full population. For example, to systematically select respondents from

Kalumbaleza village where 82 small scale crop farmers were involved in FFSs, 82 was divided by 20. Thus every 4th name was systematically selected for participation in the study.

4.6.3.2 Non-Probability Sampling

Purposive sampling was used to select 10 villages where FFSs (*shamba darasa*) were located because not all villages in Rukwa region have Field Farm Schools (FFSs) and extension services were not adequately provided. Thus, only villages with FFSs were purposely selected. Non-probability sampling was also used to purposely select 6 district agricultural and livestock officers (DALDOs), two from each district and 44 information service providers (30 Extension officers and 14 librarians) because of their role in disseminating agricultural information to small scale farmers. Purposeful sampling was further used to select a total of 50 small scale crop farmers, five from each village who were interviewed. The identification of the five small scale crop farmers as key informants was based upon discussions with village leaders and local extension officers in order to cover a broad spectrum of farming systems, ethnic-religious groups, gender and age groups. It was further assumed that the sample selected possessed sufficient required knowledge and were information rich on issues pertaining to information service provision, and hence they were the right representative of the whole unit of the population.

4.7 Data Collection Methods

Data collection involves gathering data using defined techniques in order to answer the pre-defined research questions of the study (Tracy, 2013). The type of data collection method is determined by the chosen research strategies.

Given the research paradigm and the descriptive cross sectional survey method adopted by the study, it was possible to collect both quantitative and qualitative data simultaneously. Quantitative data was obtained mainly from farmers using both, structured and semi-structured questionnaires, while qualitative data was obtained from key informants described in section 4.6.3.2 using interviews. Semi-structured interview was used to obtain data from illiterate farmers. To get a good insight of the study and to obtain key information to fulfill the objectives of the study, in-depth interviews of key informants was conducted, namely; the DALDOs, extension officers, librarians and selected small scale crop farmers. Non- participant observation was also conducted to get additional information for the study.

4.7.1 Questionnaires

Questionnaires are the single most popular data collection tools in any research involving human subjects (Pickard, 2007). Questionnaires are widely used and are useful instruments for collecting survey information, providing structured, often numerical data, being able to be administered without the presence of the researcher, and often being comparatively straightforward to analyze (Neuman, 2014). The major considerations involved in formulating questions are their content, structure, format and sequence (Nachmias and Nachmias, 1996).

Neuman (2014) states that, designing a good questionnaire involve selecting the questions needed to meet the research questions; testing them to make sure they can be asked and answered as planned. They should be clear, succinct and unambiguous to yield high response from respondents. The advantages and disadvantages of questionnaires are

well documented (Babbie and Mouton, 2001; Cohen, Manion and Morrison, 2007; Nachmias and Nachmias, 1996; Leedy and Ormrod, 2005; Mugenda and Mugenda, 2003; Creswell, 2014). Compared to other data collection tools, the questionnaire is relatively inexpensive and it allows a large number of respondents to be surveyed in a relatively short period of time even if the respondents are widely distributed geographically like the case of this study where small scale crop farmers were widely dispersed throughout the entire Rukwa region.

This study used the questionnaire technique consisting of both closed and open ended questions to gather information from 200 small scale crop farmers (20 from each selected village). The questionnaire was selected because it enabled the researcher to collect data from this large number of respondents in a cost-effective manner.

For the purpose of this study, questionnaires were translated into Swahili language before being administered to the respondents with the help of a Swahili expert from the University of Dar es salaam. For respondents who were able to read and write, the questionnaire was self administered. Respondents were left to fill in the questionnaires themselves. Robson (2002) asserts that self-completed questionnaires, which respondents fill in for themselves, are very efficient in terms of researcher's time and effort.

4.7.1.1 Questionnaire Design and Administration

Questionnaires are the dominant mode of quantitative data collection and are powerful tools in measuring variables involved in a study. A well designed and administered questionnaire provides structured, detailed and sufficient information regarding the

research objectives and research questions. To ensure that the objectives and research questions were sufficiently covered, care was taken to design questionnaires that were;

- a) Clearly worded, focused, categorical with simple clear language for easy response.
- b) Not ambiguous with a clear layout for easy reading
- c) Sequential, starting with the simplest questions to trigger response from participants. Where necessary, clarifications were carefully made to ensure that respondents understood the questions.
- d) In addition, before the administration of the questionnaire, a brief introduction was made by village leaders to establish rapport. The researcher then briefly explained the research topic and the purpose of the questionnaire.

Due to the extensive nature of the study and the fact that data was collected concurrently from questionnaires and interviews, it was not possible for the researcher to do it alone. Two research assistants were recruited to assist in administering the questionnaire. Research assistants were also helpful in assisting respondents who were not able to read and write. The researcher recruited research assistants who were degree holders (BALIS) and had a wide experience in data collection techniques in rural areas. In addition, they were natives of the Rukwa region with the same ethnic group as the respondents of the study; thus, they had wide knowledge of the local language, customs and traditions of respondents.

In order to maintain validity, reliability, consistency, efficiency and continuity of the study, these research assistants were trained on how best they could collect data related to

agricultural information service provision using the questionnaires. Training sessions took two sessions (two hours each). The sessions involved acquainting research assistants with some terminologies used and the general content of the questionnaire, simulation and role playing. In addition, the training sessions involved instructions involved in each item involved in the questionnaire.

Care was taken to avoid any sort of bias, to maintain validity and reliability of the study. Both structured and semi-structured questionnaires were used with open-ended (unstructured) and closed-ended (structured) questions. Neuman (2011), states that, the disadvantages of the questionnaire can be reduced by mixing open-ended and closed-ended questions. Closed-ended questions were used to elicit structured responses. According to Babbie and Mouton (2001), closed-ended questions provide a greater uniformity of responses and are easily processed.

In the context of this study, a combination of two types of structured questionnaires were used namely nominal scaled questions (forced) and ordinal scaled questions (Likert scale) which asked the respondents to rate their degree of agreement and disagreement to a particular question. Nominal and likert scale were used because they are both easier and faster for respondents to complete, they were also easier to code and analyze using statistical packages like SPSS which was used in this study. Unstructured/ open ended questions were also used to allow respondents to provide their opinion, show their feelings and attitude towards various aspects related to agricultural information services provision and how the information provided enhanced their crop production. Questionnaires were supplemented with interviews and non- participant observation.

4.7.2 Interview

Tracy (2013) is of the view that, a personal interview involves face-to-face communication between an interviewer and a respondent with the purpose of obtaining information relevant to research problem. The strength of face-to-face interviews lies in its flexibility and adaptability, ensuring a high rate of response, recording of spontaneous and unintended responses and provision of in-depth data to meet specific objectives of the study (Neuman, 2014).

Well-planned interviews usually produce most useful information as well as supplementary, insightful observations and opinions from the respondents. Interviews are classified as structured, semi structured or unstructured. Structured interviews generally use a list of questions that are repeated in the same order and in the same wording to elicit pre-determined answers. However, they are not flexible. Unstructured interviews on the other hand are more flexible and organic in nature. The flexibility nature of structured interviews encourages respondents to be creative, adapt to ever-changing circumstances, and effectively participate in the interview session (Tracy, 2013). Furthermore, less structured interviews are likely to tap both content and emotional levels. The interview process is the venue through which researchers learn what data are most interesting and important, and flexible interview guides allow for focusing on topics that emerge as most fruitful (Tracy, 2013). Based on these reasons, the current study used both structured and unstructured interview schedules.

Personal interviews with both structured and semi-structured questions were conducted by the principal researcher to categories of key informants of the study. It was conducted

to 50 selected small scale crop farmers which involved five small scale crop farmers from each village. It was also conducted to six agricultural officials, two from each district. The interviews were also conducted to 30 extension officers and 14 librarians. Semi-structured interview was used to collect data from illiterate farmers. The interview schedules were based on various aspects of research objectives, research questions and study assumptions.

4.7.3 Observation Method

This study used the non-participant observation where the semi-structured observational instruments were employed. Non-participant observation was conducted on farmers to determine the following: different types of agricultural practices; how information is provided and how they access information to address their information needs. Furthermore, observation was made to examine the sources used, their package and the challenges they face in accessing the information provided.

Observation was used because it allowed the researcher to gain insights about the culture that could not be obtained in any other way; it was easy to obtain firsthand experience with participants and that the researcher was able to discover recurring patterns of behaviour and relationships as argued by Leedy and Ormrod (2005). In addition, observation method was employed because it was more reliable and free from the respondent bias since data were obtained through observation of events as they normally occur. An observation checklist was developed to guide observation of small-scale farmers and farmers groups in their natural setting. In addition to maintaining the validity and reliability of the study, triangulation of methods, sources and instruments for data collection was made.

4.8 Validity and Reliability of Research Instruments

The quality of a research study depends to a large extent on the accuracy of the data collection procedures. That is, the instruments or tools used to collect the data must yield the type of data the researcher can use to accurately answer his or her questions (Mugenda and Mugenda, 2003). Reliability and validity are the major technical considerations in both quantitative and qualitative research (Babbie and Mouton, 2001). Reliability and validity helps to establish the truthfulness, credibility and believability of findings. Research is considered to be valid when the conclusions are true or correct and reliable when the findings are repeatable (Babbie, 2004; Bryman 2004).

Scholars view validity and reliability of a quantitative and qualitative study differently. For example, Tracy (2013), view validity in quantitative research as concerning objectivity, generalizability, replicability, predictability and controllability of the study. He also views validity in qualitative research as it concerns honesty, richness, authenticity, depth, scope and subjectivity of the study. On the other hand, Tracy (2013), argues that reliability in quantitative research refers to consistency (stability), accuracy, predictability, equivalence, replicability, concurrence, descriptive and causal potential of the study. While in qualitative research, it refers to the accuracy, fairness, dependability, comprehensiveness, empathy, uniqueness and conformability of the study.

In the context of this study, validity and reliability were maintained through careful sampling, appropriate instrumentation, pre-testing of research instruments and triangulation as advocated by Creswell (2014).

4.8.1 Pretesting of Research Instruments

Creswell (2014) argues that questions containing clarity and consistency in meaning to all respondents can be instrumental in reducing bias; and well-constructed questionnaires may contribute to reduce non-response. On the other hand, poor construction may lead to erroneous conclusions. Pre-testing of the research instruments is meant to ensure that the indicators would yield the same results, irrespective of when or where they are applied. Neuman (2011) argues that research instruments need to be tested during their development and application for acceptability, feasibility, reliability, sensitivity to change and validity. Neuman further points out that reliability and validity are central issues in all scientific measurements.

For the purpose of the current study, pretesting of research instruments was undertaken prior to the main study. This was done using twenty small scale crop farmers, five extension workers, two librarians and one regional officer. One ward and village with FFS namely Kaengesa and one village namely Mkunda in Sumbawanga rural district were randomly selected from the sampling frame for pre-testing of the research instruments. Small scale crop farmers were given the questionnaire and requested to complete and also to comment on the clarity and suitability of the instrument. Agricultural officers, extension officers and librarians were interviewed and given an opportunity too to comment on the instruments. The findings were coded and analyzed; and were used to modify research instruments. Unclear questions and instructions identified during pre-test were reworked. Further, technical terms that needed clarification were identified and the instruments were modified to remove ambiguities.

4.8 .2 Triangulation

Triangulation refers to the designed use of several different research methods, with offsetting or counteracting biases, in investigations of the same phenomenon in order to strengthen the validity of the results (Babbie, 2004). Babbie further asserts that the concept of triangulation is based on the assumption that an inherent bias or limitation in particular data sources, investigators and methods would be neutralized when used in conjunction with other data sources, investigators and methods. The idea behind triangulation is that by drawing data from sources, methods and instruments that have very different potential threats to validity, it is possible to reduce the chances of reaching false conclusions. If the data from contrasting sources confirm the original conclusion, then that conclusion can reasonably be held with more confidence than before. There are several ways of executing triangulation. Babbie (2004) identifies data triangulation, investigation triangulation, methodological triangulation and triangulation of theories. This study was informed by a triangulated conceptual framework, the ISCM which is made up of both information seeking and communication models. Sources of data were also triangulated in which various documents in different forms and formats were used to obtain information for the study. Pragmatic research paradigm was used which allowed the combination of both quantitative and qualitative research methods. For the purpose of this study, quantitative method was dominant with some aspects of qualitative methods. Furthermore, the study triangulated the instruments for data collections in which questionnaires with both structured and semi structured questions were used to collect data from small scale crop farmers. Information from key informants was obtained from interview schedules. Additionally, observation method was used to get more insights on

various issues related to information service provision to small scale crop farmers. Babbie (2004), points out that triangulation is necessary because no single research method can adequately address all aspects of a problem.

4.9 Data Analysis and Presentation

Data analysis involves a number of closely related operations which are performed with the purpose of summarizing the collected data and organizing them in such a manner that they answer the study objectives and research questions. Quantitative data analysis emphasizes the analysis of numeric data, using a variety of statistical techniques, while Qualitative data analysis, searches for patterns in data, recurrent behavior, objects, phrases, or ideas which are subjectively interpreted in terms of social theory or the setting in which they occurred.

4.9.1 Types of Data Collected

In the current study, both primary and secondary data were collected. The primary data are those which are collected afresh from the field and for the first time, hence original in character. Primary data for this study was collected from selected small scale crop farmers, information service providers which included extension officers, librarians and agricultural officers. This data was based on the research objectives and research questions. Secondary data was obtained from published documents as well as published technical reports related to the current study.

4.9.2 Quantitative and Qualitative Data Analysis

This study collected both quantitative and qualitative data. Given the pragmatic nature of the study, the researcher was free to choose data analysis processes for quantitative and qualitative data to be in phases or simultaneously. In the context of this study, quantitative and qualitative data analyses were carried out concurrently based on research objectives and research questions. All relevant data from questionnaires, interviews and observations were collated to provide a collective answer to a research question.

Quantitative data was analyzed through the use of numeric data using statistical techniques to test the relationship among variables related to agricultural information service provision. Statistical Package for Social Scientists (SPSS) version 20 software program and Microsoft excel were used to analyze quantitative data from the set of questionnaires. SPSS was used because it offers powerful and easy ways to extract meaningful information from data, enables the input of raw data, modification, and re-organisation of data to carry out a wide range of simple, statistical and multivariate analyses. In addition, SPSS can reduce time required to analyze data, reduce errors involved in coding data, and analyze data with in-depth statistics and charts, and present results clearly with flexible reports and charts (Pickard, 2007). Frequencies, percentages, statistical tests and forms of graphical presentation were used to analyze and present quantitative data from questionnaires. Qualitative data from open-ended responses and interviews were thematically organized based on research questions and research objectives and then content analysed.

4.10 Ethical Considerations

Ethics define what is or is not legitimate to do, or what “moral” research procedure involves (Neuman, 2006). Ethical issues are of importance to all kinds of social and behavioural research and of particular importance when human subjects are involved. Many ethical issues involve a balance between two values: the pursuit of scientific knowledge and the rights of those being studied or of others in the society (Neuman, 2006). Thus, potential benefits such as advancing the understanding of social life, improving decision making or helping research participants, must be weighed against potential costs, such as a loss of dignity, self-esteem, privacy, or democratic freedoms (Neuman, 2006).

This study abided by the Moi University research ethics policy by collecting a research clearance from the university before commencing data collection activities. The researcher also complied with the Tanzania Government research ethical standards by securing permission to conduct research in the study areas from Rukwa regional administrative offices. The information was then sent to responsible officers to the districts involved in the study.

This study took into consideration the principle of informed consent, in which research participants were informed about the purpose and nature of the study in which they were being asked to participate so that they can evaluate the procedures to be followed and make an informed judgment as to whether they want to participate.

Additionally, cultural issues were taken into consideration to avoid misconceptions which might have affected the data collection hence affecting validity and reliability of the

study. Prior to collecting data, the researcher met with the village leaders and responsible extension officers and explained to them what the research was all about. The village leaders then informed the respondents about the research. Neuman (2011), explained that respondents are likely to provide information accurately and honestly when asked in an informed context, with mutual respect and trust. Further, the study acknowledged all sources of information used in the study to avoid plagiarism. In addition, respondents' privacy, anonymity and confidentiality were maintained throughout the study.

4.11 Chapter Summary

This chapter discussed the research methodology adopted by the study. It explained the research paradigms in which the pragmatic approach and a cross sectional survey research design were adopted. Since the study was pragmatic in nature, both quantitative and qualitative approaches have been explained followed by the study population, sample and sampling procedures. The chapter discussed the instruments used in collecting qualitative and quantitative data, qualitative and quantitative data analyses, validity, reliability and the pretesting of instruments; and finally the chapter discussed the research ethics that guided the study.

CHAPTER FIVE

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

5.1 Introduction

This chapter presents empirical findings of the study derived from questionnaires, interviews and non-participant observations. The aim of the study was to investigate the provision of agricultural information services to small-scale crop farmers in Rukwa region with a view to establishing a proper framework of improving information service provision. Both SPSS version 20 and Microsoft excel were used to analyse and present quantitative data after being cleaned, edited, checked for accuracy and coded to facilitate analysis. Quantitative data were recorded as frequencies, percentages and in some cases cross tabulation and statistical measures to test the relationship of some variables such as age, gender and education were made with the aim of knowing how these variables affected information provision, access and use of information services provided to small-scale crop farmers. Pearson's chi square test (P-value) was used for this purpose and the strength between variable was tested at 0.05 (5%) significance level. The findings are presented in various forms such as frequency tables and figures. Qualitative data were transcribed and presented into different themes that address a particular research objective. Data presentation was categorized based on the study objectives and research questions. Data from research questionnaires, interviews, non-participant observations and different secondary sources addressing a particular research theme are presented together starting with quantitative data followed by qualitative data. The study findings are organized and presented based on the study objectives and research questions.

5.2 Response Rate

The study targeted a total of 300 respondents of which 250 were small-scale crop farmers, 44 information providers which included 30 extension officers and 14 librarians and a total of 6 agricultural officers, two from each district namely, Sumbawanga Municipality, Sumbawanga Rural and Kalambo. Out of 250 small-scale crop farmers, 200 (80%) participated in the study of which 98 (39%) were female and 102 (41%) were male. The study included all (20) extension officers and all librarians (7) found in the study area, making a total of 27 (61%) information service providers. The study also involved a total of six (100%) district agricultural officers, two from each district involved, making a total of 233 (78%) of the targeted respondents. Eighty (40%) small-scale crop farmers were from Sumbawanga Municipality, 60 (30%) were from Kalambo district and 60 (30%) were from Sumbawanga Rural.

5.3 Demographic Characteristics of the Respondents

Identifying demographic characteristics of respondents was not part of the specific objectives of the study. However, characteristics of the respondents provided a snapshot on the suitability of the respondents for the study and shed some light on different issues pertaining to the study. Background information included age, gender, education level, occupation and source of family income. These demographic characteristics of respondents were included in the study with the purpose of examining their influence on the whole process of information service provision to small scale farmers in the region. Statistical Chi square test was performed to examine the relationship among demographic

variables as independent variables and aspects of information service provision as dependent variables.

5.3.1 Age Distribution of Respondents

Respondents were asked to indicate their age ranges and not to mention their exact ages. This is because most people are reluctant to disclose their exact ages to strangers. Asking their exact age could have made some of them uncomfortable thus affecting their ability to speak the truth and generally affecting the validity and reliability of the study. To ensure that validity and reliability of the study were not affected, age range was provided. This was necessary so as to understand the age range distribution of the respondents and to establish whether age had any influence on information provision, economic activities conducted in the study area, information needs and seeking habits and on the use of ICTs in accessing and using agricultural information. The findings revealed that out of 150 respondents, a total of 23(15.3%) were of the age range 20-29 years, 69 (46%) were in the 30-39 age bracket, 44 (29.3%) were in the 40-49 age bracket, eight (5.3%) were of the age range 50-59 years and six (4%) were of the age range 60-69 years. From these findings it can be established that a significant number of the respondents 69 (45%) were of the age range 30-39 years and 44 (29%) respondents who were aged 40-49 years. This is probably because they are the workforce of the farming community in most parts of the world, including the study area. It might also be because they are occupied by family responsibilities such as feeding the family, clothing, taking care of children education and taking care of the extended family such as older members of the family. These responsibilities need to have more family income which can be raised through engagement in various agricultural activities. Further findings showed that, out of 150

respondents, 76(51%) were female and 74 (49%) were male ranging from 20 to 69 years.

The findings are summarized in Table 3.

Table 3: Age Distribution of Respondents N= 150

Village	Age Range										Frequency	Total
	20-29		30-39		40-49		50-59		60-69			
	F	%	F	%	F	%	F	%	F	%		
Katuka	-	-	6	40%	3	20%	3	20%	3	20%	15	100%
Msanzi	-	-	7	47%	6	40%	2	13%	-	-	15	100%
Muze	-	-	7	47%	8	53%	-	-	-	-	15	100%
Mtowisa	1	6.7%	9	60%	4	26.7%	1	6.7%	-	-	15	100%
Kalumbaleza	3	20%	9	60%	3	20%	-	-	-	-	15	100%
Ntendo	2	13%	10	67%	1	7%	2	13%	-	-	15	100%
Milanzi	2	13%	7	47%	3	20%	-	-	3	20%	15	100%
Mtimbwa	6	40%	4	27%	5	33%	-	-	-	-	15	100%
Kizombwe	9	39%	2	3%	4	9%	-	-	-	-	15	100%
Kasense	-	-	8	53%	7	47%	-	-	-	-	15	100%
TOTAL											150	100%

* F= Frequency

5.3.2 Education Level Attained by Respondents

Respondents were asked to indicate the highest level of education they had attained. The aim was to establish the influence of their education levels on agricultural information services provided to them. Categories ranged from none to tertiary or degree. Respondents displayed varied educational levels ranging from those who did not have an

opportunity to attend any form of education to those who were lucky to have secondary education. None of the respondents attained a tertiary or a degree level education. Out of 150 small scale farmers, 18(12.7%) had not attended any form of education, 11(8.7%) had informal education, 113 (73.4%) had primary education, and eight (5.3%) had secondary education. The findings also show that all small-scale crop farmers who were involved in key informants' interviews were primary school holders. The findings further show that out of 150 respondents, seven (9.2%) female had not attended any form of education, four (5.3%) had informal education, 62(81.6%) had primary education and three (3.9%) had secondary education. On the other hand, 11(14.9%) male had not attended any form of education, seven (9.5%) had informal education, 51 (68.9%) had primary education and five (6.8%) had secondary education. The results are summarized in Table 4.

Table 4: Education Level Attained by Respondents N= 150

		Non	Informal	Primary	Secondary	Total
Male	Frequency	11	7	51	5	74
	% within Gender of respondents	14.9%	9.5%	68.9%	6.8%	100.0%
Female	Frequency	7	4	62	3	76
	% within Gender of respondents	9.2%	5.3%	81.6%	3.9%	100.0%
Total	Frequency	18	11	113	8	150
	% within Education of respondents	12.7%	8.7%	73.4%	5.3%	100.0%

5.3.3 Average Age, Land Cultivated, Yield and Income per Year: Data from Key Informants

The study involved 50 small-scale crop farmers as key informants. Five of them were purposely selected from each village to participate in in-depth interviews. These key

informants had lived in their villages for more than five years and had actively participated in farming activities. The aim was to obtain their demographic information and later obtain valuable detailed information on agricultural information services provided in the study area. The findings are presented in Table 5.

Table 5: Average Age, Land Cultivated, Yield and Income per Year: Data from Key

Informants N=50

Villages	Mean Age	Average Land Cultivated in Acres	Average Maize Yield per Year (100kg Bags)	Average Income per Year (TSH)
Kasense	40	3	20	200,000
Katuka	43	5	40	400,000
Msanzi	37	3	20	300,000
Muze	42	4	25	400,000
Mtowisa	47	4	20	400,000
Kalumbaleza	36	4	25	500,000
Ntendo	38	2	12	140,000
Milanzi	46	1.5	10	200,000
Mtimbwa	36	4	23	460,000
Kizombwe	44	3	20	400,000
Average	41	3.4	22	340,000

The findings show that the average age of key informants was 41 years (Table 5). These adults form the basis and the backbone of agricultural production in the area. The findings further show that there were low maize yields as the highest recorded average number of bags per year was 25 and 23 bags at Kalumbaleza village and Mtimbwa village respectively. The average number of bags of maize produced in all villages was 22 bags produced from an average of 3.4 acres per person. The yields were low compared

to an average of 15 to 20 bags per acre as observed (Rukwa Investment Profile, 2013). The production trend experienced by respondents was attributed to lack of necessary information on how to improve productivity or where to find suitable markets for their farm produce.

5.4 Farming Activities and Performance

The first objective of the study was to establish the information needs and seeking behavior of the people in the study area. This objective aimed at capturing information related to their crop farming activities so as to identify any information gap arising from their daily farming activities and how respondents address it. It was also important to identify respondents' crop farming activities so as to examine whether agricultural information services provided addressed their information needs to facilitate crop production.

5.4.1 Crop Farming Activities

Respondents were required to state crops grown; a multiple response item was used to gather information from small scale crop farmers (SSCF). Based on Robinson and Robson (2013) Information Seeking and Communication Model (ISCM) which was used to inform this study, there was a need to establish activities related to crop farming. The activities give rise to information needs and seeking habits.

The findings revealed that respondents were involved in various crop farming activities and various varieties of crops were grown by small scale crop farmers in the region depending on their geographical locations and agro-ecological zones. The findings show that 95 (61.7%) respondents were maize farmers, 19 (12.5%) were beans farmers, and 12

(7.8%) were engaged in paddy farming. The findings further show that six (3.9%) respondents were engaged in wheat production, four (2.6%) in irish potato farming, sunflower and simsim farming respectively. Three (1.9%) respondents were engaged in cassava and other three (1.9%) respondents were engaged in sorghum production. More findings are presented in Figure 3.

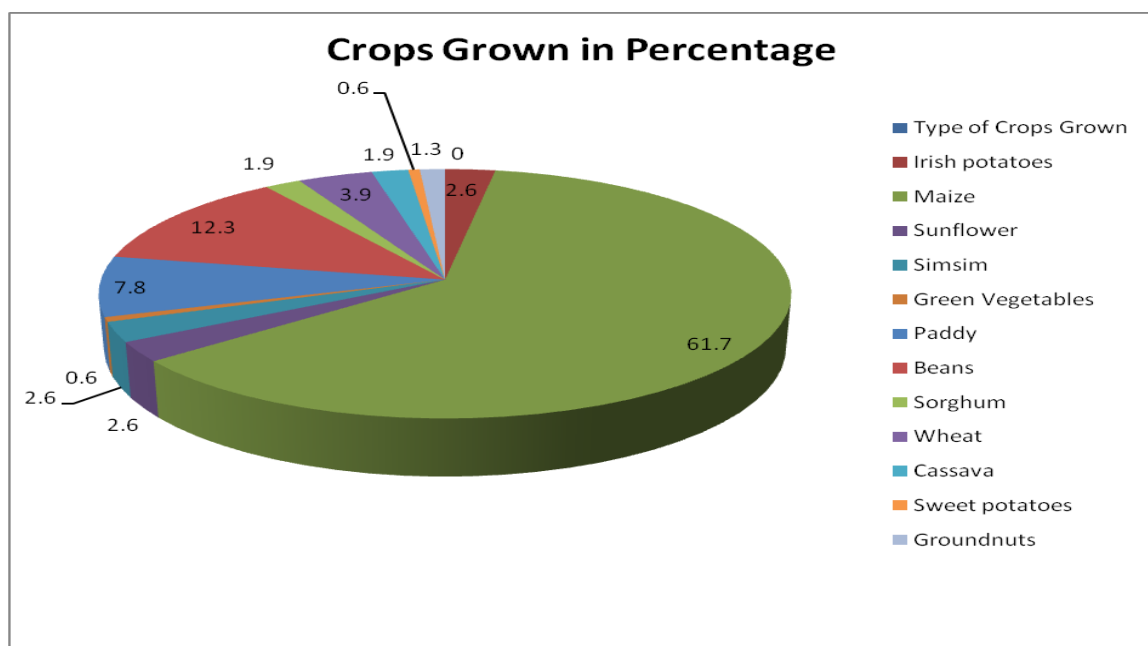


Figure 3: Type of Crops Grown (N=150)

Information from key informants and observations made by the researcher on farming activities revealed that apart from crop farming, small scale farmers engage in fruits and vegetable farming particularly along river valleys and on the shores of Lake Rukwa where water melons and other fruits are grown. One key informant said:

“...well, through information services received from our extension officers, we have realized that we have got a very potential arable land not only for cereals but for variety of crops, fruits and vegetables.”

Over decades small scale farmers in Rukwa region have been engaged in crop farming and in particular cereals. In the recent past, after the intervention of extension officers through information service provision to small scale farmers, other crops such as simsim, sunflower, fruits and vegetables have been introduced and are grown though at a very small scale. In one of the interviews, one information officer lamented:

“...Most of our small scale farmers are reluctant when it comes to introducing new crops particularly vegetables and fruits...”

Comments like this may suggest that small scale farmers believe in their traditional farming activities inherited from their parents. This situation is probably the reason for poor yields and poverty as a result of not engaging in agribusiness. The situation can also be partly attributed to either lack of access to the required information or not properly using the information services provided to them.

5.4.2 Duration in Farming Activities

Respondents were asked to mention the duration they were engaged in farming activities. The aim was to examine whether the duration in farming activities had an impact on their production and whether information service provision had influenced their production. The findings revealed that 20 (13%) respondents had been engaged in farming activities for a period of 1-5 years, 28(19%) respondents 6-10 years, 40(27%) respondents 11-15 years, 28 (19%) respondents 16 -20 years and 27 (18%) respondents had been engaged in farming activities for over 20 years. It was clear that most farmers were engaged in farming activities for more than ten years. It can generally be said that farming activities are part and parcel of their livelihood.

Observation made showed that children aged seven years and above accompanied their parents in farming activities during weekends and public holidays. It was also observed that as soon as one completed his/her primary school, he/she started to engage in various farming activities. In some of the families, the youth were given their own small plots to start farming activities particularly crop production. The findings on duration in farming activities are presented in Figure 4.

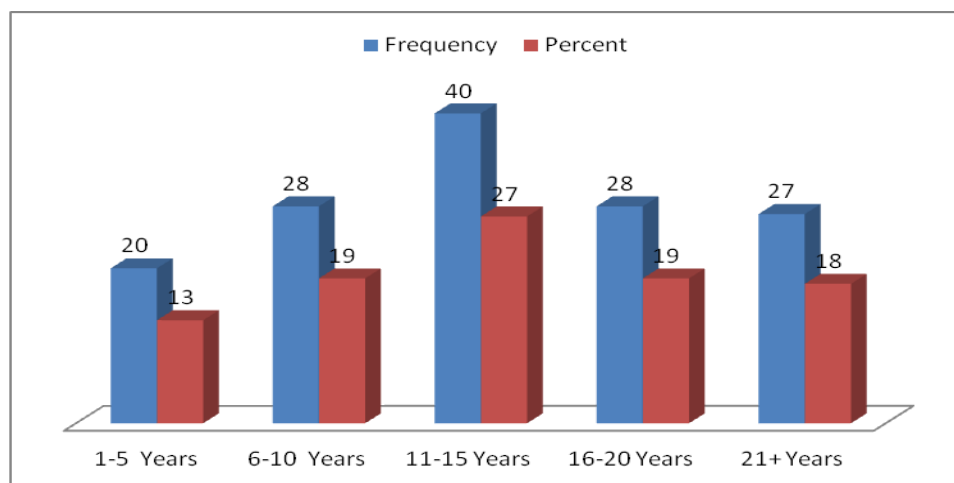


Figure 4: Duration in Farming Activities (N=150)

5.4.3 Size of Farms and Crop Yield

Respondents were small-scale crop farmers whose farms ranged from less than an acre to ten acres. Figure 4 shows that 33(22%) respondents owned less than an acre, 72(48%) owned 1-5 acres, 35 (23%) owned 6-10 acres while 10 (7%) owned more than 10 acres. When asked to state the number of maize crop in 100kg bags obtained from their farming activities per acre, it was found out that 38 (25%) obtained less than five 100kg maize bags per acre, 55 (37%) obtained five to ten bags, 48(32%) obtained eleven to fifteen bags, eight (5%) obtained sixteen to twenty bags and one (7%) obtained more than 20

bags. These findings indicate that generally the farmers obtained low yields compared to the average yield per acre which is 20 to 25 maize bags as per URT (2011). This situation is probably caused by several factors including poor, irrelevant and uncoordinated information and information service provision. The findings are presented in Figure 5.

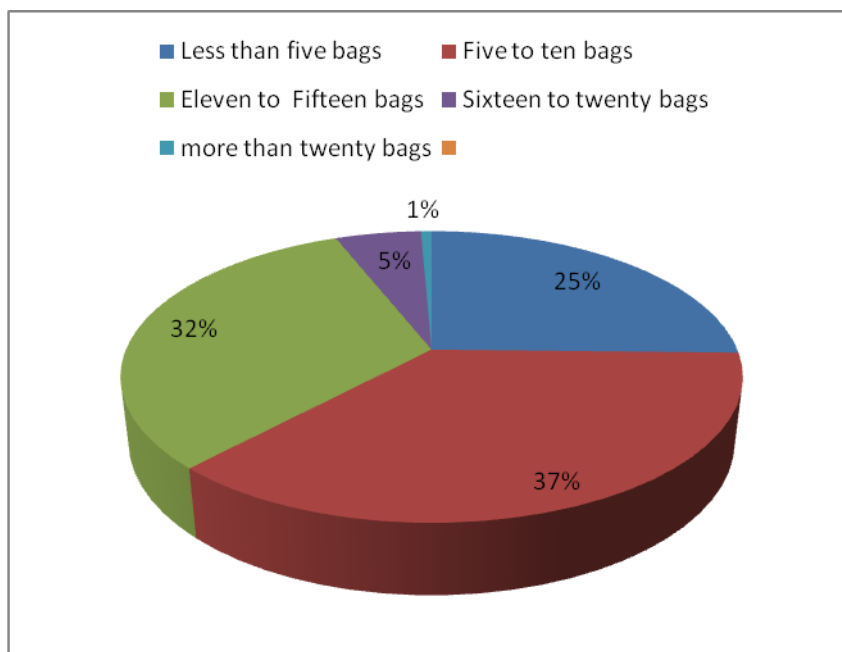


Figure 5: Respondents' Maize Yield in Bags per Acre (N=150)

In trying to establish whether there was a relationship between land ownership and maize crop yield in 100kg bags per acre, the findings show that five (10%) respondents who owned more than 10 acres harvested more than 20 bags, those with 6-10 acres 15 (31%) harvested eleven to fifteen bags. The findings also show that for respondents who owned 1-5 acres 32 (58%) harvested five to ten bags and 24 (50%) respondents harvested eleven to fifteen bags per acre. Statistical test (Chi- Square) shows that there was a significant difference between land ownership and maize yield in bags per acre as the P-Value was less than 0.05 i.e it was 0.01. From this statistical test it can confidently be established

that the size of land owned by respondents positively affected the number of crop yields in bags per year. Figure 6 summarizes the findings on land cultivated and yields in bags per acre.

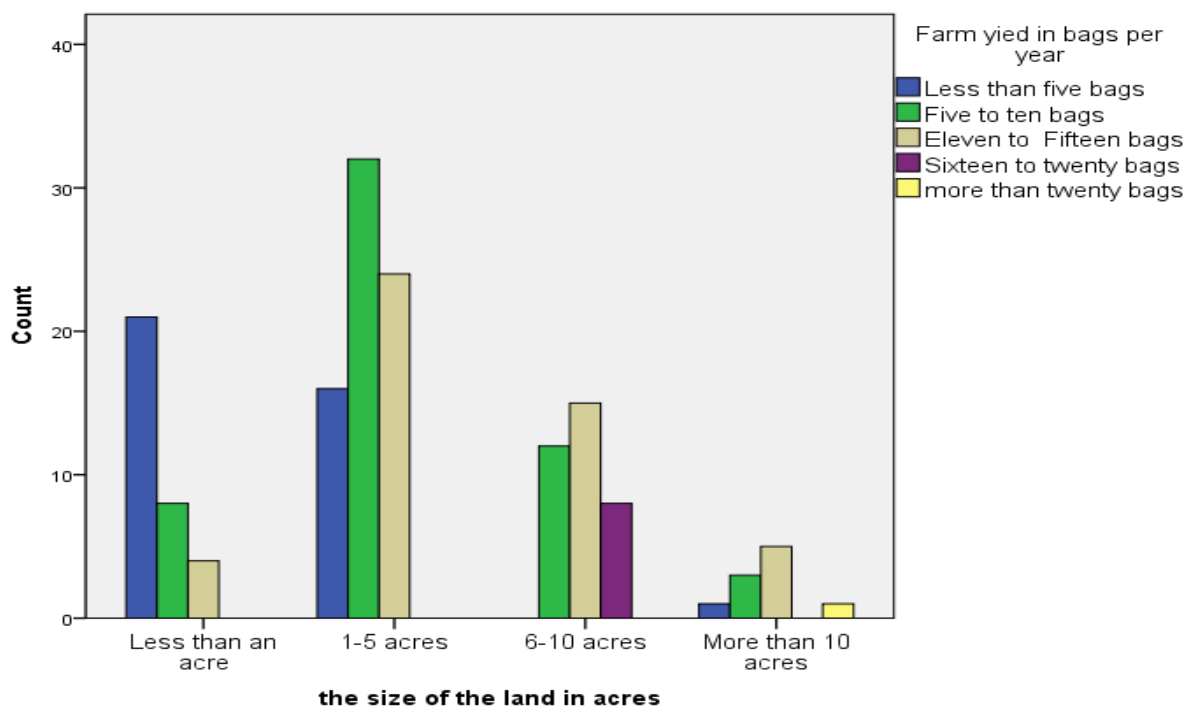


Figure 6: Size of Land and Maize Yield in Bags per Acre (N=150)

5.4.4 Relationship Between Crop Yield and Education

Findings from a cross tabulation on the highest education level reached and crop yields (in 100kg maize bags per acre) show that for respondents with secondary education; two (5%) harvested less than five bags per acre, two (4%) harvested five to ten bags per acre and three (38%) respondents harvested sixteen to twenty bags per acre. Twenty seven (71%) respondents with primary education harvested less than five bags per acre, 43 (78%) harvested five to ten bags per acre, 40 (83%) respondents harvested eleven to fifteen bags per acre. More findings are presented in Figure 7.

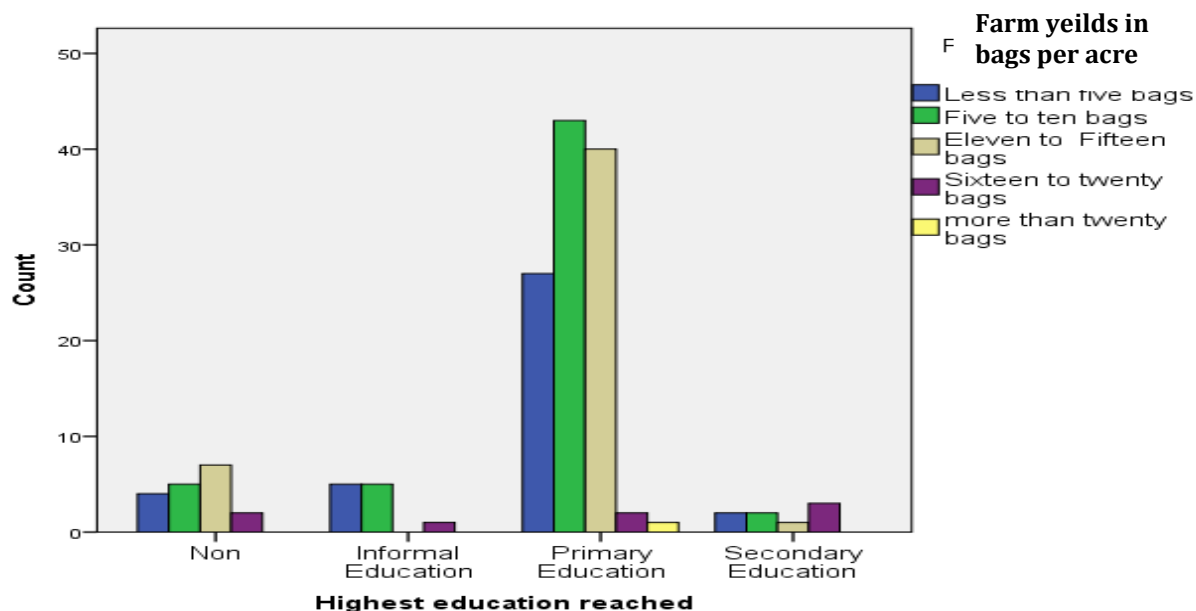


Figure 7: Respondents Level of Education and Farm Yields per Acre (N=150)

5.4.5 Factors Contributing to Low Yields

In an attempt to find out the reasons contributing to low crop yield, 57(38%) respondents attributed it to lack of necessary farming information, 53(35%) attributed it to poor farming methods, 27(18%) attributed it to untimely information, nine (6%) to lack of fertilizers and other necessary farm implements and four (3%) attributed the situation to lack of sufficient information service providers.

Observations made show that most farmers used their experience and traditional methods of farming inherited from their parents and grandparents despite being informed on modern farming methods by information providers. The findings are presented in Figure 8.

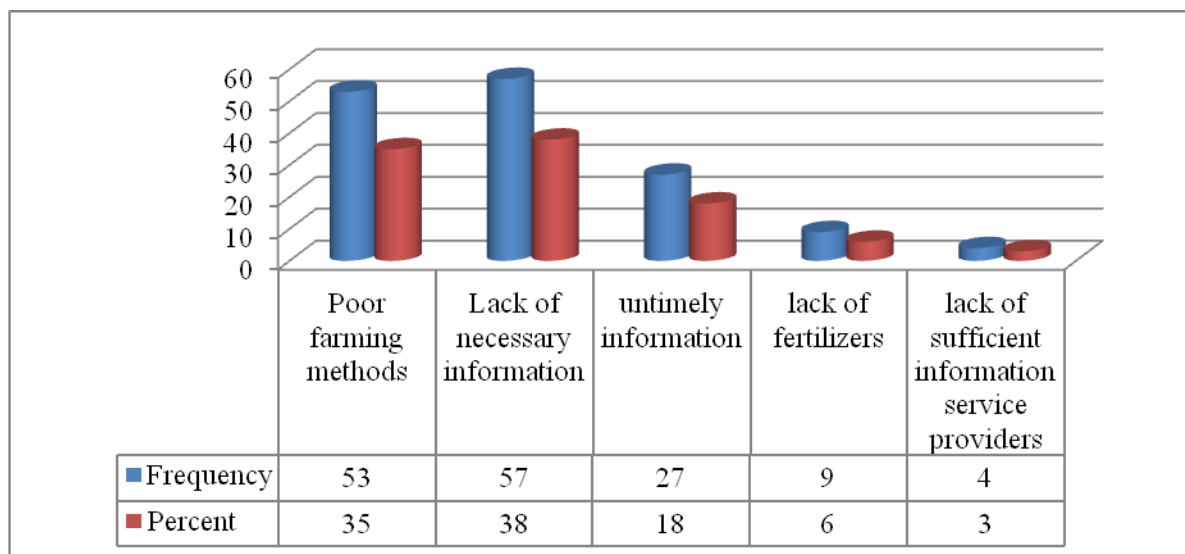


Figure 8: Reasons for Low Crop Yields (N=150)

Small scale farming can be a source of youth employment, food and income to most rural dwellers. However, small-scale farmers in Rukwa region are poor and do not benefit much from farming activities as a source of employment and income generation. Out of 150 respondents, 69% said they didn't sell their farm products because they obtained low yields. It was found that only few respondents 31% sell their farm products. This situation was caused by several challenges reported during interviews conducted on key informants. It was established that small scale farmers faced many hurdles including untimely availability of farm implements, poor farming methods, unclear source and place for obtaining information and inadequate physical, human and financial resources to enhance agricultural production.

5.5 Information Needs and Seeking Habits

Having established the farming activities carried out by respondents, size of land in acres used for farming activities, duration involved in farming activities, yields in bags per year

and the reasons for the yields obtained, the researcher sought to identify respondent's information needs and seeking behavior by addressing the following: information requirements, reasons for seeking that information, sources consulted, reasons for consulting the sources and information obtained from information service providers. Based on Robinson and Robson (2013) ISCM which informed this study, small-scale crop farmers (SSCFs) and information providers need to understand farming activities done in the villages (environment) and establish the information and knowledge gaps arising from these daily farming activities. In trying to address the information gap, different sources of information in different forms and formats were consulted by SSCFs.

5.5.1 Information Needs

In an attempt to establish the information needs of respondents, a list of 26 multiple response items was provided and the respondents were asked to tick against those which were applicable to them. Respondents expressed various information needs which included equipment sourcing 82(55%), trade fair 50(33%), proper use of fertilizers 95(63%), sustainable agriculture 84(56%) and legal issues 66(44%). The findings further show that most (85%) respondents needed information about market for products, irrigation farming (62%), pest management (54%) , input subsidy (53%), product packaging technology (55%), credit and loan facilities (59%), horticulture (58%), ware house receipt system (58%) and proper methods of farming (57%). The findings also show that respondents needed information on plant breeding 64 (43%), traditional methods of farming 87 (58%), plant grading system 61(41%) and crop varieties 81(54%). More findings on information needs are presented in Table 6.

Table 6: Respondents' Information Needs N=150

Information Needed	Highly Needed	Needed	Not sure	Not needed
Equipment sourcing	42(28%)	82(55%)	11(7%)	15(10%)
Trade fairs	64 (43%)	50 (33%)	35(23%).	1 (7%)
Plant breeding	22 (15%)	44 (30%)	20 (13%)	64(43%)
Traditional methods of farming	13 (9%)	43 (29%)	7(5%)	87(58%)
Proper use of fertilizers	19 (13%)	95(63%)	26(17%)	10 (7%)
Sustainable agriculture	52 (35%)	84 (56%)	5(3%)	9 (6%)
Plant diseases	49(33%)	54 (36%)	16(11%)	31(21%)
Proper methods of farming	85 (57%)	61(41%)	4(3%)	-
Warehouse Receipt System	87(58%)	59(39%)	2(1%)	2(1%)
Modern storage technology	4(32%)	39(26%)	17(11%)	46(31%)
Storage facilities	36(24%)	45(30%)	42(28%)	27(18%)
Improving products	47(31%)	65(43%)	16(10%)	22(15%)
Plant grading systems	23(15%)	34(23%)	31(21%)	61(41%)
Where and how to get market for products	128(85%)	21(14%)	1(7%)	-
Crop varieties	16(11%)	35(23%)	18(12%)	81(54%)
Horticulture	88(58%)	46(31%)	5(3%)	11(7%)
Organic farming	34(23%)	42(28%)	44(29%)	30(20%)
Credit and loan facilities	89(59%)	26(17%)	26(17%)	4(3%)
Legal issues	33(22%)	66(44%)	14(9%)	37(25%)
Food Processing and storage	65(43%)	29(19%)	43(29%)	13(9%)
Product Packing technology	82(55%)	27(18%)	28(19%)	13(9%)
Soil classification	22 (15%)	44 (30%)	64(43%)	20(13%)
Weather related information	35(23%)	29(19%)	43(29%)	43(29%)
Input Subsidy	80(53%)	48(32%)	7(5%)	15(10%)
Information about pest management	81(54%)	49(33%)	8(5%)	11(7%)
Irrigation farming	92(62%)	32(21%)	17(11%)	9(6%)

**Multiple response was possible*

The Pearson's chi-Square test was used to determine whether there was a significant difference between independent variables like age, gender, education and income per year and dependent variables like information needs, seeking habits, use of ICTs in accessing agricultural information services provided or not.

Pearson's chi-Square test was used because the frequencies obtained on information needs needed to be further tested to determine the influence of demographic variables on

information needs. Based on the chi-square test, if the “P” value (Asymp.sig) is greater than 0.05, then there is no significant difference among the variables being tested. This means one variable does not influence the other. But if the “P” value is less than or equal to 0.05, then there is a significant difference among the variables being tested, i.e one variable influences the other. In an attempt to establish whether the information required by respondents affected crop production per acre, it was found out that, with the exception of information on trade fair and information on where and how to get market for crops, there was no significant difference between the identified information needs (P-Value greater than 0.05) and crop production. This was probably because small scale farmers relied on their experience and informal sources of information like gatekeepers, friends/colleagues and village leaders. Table 7 summarizes the relationship between information needs and crop production per year.

Table 7: Relationship between Crop Production per Year and Information Needs

Information needs	Measures of Association: Pearson's Chi-Square			Remarks
	χ^2	df	Phi Value (Asymp.sig)	
Trade Fair	24.977	12	.015	Significant difference
Where and how to get market	45.934	8	.000	Significant difference
Horticulture	24.557	12	.063	No significant difference
Credit and loan facilities	20.072	12	.142	No significant difference
Irrigation farming	20.507	12	.157	No significant difference
Proper farming methods	10.171	8	.253	No significant difference
Packaging technology	11.996	12	.639	No significant difference
Input subsidy	19.916	12	.137	No significant difference
Pest management	13.821	12	.251	No significant difference

* (χ^2)= Chi-square test *df= Degree of Freedom

An enquiry from key informants clearly shows that small scale crop farmers have varied information needs which differ from one individual to another, village to village and from one farming community to another. Information service providers need to be pro-active, always thinking outside the box and frequently mingling with farmers with a view to understanding issues related to their farming activities as well as their environment in order to be able to clearly understand and address their diverse information needs.

One key respondent had this to say:

“We all have our specific information needs which differ from one farmer to the next but we are always provided with the same information regardless of what we need.....”

Another respondent said:

“.....well, I did not have any option did I? I have my specific farming information needs but I have to receive what I’m being given.....”

When information providers were asked about the identified information needs prior to the provision of information, they gave varied responses though most (81%) admitted that they rarely identify information needs of farmers. One information service provider had this to say:

.....You know what... Information needs identification is a difficult task and needs skilled people, in addition it is difficult to identify the information needs of every farmer...

Proper identification of agricultural information needs is key to enhancing crop production at an individual level and the nation at large.

5.5.1.1 Information Needed by Gender

A cross tabulation was made on information needs and gender of respondents. The purpose was to ascertain whether gender affected information needed. Pearson’s chi-Square test was used to determine the relationship between gender as an independent variable and information needs as dependent variables. The findings show that male respondents were leading in most of the needed information while their female counterparts were leading in trade fair information. For example, female scored 35 (55%) in trade fair information and male respondents scored 29 (45%). From a Pearson chi-Square test performed, it was established that there was a significant difference on information needed by gender with the P-Value .000 on some of the information needs

across gender. It can therefore be deduced that gender influenced agricultural information needs. More information is obtained in Table 8.

Table 8: Relationship between Gender of Respondents and Information Needs

Information Needs	Female		Male		Pearson's chi-Square (P-Value)	Remarks
	F	%	F	%		
Trade fair	35	55	29	45	$\chi^2 = 51$ df= 8 Appro. Sig=.000 (2 sided) P-Value .000	Significant Difference
Warehouse Receipt System	41	47	46	53		
Where and how to get market for crops	65	51	63	49		
Horticulture	27	44	35	57		
Credit and loan facilities	42	47	47	53		
Input subsidy	38	48	42	53		
Irrigation	41	47	47	53		
Proper Modern farming methods	37	44	48	56		

5.5.1.2 Information Needed by Age

The findings further show that there was great variation in information needs across age of respondents. For example, respondents aged 30-39 years and 40-48 years highly needed information on trade fair, warehouse receipt system, how and where to sell crops and credit and loan facilities. On the other hand, seven (50%) respondents aged 50 years and above needed information on input subsidy but rarely needed information on horticulture and credit and loan facilities. It was found that respondents aged 30-39 years and 40- 49 years were leading in most of the needed information, while respondents aged 50 years and above were showing low response. This situation can be attributed to the fact that respondents aged 30-49 were the most energetic and were expected to carry out most of the family responsibilities and other social economic issues including farming

activities. It was assumed that they needed more information to be able make good informed choices in carrying out their farming activities. Pearson's chi-Square statistical test performed showed a significant difference with a P-Value of $\leq .05$ on information needed across age of respondents (Table 9).

Table 9: Relationship between Age of Respondents and Information Needs N=150

Information Needs		Age in Years												P-Value
		19-29			30-39			40-49			50+			
		Not Needed	Needed	Highly Needed	Not Needed	Needed	Highly Needed	Not Needed	Needed	Highly Needed	Not Needed	Needed	Highly Needed	
Trade fair	F	-	9	7	-	26	21	1	11	21	-	-	-	$x^2 \leq 30$ df= 11 (2-sided) P-Value $\leq .005$
	%	-	39	30	-	37	48	2	25	48	-	-	-	
Warehouse Receipt System	F	-	4	19	-	30	35	-	3	41	-	7	-	
	%	-	17	83	-	44	51	-	7	93	-	50	-	
Where and how to get market for products	F	-	-	23	1	15	53	-	3	41	-	2	-	
	%	-	-	100	1	22	77	-	7	93	-	28	-	
Horticulture	F	1	8	14	4	33	29	5	20	18	-	-	1	
	%	4	35	61	6	48	42	11	46	41	-	-	13	
Credit and loan facilities	F	-	3	15	4	15	42	-	12	25	-	1	-	
	%	-	13	65	6	22	61	-	27	57	-	13	-	
Input subsidy	F	5	3	14	3	24	36	7	14	23	-	7	7	
	%	22	13	61	4	35	52	16	32	52	-	50	50	
Irrigation	F	1	5	16	4	12	40	-	6	12	-	-	-	
	%	4	22	67	6	27	58	-	14	27	-	-	-	
Modern farming methods	F	-	4	19	2	30	35	-	14	30	3	-	-	
	%	-	7	22	3	44	51	-	32	68	38	-	-	
Pest and pets management	F	-	5	14	3	24	36	6	13	24	-	-	-	
	%	-	22	61	4	35	52	14	30	55	-	-	-	
Product packaging technology	F	3	2	15	6	17	36	2	6	24	-	-	-	
	%	13	9	65	9	25	52	5	14	55	-	-	-	

Further findings indicated that there was no significance difference on modern farming information, pest and pets management and product packaging technology. This is probably because respondents were using their own experience. More findings are presented in Table 9.

5.5.1.3 Variation of Information Needs Across Villages

Analysis of information in trade fair, warehouse receipt system, horticulture, where and how to get market for products and credit and loan facilities across villages was made. It was clear that information needs varied from one village to another. For example, information on trade fair ranked high at Kalumbaleza 15(23%), Muze and Mtowisa with 13 (20%) respondents each, and Katuka 11(17%) followed by Kasense 13(26%). Information on Warehouse Receipt System ranked high at Kizombwe 15(17%), Kasense 14(16%), Kalumbaleza and Msanzi 12(14%), respectively. Information on horticulture was rated high at Kizombwe 15(24%), Mtowisa 13(18%) and Kalumbaleza 11 (18%); Kasense and Milanzi rated 8(13%) respectively. It was also found out that information on where and how to get market for products, warehouse receipt system, credit and loan facilities and input subsidy was rated high in almost all villages. The findings are presented in Figure 9.

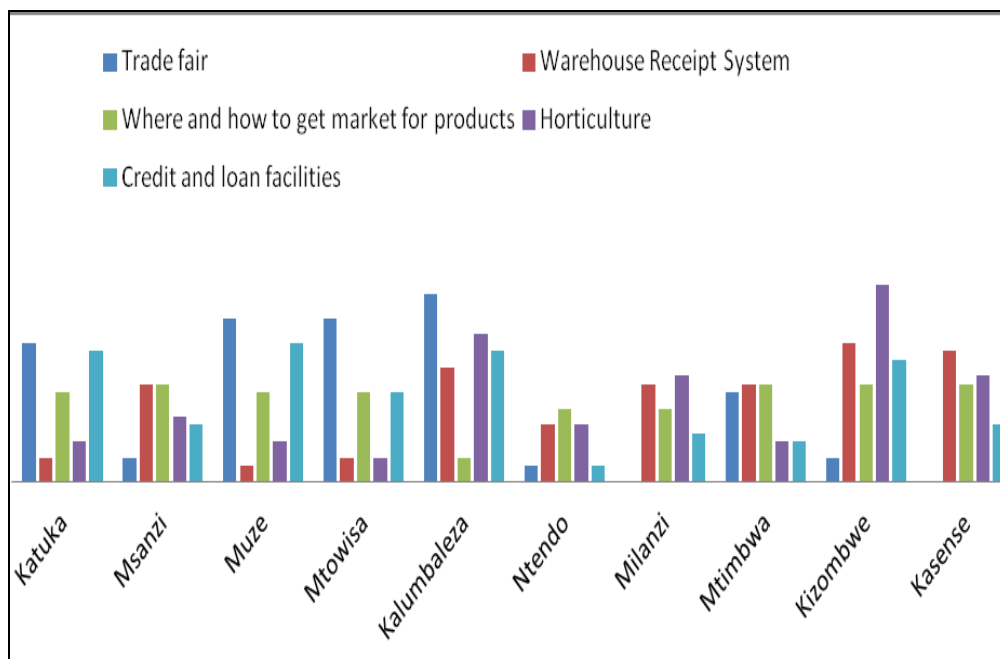


Figure 9: Variation of Information Needs Across Villages (N=150)

Respondents were asked to state the purpose of seeking information. It was shown that 58(39%) needed information for getting knowledge on various farming issues, 39(26%) needed information for the purpose of improving their farming activities, 37(25%) needed information to teach others, while 16(11%) needed information for improving products. The findings are presented in Figure 10.

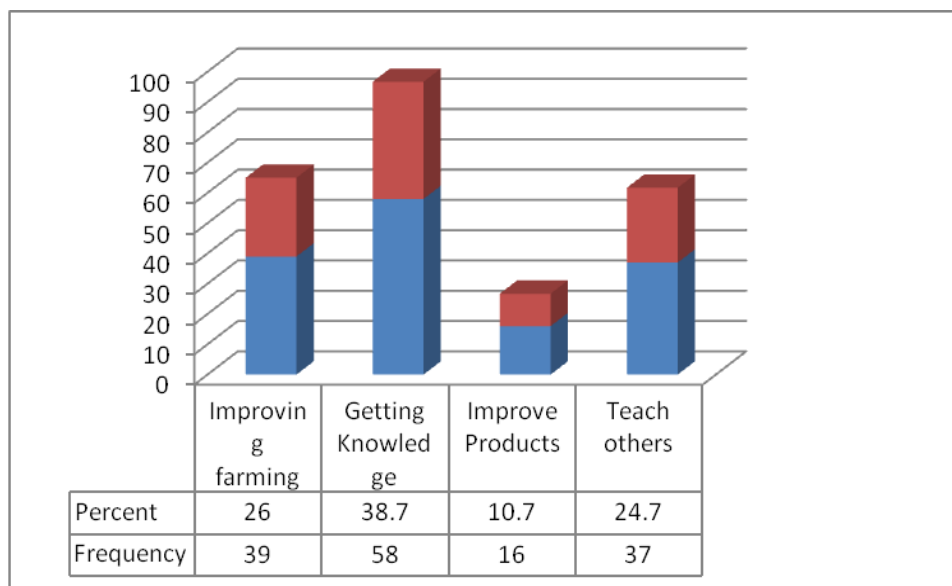


Figure 10: Purpose for Seeking Information (N=150)

5.5.3 Agricultural Information Seeking Habits

Having established the information needs of the respondents, it was imperative to find out how SSCF sought information to fulfill their information needs. Wilson (1999) contends that information needs have to do with one's recognition that there is an information gap. This inadequacy influences the way individuals seek information.

In an attempt to establish information seeking habits, several questions were asked. The following subsections present respondents information seeking patterns.

5.5.3.1 Sources of Information Consulted

Respondents were asked to state sources of information used in their quest for information. This question aimed at gathering information that would help to determine the effectiveness and efficiency of agricultural information services provided. A multiple response question was used to solicit information from respondents. The findings indicate that information sources often used by respondents in order of their preference were as

follows: gatekeepers 103(69%), friends/ colleagues 101(67%), church/ mosque 94(63%), Village leaders 79(53%), extension officers 72(48%), clubs and associations 72(48%) and radio programmes 51(34%) (Table 10).

The findings show that ICT related sources of information were rarely used and in some cases not used at all. For example, all respondents said that they have never used online databases like AGRICOLA or Tanzania Online, though important to them with a lot of current and relevant information to farmers in the region. This situation was attributed to inadequate knowledge and awareness for both the farmers and information service providers coupled with lack of ICT centers and other information infrastructures like libraries in all villages involved in the study.

It was noted through observation that printed sources of information were not used at all by most (82%) respondents. With regard to printed sources of information, one elder from Mtowisa village had this to say:

“You know what... we are provided with brochures which are boring with small writings, I can't read at this age.....instead I can use it to make my “ugoro” for smoking...

“Ugoro” is a type of locally made tobacco usually smoked by old people in the region and other parts of the country. A comment like this should be taken into consideration when selecting sources of information for SSCF. Farmers should be provided with relevant user friendly sources of information.

Table 10: Sources of Information Used by Respondents N=150

SN	Information Source	Frequency of Using the Source			
		Very often	Often	Rarely	Never
1.	Friends/ colleagues	31 (21%)	101(67%)	15(10%)	3 (2%)
2.	Gatekeepers	10(7%)	103(69%)	29(19%)	8(5%)
3.	Government publications	4(3%)	23 (15%)	52 (35%)	71(47%)
4.	Leaflets and Brochures	3(2%)	20(13%)	27 (18%)	100 (68%)
5.	Internet	5(3%)	9(6%)	-	136(91%)
6.	Television programmes	22(15%)	20(13%)	46(31%)	62(41%)
7.	Radio programmes	51(34%)	51(34%)	47(31%)	1(7%)
8.	Personal collections	16(11%)	27(18%)	38(25%)	66(49%)
9.	Church/mosque	28(19%)	94(63%)	15(10%)	13(9%)
10.	Village leaders	58(39%)	79(53%)	2(2%)	11(8%)
11.	Extension officers	76(51%)	72(48%)	1(7%)	1(7%)
12.	Clubs and Associations	9(6%)	72 (48%)	48(32%)	21(14%)
13.	Video/ radio cassettes	1(7%)	12(8%)	8(5%)	129(86%)
14.	CD-Roms	-	-	9(6%)	141(94%)
15.	Agricultural exhibitions	-	47(31%)	22(15%)	81(54%)
16.	Newspapers	-	3(2%)	13(9%)	134(89%)
17.	Magazines	-	2(1%)	4(3%)	144(96%)
18.	Journal articles	-	2(1%)	29(1%)	146(97%)
19.	Mobile phones	-	9(6%)	3(2%)	138(92%)
20.	Library	-	-	2(1%)	148(99%)
21.	Databases i.e Tanzania online, AGRICOLA, among others	-	-	-	150(100%)

**Multiple Response was possible*

The findings further show that 134(89%) respondents never used newspapers as a source of information, 144(96%) never used agricultural magazines, and 146 (97%) never used journal articles probably because they were not available at all or very rarely found in the villages. It was also found out that despite the fact that most respondents owned mobile phones, 138(92%) had never used it as a source of agricultural information while 148(99%) respondents said they have never used a library to obtain information for their

farming activities. This is probably because there is only one regional public library in all the three visited districts; it is located in Sumbawanga municipality, thus its location forms an impediment for information access. Observations by the researcher indicated that the library was ill equipped with less than 100 copies of agricultural information sources to cater for the needs of the entire region.

One respondent lamented:

“...in those old days, there were mobile libraries and mobile cinemas which were preferred by most of us, but I don’t know what is happening in these days.....”

When information service providers were asked to comment on the above observation, they all agreed that mobile libraries and cinemas used to be suitable sources of agricultural information in rural parts of the country. Unfortunately, they died a natural death and they are no longer there. One of the main reasons being budget constraints as it was also observed by Manda (2002). With regard to sources of information, one key informant had the following to say:

“Since I can’t read and write, I prefer to use elders who are knowledgeable on various farming issues.....”

Another respondent commented as follows:

“.....do you know that in this village most people are illiterate? There must be more information service providers and not other sources of information....”

These comments appear to suggest that these respondents are probably not aware that there are other sources of information that are also suitable for people who cannot read and write. Sources like mobile cinemas, audio and video tapes, traditional dances and the like may serve the purpose.

Findings from information service providers and observations made by the researcher on various sources of information used by small scale farmers found out that there were various sources of information used to provide information services to small scale farmers, including: field farm visits and meetings, group discussions and practical sessions, demonstration plots, leaflets and brochures, face to face interactions with SSCFs. They also included seminars (though rarely used), “Gulio” (Village market days), traditional dances and festivals and use of farming groups and associations.

5.5.4 Frequently Used Sources of Information

Social demographic information like age, gender and education may have an influence on the way people seek information. Several studies conducted worldwide on information seeking habits of farmers show that farmers all over have as varied information needs as their varied farming activities and so are the sources used to address their information needs. Information sources and channels used to address information needs differ depending on farming activities, information environment, age, gender, exposure to information and their social- economic background. The following subsections present these variations among respondents in the study area.

5.5.4.1 Frequently Used Sources of Information by Age

A cross tabulation was made on frequently used sources of information against the age of respondents. The aim was to examine the influence of age on the sources of information utilized by small-scale crop farmers. It was established that respondents aged 30-39 years and 40-49 years were active in using gatekeepers, friends and colleagues, clubs and

associations as sources of information. This was probably because they needed much information from a variety of sources to enable them to carry out their farming activities efficiently and enhance production. Respondents aged 60-69 years hardly used any sources, particularly printed and electronic sources. They relied on friends and colleagues, the church and mosque, extension officers and village leaders six (Table 11).

Pearson's chi-square statistical tests show that there was a significant difference on preferred sources of information across age of respondents as the P-Value was either less than or equal to 0.05 for most of the frequently used sources of information as indicated in Table 10. From these findings it was established that age influences the use of sources of agricultural information. More findings are presented in Table 11.

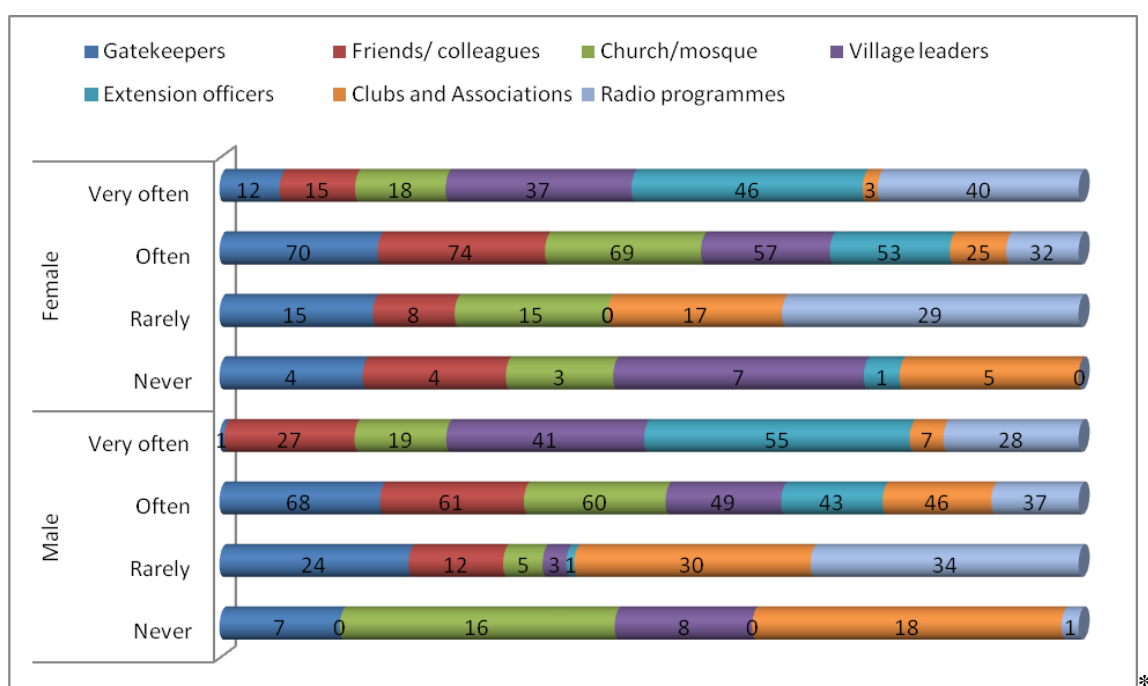
Table 11: Relationship between Age of Respondents and Frequently Used Sources of Information N=150

Information Source	Frequency of Using the Source	Age					P-Value
		19-29	30-39	40-49	50-59	60-69	
Gatekeepers	Never	3(38%)	5(63%)	-	-	-	0.001
	Rarely	9(31%)	16(55%)	4(13%)	-	-	
	Often	11(11%)	46(45%)	32(31%)	6(6%)	-	
	Very often	-	2(20%)	8(80%)	-	-	
Friends/colleagues	Never	2(67%)	1(33%)	-	-	-	0.035
	Rarely	5(33%)	6(40%)	3(20%)	5(5%)	6(6%)	
	Often	16(16%)	41(41%)	33(33%)	2(7%)	-	
	Very often	-	21(68%)	8(26%)	-	-	
Church/mosque	Never	-	11(85%)	-	27(15%)	-	0.006
	Rarely	2(13%)	7(47%)	2(13%)	1(7%)	3(3%)	
	Often	17(18%)	38(40%)	32(34%)	4(4%)	-	
	Very often	4(14%)	13(46%)	10(36%)	1(4%)	-	
Village leaders	Never	-	6(55%)	3(27%)	2(18%)	-	0.071
	Rarely	-	2(100%)	-	-	-	
	Often	9(11%)	38(48%)	21(27%)	5(6%)	6(8%)	
	Very often	14(24%)	23(40%)	20(35%)	1(2%)	-	
Extension officers	Never	-	1(100%)	-	-	-	0.208
	Rarely	1(100%)	-	-	-	-	
	Often	8(11%)	34(47%)	19(26%)	5(7%)	6(8%)	
	Very often	14(18%)	34(45%)	25(33%)	3(4%)	-	
Clubs and Associations	Never	8(38%)	9(43%)	4(19%)	-	-	0.040
	Rarely	9(19%)	19(37%)	17(35%)	3(6%)	-	
	Often	5(7%)	36(50%)	20(28%)	5(7%)	-	
	Very often	1(11%)	5(57%)	3(33%)	-	-	
Radio programmes	Never	-	-	-	-	-	0.000
	Rarely	5(11%)	21(45%)	13(28%)	5(11%)	6(8%)	
	Often	9(18%)	29(60%)	8(16%)	2(4%)	-	
	Very often	9(18%)	19(37%)	23(45%)	-	-	

5.5.4.2 Frequently Used Sources of Information by Gender

Gender analysis was made on frequently used sources of information. It was established that there were slight differences on preference of information sources used by respondents with P-Value of less than 0.05 in all frequently used sources of information.

More female respondents 53(70%) used gatekeepers as their source of information compared to male 50(68%) respondents. It was also shown that nine (12%) female used the same source very often while one (1%) male used the same source very often. The findings further show that radio programmes were more preferred by female 30 (40%) than male respondents 21(28%). Extension officers were more preferred by male 41(55%) than female respondents 35 (46%). More findings are presented in Figure 11.



Multiple Response was possible

Figure 11: Frequently Used Sources of Information by Gender N=150

In regard to education level of respondents and frequently used sources of information, it was established that respondents depended mainly on informal sources of information like friends, village leaders and church leaders. For example, out of eight respondents with secondary education, seven (88%) used informal sources. It was expected that secondary school leavers should have used more reliable sources of information like

books, agricultural magazines and a library. This was not as expected probably because of the challenges they face in accessing and using different sources, including lack of awareness, skills and inadequate information sources.

5.5.5 Reasons for Selecting Information Sources

Respondents were required to indicate the reasons for selecting the sources of information they used to address their information needs. A multiple response item was used to solicit information in which a four range likert scale ranging from not important to very important was used. Out of 150 respondents, 113 (75%) preferred sources closest to their place of residence, 102 (68%) said ease of use of the source, 119 (79%) said it depended on a source's availability, while 69 (46%) preferred language familiarity. The findings further show that 94(63%) respondents considered adequacy of the information contained in the source to be important in choosing a source. Out of 150 respondents, 90(60%) considered source's reliability important in selecting sources, 96(64%) were guided by affordability, 64(43%) said format was very important in selecting a source to address their information needs (Table 12).

Table 12: Reasons for Selecting Information Sources N=150

Reasons for choosing the source	Very Important		Important		Somehow Important		Not Important	
	F	%	F	%	F	%	F	%
The source's closeness to place of residence	17	11.3	11	75.3	12	8	8	5.3
Ease of use	30	20	10	68	16	10.7	2	1.3
Source's availability	16	10.7	11	79.3	15	10	-	-
Language familiarity of the source	69	46	61	40.7	20	13.3	-	-
Adequacy of the information contained	24	16	94	62.7	32	21.3		
Source's reliability	39	26	90	60	21	14	-	-
Affordability of the source	24	16	96	64	29	19.3	1	0.7
Format of the source	64	42.7	65	43.3	21	14	-	-

**Multiple Response was possible*

Further statistical analysis on the influence of age in choosing agricultural sources of information showed a significant statistical difference on; affordability of the source, format of the source and ease of use. A two tailed Pearson Chi Square test showed a significant difference with P- value $\leq .05$ as indicated in Table 13.

On the other hand, the findings indicated that age did not influence the choice of information sources with regard to sources closeness, availability, reliability and adequacy of information obtained from the source (See Table 13). This was probably because respondents relied much on informal sources of information.

Table 13: Relationship between Age and Reasons for Choosing Information Sources

N=150

Reasons for Choosing Information Sources		Age in Years											P-Value	
		19-29 N=23			30-39 N= 69			40-49 N= 44			50+ N=14			
		Somewha	Importan	Very Importan	Somewha	Importan	Very Importan	Somewha	Importan	Very Importan	Somewha	Importan		Very Importan
The source's closeness to where I live	F	-	20	3	8	47	10	4	33	4	7	-	-	$x^2 \leq 28.169$ df= 8
	%	-	18	18	12	68	59	33	75	9	50	-	-	
Source's availability	F	3	15	5	9	55	5	3	37	4	-	7	7	P-Value \geq .005 No Significance Difference
	%	13	65	22	13	80	7	9	84	9	-	50	50	
Language familiarity	F	3	3	17	12	30	27	5	17	22	-	6	8	$x^2 \leq 40.559$ df= 12
Adequacy of Information Obtained	%	13	13	74	17	44	39	11	39	50	-	43	57	
Source's reliability	F	3	10	9	14	38	17	4	29	11	-	6	-	P-Value \leq .005 Significant Difference
	%	13	44	43	20	55	25	9	66	25	-	43	-	
Affordability of the source	F	9	11	3	10	46	12	4	31	9	-	7	7	P-Value \leq .005 Significant Difference
	%	39	48	11	15	68	17	9	71	21	-	50	50	
Format of the source	F	5	3	15	9	35	25	1	20	23	-	6	8	P-Value \leq .005 Significant Difference
	%	22	13	62	13	51	36	2	46	52	-	43	57	
Ease of use	F	-	16	5	-	7	47	6	28	10	-	-	14	P-Value \leq .005 Significant Difference
	%	-	70	22	-	10	68	14	64	23	-	-	100	

Observation made established that there was only one public library in Sumbawanga municipality for all three visited districts. The library was poorly stocked with less than 100 volumes on agricultural issues and only seven library staff who were not able to manage the entire region. One librarian had the following to say:

“... well, we know the importance of libraries to farmers, but we have more challenges than we could afford to manage...”

Another one had the following comment:

“ we rarely visit some villages to create awareness on the presence and use of library, its resources and its role to small scale farmers”

On the other hand one key informant while bursting into laughter said that;

“I’ve been destined in this village, I was born here and I will die here. I have never even been to town, I don’t have money even to afford my basic needs; how can I misuse it for travelling all the way to seek information in the library... I can’t do it...”

Although it sounds ridiculous, this comment represents views by a number of poor small scale farmers in rural areas who can hardly afford to fulfill their basic needs due to poverty.

Further analysis was done using a two sided Person Chi-square statistical performance to determine the level of relationship between gender and reasons for choosing information sources. The findings show that there is a significant relationship between gender and the choice of information sources as $p > 0.05$ ($p = 0.000$ while the degree of freedom (df) = 8). More findings are indicated in Table 14.

Table 14: Relationship between Gender and Reasons for Choosing Information Sources N=150

Reasons for choosing Information Sources	Male N=74			Female N= 76			Pearson Chi-Squire Test
	Somewhat important	Important	Very Important	Somewhat important	Important	Very Important	
The source's closeness to where I live	4 (5%)	15 (20%)	35 (74%)	8 (11%)	58 (76%)	10 (13%)	$\chi^2 \leq 161.733$ df= 8 Asymp. Sig. (2- Sided) P-Value .000 Remarks Significant Difference
Source's availability	10 (14%)	52 (70%)	12 (16%)	5 (7%)	67 (82%)	4 (5%)	
Language familiarity	13 (18%)	25 (34%)	36 (49%)	7 (9%)	36 (47%)	33 (43%)	
Adequacy of information Obtained	19 (26%)	45 (61%)	10 (14%)	13 (17%)	49 (65%)	14 (18%)	
Source's reliability	12 (16%)	45 (61%)	17 (23%)	9 (12%)	45 (59%)	22 (29%)	
Affordability of the source	15 (20%)	50 (68%)	9 (12%)	15 (19%)	46 (61%)	15 (20%)	
Format of the source	11 (15%)	33 (45%)	30 (41%)	10 (13%)	32 (42%)	34 (45%)	
Ease of use	7 (10%)	49 (69%)	18 (24%)	11 (15%)	53 (70%)	12 (16%)	

5.5.6 Satisfaction from the Sources Used

Respondents were asked whether the sources used to address their information needs satisfied their information requirements. The aim was to obtain information on the suitability of each source and provide recommendations on suitable sources to be used in information service provision in the region. A Likert scale was used to gather information from respondents. The findings show that respondents were not satisfied with the sources used. The frequently used sources of information did not fully satisfy respondents' information requirements. For example, 68(45%) respondents said that they were not at

all satisfied with friends as their source of information, 61(41%) respondents were somewhat satisfied, 16 (11%) were satisfied with friends and only one (7%) was satisfied with friends as a source of information. A total of 43 (29%) respondents were not at all satisfied with gatekeepers, 93(62%) were somewhat satisfied and 14 (1%) respondents were satisfied. Twenty (13%) respondents were not at all satisfied with the radio as a source of information, 75(50%) were somewhat satisfied, and 48(32%) were satisfied (Table 15). Although respondents frequently used these sources of information, they were not very much satisfied with them. They were probably using them simply because they were the only options available although they did not fully address their information needs. When asked to comment on their level of satisfaction in using information sources, one said:

“Although I’m not fully satisfied with the available sources, I have no option, other sources like books and television are expensive I cannot afford”

Another respondent commented:

“Sometimes I’m not satisfied with my friends as sources of information, they are not reliable, trustworthy or formal and they only use their experience”

Dissatisfaction on the sources used to provide information among respondents may be attributed to a number of factors such as improper information needs identification which could lead to the provision of relevant sources of information to address the farmer’s information gaps and shortage of information providers.

Table 15: Respondents Level of Satisfaction on the Sources of Information Used**N=150**

Information Source	Level of satisfaction				
	Very much satisfied	Satisfied	Somewhat satisfied	Not at all satisfied	Never Used
Friends/ colleagues	1(7%)	16(11%)	61(41%)	68(45%)	4(3%)
Gatekeepers	-	14(9%)	93(62%)	43(29%)	-
Government publications	1(7%)	12(8%)	73(49%)	43(29%)	21(14%)
Leaflets and Brochures	-	7(5%)	50(33%)	58(37%)	35(23%)
Internet	-	5(3%)	12(8%)	2(1%)	131(87%)
Television programmes	-	23(15%)	48(32%)	56(37%)	23(15%)
Radio programmes	1(7%)	48(32%)	75(50%)	20(13%)	4(3%)
Personal collections	-	11(7%)	27(18%)	54(36%)	58(39%)
Church/mosque	-	58(39)	55(37%)	13(9%)	24(16%)
Village leaders	6(4%)	62(41%)	48(32%)	24(16%)	10(7%)
Extension officers	25(16%)	75(50%)	47(31%)	-	3(2%)
Clubs and Associations	3(2%)	17(11%)	65(43%)	31(21%)	34(23%)
Video/ radio cassettes	-	1(7%)	10(7%)	20(13%)	119(79%)
CD-Roms	-	1(7%)	2(1%)	7(5%)	140(93%)
Agricultural exhibitions	3(2%)	8(5%)	61(41%)	8(5%)	70(47%)
Newspapers	-	2(1%)	5(3%)	31(21%)	112(75%)
Magazines	-	1(7%)	4(3%)	5(3%)	140(93%)
Journal articles	1(7%)	-	4(3%)	6(4%)	139(93%)
Mobile phones	1(7%)	6(4%)	7(5%)	33(22%)	103(61%)
Library	1(7%)	2(1%)	15(10%)	4(3%)	128(85%)
Databases i.e Tanzania online, AGRICOLA, among others	-	-	-	-	150(100%)

**Multiple Response was possible*

When respondents were requested to comment on the relevance of the content of information provided, the following were elicited; 77 (51%) respondents said that the information provided was very relevant, 59 (39%) said it was relevant, 13 (9%) were not

sure and one (7%) said it was irrelevant. From these findings, it was clear that information provided through the sources and channels was relevant though not satisfactory in addressing their daily farming information gaps. The findings are presented in Figure 12.

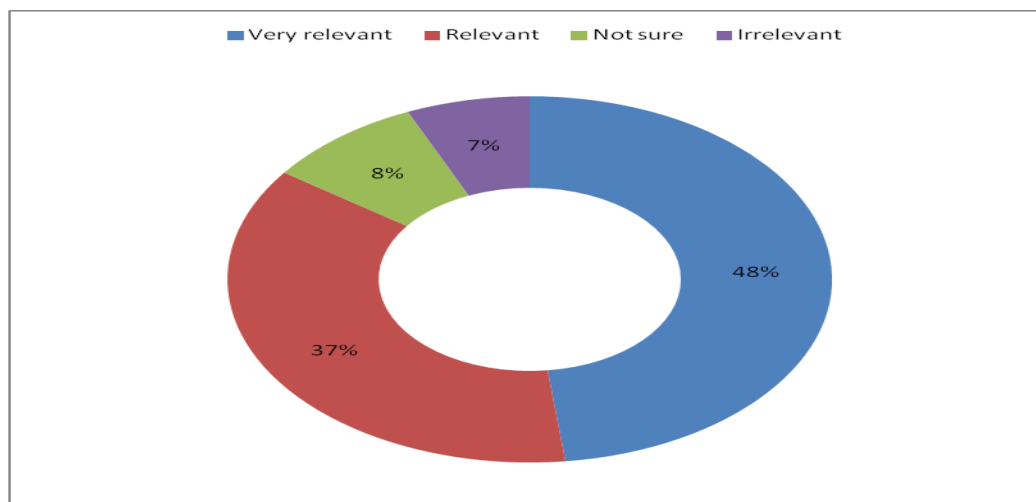


Figure 12: Relevance of the Content Obtained from Information Sources (N=150)

5.5.7 Format Preferred by Respondents

Respondents were asked to state the format of information sources they prefer. The findings show that 110 (73%) respondents preferred print format, 14(9%) preferred both print and electronic format, 16(11%) preferred audio format and 10(7%) preferred audiovisual sources of information. Gender difference on information source's preference was minimal except for audiovisual sources. About eight (11%) female respondents preferred audiovisual sources compared to male two (3%) respondents.

When asked to state the reasons for selecting the formats, 76(51%) respondents said they selected the format because it was easy to use, 34(23%) said the format was user friendly, 22(15%) said the sources were affordable, eight (5%) said it was the only source

available and 10(7%) said it was the only source suitable in their environment. The findings are summarized in Figure 13.

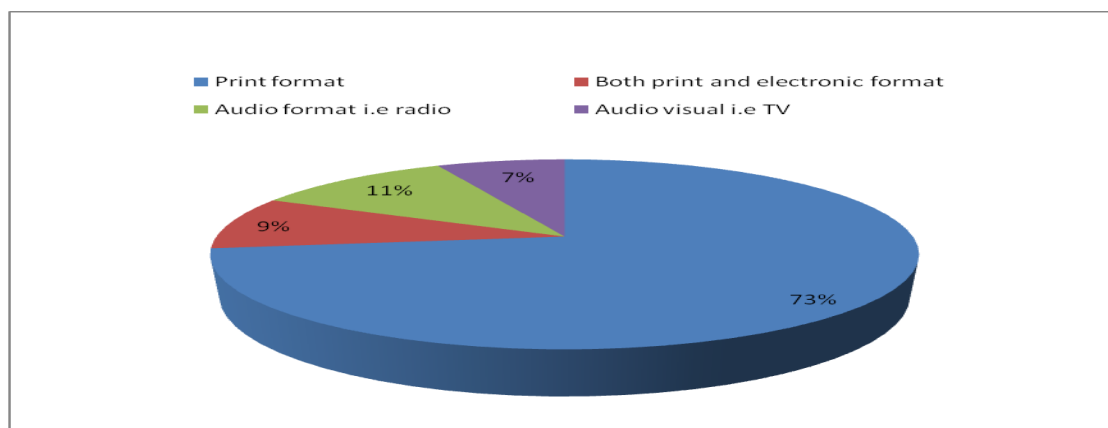


Figure: 13 Format Preferred by Respondents (N=150)

5.5.8 Language of Preference

Respondents were required to state their language preference in using information sources. A total of 141(94%) said Swahili and nine (6%) said local language. None of them selected English language probably because most respondents had primary school education with Swahili being the main medium of instruction; as a result most of them completed their primary school without having basic English knowledge. When asked to give reasons for their language preference, 93(62%) respondents said familiarity with the language and 57(38%) said Swahili language was easily understood.

5.6 Types and Range of Information Services Offered to Small-Scale Farmers.

The second objective of the study examined the type and range of information services offered to small-scale crop farmers in the study area. The aim was to establish whether information services offered met their information needs. The following subsections present responses on this objective.

5.6.1 Agricultural Information Services Offered to Small Scale Farmers

Respondents were required to state agricultural information services offered by information service providers. A multiple response item was used to solicit information from respondents. The findings show that a small range of agricultural information services were provided to small scale crop farmers, including document delivery services 129(86%), technical advice 139(93%) and on farm reference services 139(93%). The findings further show that abstracting services 125(83%), translation services 136(91%), instructions on how to use the sources 128(85%), information referral services 108(72%) and CD-ROM databases 135(90%) were very rarely provided and in other villages not provided at all.

The researcher observed that the most prominent information service provided was technical advice on different farming issues such as proper use of fertilizer, ratios of pesticides to be applied on crops, grafting of fruit trees and modern crop storage techniques. It was also observed that there was on farm reference services through small farming groups and mostly through “shamba darasa” (field farm schools).

The findings from interviews conducted to seven (26%) librarians revealed that the services provided to small-scale crop farmers included document delivery, awareness creation on the presence of the library and how to use it. However, observations made by the researcher revealed that these services were rarely provided due to shortage of human and financial resources. More findings are presented in Table 16.

Table 16: Agricultural Information Services Offered to Farmers N=150.

Information service	Response	
	YES	NO
Technical advice	139(93%)	11(7%)
On farm reference service	138(92%)	12(8%)
Document delivery service	129 (86%)	21(14%)
Training on different farming issues	120(80%)	30(20%)
Information repackaging	90(60%)	60(40%)
Selective dissemination of information	80 (53%)	70(47%)
Routing of documents on new innovations	78(52%)	72(48%)
Instant massaging through mobile phones	73(49%)	77(51%)
Current awareness services	55 (37%)	95(63%)
Photocopies of available literature	54(36%)	96(64%)
Information referral services	42(28%)	108(72%)
Abstracting services	25(17%)	125(83%)
Instructions on how to use information sources	22(15%)	128(85%)
CD-ROM database provision i.e AGRICOLA	15(10%)	135(90%)
Translation services of available literature	14(9%)	136 (91%)

**Multiple Response was possible*

Data obtained from interviews conducted to extension officers 20 (74%) confirmed that information services offered to small scale farmers included provision of advice and consultancies on different farming activities, for example, agricultural project management though rarely provided and mostly on demand from individual farmers or groups. This was also evidenced by observation made in several villages where individual farming projects were carried on. A good example was a farmer from Mtimbwa village who after receiving information from information providers changed

completely from the old traditional methods of farming to modern farming. In an interview with him he said:

“.....For a very long time I was using the same old methods of farming inherited from my parents, but after receiving information I have tripled my products and income as well....”

This small scale farmer claimed to have started to grow other crops for commercial purpose such as fruits (mangoes, avocado and citrus fruits). There were also different varieties of vegetables which were observed by the researcher. Figure 13 presents one of the “*bustani ya jikoni*” (kitchen garden) from this respondent.



Figure 14: Vegetable Garden Source: Field Data (2014)

Figure 13 shows a vegetable garden popularly known as “*bustani ya jikoni*” (kitchen garden) grown by one of the key informants after receiving information on creating special small hills covered with dried grass and animal manure for a kitchen garden. Figure 14(a) and 14(b) represents some of the beans projects grown for commercial purpose at Msanzi and Mtimbwa villages.



Figure 15 (a): Beans Plot at Msanzi Village Source: Field Data (2014)



Figure 15 (b): Beans Plot at Mtimbwa Village Source: Field Data (2014)

Fifty five (37%) respondents said that current awareness services were provided. Interviews conducted to information providers confirmed that both Current Awareness Services (CAS) and Selective Dissemination of Information (SDI) were provided though not frequently. For example, CAS was provided in case of army worm attack and drought. Farmers were advised on how to recognize the worms and to report immediately if found. In case of drought they were advised to plant drought resistant crops like sorghum. An example of Current Awareness Services is provided in Appendix X.

Twenty (74%) information service providers (extension officers) provided information services on demand to individuals and groups on horticulture, pesticides and storage facilities. This was confirmed by one key informant who said:

“when we request information from extension officers they always provide very useful and detailed information though it is difficult to get them...”

Another one remarked:

“Mhhh.... I may need certain information, though I know that I will get it, it may take weeks to get it..... By the time I get it, it might be too late..”

Shortage of information service providers in the study area might be the cause of such comments. Interviews with district agricultural officers established that Sumbawanga rural had 101 villages with only 36 extension officers and seven (7) motor bikes. Thus it was difficult for information providers to reach all villages when required.

Pearson Chi Square Test was used to determine the relationship between crop production and agricultural information service provided. The findings are presented in Table 17.

Table 17: Relationship between Crop Production and Agricultural Information Services Provided N=150

Information service	Pearson Chi Square Test			
	χ^2	Df	Asympt. Sign (Two sided)	Remarks
On farm reference services	4.261	4	0.02	P-Value \leq .005 Significant Difference
Current awareness services	2.131	4	0.03	
Selective dissemination of information	3.211	4	0.02	
Instant messaging through mobile phones	14.597	4	0.05	
Technical advise	3.786	4	0.01	
Instruction on how to use the sources	1.801	4	0.04	
Training on different farming issues	6.558	4	0.05	
Information repackaging	1.892	4	0.35	P-Value \geq .005 No Significance Difference
Document delivery service	2.351	4	0.85	
Routing of documents on new innovations	7.165	4	0.37	
Photocopies of available literature	5.558	4	0.32	
CD-ROM database provision i.e AGRICOLA	3.118	4	0.53	
Translation services of available literature	1.061	4	0.90	
Information referral services	5.589	4	0.93	
Abstracting services	1.862	4	0.93	

From the findings in Table 17, it can safely be established that crop production was influenced by agricultural information services provided in the area of study. This depended on the type of information service provided and whether it addressed the information needs of respondents or not. For example, if respondents were provided with current awareness services, selective dissemination of information, training on farming issues, on farm reference services, technical advice and information on how to use information sources, they could probably increase their production and vice versa.

However, other agricultural information services seemed not to have effect on crop production as they showed no significant difference as indicated in Table 17.

5.6.2 Frequency of Receiving Agricultural Information Services

Respondents were asked to state the frequency of receiving information services from information service providers. The aim was to find out whether farmers received information on timely basis and whether the services were reliable. The findings showed that 96(64%) respondents received information services at least once a month, and three (2%) said at least once after every three months.

When asked to state reasons why they received information services as stated, 67(45%) respondents said there was shortage of information service providers while majority (55%) attributed the situation to poor budgeting for agricultural information service provision. More findings are presented in Figure 16.

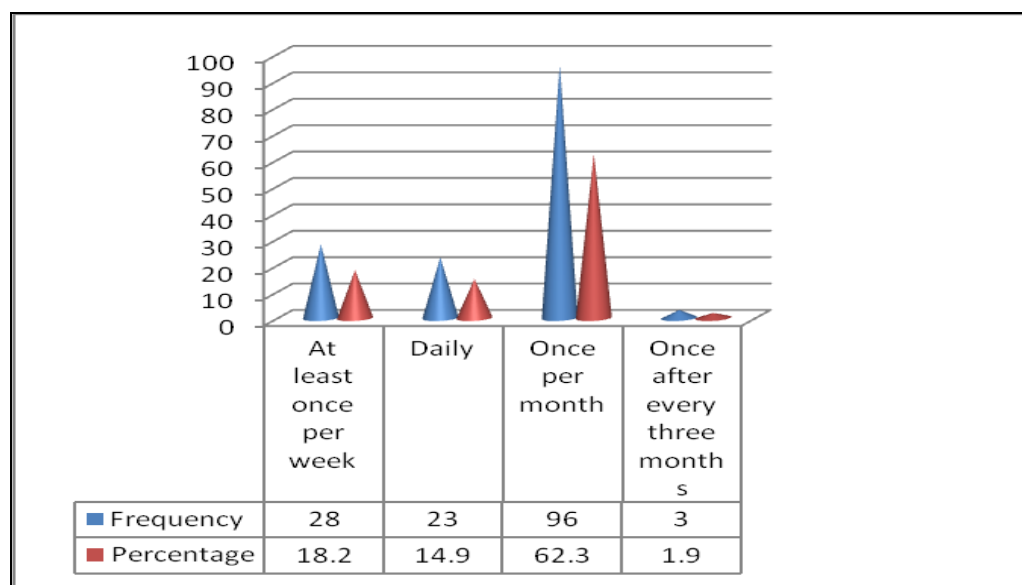


Figure 16: Frequency of Receiving Information Services (N=150)

5.6.3 Skills and Competence of Information Service Providers

Respondents were required to state the competence and skills of information service providers in agricultural information service provision. A total of twelve multiple response items were provided in a likert scale. The findings show that information service providers were not competent in assessing information needs and addressing it appropriately as noted by 113(75%) respondents and in providing sustainable information services as noted by 71(47%) respondents. Out of 150 respondents, 119(79%) said information service providers were not consistent in information service provision. More information is presented in Table 18.

Table 18: Skills and Competence of Information Service Providers N=150

Skills and Competencies of Information Service Providers	Response			
	Very Competent	Competent	Somehow Competent	Not Competent
Information Provision skills	-	93(62%)	43(29%)	14(9%)
Information delivery process	-	54(36%)	75(50%)	21(14%)
Customer care	1(7%)	22(15%)	95(63%)	32(21%)
Consistency in information service provision	9(6%)	6(4%)	16(11%)	119 (79%)
The quality of information services provided	10(7%)	118 (78%)	21(14%)	1(7%)
Relevance of information provided	7(5%)	112(75%)	23(15%)	8(5%)
Knowledge on the subject matter in hand	3(2%)	80(53%)	57(38%)	10(7%)
Sustainability of information service provision	-	32 (21%)	47(31%)	71(47%)
Assessing information needs and addressing it appropriately	-	16(11%)	21(14%)	113(75%)
Developing specialized information products	-	35(23%)	60(40%)	55(37%)
Using appropriate information dissemination technology	2(1%)	39(26%)	89(59%)	20(13%)
Continuously improving information service provision	-	42(28%)	77(51%)	31(21%)
Planning and prioritizing information service provision on what is important	27(18%)	20(13%)	71(47%)	32(22%)

**Multiple Response was Possible*

The findings show that respondents were not happy with the competence of information service providers in some aspects. For example, out of 150 respondents, 32(22%) respondents said they were not competent in planning and prioritizing information service provision. Twenty (13%) respondents said information service providers were not competent in using appropriate information dissemination technology. Interviews conducted and observations made by the researcher show that information service providers lacked important skills such as translation, abstracting, indexing, community mobilization, public speaking as well as information marketing skills.

5.6.4 Quality of Information Provided to Farmers

Farmers need to be provided with relevant, timely and useful information to be able to make informed decision relating to farming. To ensure that these attributes of good information were met, Robson and Robinson (2013) ISCM was used in this study (See chapter three). To obtain information on these attributes, respondents were provided with a multiple response item with several attributes of good information accompanied with brief explanations to respond to. The findings showed that information received was objective as it was attested by 72(48%) respondents as excellent and 54(36%) respondents said it was very good. Out of 150 respondents, 74(49%) said the information received was very much relevant to their daily farming activities, while four (3%) respondents said the information received was not relevant as it did not fully address their information needs. A total of 43(29%), 54(35%) and 49(32%) respondents said the information received was excellent, very good and good, respectively. The findings also established that there was disparity in rating the authority of the information received probably because most (69%) respondents relied on gatekeepers, people who were

believed be more informed on different agricultural aspects than others in the village and their fellow friends. Sometimes they used friends/colleagues 101(67%), the church/mosque 94(63%), village leaders 79(53%) and extension officers 72(48%). Apart from extension officers, some of these sources might not be very reliable.

More findings show that 88(59%) respondents were not happy with the extent to which information provided was beneficial and provided competitive advantage to farmers (value added), they rated poor. This was probably because all farmers were provided with almost the same information regardless of their farming activities, products and market variability. This situation did not give them competitive advantage over others who did not have such information.

The findings further show that with the exception of the extent to which information was available and quickly retrievable and the extent to which information provided was beneficial and provided competitive advantage to farmers, there was a significant relationship on the quality of information provided and crop production in the area. More information is presented in Table 19.

Table 19: Quality of Information Provided as Rated by Respondents N=150

ATTRIBUTE OF INFORMATION	RANKING				
	Excellent	Very good	Good	Poor	P-Value
Objectivity: the extent to which information is unbiased, true and credible	72(48%)	54(36%)	24(16%)	-	0.01
Relevancy: The extent to which information is applicable and helpful for your daily farming activities/ task at hand	24(16%)	74(49%)	48(32%)	4(3%)	0.00
Authority: The extent to which information is highly regarded in terms of its source or content	47(31%)	54(36%)	49(32%)	-	0.01
Reliability: The extent to which information is dependable and free of error	43(29%)	53(35%)	54(36%)	-	0.01
Currency: The extent to which information is sufficiently up to date for the task for the task at hand/ information requirement of the farmer	27(18%)	49(33%)	74(49%)	-	0.00
Accessibility: The extent to which information is available and quickly retrievable	4(3%)	62(41%)	84(56%)	-	0.34
Completeness: The extent to which the volume and coverage of information is sufficient to address the information needs of a farmer	13(9%)	43(29%)	94(63%)	-	0.00
Concise Representation: The extent to which information is presented in the same format, language and is easily understood	15(10%)	44(29%)	77(51%)	14(9%)	0.08
Value added: The extent to which information provided is beneficial and provides competitive advantage to farmers	1(7%)	20(13%)	41(27%)	88(59%)	0.50

**Multiple Response was Possible*

5.6.5 Effectiveness of Information Services Provided

Effective information service provision ensures improved production. Respondents were required to state the effectiveness of information systems and services provided. Out of 150 respondents, 25(17%) said that the information systems and services were very effective, 80(53%) respondents said they were effective and 45(30%) respondents said they were fairly effective. However, observation made by the researcher revealed that agricultural information services provided were inadequate in enhancing crop production

in the region. When respondents were asked if there was a possibility of improving information service provision to enhance agricultural production, 137(91%) respondents agreed while 13(9%) disagreed. Those who agreed that information service provision can be improved attributed it to the current *kilimo kwanza* (Agriculture first) strategy which aims at facilitating agricultural production in the country including the study area. Those who disagreed said that until very recently, there were no proper information provision strategies that fully addressed farmer's information needs. The findings are presented in Figure 17.

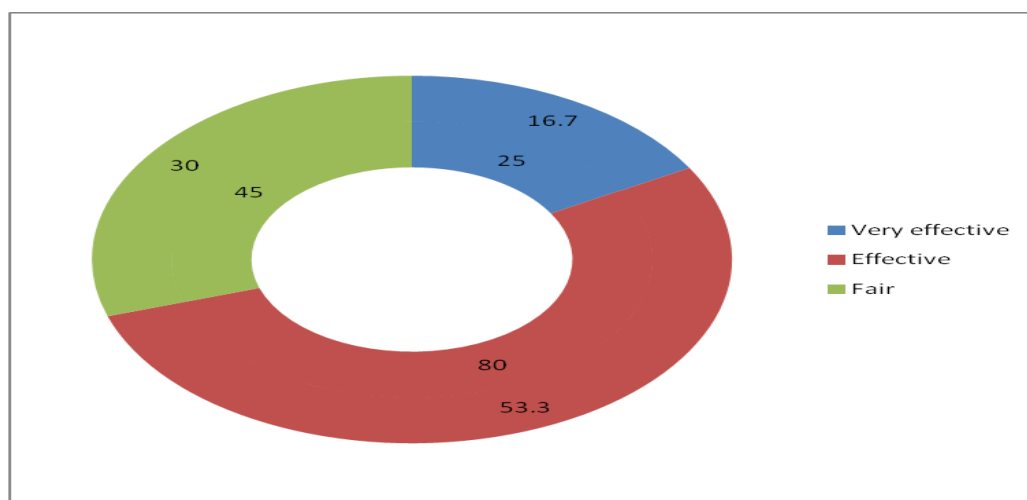


Figure 17: Effectiveness of Agricultural Information Services Provided N=150

5.7 Application of ICTs in the Provision of Information Services

Modern Information and Communication Technologies have changed the way information is created, processed, organized, shared and communicated. To a very large extent these changes have facilitated the diffusion of new technologies particularly agricultural innovations to rural areas. However, the extent to which ICT technologies has benefited small scale crop farmers in Tanzania and in particular the study area is

uncertain. The third objective of this study was to examine the application of ICTs in the provision of information services to small scale crop farmers in the region. This objective aimed at soliciting information from respondents on the available and accessible ICTs tools and services and how they are used in accessing agricultural information services. It also aimed at finding out how effective these ICT tools and services were in the whole process of communicating agricultural information to enhance agricultural production in the region.

5.7.1 ICTs Owned by Respondents

Respondents were provided with a list of ICTs in which they were required to identify facilities and items owned. Multiple responses were possible in which they were supposed to indicate whether they own the facility or not. The aim was to identify ICTs owned by respondents and whether they use them in accessing or communicating agricultural information. The findings clearly show that most (71%) respondents have mobile phones, radio 104(69%) and television sets 72(48%). Among villages more ICTs were owned by respondents residing close to the Municipality. For example, computers were owned by two (13%) respondents from Mtimbwa village and three (20%) from Ntendo village while landlines were owned by two (13%) respondents from Ntendo and one (7%) from Msanzi village. Video tapes were owned by one (7%) respondent from Kasense village, two (13%) from Milanzi village and five (33%) from Ntendo vilage. These findings also suggest that people in the region were affected by digital divide. Figure 18 presents ICTs owned by respondents in the study area.

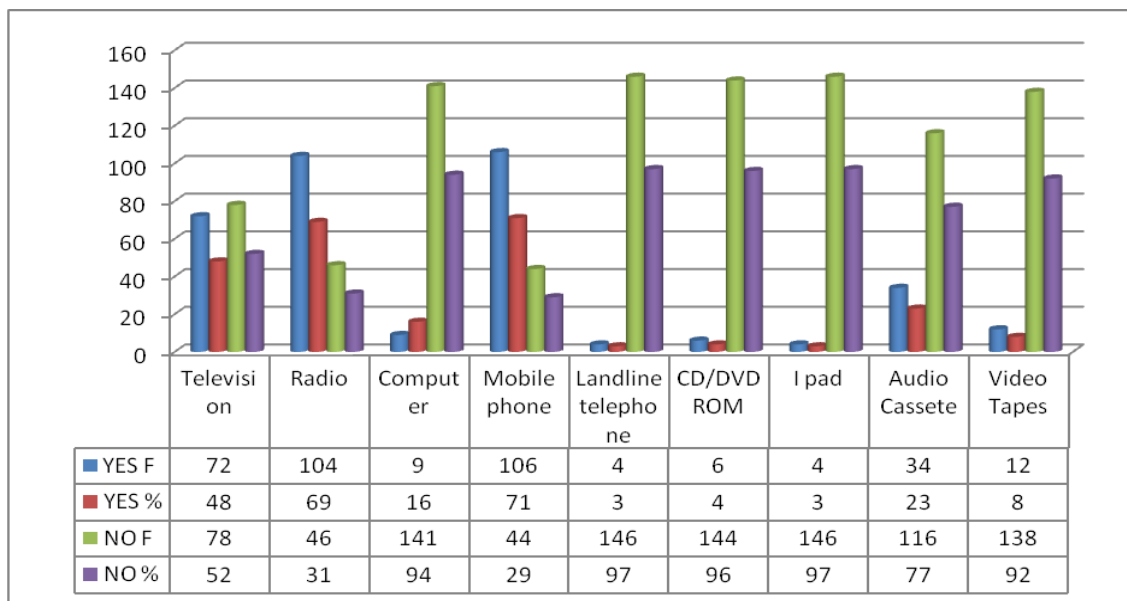


Figure 18: ICTs Owned by Respondents (N=150)

Out of 74 male respondents, 34(46%) owned television sets; 54(73%) owned radio, six (8%) owned computers and 55(74%) owned mobile phones. Findings from 76 female respondents show that, 38(50%) owned television sets, 50(66%) owned radio, 51(67%) owned mobile phones and none had a computer. Although some of the ICTs were owned by female respondents, further indepth interviews confirmed that radio, televisions sets, and sometimes mobile phones belonged to family heads who were male. It was further established that more respondents aged 30-39 years and 40- 49 years owned ICTs than other age groups. Elderly respondents aged 60-69 years had less ICTs. More information on ICT ownership by age is presented in Table 20.

Table 20: Age of Respondents and ICTs Ownership N=150

ICTs	19-29 N=23		30-39 N=69		40-49 N=44		50-59 N=8		60-69 N=6		P- Value (Chi- Square)
	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	
Television	9 (39%)	14 (61%)	30 (4%)	39 (57%)	24 (55%)	20 (45%)	4 (50%)	4 (50%)	5 (83%)	1 (17%)	0.281
Radio	19 (83%)	4 (17%)	42 (61%)	27 (39%)	33 (75%)	11 (25%)	5 (63%)	3 (38%)	5 (83%)	1 (17%)	0.229
Computer	-	23 (100%)	6 (9%)	63 (91%)	-	44 (100%)	-	8 (100%)	-	6 (100%)	0.059
Mobile phone	21 (91%)	2 (9%)	50 (73%)	19 (28%)	27 (61%)	17 (39%)	5 (63%)	3 (38%)	3 (50%)	3 (50%)	0.086
Landline telephone	-	23 (100%)	4 (9%)	65 (94%)	-	44 (100%)	-	8 (100%)	-	6 (100%)	0.306
CD/DVD ROM	1 (4%)	22 (96%)	3 (4%)	66 (96%)	-1 (2%)	43 (98%)	1 (12%)	7 (88%)	-	6 (100%)	0.016
I pad	1 (4%)	22 (96%)	1 (4%)	68 (99%)	2 (5%)	42 (96%)	-	8 (100%)	-	6 (100%)	0.804
Audio Cassete	4 (17%)	19 (83%)	11 (16%)	58 (84%)	11 (25%)	33 (75%)	4 (50%)	4 (50%)	4 (67%)	2 (33%)	0.015
Video Tapes	1 (4%)	22 (96%)	6 (9%)	63 (91%)	2 (5%)	42 (96%)	1 (13%)	7 (88%)	2 (33%)	4 (67%)	0.157

**Multiple Responses was possible*

Findings from statistical test on ICTs owned by respondents varied across age. The findings show that age wise, there was a significant difference in some ICT item ownership. For example, a Pierson Chi-Square test (Two sided) shows that the P-Value for computer ownership, CD/DVD ROM and audio cassette ownership was either smaller than or equal to 0.05 (Table 20). It was also shown that for other items like radio, television, mobile phones and landline telephone, there was no significant difference in ownership as the P-Value was greater than 0.05 (Table 20).

Observation made on ICTs owned by information service providers show that all extension officers had desktop computers which were available in their offices. Further observation on the available desktops showed that they were connected to the internet though it was very unstable and unreliable. Ten (37%) extension officers owned modems and wireless networks connected from their mobile phones. Further findings from the regional public library showed there were less than five working desktop computers of which only one in the regional librarian's office was connected to the internet, the rest were not. There was also one television set on the wall of the reception for library users. It was noted that 7 (26%) librarians were either not able to search agricultural information from the internet effectively or had limited skills in searching information from different web based sources of information.

5.7.2 Availability of ICTs Tools and Services

Respondents were asked to indicate the ICTs tools and services available in their respective villages. A multiple response item with a list of ICT tools and services was provided. They were asked to tick against the ICT tools and services that were available in their villages. The findings show that different ICTs tools and services were available in the villages in various forms and format. For example, out of 150 respondents, 115(75%) said mobile telephone services were available, 89(59%) said radio services, 67(45%) said TV programmes, 37(27%) said internet and e-mails services. Further investigation show that 20(13%) respondents said computers were available. However other ICTs like agricultural CD ROM databases, and online agricultural books and journals were either not available at all or rarely available. More findings are presented in Table 21.

Table 21: Availability of ICT Tools and Services to Small Scale Crop Farmers**N=150**

ICTs Services	Available		Not Available	
	F	%	F	%
Television programs	67	45	83	55
Radio program services	89	59	61	41
Computer Services	20	13	130	87
Mobile phone services	115	75	45	25
Landline telephone services	4	3	146	97
Agricultural CD/DVD ROM Database services	-	-	150	100
Internet services	37	27	113	73
Online agricultural books and journals	-	-	150	100

*Multiple Response was Possible

5.7.3 Accessibility of ICTs Tools and Services

Respondents were required to state the level of accessibility of available ICTs tools and services in their villages. The aim was to examine the extent to which available ICTs tools and services were accessible in villages, which ones were mostly preferred by respondents and which one were most appropriate in providing information to small scale farmers in that area. A list of a multiple response ICTs tools and services was provided to respondents. They were required to indicate the level of accessibility from a likert scale which ranged from very accessible to not accessible. The findings found that in most remote villages, ICTs were not very much accessible as 113(75%) respondents said that the internet and e-mails were not accessible. All respondents 100% said electronic journals, CD-ROM databases, and other agricultural databases like AGRICOLA were not accessible. This was probably because they required subscription which was also very expensive. In addition, other accessible ICT tools and services were radio 89(59%), television programmes 53(35%) and computer 20(13%). Interviews made to information service providers and key informants (Small Scale Crop farmers) on accessible radio

services in the region revealed that eight radio stations were accessible namely; Tanzania Broadcasting Corporation (TBC FM), Radio Free Africa (RFA), TBC Taifa, Radio One, KISS FM, Radio Maria and Radio CHEMCHEM. Further inquiry to key informants revealed that 45(90%) respondents listened to an educational programme broadcast by TBC Taifa on agriculture called TBC Naliendele followed by CHEMCHEM radio which is a local radio found in the region. With regard to information service provider, 20(76%) used radio CHEMCHEM for providing information to farmers in the region. When asked to name information provided through this radio they mentioned provision of current awareness services in case of plant or animal disease outbreak, input subsidy, warehouse receipt systems and proper use of seeds and artificial fertilizers. Information on accessible ICTs tools and services in the study area are presented in Table 22.

Table 22: Accessibility of ICT Tools and Services N=150

ICT FACILITY/SERVICE	ACCESSIBILITY			
	Very accessible	Accessible	Less Accessible	Not Accessible
Internet/World Wide Web	-	20(13%)	17(11%)	113(75%)
Mail	-	20(13%)	17(11%)	113(75%)
Agricultural electronic journals/books	-	-	-	150(100%)
CD- ROM Databases	-	-	-	150(100%)
Computer	8(5%)	20(13%)	-	121(81%)
Radio programmes (Please Specify)	33(22%)	89(59%)	22(15%)	6(4%)
TV programmes (Please Specify)	12(8%)	53(35%)	10(7%)	75(50%)
Fax	-	-	-	150(100%)
Landline telephone	-	3(2%)	10(7%)	137(91%)
Mobile telephone	14 (21)	101 (67%)	23(15%)	12(8%)
Social media(Please specify)	-	-	-	150(100%)
Geographic information system	-	-	-	150(100%)
Agricultural databases i.e AGRICOLA	-	-	-	150(100%)
Agricultural information gateways	-	-	-	150(100%)

**Multiple Response was Possible*

5.7.4 Use of ICTs Tools and Services

Respondents were asked if they have ever used ICTs to obtain agricultural information. All respondents 100% affirmed that they have used one form of ICTs or another at different farming season to obtain agricultural information. Further investigation was made to identify information received through ICTs. Respondents were provided with a multiple response item with a list of agricultural information to choose from. They were also required to indicate the frequency of accessing information through ICTs. A likert scale ranging from very often to very seldom was used to solicit information from respondents.

The findings show that respondents received diverse agricultural information through ICTs at varying rates. It was found out that 103 (69%) respondents received information on proper methods of farming and Ware House Receipt System 48 (32%) very often. The findings also show that information on equipment sourcing 75(50%), proper use of fertilizers 66 (44%), organic farming 63(42%), input subsidy 111(74%) and information on irrigation farming 70 (47%) was often received through ICTs. It was also showed that information on traditional methods of farming 126(84%) and information on crop varieties 77 (51%) was very rarely received through ICTs. This was probably because they used their experience on plant and animal varieties or traditional methods of farming.

When asked whether the information received through ICTs was relevant or not, majority (71%) said it was relevant, while 42(28%) said information received was not relevant because it did not adequately address their information needs. More findings on information obtained through ICTs are presented in Table 23.

Table 23: Information Received Through ICTs (N=150)

Information Needed	Very Often	Often	Neither Often Nor Seldom	Seldom	Very seldom
Equipment sourcing	63(42%)	75(50%)	7(5%)	3(2%)	2(1%)
Trade fairs	-	1(0.7%)	19(13%)	68(45%)	62(41%)
Plant breeding	-	1(0.7%)	31(21%)	40(27%)	78(52%)
Traditional methods of farming	-	-	20(13%)	4(3%)	126(84%)
Proper use of fertilizers	-	66(44%)	82(55%)	1(0.7%)	1(0.7%)
Sustainable agriculture	1(0.7%)	34(23%)	87(58%)	10(7%)	18(12%)
Plant diseases	-	-	31(21%)	70(47%)	49(33%)
Proper methods of farming	103(69%)	35(23%)	12(8%)	-	-
Warehouse Receipt System	48(32%)	57(38%)	48(29%)	1(0.7%)	-
Modern storage technology	-	31(21%)	26(17%)	91(61%)	2(1%)
Storage facilities	-	1(0.7%)	35(23%)	105(70%)	9(6%)
Improving products	2(1%)	7(5%)	79(53%)	51(34%)	11(7%)
Plant grading systems	-	2(1%)	15(10%)	53(35%)	80(53%)
Where and how to get market for products	1(0.7%)	6(4%)	99(66%)	9(7%)	33(22%)
Crop varieties	-	-	15(10%)	58(39%)	77(51%)
Horticulture	-	9(7%)	77(51%)	41(27%)	23(15%)
Organic farming	-	63(42%)	84(56%)	-	3(2%)
Credit and loan facilities	-	5(3%)	38(25%)	107(71%)	-
Legal issues	-	20(13%)	46(31%)	80(53%)	4(3%)
Food Processing and storage	-	-	41(27%)	68(43%)	41(27%)
Product Packing technology	-	7(5%)	35(23%)	68(45%)	40(27%)
Soil classification	-	-	36(24%)	56(37%)	58(39%)
Weather related information	-	1(0.7%)	32(21%)	43(29%)	74(49%)
Input Subsidy	7(5%)	111(74%)	27(18%)	-	5(3%)
Information about pest management	1(0.7%)	1(0.7%)	110(73%)	8(5%)	24(16%)
Irrigation farming	-	70(47%)	49(33%)	31(21%)	-

**Multiple Response was Possible*

5.7.5. Frequency of Using ICTs

Respondents were requested to state their frequency of using ICTs in accessing and using agricultural information. All respondents agreed that they have used one form of ICT or

ICT related services at different times. It was established that 31(21%) respondents used radio on daily bases, while 61(48%) used it once a week. Out of 150 (100%) respondents only six (4%) said they used the internet and emails on weekly basis, 15(10%) used the same on monthly basis, while 112(75%) have never used it. Table 24 shows the frequency of using ICTs tools and services.

Table 24: Frequency of Using ICTs N=150

ICT FACILITY/SERVICE	Frequency				
	Daily	Weekly	Monthly	Occasionally	Never
Internet/World Wide Web	-	6(4%)	15(10%)	17(11%)	112(75%)
Mail	-	6(4%)	15(10%)	17(11%)	112(75%)
Agricultural electronic journals/books	-	-	-	-	150(100%)
CD- ROM Databases	-	-	-	-	150(100%)
Computer	-	8(3%)	8(3%)	16(11%)	118(79%)
Radio programmes (Please Specify)	31(21%)	61(41%)	23(15%)	4(3%)	31(21%)
TV programmes (Please Specify)	-	5(3%)	21(14%)	40(27%)	84(56%)
Social media(Please specify)	-	-	-	-	150(100%)
Geographic information system	-	-	-	-	150(100%)
Agricultural databases i.e AGRICOLA	-	-	-	-	150(100%)
Agricultural information gateways (Please Specify)	-	-	-	-	150(100%)

**Multiple Response was Possible*

5.7.6 Effectiveness of ICTs in Providing Agricultural Information Services

Respondents were asked to state their views on the level of effectiveness of ICTs tools and services in providing agricultural information services. An open ended question was used to solicit information from respondents. The findings show that out of 150

respondents, 23(15%) said the internet was not effective in providing agricultural information services, 70(46%) said it was less effective, while 51(33%) said it was effective. When asked to comment on the effectiveness of e-mails on providing agricultural information, 31(20%) said it was not effective, 77(50%) said it was less effective and 42(27%) respondents said it was effective. These responses may be due to a number of factors including poor ICT infrastructure, particularly in rural areas where most farmers reside, lack of exposure to modern communication technologies. Results from information service providers show that 20(74%) extension officers and 7(26%) librarians agreed that the internet and e-mails were very effective means of providing information services to small scale farmers though they all claimed it was hampered by several factors as discussed above. When asked to comment on the effectiveness of electronic journals, books and CD-ROM database, 124(81%) respondents said electronic journals and books were not effective, but four (3%) said they were effective. On CD-ROM databases, 109(71%) respondents said they were not effective, while three (2%) said they were effective.

With regard to radio services, 79(51%) and 37(24%) respondents said it was effective and very effective, respectively. Similarly, 41(27%) and 34(22%) respondents said television programmes were effective and very effective, respectively. Further findings show that 73(47%) respondents said television programmes were not effective in providing information to small scale farmers. With regard to computers, 37(24%) respondents said they were not effective, 60(39%) said they were less effective, 48(31%) said computers were effective in providing information services to small scale farmers. The findings are summarized in Table 25.

Table 25: Effectiveness of ICTs in Providing Agricultural Information Services N=150

ICT FACILITY/SERVICE	Effectiveness			
	Not Effective	Less Effective	Effective	Very effective
Internet/World Wide Web	23(15%)	70(46%)	51(33%)	6(4%)
Mail	31(20%)	77(50%)	42(27%)	-
Agricultural electronic journals/books	124(81%)	21(14%)	4(3%)	-
CD- ROM Databases	109(71%)	38(25%)	3(2%)	-
Computer	37(24%)	60(39%)	48(31%)	5(3%)
Radio programmes	3(2%)	31(20%)	79(51%)	37(24%)
TV programmes	2(1%)	73(47%)	41(27%)	34(22%)
Social media	100(65%)	24(16%)	18(12%)	8(5%)
Landline telephones	59(38%)	74(48%)	17(11%)	-
Mobile Phones	46(30%)	51(33%)	53(34%)	-
Agricultural databases i.e AGRICOLA	110(71%)	24(16%)	16(10%)	-

**Multiple Response was Possible*

5.8 Challenges Experienced by Small Scale Crop Farmers in Accessing and Using Agricultural Information Services

The study sought to establish the challenges facing small scale crop farmers in accessing and using information services provided. Respondents were provided with an open ended question to respond to. Several challenges were raised which are presented in the following subsections.

5.8.1 Challenges Relating to Information Needs and Seeking Habits

Respondents were asked to state the challenges they face in accessing and using the information, 128(85%) respondents said they have limited ability to access and use information. This was probably because they did not have enough knowledge on where and how to access information.

A total of 109(73%) respondents said insufficient information resources to meet small scale farmers' information needs was a challenge to them. It was observed that all villages in the entire region depended on one library located at Sumbawanga Municipality, a long distance away from most villages. This was also mentioned by 112(75%) respondents who said long distance to information centers was a big problem when it comes to accessing and using information. None of the villages visited had a library or any sort of an information resource center, village radio or tele-center. Respondents had to travel a very long distance in search of information, something that they could not afford. One of the respondents had this to say:

“I have so many things to solve with the little amount of money I have from my harvest... I cannot misuse it by travelling all the way to the municipality in search for information, why should I?... I can use experience inherited from my parents..”

From the above observation, it was obvious that not only this respondent but many of them in the villages cannot afford to travel a long distance in search of information. Computer illiteracy was mentioned by 102 (68%) respondents while lack of training on information searching techniques was mentioned by 111 (74%) respondents. It was observed that none of the respondents had ever been trained on either the use of computer or information searching techniques manually or electronically. Further observation showed that computers were used more as typewrites as opposed to useful gadgets for information searching and sharing.

With regard to the challenges faced in relation to the types and range of information services offered, 128(85%) respondents said they were not instructed or trained on how to use various sources of information. Out of 150 respondents, 119 (79%) said information service providers were not consistent in identifying their information needs and in

providing information services. Interviews conducted on key informants confirmed that information needs were rarely identified. Inadequate information service providers also contributed to unreliability and untimely information service provision. Other challenges included the following;

- a) Inadequate budget to facilitate information service provision.
- b) Information service providers were not easily found when they needed because they live far away from most farmers.
- c) Information service provision was always not timely
- d) Lack of translation services. Some of the information materials like brochures were either written in English language which was not familiar to most farmers or contained technical terms which were difficult to understand.
- e) Lack of follow up and feedback from information service providers.

5.8.2 Challenges Related to the Application of ICTs in Information Service Provision.

When asked about availability, access and use of ICTs in accessing agricultural information services, 109(73%) respondents said that poor information infrastructure was a major barrier in the whole process of accessing and using information service. This was supported by observation made by the researcher on information systems, resources and sources used to provide information services to farmers in the region. It was observed that there was only one library in the entire region which was ill equipped with less than 100 volumes of materials related to agriculture. It was also observed that none of the villages had either a village information resource center, ICT center or a place where villagers can assemble to watch agricultural cinema, video or even listen to a village

radio. This is probably due to lack of connectivity to reliable power supply and high tariffs to purchase daily internet bundles from internet service providers.

Out of 150 respondents, 134 (89%) said information sources like television, radio, CD-ROMS and even books were expensive for them to afford. They claimed to be burdened by daily basic needs such as food, shelter and clothing. Buying information materials could be like wasting the little resources they have.

With regard to television and radio broadcasting, majority (73%) of the respondents opined that agricultural information was not disseminated on radio and television at the right time. It was observed by the researcher that most radio and television programmes were aired at the time when the farmers were busy with their daily farming activities. Interviews conducted on information service providers established that they were not aware of the exact time and day when programmes on agricultural issues were aired on radio or television. Even the channels used to air the information were not known to information service providers. This posed a major barrier in advising the farmers on programmes, channels, day and exact time to be by the sides of their radio or television to watch or listen to radio or television programmes.

Similarly, 98(65%) respondents opined that they could not make follow ups on the information broadcasted on radio or television because it was either broadcasted speedily that they could not afford to write or there was no time for catch up periods. Other challenges raised by respondents included:

- a) Shortage of competent skilled information service providers
- b) Information illiteracy
- c) Unreliable power supply and internet services in rural areas

5.9 Strategies Proposed by Small Scale Crop Farmers to Improve Provision of Agricultural Information Services.

Respondents were asked in an open ended question on strategies to improve the provision of information services in the region. Several views were provided and responses with similar phrases were coded and grouped based on their frequencies.

A total of 109 (72%) respondents proposed the establishment of community based libraries or information centres as a strategy for improving information service provision. Out of 150 respondents, 128 (85%) said information service providers should be employed, 102(68%) respondents said creation of awareness on available information and information sources, 98(65%) respondents opined that relevant information on farming should be made available to all small-scale farmers on timely basis. A total of 127(85%) respondents were of the view that Radio and TV broadcast on agricultural information should be aired when rural farmers have returned from their farms. Other views provided included:

- a) Construction of good access roads to enable regular visits by extension workers and other agricultural agents
- b) Installation of radio and television antennas at strategic places to improve reception of radio and television signals.
- c) Provision of information literacy programmes to both farmers and information service providers
- d) Allocation of adequate funds for agricultural information service provision
- e) Frequent identification of small scale crop farmers information needs
- f) Holding regular seminars and workshops on agricultural innovations.

- g) Information service providers should be provided with accommodation and personal transport like motorbikes.
- h) There should be collaboration between mobile phone companies, the Ministry of Agriculture, information service providers and other stakeholders on effective dissemination of agricultural information.

5.10 Chapter Summary

This chapter has presented and analysed data based on the research objective and research questions. Data from questionnaires were presented first followed by data obtained from interviews and non-participant observations. Cross tabulation and statistical measures were used to obtain relationship between demographic variables and their influence on agricultural information service provision. To obtain more accurate data, Pearson's Chi square test (P-value) was used and the strength between variable was tested at 0.05 (5%) significance level. This chapter also formed the basis for data interpretation and discussion to be presented in chapter six.

CHAPTER SIX

DISCUSSION OF THE FINDINGS

6.1 Introduction

This chapter discusses the findings obtained through research instruments used namely, questionnaires, interviews and observations as presented in chapter five. The overall aim of this study was to investigate the provision of agricultural information services to small scale crop farmers in Rukwa region with a view to proposing an appropriate model of information service provision to enhance crop production in the region. The discussion is based on research objectives and theoretical framework used to inform the study. Information and insights obtained from literature review provided a source for comparing and contrasting the findings of this study with the existing studies. The discussion includes agricultural information needs and information seeking behavior, sources of information consulted, types and range of information services provided, the use of ICTs and the challenges experienced by small scale farmers in accessing and using agricultural information services provided.

6.2 Characteristics of the Respondents

Although demographic characteristics of respondents were not part of the research objectives and research questions, the study found it to be important variables to be examined. Demographic information helped the researcher to validate the composition and nature of respondents for the study. In addition, they are known to have influence on information service provision, access and use. They were included so as to find out their influence on agricultural information service provision in the study area. They included age, gender, education level, average yield and income per year.

6.2.1 Age of Respondents

The study established that a significant number 69 (45%) of the respondents were middle aged 30-39 years and 44(29%) respondents were 40-49 years. These findings are similar to most of related studies on the ages of small scale farmers in Africa. For example, Munyua (2011), in Kenya found that small scale farmers were less than 80 years and most of them belonged to 18-25 age brackets. Maepa (2000) found out that about 42.7% of small scale farmers were aged between 18-29 years followed by 30-39 years. In Tanzania, studies done by Lwoga, Ngulube and Stilwell (2010) found that the mean age of small scale farmers was 48 years, with majority of the respondents (74.6%) ranging between 29 and 68 years. Again Benard, Dulle and Ngalapa (2014) found out that about 41.25% of respondents were aged 31 – 40 years, while respondents aged below 20 years accounted for only 1.25%. Thus, the finding of this study with regard to age of respondents concurs with most of other studies done on small scale farmers in Africa and other parts of the world. Small scale farming activities are dominated by middle aged people who are energetic, enthusiastic and ready to learn new farming technologies through agricultural information services provided to increase crop productivity. However, this was not the case for small scale crop farmers in the study area. Although most of them were young, middle aged and energetic, they still relied on poor methods of farming backed by experience inherited from their parents and grandparents. This situation leads to low crop production. The situation is partly attributed to the fact that most of them are either not exposed to agricultural information or they do not know where and how to access it.

Studies show that the age of respondents has influence on information needs and seeking behavior. It also affects information service provision. The findings established a significant statistical relationship between age of respondents and other variables related to agricultural information service provision. For example, the Pierson Chi Square statistical test showed that there was a significant difference (with a P-Value of less than 0.05.) between age of respondents and agricultural information needed, agricultural information sources and services utilized and in the use of ICTs in accessing and using agricultural information.

It was found out that respondents aged 30-39 years and 40- 49 years demanded more information, utilized various sources of information and were also leading in the use of ICTs in accessing agricultural information. Respondents aged 60-69 years showed low response and sometimes did not use the sources or ICTs at all. For example, Six (6%) respondents relied much on sources like friends and colleagues, three (3%) relied on the church and mosque, six (8%) relied on extension officers and six (8%) relied on village leaders. In the African context, middle aged people are full of responsibilities which include taking care of extended families, schooling and raising their standard of living, thus need more information to make good informed decisions and choices with regard to their farming activities and farm produce.

6.2.2 Gender and Education Level of Respondents

Gender and education level of respondents are said to have much influence on agricultural information access, use and agricultural information service provision in general. The findings show that out of 150 respondents, 76(51%) were female and 74

(49%) were male ranging from 20 to 69 years. Majority (73.4%) of the respondents had primary education, and eight (5.2%) had secondary education. The findings also show that all small scale crop farmers who were involved in key informants' interviews were primary school holders. According to the Rukwa Investment Profile (2013), majority of small scale farmers cultivate 0.5 to 2 acres. Most (69%) of these have primary education. Only three percent had post primary education. This educational trend is similar to other studies conducted on small scale farmers in Africa and other parts of the world. For example, a study by Kaniki (2003) in Zambia showed that most respondents were primary school holders. In Nigeria, Mamodu (2002) found out a high level of illiteracy among rural farmers. Another study by Elly and Silayo (2013) in Tanzania showed that 78% of small scale farmers had acquired primary school education while a few of them, 13% had secondary education level. The general trend shows that in developing countries and Africa in particular, most small scale farmers are illiterate or have low levels of education as it was observed by Aina (2007). Similar studies in Africa show slight differences in education level of respondents based on gender. For example, in Kenya, Munyua (2011) found out that more (56.7%) male farmers' attained secondary education compared to 38.5% female who attained the same.

In Tanzania, Lwoga (2010) found out that out of 128 respondents, 114 (89.1%) had some level of formal schooling and about 90.7% (116) could read and understand simple instructions. Among those with formal schooling, male respondents dominated the higher education category 48(41.4%) compared to women. Male respondents accounted for 48 (41.4%) of those with primary school education, 8.6% (10) with secondary education, 1.7% (2) with post-secondary education, and 0.9% (1) with some form of adult education.

The current study show that out of eight respondents with secondary education, three (3.9%) were female while five (6.8%) were male. Among respondents with primary education, 62(81.6%) were female and 51 (68.9) were male. The Pearson Chi-square findings show that there was a statistical significance between gender of respondents and their education level (p value ≤ 0.05).

Modern agricultural information is recorded in different forms and formats outside the human memory. To access such information, the user is required to be literate with some skills on how and where to obtain the information. Low crop production and sluggish economic growth in the study area may be attributed to the reliance of residents on human memory and experience from friends and colleagues to obtain agricultural information. Education plays a significant role in increasing crop productivity. This is because through education small scale crop farmers can acquire necessary knowledge and skills to facilitate their crop production. For farmers who are illiterate or have low literacy levels like those in the study area, appropriate information packages are required to facilitate agricultural information access and usage to enhance crop production.

6.2.3 Average Crop Production and Income per Year

Information plays an important role in facilitating agricultural production. Small scale crop farmers need agricultural information to be able to make strategic plans and forecast their farming activities, including planting, how to take care of crops, harvesting, storing produce with minimal waste and how to improve crop productivity in general. More importantly, farmers need to know when and how to sell their crop produce profitably to enhance their family economy. The findings show that small-scale crop farmers

cultivated an average of 3.4 acres per person with an average of 22 bags per year. The highest recorded average number of bags per acre was 25 and 23 bags at Kalumbaleza village and Mtimbwa village respectively. According to Rukwa Investment Profile (2013), the average crop production per acre was minimally 15 cereal bags and maximally 20 100kg maize bags per acre. The findings show that small scale crop farmers obtained approximately seven maize bags per acre. This crop production trend was low compared to 2012/2013 Rukwa region crop production trend (Rukwa Investment Profile, 2013). It was also shown that, the bigger the land one owns, the more crops one obtained. Statistical test (Pierson Chi-Square) show that, there was a significant difference between land ownership and crop yield in bags per year as the P-Value was less than 0.05 i.e it was 0.01.

A study by Lwoga, Stilwell and Ngulube (2011) showed that small scale farmers cultivated an average of 4.9 acres per person with majority (61.9%) out of 181 crop farmers cultivating less than 4.9 acres. The study did not establish crop production in bags per acre and the income generated from crop production. Another study by Benard, Dulle and Ngalapa (2014) showed that 27.5% of small scale rice farmers in Kilombero, Tanzania had an income level of less than Tsh. 100 000/= per year. Very few farmers (3.75%) had their annual income level between Tsh. 300 000/= and 400000/=. The current study show that, small scale crop farmers had an average income of Tsh. 340,000/= income level per year. This income is low and not satisfactory when compared to the cultivated land in acres and the crops obtained. This situation is attributed to acute lack of appropriate agricultural information to make good informed decisions. The current study showed that 85% of the respondents needed information on where and how

to get market for their produce. Inadequate information affects small scale farmers as most of them end up in the hands of middle men who buy the produce at very low prices. Another problem is that, small scale crop farmers in the region do not treat agricultural information as a strategic resource to enhance their crop production and maximize their profit. Instead, they perceive information as mere data that has little impact on their farming activities because they rely much on experience, friends and colleagues. Burk and Hurton (1998) assert that when treated as a resource to farmers, information has an impact on crop productivity and financial position of small scale farmers. Similarly, Matovero (2008), Lwoga (2010) and Mtega (2012) assert that when information is treated as a resource and is shared among farming stakeholders, it enhances productivity and brings about agricultural development. Information service providers and other responsible bodies providing information to farmers should ensure that there is free flow of information and information exchange among farmers and information service providers to maximize its use for the benefit of the community.

6.3 Farming Activities, Information Needs and Seeking Habits

This was the first objective of the study. Information for this objective is presented in section 5.4. This section discusses the findings based on study objectives, assumptions, literature review, philosophical stances and the ISCM model used to inform this study.

6.3.1 Farming Activities

This study basically involved small scale crop farmers. The findings showed that most residents in Rukwa region were small scale farmers, cultivating an average of 3.4 acres. The area cultivated is higher compared to an average of 2.4 acres indicated in the Rukwa Investment Profile (2013). These changes are probably due to increased awareness of

farming issues and information services provided as a result of “*Kilimo Kwanza*” a Swahili word for agriculture first interventions. In its effort to enhance agricultural production in the country, the “*Kilimo Kwanza*” has set ten pillars. The last pillar put much emphasis on agricultural information dissemination through awareness creation and sensitization of “*Kilimo Kwanza*” strategies to all stakeholders involved in the sector. However, crop production is still low and the income generated from crops grown is not satisfactory. This is probably because information disseminated is not appropriate to farmers or information service providers use inappropriate formats which are not user friendly. It might also be because farmers rely much on their experience and friends in obtaining agricultural information.

Based on the ecology of the region, Rukwa consists of three (3) agro-climatic zones which are the Ufipa plateau, the Rukwa valley and the Lake Tanganyika shores. These ecological zones have favorable arable land suitable for agricultural development, particularly crop production. People in the region depend on agriculture, particularly crop production as their main stay. The findings of this study show that maize is grown as the main food and cash crop. About 95 (61.7%) respondents were maize farmers, while 19(12.5%) were beans farmers, and 12(7.8%) were engaged in paddy farming. Paddy and simsim are mostly grown along the shores of Lake Rukwa. Crops like simsim were recently introduced in the region. Though much profitable in the market compared to maize and other cereals in the region, people are still reluctant to adopt it and concentrate more on maize production. This is another reason for sluggish economic growth of the region.

Although farming activities are part and parcel of the livelihood of people in the region, the findings indicate that generally farmers obtain low yields per acre compared to an average of 20 to 25 bags per acre as per URT (2011). The findings also show a significant relationship between land owned and cultivated by respondents and yield obtained, with a P-Value 0.01. That is, the bigger the land one owned, the more products he/she obtained. However, the general crop production is still low.

Several studies in Africa show that most small scale farmers obtain low yields due to several challenges facing them. One of which is the shortage of appropriate and comprehensive information regarding their farming activities. For example, studies by Agyei and Osman (2014); Benard, Dulle and Ngalapa (2014); Mtega (2012) and Aina (2007). In addition, out of 150 respondents, majority (69%) were not selling their farm produce because they obtained low yields. It is only 46(31%) respondents who sell their farm produce, they do it cheaply and most of the time they ended up in the hands of wrong people who fed them with wrong information for their own benefit. One of the farmers painfully lamented:

“You know what? Farmers in this country will always be poor, we spend so much money and sometimes we acquire loans. But guess what? we get low yields and we sell them at a very low price, we cannot even afford to pay back our loans... How are we going to get out of this circle?”.....

This is only one scenario. Many farmers in the region face similar situations, with the income of less than one USD per day. In villages, the situation is even worse though people are working hard to come out of the situation. For example in the 2013/2014 farming season, one 50kg bag of urea was sold at TSH 75,000 which is equivalent to USD 34. For an acre, one requires a minimum of two bags, which is TSH 150,000 or

USD 64. This is very expensive and only a few farmers can afford it. Although the government has set input subsidy and warehouse receipt system for farmers to help them improve their crop production, only a few of them benefit from these interventions. During the same season the price of crop produce went down to around TSH 18,000 to 25,000 which is equivalent to USD 8 to 11 per 100kg of maize respectively. This situation is attributed to inappropriate and ineffective information service provision to farmers as it was assumed by this study in section 1.7. However, if proper agricultural information is provided and used by small scale crop farmers, it is possible to improve crop production and raise individual and the whole country's economy.

6.3.2 Agricultural Information Needs

Agricultural information needs are dynamic, varying from one individual to another, one farming community to another and from one village to another. They differ depending on agricultural activities one is engaged in, agro-ecological conditions, socio- economic development, culture, education, gender and exposure to information environment. From the ISCM used to inform the current study, it was indicated that small scale crop farmers have goals to fulfill, and in the context of this study, the needs are related to enhanced crop production. These needs arise when an individual is unable to use the knowledge and experience that he or she possesses to solve farming problems within a specific situation or environment and thereby, triggers a search for new information.

The findings of this study show that small scale crop farmers are in need of agricultural information. The information differs variously across individuals, villages, and demographically.

Although the findings show that information on where and how to obtain market for products, warehouse receipt system, credit and loan facilities and input subsidy was rated high in almost all villages, there were also variations in ranking other agricultural information. The findings show that information on trade fair ranked high at Kalumbaleza 15(23%), Muze and Mtowisa with 13 (20%) respondents each, and Katuka 11(17%) followed by Kasense 13(26%). Information on Warehouse Receipt System ranked high at Kizombwe 15(17%), Kasense 14(16%), Kalumbaleza 12(14%) and Msanzi 12(14%). Information on horticulture was rated high at Kizombwe 15(24%), Mtowisa 13(18%), Kalumbaleza 11(18%), Kasense 8(13%) and Milanzi 8(13%). Similar trend in information variation across villages was observed by other studies worldwide. For example, in Tanzania, studies by Lwoga (2010); Bernad, Dulle and Ngalapa (2014); Elly and Silayo (2013) and Lwoga, Stilwell and Ngulube (2011) observed that small scale crop farmers across villages and communities have varied information needs. It appears that small scale crop farmers tend to concentrate more on the needs that directly affects their daily farming activities. Similarly, Byamugisha, Ikoja-Odongo and Nasinyama (2010) in Uganda found out that the information needs of the urban farmers in the study area seemed to be as varied as their farming activities and also appeared to vary from one urban farmer to another. Another study by Agyei and Osman (2014) in Ghana revealed that the farmers' range of information needs differed greatly depending on the level of their activities and also from one community to another. This trend is not only shown in African small scale crop farmers, but also in other parts of the developing world. For example, studies by Bachhav (2012); Akanda and Roknuzzaman (2012) in India and Siraji et al., (2013) in Pakistan show a similar trend. This variation in information needs

depict that information needs identification should be constantly carried out if we really need to enhance crop production for small scale farmers. This is because when a certain farmer is in need of certain information, another one might not be in need of the same.

Information needs identification is complex since the needs are not static. Chowdhury (2004) supports this by arguing that information need does not remain constant but changes over time. Information needs may also vary from person to person, from job to job, subject to subject, or depending on one's environment. This is in line with the ISCM, which shows that information needs depend on a particular environmental context in which an individual lives. The context involved small scale crop farming activities, location, social influences, culture, activity-related and work-related factors, finances and technology. As an umbrella term, context may also be taken to include personal factors such as demographics and expertise (Robson and Robinson, 2013). The findings show that demographic characteristics influence information needs of respondents.

For example, the findings show that gender of respondents influences the information needs. There was a significant difference on needed information with the P-Value of less than 0.05. For example, female scored 35(55%) on trade fair information while male respondents scored 29 (45%) on the same.

These findings concur with what Adomi, Ogbomo and Inoni (2003) found in Nigeria. Their findings revealed that there were gender differences between male and female respondents with respect to information needs and information sources utilized. For example, their findings showed that more male 51(70.8%) were in need of information on improved farming methods while more female, 60(82.2%) were in need of information

on where and how to obtain credit and loan facilities. Only 50(69.4%) male were in need of credit and loan facilities. However, a study by Lwoga, Stilwell and Ngulube (2011) found out that there were also slight variations in information needs according to gender. It was found out that males needed knowledge in agricultural marketing 70(62.5%), and soil fertility 57(50.9%), while women needed knowledge in value added techniques 29(42%), crop planting 25(36.2%), and irrigation 23(33.3%).

A study by Odini, Otiike and Kiplang'at (2012) on empowering rural women in Kenya to alleviate poverty through information provision established that women were constantly in need of information related to their daily activities of farming, business, education and training, among others. In most developing countries and Africa in particular, women are the productive forces in the agricultural sector. They are faced with a dual responsibility of taking care of the family and at the same time, engage in productive activities to raise income for the family. This is probably the reason why most female respondents needed more information on trade fair activities and credit and loan facilities compared to male respondents. Education and empowerment of women has enabled them to participate in family decision-making as well as national socio-economic development. Thus, irrespective of their education, status, position in the family or geographical location, they also need information and in particular agricultural information to be able to make informed decisions. It can generally be stated that, gender affects information needs. This is because there are different gender roles; every gender strives to accomplish its role. Information assists them to make informed decisions.

With regard to the age factor, there was a great variation. Respondents aged 30-39 years and 40- 49 years showed greater need for information, while respondents aged 60-69

years needed less. The findings revealed a significant relationship between the age of respondents and their information needs with a statistical significance value, P-Value of less than 0.05. A similar trend was observed by Lwoga, (2010) and Mtega, (2012). The trend in an active farming age observed in this study is in line with the URT (2012), which shows that middle aged people are mostly engaged in farming activities compared to other age profiles. This might be the reason behind their need for information to enhance crop production. Although the ISCM used to inform this study shows that some factors including education influence information needs and seeking behavior, the current study found it to be on contrary. This is probably because majority (73.4%) of the respondents had primary education, and only eight (5.2%) had secondary education. Thus, based on their level of education, they relied much on informal sources. These results are not surprising because Banmeke and Olowu (2005) in Nigeria obtained the same results. Trends in many similar studies carried out in Africa show that most small scale farmers are either illiterate or have low level of education. This situation greatly affects agricultural information utilization and their crop production.

6.3.3 Agricultural Information Seeking Behavior

The ISCM proposes that information users should actively seek information to meet their requirements because they have needs and goals they want to fulfill (Robson and Robinson, 2013). In the context of this study, they wanted to improve their crop production. The gap that exists in their knowledge on farming activities triggers them to look for information from various sources in order to attain their goal.

The findings of the current study show that small scale crop farmers sought information from various sources ranging from primary to secondary sources of information. The findings show that respondents preferred gatekeepers 103(69%), friends/ colleagues 101(67%), church/ mosque 94(63%), Village leaders 79(53%), extension officers 72(48%), clubs and associations 72(48%) and radio programmes 51(34%). These findings are consistent with several other studies done world wide though the preferences differ from one area to another and from farmer to farmer. For example, in Nigeria, Agyei and Osman (2014) found out that 96 (70.6%) respondents obtained their information by asking friends, relatives and neighbors. Other sources included personal experience, opinion leaders and role models. Daudu and Mohammed (2013) found out that rural people utilized village heads (89.2%); Colleagues (84.4%); radio (80%) and market square (65%). Most studies in Africa show that, small scale crop farmers prefer informal, interpersonal and largely oral methods of information transfer than formal methods in accessing and sharing agricultural information. For example, studies by Lwoga, Ngulube and Stilwell (2010), Asenso-Okyere and Mekonnen (2012), Mwakaje (2010) and Mtega (2012), show that small scale farmers prefer their fellow farmers, neighbors and village leaders. Other sources utilized by small scale crop farmers in Africa include church leaders, storytelling, demonstration, acting, and traditional dances as observed by Meyer and Boon (2003) in South Africa.

These findings are contrary to what Murugan and Balasubrami (2011) found out that farmers in India mostly use radio, films, video and television programmes. In Malaysia, Hassan et al. (2010) observed that small scale farmers frequently utilize television programmes compared to other sources. Maitei and Devi (2009) found out that radio was

the most preferred source of information followed by television and newspapers. These findings show that there is a tendency of small scale crop farmers to find information from the sources that they are familiar with and the sources they perceive to be reliable and trustworthy. According to ISCM, perceptions play an important role in information behavior.

Although agricultural information in Tanzania is disseminated through print sources like books, newsletters, handbooks, conference proceedings, journals and research reports from research institutions like universities, COSTECH, REPOA, ESRF , among others. but as observed by Kaaya (1999), small scale farmers in the country and in particular Rukwa region still rely on verbal sources of information. Based on the nature and Rukwa region environment where most rural areas are impermeable during rainy season and for most small scale crop farmers who are illiterate or semi illiterate, interpersonal sources are more convenient and accessible because of their proximity. Small scale crop farmers in the region cultivate small plots and thus they obtain low yields and low income. Low income generation resulting from their farm produce hinders them from using other sources of information such as agricultural newspapers, television, and a library which is far away from their proximity and consequently require a substantial amount of money to reach.

Opara (2010) noted that income is crucial in agricultural information acquisition and use because the higher the income of the farmer, the more he/she would seek information for use. With improved income earned from crop production, the farmer will be in a better position to acquire more information to improve crop production. However, most small scale crop farmers in the region are poor and have little or no access to credit facilities.

Therefore, they tend to seek information from sources that are convenient, readily accessible, easy to use and require least effort. They tend to make decisions on farming activities based on their experience, their thinking and on ways that are easy, natural and convenient. This situation affects crop production in the region.

Based on ISCM, information seeking may be influenced by demographic features such as age, education, economic conditions and gender. This is in line with the findings of this study because it appears that information seeking and communication behavior of small scale crop farmers was also affected by demographic features. For example, with regard to age, the findings showed that respondents aged 30-39 years and 40-49 years were active in using many sources of information to address their information requirements. The current study showed a significant difference on preferred sources of information across age of respondents with P-Value less than 0.05 for most of the frequently used sources of information. These findings concur with other studies done in Africa and other parts of the world, including those by Opara (2008), Mwakaje (2010) and Omogor (2013).

According to the URT (2012), the agricultural sector is made up of middle aged people both men and women. Middle aged people are the backbone of the farming community despite having other social- economic responsibilities. This situation makes them to seek information from all readily available sources of information in order to make informed decisions.

With regard to gender and agricultural information seeking behavior, the findings show a significance difference with a Pierson Chi square statistical test (P- Values) less than

0.05. The findings show that most female respondents 53(70%) used gatekeepers as their source of information compared to male 50(68%) respondents. Oдини (2014) observed that women sought information by asking friends, neighbors and talking to relatives. She showed that women selected appropriate information channels in order to satisfy information needs arising from their day-to-day activities from whoever they thought had the right information. However, Byamugisha, Ikoja-Odongo and Nasinyama (2010) found out that there was no significant relationship between information needs and gender, with the exception of information needs concerning improved farming practices. It was found out that information seeking pattern differs depending on how both genders are empowered in information seeking skills to fulfill their information requirements.

With regard to electronic sources of information, the findings show a low usage due to several challenges, including inadequate skills, lack of awareness, power supply and the expenses associated with the use of electronic sources like internet bundle purchase. The findings also show that age and gender differences affect electronic information seeking behavior of respondents. Old people and women were lagging behind in the use of electronic sources of information. These findings concur with those of Oдини (2014) who established that very few rural women in Vihiga County in Kenya used or accessed agricultural information using electronic media such as online remote databases and Web based agricultural information sources. However, Büyükbay and Gündüz (2013) found out that male and female used ICT technologies similarly with no significance difference in computer and internet use. Another study by Agyei and Osman (2014) found out that only a few 2 (1.5%) of the cocoa farmers in their study used the internet. It was also

established that some formal resources and services like libraries and internet were used by few farmers.

Although majority (51%) of the respondents said that the content of information provided from various sources of information were relevant, they were not satisfied with the sources in meeting their information needs. Therefore they used experience when their needs were not met using the provided sources of information. These findings are consistent with those of Lwoga, Stilwell and Ngulube (2011), Bernad, Dulle and Ngalapa (2014) and Elly and Silayo (2013). However, these findings are contrary to what Agyei and Osman (2014) found. In their study it was found out that though small scale farmers relied on informal sources of information like the current study, majority of the respondents (57.4%), showed that they depended on their personal experience. Again, greater proportions of the respondents (54.4%) were satisfied with information or knowledge from friends and relatives. Hossain (2012) in Bangladesh revealed that most of the rural women were moderately satisfied with informal sources because they were easily available and familiar with them.

With regard to the format of agricultural sources of information, most (73%) respondents preferred print format. Also most (94%) respondents preferred Swahili language as a medium of communication and agricultural information transfer. This is probably because respondents could read and write in Swahili. To ensure that a large number of small scale crop farmers benefit from printed sources of information, they should be supplied in a format that would be comprehensible and user friendly to them as observed by Aina (2006). Craig and Stilwell (2003) support this by arguing that printed materials have inherent attractive qualities that make it a suitable medium for information diffusion

in rural areas. They are easily transported from place to place, require relatively simple and cheap technology to produce (relative to audio and visual media) and no equipment to transmit and decode the information content. They can also be used as many times as the user requires, to quickly look up some fact or to study its contents in-depth, and is easily stored for future reference.

6.4 Types and Range of Information Services Offered to Small Scale Farmers.

Information is a raw material for any sustainable agricultural production. Growth and prosperity of any agricultural industry in any country depends on how it acquires, produces, processes, uses and disseminates relevant agricultural information to its stakeholders. Agricultural information service provision is one of the major solutions in enhancing crop production in rural areas. Through agricultural information service provision, small scale crop farmers will be able to obtain essential information for enhancing crop production.

The findings established that a small range of information services were provided to small scale crop farmers in the region. These included document delivery services 129(86%), technical advice 139(93%) and on farm reference services 139(93%). Other services like abstracting services, translation services, and instructions on how to use the sources, information referral services, and CD-ROM databases were very rarely provided and in other villages not provided at all. It was further established that the most prominent agricultural information service provided was technical advice on different farming issues such as proper use of fertilizers, ratio of pesticides to be applied on crops, grafting of fruit trees and modern crop storage techniques. It was also observed that was

“on farm reference services” was provided through small farming groups and mostly through “shamba darasa” (field farm schools).

Although document delivery services were provided to small scale crop farmers, it was not as effective as the technical advice provided through “*shamba darasa*” and field visits. This is probably because small scale crop farmers had time to communicate face to face with information services providers who were mostly extension officers. They communicate orally and exchange ideas, ask questions and discussed together to make clarifications whenever possible. This is a more friendly way of information service provision to small scale crop farmers who are used to oral communication as observed by several scholars, including Agyei and Osman (2014) and Odini (2014). These scholars contended that rural villagers prefer and are accustomed to acquiring information through listening (audio) rather than reading. They also contend that their information and communication channels are still deeply rooted in orality.

Agricultural information service provision on market days, popularly known as “*gulio*” in Swahili, traditional dances and festivals were effective in the study area. This is probably because on market days a lot of small scale crop farmers sell their crop produce, refresh themselves from tiring works done throughout the month by playing their favourite traditional dances. While doing this, they also get information from information service providers. This is in line with the ISCM which shows that the context from which an individual exists, which includes culture, working and information environment plays a fundamental role in influencing user’s information behavior. It also stimulates the user’s information needs and the perceptions of information sources and information services provided. In this case, users will select and use information services which are perceived

to be useful with high utility and credibility. It is the duty of information service providers to conduct information needs analysis, study and understand the community well before providing information services. This will help them to know which channel to use and which information services are suitable in a certain community. Small scale crop farmers in the region and indeed the whole country are in need of information services that will greatly enhance their productivity, transform their community into a lively and enlightened one, and enhance their economic base.

Other agricultural information services provided in the region included Selective Dissemination of Information (SDI) and Current Awareness Services (CAS). These services were rarely provided without the knowledge of information service providers. The services were provided in the form of advertisements, posters or through local CHEM-CHEM radio broadcasting. However, the radio frequencies were limited to Sumbawanga Municipality and other villages closer to the municipality. CAS was provided in case of army worm attack and drought. Farmers were advised on how to recognize the worms and to report immediately if found. In case of drought, they were advised to plant drought resistant crops like sorghum. An example of Current Awareness Services is provided in form of an advertisement (See Appendix X). To provide an effective SDI, information service providers need to be skilled. Aina (2004b) asserts that information service providers have to communicate with small scale crop farmers, interview them and establish user profile in order to be able to provide specific and relevant information based on their information needs.

The findings show that information service provision on demand was rarely provided. Extension officers claimed to provide it to individuals and groups on horticulture,

pesticides and storage facilities. Provision of information on demand is very effective in meeting the needs of the farming community. It is a push factor in agricultural information service which starts with the user him/ herself. This situation makes the information user an active participant in the whole process of agricultural information communication as suggested by the ISCM.

With regard to the role played by Rukwa regional library in agricultural information service provision, the findings revealed that it played a very minimal role. The library was very ill equipped with less than a hundred books on agricultural issues. The library did not have any CD-ROM, cassettes or anything on agricultural issues. Although the library was inadequately stocked, librarians said that they do provide advice on where to get information on various farming activities. Although studies show that many public libraries in developing countries are poorly equipped like the case of Rukwa regional library, there is still an ample possibility of improving the services. Aina (2004b) asserts that for effective agricultural information services to be provided by a library, it is expected to collect all kinds of information materials, such as audio and video-cassettes, audio and video-record players, films, projectors, posters and leaflets on agricultural information. This could be repackaged and then made available to farmers in a usable form.

The findings show that respondents received information hardly once a month, 96(64%). However, majority (59%) were not happy with the extent to which information services were provided. This is because the services did not meet their information needs; neither did it provide competitive advantage to farmers (value added). This is not surprising because several studies conducted on agricultural information services provided to small

scale farmers concurs with the findings of the current study. For example, Renwick (2010) in Trinidad and Tobago found out that the information needs of small scale farmers were not met and the information services provided were ad hoc and not organized. Similarly, Arusei (2012) revealed that small scale dairy farmers in Wareng District, Kenya have varied information needs which were not met. At the same time the provision of extension information services were not satisfactory.

Although indexing and abstracting services act as reference tools for simplifying agricultural information access and retrieval, the findings of this study revealed that none of them were provided in the region. This is probably because there were few information service providers with inadequate knowledge and skills in abstracting and indexing techniques.

6.4.1 Competence of Information Service Providers

The ISCM suggests that information service providers exist within a certain context. The context involves information service provider's daily working activities, knowledge and skills, experience and culture. It also included the socio-economic status, demography, technology and information exposure. These contextual factors affect agricultural information service provision. Information service provider's knowledge, skills and experience in information service provision forms the base for effective agricultural information service provision. Gwang (2011) asserts that agricultural information service providers must possess professional knowledge and skills to be able to effectively provide information services to users, in this case small scale crop farmers.

With regard to the competency shown by information service providers in agricultural information service provision, the findings show that they have enough skills in information service provision 93(62%); they were competent in providing quality information 118(78%) and relevant information 112(75%). The findings show that they possessed adequate knowledge on the subject matter in hand 80(53%). Although respondents claimed to be provided with quality information from knowledgeable and skilled information service providers, it was noted by the researcher that most of the information service providers were using their experience in information service provision. It was further noted that none of them had attained any training on information service provision apart from their academic qualification as extension officers. Librarians who were professionally information service providers were only sensitizing farmers on how to use the library once they pay a visit to the library. It was noted that small scale crop farmers very rarely visit the library. This is because the library had nothing to offer other than poor, outdated, irrelevant and few agricultural information resources. Despite the fact that there were only seven librarians in the regional library, these librarians were inactive and enclosed in the four walls of the library. These librarians were similar to what Gwang (2011) observed that in Nigeria, there were passive information service providers who concentrated on the acquisition and processing of information resources as a matter of routine, with little or no regard to use. Meeting the needs of the users was not their concern. Active and modern librarians need to think outside the box, come out of the enclosed four walls of the library, and spread their tentacles by reaching small scale farmers and empowering them with relevant information to enhance crop productivity.

From the findings, it appears that information service providers were not competent in assessing information needs and addressing them appropriately, developing specialized information products and in providing sustainable information services. This is not surprising because information service providers especially extension officers have never been trained in information service provision. They only use their experience, even the librarians who were professional information service providers did not know what to do in enhancing crop productivity through information service provision. The working environment of agricultural information service providers may probably be the reason behind their failure in providing effective information services. To be an effective agricultural information service provider, one needs to be frequently trained on various aspects of information service provision. They also need to be acquainted with modern technological tools such as the use of mobile phones, internet and social media which are vital in service provision.

Small scale crop farmers have different perceptions regarding information services provided to them. Their decision to use them depends on their perceived utility and credibility. From utility, small scale crop farmers examine the perceived usefulness, relevance, timeliness, accessibility and ease-of-use of information, the source or information service. Credibility refers to the perceived trustworthiness, authority, reliability and lack of bias of the same (Robson and Robinson, 2013).

The findings show that information received was objective, 72(48%), relevant 74(49%) and authoritative 54(35%) though it did not fully address their information needs. Other respondents 84(56%) said that information received from extension officers was accessible and in a format and language which they understood. There is no doubt that

information users received quality information from extension officers though it did not fully meet their agricultural information requirements. This was probably because extension officers receive readymade agricultural information from the ministry and other agricultural sector lead ministries. This information is acquired and prepared by agricultural experts from the ministry. Literature shows that there is plenty of agricultural information out there. Its accumulation started way back during the ancient Babylonian era. One of the problems which face agricultural sector worldwide is poor management of agricultural information. Agricultural information is poorly organized, fragmented and uncoordinated. Where it is effectively disseminated; the channels used are Western oriented which do not put into consideration the information needs of the targeted community. The channels used to communicate agricultural information in most African countries are mostly oral channels.

Although the findings show that information services provided were effective 80(53%), they were not reliable. This is probably because they were not frequently provided. These findings are different from what Harande (2009) found in Nigeria. In his study on information service provision for rural community development, he found out that the rural populace suffers from acute low productivity, social and economic retrogression mainly due to either inadequate or total lack of information service provision to them. He further found out that information services provided were not effective, relevant and not fashioned towards addressing rural community development. There was an acute shortage of information services in rural areas. This makes the rural community incapacitated and makes it difficult to prosper economically.

Lwoga, Stilwell and Ngulube (2011) found out that extension officers were important sources of information and knowledge, though farmers were dissatisfied with the frequency of their interactions. This study revealed that there were few information service providers. Thus, it was difficult for information providers to reach all villages on time. It was further established that there were only three houses at Ilemba, Laela and Mpui villages for extension officers and other government employees like nurses or clinical officers. However, it was found out that there was ample possibility of improving information service provision to enhance agricultural production in the region. Most (91%) respondents attributed it to the current “*Kilimo kwanza*” (Agriculture first) strategy and its pillars which aim at facilitating agricultural production in the country including the study area.

6.5 Application of ICTs in Information Service Provision

Information is vital to any meaningful socio-economic development. More than four decades ago, Nyerere (1967) in his speech during the opening of the National Central Library in Tanzania (Tanganyika by then) said:

“...while other countries aim to reach the moon, we must aim for the time being at any rate to reach the villages by providing them with necessary information.”

Information acts like blood in the veins and arteries of any development, particularly agricultural development which sustains more than 80% of the rural population throughout Africa. The recent invention of ICTs forms an important ingredient in the recipe of agricultural information service provision. Though coupled with several

challenges in developing countries like Tanzania, still ICTs can propel the engine further in reaching every village.

It was found out that small scale crop farmers owned a range of ICTs including radio, television sets, mobile phones, computers, video and audio cassettes. In many developing countries, most of small scale farmers own radio followed by mobile phones and television sets. These findings concur with Chilimo (2008), Lwoga (2010), Mtega and Msungu (2013). The current study shows a great disparity on ICT ownership with regard to demographic features. For example, it was found out that male respondents owned more ICTs compared to their female counterparts. The male to female ratio on ICT ownership was as follows; Television sets 34(46%) male: 38(50%) female. Radio ownership 54(73%) male: 50(66%) female. Mobile phone ownership 55(74%) male: 51(67%). The finding further shows that none of the female respondents had a computer, an i-pad or a digital camera. Some of the ICTs like radio, televisions sets, and sometimes mobile phones belonged to family heads who were male. These findings are different from what Büyükbay and Gündüz (2013) observed in Turkey. In their study, they observed no significant difference on ICT ownership based on gender. Similarly Lwoga and Ngulube (2008) observed that there were no major differences across gender in terms of ICT ownership.

With regard to age, it was established that more respondents aged 30-39 years and 40- 49 years owned ICTs than other age groups. Older respondents aged 60-69 years had less ICTs. There was a significant difference in some ICT item ownership like computer, CD/DVD ROM and audio cassette. The statistical test (Chi-Square) shows that the P-Value was either smaller than or equal to 0.05. A similar trend was observed by Lwoga

and Ngulube (2008) who found that ICTs such as radio, cell phones and TV were owned by young farmers aged between 26 and 36 years to a greater extent than by middle aged and elderly farmers.

Findings across villages show a vivid digital divide as more ICTs were owned by respondents residing close to the municipality. For example, computers were owned by two (13%) respondents from Mtimbwa village and three (20%) respondents from Ntendo village while landlines were owned by two (13%) respondents from Ntendo and one (7%) from Msanzi village. These findings concur with studies by Omogor (2013); Mwakaje (2010) and Elly and Silayo (2013) in Tanzania.

6.5.1 Availability and Accessibility of ICTs

It was found out that several ICT related information provision services were available and accessible in the region. They include mobile telephone services, radio broadcasting services, television broadcasting services, internet, e-mail and computer services. Availability of the services does not guarantee its accessibility and use. Although internet and email services were available, majority (75%) of the respondents were not able to access it. Despite the fact that electronic journals, agricultural databases like AGRICOLA, CD-ROM databases, and online agricultural books were freely available, they were not accessed by respondents. Tanzania Library Service Board (TLSB), Sokoine National Agriculture Library (SNAL) and other academic libraries in the country are beneficiaries of free access to electronic journals and books courtesy of the International Access to Scientific Publications (INASP). Despite its free access, only few agricultural information service providers and none of the small scale farmers made use of the

electronic journals and books. This could be attributed to lack of awareness and necessary skills which impeded respondents from effectively utilizing electronic journals.

Several radio stations were available and accessible in the region namely; Tanzania Broadcasting Corporation (TBC FM), Radio Free Africa, TBC Taifa, Radio One, KISS FM, Radio Maria and Radio CHEMCHEM. Respondents' frequently listened to "*Naliendele*" agricultural programme broadcasted by TBC Taifa and Radio CHEMCHEM which is a local radio found in the region. With regard to information service providers 20(76%) extension officers confirmed using radio CHEMCHEM to provide current awareness services to farmers in the region. It was also established that, most information service providers relied mostly on printed sources of information such as books, pamphlets, brochures and leaflets from the Ministry of Agriculture and Food Cooperatives and other agricultural sector lead ministries. Similarly, Kiplang'at (2004) in Kenya found out that extension officers relied heavily on printed sources of information to obtain information for their daily activities.

Further findings from the regional public library showed there were less than five working desktop computers of which only one in the regional librarian's office was connected to the internet, the rest were not. There was also one television set on the wall of the reception for library users. It was established that 7 (26%) librarians were either not able to search agricultural information from the internet effectively or had limited skills in searching information from different web based sources of information.

6.5.2 Use of ICTs Tools and Services

The advent of the internet and mobile telephone during the last few years has provided a much wider choice in collection, storage, processing, transmission and presentation of agricultural information in multiple formats to meet the diverse requirement and skills of people including those in rural areas (Asenso-Okyere and Mekonnen, 2012).

The study found out that all respondents have used one form of ICT tools and services or another in accessing and using agricultural information provided. For example, it was found out that respondents often received information on proper methods of farming, Ware House Receipt System, equipment sourcing, proper use of fertilizers, organic farming, input subsidy and information on irrigation farming through ICTs. With regard to the relevance of information provided through ICTs, the response from majority (71%) show that it was relevant though it did not adequately address their information needs as attested by 42(28%) respondents. It was also established that respondents used ICTs to communicate with other farmers 111(74%) and 99(66%) used it to communicate with information service providers. The findings show that farmers frequently communicate with each other, exchange ideas, experience and expertise than information providers. This conforms to the results discussed earlier that they frequently obtain information from gatekeepers, friends and colleagues. This pattern is common in most developing countries as it was shown by other studies like Renwick (2010), Arusei (2012), Agyei and Osman (2014) and Daudu and Mohammed (2013). Although some 43(29%) respondents used it to communicate with agricultural researchers, further investigation through key informants interviewed revealed that they were communicating with extension officers.

Further findings showed that none of the respondents and information service providers used online agricultural discussion forums and groups. The findings show that lack of awareness, skills and information illiteracy hampered the utilization of these valuable and informative web 2.0 tools in facilitating information service provision in the region. The same trend was observed by Mtega et al. (2014) in their study on awareness and use of Web 2.0 technologies in sharing of agricultural information in Tanzania. The study found out that the use of Web 2.0 tools for agricultural information creation and sharing in Tanzania was still at a very low level. This was caused by limited awareness and inadequate skills on Web 2.0 tools for information sharing.

With regard to the frequency of using ICT tools and services in accessing agricultural information provided, it was found out that frequently used ICT tools and services were radio services particularly TBC Taifa and CHEMECHEMI radio, Television programmes and computer services, though very rarely and mostly to people around the municipal. E-mail and internet services were rarely used and in some villages, not used at all. Studies by Chasita (2011), Odini (2014), Lwoga, (2010) and Elly and Silayo (2013) show a similar trend on the frequency of using ICT tools and services in accessing agricultural information.

The findings show that some of the modern agricultural information dissemination tools were not used at all, probably due to lack of awareness, inadequate skills and poor information infrastructure. They include agricultural electronic journals and books, CD-ROM databases, social media like agricultural based blogs, face book, twitter, wikis and the like. Others include agricultural databases such as AGRICOLA and other agricultural information gateways.

6.5.3 Effectiveness of ICTs in Providing Agricultural Information Services

A significant number of respondents 79(51%) agreed that radio programmes were effective in agricultural information service provision. Lwoga (2010) found out that radio programs were effective in providing agricultural information to farmers. For instance, she found out that 70% of the content of FADECO community radio in Karagwe district focused on agriculture, with topics ranging from production, marketing and value addition. Similarly, Nyireza and Dick (2012) established that radio was useful in communicating agricultural information. Despite the fact that radio programmes seems to be effective in agricultural information provision, Munyua (2011) found out that the listenership patterns were affected by the time of broadcasting, the content covered, the language used and the frequency of programmes.

Although information service providers provide information to small scale crop farmers in the region, findings show that they do not satisfy the information needs of the farming community. This is because they were few; they do not have the means of transport to reach all villages and households; they lack communication skills to interact effectively with the peasant farmers and motivation to carry out their work. A community radio service could be the best medium of communication for small scale farmers in the region. CHEMCHEM radio which is a community radio does not satisfy the needs of the farming community. This is because it does not have its own farming programmes. It depends on what has been provided by extension officers in the form of current awareness services. This is different from what Lwoga (2010) observed in Karagwe where farmers and experts were involved in preparing programmes. Although a similar situation occurred

in Zimbabwe, Nyireza and Dick (2012) found out that the radio community was preferred because the programmes were prepared by farmers and other experts.

In Tanzania, the Sokoine University of Agriculture (SUA) and the American Institute of Research have signed an agreement to enable SUA to join an international alliance tasked to develop and adopt a strategy for building an impact-driven, radio-based extension support system for rural farmers in the country . The system is called Farmer Voice Radio project (Sanga, Kalungwizi, and Msuya, 2013). The Farmer Voice Radio employs a new model of agricultural extension that builds around radio extension teams supported by ICTs. The radio links extension officers and farmers with radio based system supported by mobile phones and desktop computers. The system programme also aims at enabling extension officers to reach out to many farmers with minimum effort. However, until the time this study was commenced, none of the information service providers or farmers had heard about it. Although it was operational, small scale farmers in the region did not benefit from this potential agricultural innovation.

Although small scale crop farmers in the region claimed to access agricultural information through television, 73(47%) respondents said television programmes were not effective in providing agricultural information. This was probably because in most rural areas televisions were not very much accessible as attested by 75(50%) respondents of this study. Another problem might be the scheduling of television programmes. Most of the programmes are scheduled when the farmers are not in their homes to watch and learn. In addition, Mtega and Ronald (2013) observed that among the three mostly used ICTs in Tanzania, TV sets were noted to be the least used among rural communities due to limited supply of electricity in rural areas. A similar pattern was observed in Pakistan

by Siraj et al. (2013). The study found out that the farmers expressed negative views on the use of TV, newspapers, and radio, as channels for agricultural information. Their main concerns were about scheduling of TV programmes and accessibility. They preferred the advice of field assistants/agriculture officers and print sources which was considered more reliable than other ICT related sources and services. Print sources were preferred due to their acceptance and being familiar to farmers. In addition, agricultural information was packaged and spread through extension officers.

Although the findings showed that television programmes were not effective in agricultural information provision, Alam and Haque (2014) found out that the opposite is true in Bangladesh. They found out that small scale farmers preferred TV channels and found them to be effective than radio programmes and extension services obtained valuable information for their farming activities.

A total of 106 (71%) respondents had mobile phones, but none of them used it for accessing agricultural information, though some of them were connected with modern internet facilities. They only used it for communications among themselves and very rarely with extension officers. Similar findings were observed by Munyua (2011) in Kenya. Small scale farmers used mobile phones for social communication and not for accessing agricultural information.

Mtega and Ronald (2013) found out that one of the reasons for low use of mobile phone services in rural areas in Tanzania was limited ownership of mobile phones among rural people. But this is contrary to what the current study found out. This study found out that most respondents have mobile phones but they do not use it to access agricultural

information. A study conducted by Sife, Kiondo and Lyimo-Macha (2010) revealed that mobile phones provide rural households with fast and easy modes of communication. Through mobile phones, respondents in the study area were able to obtain current awareness services from their mobile phones. This situation will help them to get the right information at the right time and make informed decision regarding their farming activities at the right time thus improving their crop production activities and their livelihoods.

Electronic journals, books, CD-ROM databases and agricultural databases like AGRICOLA, were found not effective though they contain immense agricultural information with high credibility and utility as suggested by ISCM. This is probably because small scale crop farmers in the region were not aware of the crucial role these electronic sources of information play. They also had inadequate information literacy skills to be able to access and use information from these resources.

6.6 Challenges Experienced by Small Scale Farmers in Accessing and Using Agricultural Information

Small scale crop farmers are faced with several challenges in accessing and using agricultural information services provided to them. The intensity of the challenges differs from one farming community to the next. The ISCM used to inform the current study identifies several factors that hinder effective provision of agricultural information services. They may emanate from the users themselves, the channel/sources used or the information service providers. They may also be externally or internally influenced.

The current study found out that small scale crop farmers in the region were affected by several barriers. They include inability to access and use information provided,

insufficient information resources to meet their information needs, inadequate skills to search for information from available sources, inadequate information service providers who are skilled, unreliable and untimely information service provision and information illiteracy among others. These findings concur with those of Lwoga (2010), Lwoga, Stilwell and Ngulube (2011), Elly and Silayo (2013), Odini (2014), Agyei and Osman (2014), Mtega (2012).

It was established that 128(85%) respondents have limited ability to access and use agricultural information provided to them. The findings show that most (73.4%) respondents had primary schools education; this affects their ability to search for, access and use agricultural information. This is because at both primary to secondary education system in Tanzania, information literacy skills are not taught. At tertiary levels, particularly in universities, information literacy is rarely taught by librarians in form of user studies or library orientation. Unfortunately, none of the small scale crop farmers involved in the study had tertiary education. In addition, respondents were served by few information service providers, most of whom have never been professionally trained in agricultural information service provision, consequently, they have inadequate skills in agricultural information service provision, and thus were not able to train small scale crop farmers to search for, access and use agricultural information effectively to enhance their crop production. Despite the fact that there are plenty of agricultural information being generated through research institutions like COSTECH, REPOA, ESRF, universities and agricultural sector lead ministries, small scale crop farmers in the region do not benefit much from the information generated. Information is not organized; it is scattered and not readily available when needed by small scale crop farmers. The farmers were unaware of

where and how to access agricultural information when needed. For example, it was observed that some respondents were not even aware of the existence of input subsidy or how to access information, fill the forms and access agricultural implements like fertilizers and better seeds for their farms.

Inadequate information resources were another challenge facing small scale crop farmers in the region. It was established the information needs of most of the respondents 109(73%) were not met. It was observed that all villages in the entire region depended on one library located at Sumbawanga Municipality a long distance away from most villages. As a result, respondents were not able to travel all the way from their villages to the municipal in search of information. In addition, most respondents were poor as indicated in section 6.3.1 thus, unable to spend their money to seek agricultural information. Instead, they used their own experience and other informal sources of information as indicated in section 6.3.3. It was also observed that the library was poorly stocked with less than 100 volumes of agricultural information, less than ten working computers and only one computer in the district librarian's office which was connected to the internet. There were seven librarians who were certificate and diploma holders only, who did not possess sufficient training in agricultural information service provision. They were only creating awareness on how to use the library and issuing books to library users, particularly primary and secondary school pupils. Shortage of information service providers also contributed to unreliability and untimely information service provision. Other agricultural information services like CAS, SDI, newspaper clippings, abstracting and indexing, information literacy training, information consultancy, information repackaging, translation services and information referral services were not provided in

the library. This was probably because librarians did not have adequate knowledge and skills to perform these information services.

Despite the fact that the government is working hard to improve various infrastructure like roads in the region, it was observed that information infrastructure like libraries, computer training centers, village information centers, community radio and television/cinema centers were not given priority. Observations made during research revealed that none of the villages involved in the study had a village information center or anything that plays that role. The entire region had only one community radio, CHEMCHER radio which is a private radio owned by the Catholic Church. Poor information infrastructure in the region is due to either inability of the region's economy to support it or lack of awareness, knowledge, skills and efforts from information service providers in persuading local government officers on information infrastructure development in the region. This has to a great extent, hampered food crop production and agricultural development in the region.

Although small scale crop farmers were provided with various information services, most of them faced challenges in searching, accessing and using information services provided. For example, 102(68%) respondents were computer illiterate, 128(85%) had not been instructed or trained on how to use various sources of information or how to search for agricultural information either manually or electronically. Although the TCRA report (2013) shows an increased number of internet users, a subsidized internet bandwidth subscription and reduced mobile phone subscription costs, small scale crop framers in the region were not aware. Training and awareness creation plays an important role in modern agricultural information and communication technologies. Agricultural

information is available in various formats ranging from traditional print to electronic formats from various internet platforms. These platforms include agricultural databases, agricultural information gateways, agricultural blogs, wikis and specialized agricultural websites. To be able to access agricultural information from these sites, small scale crop farmers need to be trained on information searching skills or be information literate. It is the responsibility of information service providers to acquaint small scale crop farmers with necessary knowledge and skills to enable them to search information on their own even using their mobile phones and apply the knowledge gained in enhancing their crop production.

Despite the fact that television and radio stations provided information to small scale farmers, they did not satisfy the information requirements of the farming community in the region. Television and radio programmes were not beneficial to small scale crop farmers because they were aired at the time when the farmers were busy with other daily chores. Another challenge was the fact that even the information service providers interviewed were not sure of the time agricultural programmes were aired on television or radio. This situation could be described as lack of work commitment and irresponsibility of information service providers. The ISCM suggests that information service providers should also seek information, process it, evaluate and compile information products to be used to address the information needs of small scale crop farmers. Information service providers should not just sit there, enclosed behind the four walls of their offices; instead, they should be proactive and search for information to address the information needs of the farming community in the region and the entire country. Other challenges observed include: Inadequate funding to facilitate information service provision; information

service providers were not easily found when they were needed because they live far away from most farmers; unfamiliar and technical language used in some sources of information; failure to do follow up to get feedback by information service providers; unreliable power supply; and poor internet services in rural areas.

6.7 Strategies Proposed by Small Scale Farmers to Improve the Provision of agricultural Information Services

Information service provision to small scale crop farmers remains ineffective and inefficient because it does not focus on their information needs. Consequently, as a result small scale crop farmers are faced with several challenges as discussed in section 6.6. However, there is a possibility to improve information service provision to small scale crop farmers, enhance crop production and bring agricultural development in the country particularly Rukwa region if there are proper information provision strategies that address farmers information needs. Small scale crop farmers proposed the following measures to overcome the challenges facing them.

6.7.1 Establishment of Agricultural Information Centres

A total of 109 (72%) respondents proposed the establishment of modern well equipped and organized agricultural information centers at national, regional, district, ward and village levels. At ward and village levels, there should be community information centres/ libraries. These will be useful to small scale crop farmers because they will be within their villages. The community information centre should be well stocked, organised and focus on addressing the needs of that community. It should contain relevant resources with high credibility and utility as proposed by the ISCM. For a community information centre to effectively address the needs of the said community, it

should set clear objectives and strategies based on the needs of that community. In addition, there should be a government will to overhaul agricultural information systems and services. In order to improve the situation, the government should put in place appropriate policy frameworks that promote the establishment and development of agricultural information systems and services.

6.7.2 Awareness Creation

One hundred and two (68%) respondents opined that there should be awareness creation on available information sources, services, systems and channels to allow them to access agricultural information on time. The findings suggest a need to publicize available agricultural information institutions systems, services and channels to facilitate access and use. Awareness creation will allow small scale crop farmers to access information on their products, particularly pricing information to be in a better position to bargain with the buyers. It will also help them to know when and where to sell their products at a better price instead of ending up in the arms of middlemen who always buy their products at a lower cost.

6.7.3 Information Needs Identification

Small scale crop farmers in the region suggested that their information needs should be constantly identified because they are not static. They are dynamic depending on their farming activities and agro ecological zones. Odingo (2005) observed that the information systems in Kenya were designed without a proper analysis of the needs of the users. Although it is almost a decade now, a similar trend is still observed in Tanzania. Agricultural information systems and services are not properly designed and

consequently, farmers' information needs are not met though there is plenty of agricultural information generated every day. Odini (2005) further argued that information needs identification is the first step towards satisfying information needs. Thus, there is a need for frequent agricultural information needs assessment as proposed by small scale crop farmers in the region as a basis for facilitating access and use of agricultural information services.

6.7.4 Employment of Information Service Providers

One hundred and twenty eight respondents (85%) stated that there is a need to employ enough information service providers. These employees should be skilled, competent, self motivated and ready to work and live in rural areas. Skilled and competent information service providers will help to train small scale crop farmers on where, when and how to access, process, organize, use, evaluate and store agricultural information for future reference. Observations made on the services provided revealed that there was no training conducted on these information aspects.

6.7.4 Time for Broadcasting and Information Packaging

It was noted that radio and television programmes in the country have few educational programmes for farmers. These few programmes do not reach the intended audience because they are not aired at the right time. To address the problem of power supply which interrupts radio and television broadcasting, there should be stand-by generators or solar power generators. In addition, small scale crop farmers in the region proposed that information products and services should be repackaged in a simple user friendly format to allow easy access and use.

Other measures suggested by small scale crop farmers include: construction of good access roads to enable regular visits by extension workers and other agricultural agents; allocation of adequate funds for agricultural information service provision; all agricultural institutions and organizations should collaborate to allow easy sharing of research findings and agricultural information; and organization of regular seminars and workshops on recent agricultural innovation. Respondents also suggested that there should be collaboration between mobile phone companies, the Ministry of Agriculture, information service providers and other stakeholders on effective dissemination of agricultural information.

6.8 Chapter Summary

This chapter discussed the findings of the study as presented in chapter five. The discussion was arranged according to the research questions and themes presented in chapter five. In discussing the findings, attempts were made to see how the current study concurs or differs with previous studies. The current study shows that small-scale crop farmers' information needs are not static; they differ from one individual to another and from one agro-ecological zone to another depending on the farming activities at hand, demography, and culture and information environment. Information needs are not uniform, the preference and format of information sources and services also differ. This dynamic nature of agricultural information needs calls for constant information needs identification. Although several agricultural information services like SDI, CAS, document delivery services, reference services and field farm training were provided they did not meet the information needs of small scale crop farmers. This is probably because they were provided by people who were not professionally trained to provide agricultural

information services. The study also established the presence of ICT facilities and services in the region though they were minimally used due to several challenges like lack of awareness, knowledge and skills. It was also observed that information infrastructure was poorly developed in the region, a situation which contributed much to inadequate agricultural information service provision. The government should employ well skilled, competent and rural based information professionals. There should also be constant awareness creation and training on various aspects of agricultural information service provision.

CHAPTER SEVEN

SUMMARY, CONCLUSION AND RECOMMENDATIONS

7.1 Introduction

This chapter presents the summary of the study findings as presented and discussed in chapter five and six, respectively. It also concludes, recommends, and proposes a model for agricultural information service provision and proposes areas for further studies. The aim of this study was to investigate the provision of agricultural information services to small scale crop farmers in Rukwa region with a view to proposing an appropriate model to enhance crop production in the region. Specifically, the study sought to address the following research objectives:-

1. To determine the information needs and seeking habits of small scale crop farmers in Rukwa region.
2. To establish the types and range of information services offered to small scale farmers in the study area to enhance crop production.
3. To examine the application of ICTs in the provision of information services to small scale crop farmers in the region.
4. To ascertain the challenges experienced by small scale farmers in accessing and using information services.
5. To propose an appropriate model to improve provision of information services to small scale farmers in the region.

The study was guided by Robson and Robinson's, the Information Seeking and Communication Model (ISCM) (2013).. A pragmatic paradigm was adopted with a dominant quantitative and a less dominant qualitative approach. A total of 233

respondents participated in the study. They included 200 small scale crop farmers of which 50 were interviewed as key informants. The study also included 27 information service providers (7 librarians and 20 extension officers) and six (6) District Agricultural Officers. A survey research method was used to conduct the study where data was collected from questionnaires supplemented by interviews and non-participant observation.

7.2 Summary of the Findings

The study investigated agricultural information service provision to small scale crop farmers in Rukwa Region. The study identified a number of issues of theoretical and practical significance to agricultural stakeholders. The following subsections summarize major findings in line with research objectives and research questions.

7.2.1 Characteristics of the Respondents

Demographic characteristics of respondents influence agricultural information service provision. The study findings show that there was a significant difference statistically between demographic characteristics of respondents such as age, gender, education level, farm yield and income per year and various aspects related to agricultural information service provision.

Most respondents (74%) were aged 30-49 years. The findings established a significant relationship with P- value less than or equal to 0.05 between age of respondents and agricultural information needed, agricultural information sources, services utilized and in the use of ICTs in accessing and using agricultural information services provided. Respondents aged 39 to 49 years demanded more information, utilized various source of

information, and were also leading in the use of ICTs in accessing agricultural information. Respondents aged 60-69 years showed low response and relied much on their friends and colleagues. Most (73.4%) respondents had primary level education and only a few (5.2%) had secondary level education. Among respondents with primary education, 62(81.6%) were female, while 51 (68.9%) were male.

7.2.2 Information Needs and Seeking Habits

It was established that small scale crop farmers in the region were engaged in various farming activities. Majority (61.7%) respondents were maize farmers while a few (12.5%) were beans farmers, and (7.8%) were engaged in paddy farming. The findings also show that crops like simsim were recently introduced in the region. Although simsim is much profitable in the market compared to maize and other cereals, people are still reluctant to adopt it. This is probably because respondents have inadequate information on potential commercial benefits of crops other than maize, paddy, millet and beans.

7.2.2.1 Agricultural Information Needs

The findings indicate that small scale crop farmers in the region have dynamic agricultural information needs which differed from one individual to another and one village to another. The findings show that small scale crop farmers need information on market for products 128(85%), on irrigation farming 92(61%), on pest management 81(54%), on input subsidy 80(53%), on product packaging 82(55%), on credit and loan facilities 89(59%), on horticulture 88 (58%), on ware house receipt system 87(58%), on proper methods of farming 85(57%) and on trade fair 64(43%).

The findings showed variations in information needs across villages. For example, information on trade fair ranked high at Kalumbaleza 15(23%), information on Warehouse Receipt System ranked high at Kizombwe 15(17%), while information on horticulture was rated high at Kizombwe 15(24%), Mtowisa 13(18%) and Kalumbaleza 11(18%). The findings showed a significant difference in information needs across gender with the P-value of less than 0.05. The findings indicated that male respondents showed greater need for agricultural information compared to their female counterparts 35 (55%). With regard to age, the findings showed a significant relationship between age of respondents and their information needs with a statistical significance value, P-Value of less than 0.05. Respondents aged 30-39 years and 40- 49 years showed a greater need for agricultural information, while respondents aged 60-69 years needed less. The findings indicated that respondents needed agricultural information for various reasons. It was shown that 58(39%) needed information for getting knowledge on various farming issues, 39(26%) needed information for improving their farming activities, while 37(25%) needed information to teaching others on various farming activities.

7.2.2.2 Agricultural Information Seeking Behavior

The ISCM suggests that information users, in this case small scale crop farmers, should actively seek information to meet their needs in order to make good informed decisions and choices regarding their daily farming activities. This study established that respondents preferred information provided by gatekeepers 103(69%), friends/ colleagues 101(67%), church/ mosque 94(63%), village leaders 79(53%), extension officers 72(48%), clubs and associations 72(48%) and radio programmes 51(34%). The findings further showed that, although agricultural information in the country is disseminated

through various print sources, small scale crop farmers still rely on verbal sources of information.

The findings further show that most respondents (89%) has never used newspapers as a source of information, 96% never used agricultural magazines, and 97% never used journal articles as sources of agricultural information. The findings indicated that the region is served by only one public library which is poorly stocked and understaffed located at Sumbawanga Municipality. Despite its existence, most (99%) respondents have never used it as a source of agricultural information. The findings further showed that most (92%) respondents owned mobile phones although they have never used it as a source of agricultural information.

The findings showed that gender influenced information seeking behavior as more female 53(70%) used gatekeepers as their source of information compared to male 50(68%) respondents. The findings further show that radio programmes were more preferred by female 30 (40%) than male respondents 21(28%). Extension officers were more preferred by male 41(55%) than female respondents 35 (46%). The findings further show that most (75%) respondents selected sources of information based on their closeness to place of residence, 102 (68%) on ease of use of the source, while 119 (79%) on the source's availability. Other respondents 69(46%) preferred language familiarity, 96(64%) on source's affordability, while 64(43%) respondents felt the format was important in selecting the source.

Although the findings showed that small scale crop farmers were not satisfied with the sources of information used in meeting their information needs, their level of satisfaction

differed from one farmer to another depending on the perceived utility and credibility of the source as suggested by the ISCM. The findings show that 68 (45%) respondents were not satisfied with friends as their source of information, 61(41%) were somewhat satisfied and 16(11%) were satisfied with friends as their source of information. The findings also show that 62(41%) respondents were satisfied with village leaders as their source of agricultural information. With regard to extension officers, 47 (31%) were somewhat satisfied, while 75 (50%) were satisfied as sources of agricultural information.

Although majority (51%) of the respondents said the content of information provided by various sources of information was relevant, they were not satisfied with the sources in meeting their information needs. With regard to the format of agricultural sources of information, most (94%) respondents preferred print format written in Swahili language.

7.2.3 Types and Range of Information Services Offered to Small Scale Crop Farmers

The study established that a small range of information services was provided to small scale crop farmers in the region. These included document delivery services 129(86%), technical advice 139(93%) and on farm reference services 139(93%). The findings also showed that abstracting services, translation services, instructions on how to use the sources, information referral services and CD-ROM databases were very rarely provided and in many villages not provided at all. It was further established that the most prominent agricultural information service provided was technical advice on farming issues such as proper use of fertilizers, ratio of pesticides to be applied on crops, grafting of fruit trees and modern crop storage techniques. The findings further indicate that “On

farm reference services” was provided through small farming groups and field farm schools.

Although the findings show that document delivery services were provided to small scale crop farmers, it was not as effective as the technical advice provided through “*shamba darasa*” and field visits. Further show that Current Awareness Services (CAS), Selective Dissemination of Information (SDI) and provision of information on demand were rarely provided. It was further noted that Rukwa regional library played a very minimal role in agricultural information service provision as it was ill equipped, understaffed and located far away from most of the villages involved in the study.

With regard to the credibility and utility of information and services received as suggested by the ISCM, the findings show that information received was objective 72(48%), relevant 74(49%) and authoritative 54(35%) though it did not fully address small scale crop farmers’ information needs. Although 80(53%) respondents said information services provided were effective, it was not reliable because respondents were receiving it hardly once per month. Majority (59%) said that the services received did not meet their information needs nor provide competitive advantage in crop markets. The ISCM suggests that information service providers should be knowledgeable, skillful and experienced in order to effectively provide information services to small scale crop farmers. Although the findings show that information service providers have enough skills in information service provision 93(62%), they were competent in providing quality information 118(78%), in providing relevant information 112(75%), and they possessed adequate knowledge on the subject matter at hand 80(53%). It was noted by the researcher that most of the information service providers were using their experience in

information service provision. It was further noted that none of them had attained any training in information service provision apart from the academic qualification as extension officers. It was further noted that librarians who were professional information service providers were only sensitizing farmers on how to use the library once they pay a visit to the library. Further findings showed that information service providers were not competent in assessing information needs and appropriately addressing them as noted by 113(75%) respondents.

7.2.4 Application of ICTs in Information Service Provision

The current study established that several ICT related information provision services were available and accessible in the region although they were affected by digital divide. They include mobile telephone services, radio broadcasting services, television broadcasting services, internet and e-mails services and computer services. Although internet and email services were available, 113(75%) were not able to access it. Despite the fact that electronic journals, agricultural databases like AGRICOLA, CD-ROM databases, and online agricultural books were freely available, they were not accessed by respondents due to lack of awareness and necessary skills to search and access electronic information. It was noted that 7 (26%) librarians were either not able to search agricultural information from the internet effectively or had limited skills in searching information from different web based sources of information.

It was noted that several radio stations were available and accessible in the region namely; Tanzania Broadcasting Corporation (TBC FM), Radio Free Africa (RFA), TBC Taifa, Radio One, KISS FM, Radio Maria and Radio CHEMCHER. Respondents frequently listened to Naliendele Agricultural Programme broadcasted by TBC Taifa and

Radio CHEMCHEM, a local radio found in the region. Although the findings show that information service providers relied on printed sources of information such as books, pamphlets, brochure and leaflets from the Ministry of Agriculture and other agricultural sector lead ministries, 20(76%) confirmed using radio CHEMCHEM to provide (94%) current awareness services to farmers in the region.

7.2.4.1 Use of ICT Tools and Services

It was found out that all respondents have used one form of ICT tool and service or another in accessing and using agricultural information. Small scale crop farmers received information on proper methods of farming, ware house receipt system, equipment sourcing, proper use of fertilizers, organic farming, input subsidy and information on irrigation farming through ICTs. None of the respondents and information service providers used online agricultural discussion forums and groups and none of them was a member of any online agricultural community. The frequently used ICT tools and services were radio services particularly TBC Taifa and CHEMECHEMI radio and Television programmes. Computer services e-mail and internet services were rarely used by people in the municipality, while in some villages they were not used at all.

7.2.4.2 Effectiveness of ICTs in Providing Agricultural Information services

Although small scale crop farmers accessed agricultural information through radio and television programmes, 47% said that they were not effective in providing agricultural information to small scale farmers. This was probably because in most rural areas televisions were not very much accessible as claimed by 75(50%) respondents. It was established that electronic journals, books, CD-ROM databases and agricultural databases

like AGRICOLA and internet services were found not effective though they contained immense agricultural information with high credibility and utility.

7.2.5 Challenges Experienced by Small Scale Crop Farmers in Accessing and Using Agricultural Information

Small scale crop farmers faced several challenges in accessing and using agricultural information services. The challenges included inability to access and use information provided, insufficient information resources to meet their information needs, inadequate skills to search for information from available sources, inadequate skilled information service providers, unreliable and untimely information service provision and information illiteracy.

Despite the fact that there was plenty of agricultural information being generated through research institutions like COSTECH, REPOA, ESRF, universities and agricultural sector lead ministries, small scale crop farmers in the region did not benefit much from the information generated as it was scattered, unorganized and not readily available when needed by small scale crop farmers. The findings show that small scale crop farmers were not aware where and how to access agricultural information services. Although small scale crop farmers were provided with various information services, most of them faced challenges in searching, accessing and using information services provided. For example, 102(68%) respondents were computer illiterate, 128(85%) respondents were not instructed or trained on how to use various sources of information or how to search for agricultural information either manually or electronically.

7.2.6 Strategies Proposed by Small Scale Crop Farmers to Improve Provision of Agricultural Information Services

Although the study showed a number of challenges facing agricultural information service provision in the region, there is an ample possibility of improving it to enhance crop production and bring agricultural development in the country particularly Rukwa region. Based on the findings of the study, respondents proposed several strategies to minimize or eliminate the challenges altogether. They include:

- a) Establishment of modern, well equipped and organized agricultural information centers at national, regional, district, ward and village levels.
- b) Awareness creation on available information sources, services, systems and channels to allow users to access agricultural information on time.
- c) Employment of enough information service providers who are skilled, competent, self-motivated and ready to work and live in rural areas.
- d) Agricultural information repackaging in a simple user-friendly format to allow easy access and use. In addition, it was suggested that there should be a government will to overhaul agricultural information systems and services. The government should put in place appropriate policy frameworks that promote the establishment and development of agricultural information systems and services.

7.3 Conclusion

The study established that a small range of agricultural information services is provided to small scale crop farmers. However, these services were not sufficient to meet the

farmers varied and dynamic information needs. Information services were offered by incompetent information service providers who lacked necessary knowledge and skills. A few who have undergone some basic training in library and information studies still lack important skills such as translation, abstracting, indexing, community mobilization, public speaking and information marketing skills. In addition, most small scale crop farmers are unaware of the existing agricultural information systems, services and sources. As a result, their usage is very minimal with much dependence on experience and informal sources of agricultural information. Although the study established that small scale crop farmers preferred verbal and informal agricultural information communication, the importance of electronic agricultural information sources should not be underestimated. Translation and information repackaging services are indispensable.

Based on the findings, the study concludes that if the information needs of small scale crop farmers are not properly identified and addressed through effective and adequate information service provision, crop production will continue to be adversely affected. In order to enhance effective agricultural information service provision, there should be better information marketing and awareness creation strategies to maximize the utilization of available agricultural information services.

The country would only be able to compete in the current information-driven economy if the existing agricultural information systems, services and sources are reviewed with a focus on physical, human, financial, practical and theoretical gaps. Agricultural information needs to be handled in the most benefiting way to all stakeholders. The study, therefore, emphasizes on collecting, processing, organizing and preserving agricultural information in a centralized database system for easy retrieval. Agricultural

information should be provided based on utility and credibility coupled with high standard agricultural information services. The services should be supported by modern ICT facilities and tools to meet small scale crop farmer's dynamic information needs based on their literacy level, gender, experience and economic status. However, despite having several challenges in agricultural information service provision, there is an ample possibility of improving the situation and enhance crop production if deliberate efforts are made to include proper information service provision strategies.

7.4 Recommendations

The study identified several issues related to agricultural information service provision in the region. Based on the findings of the study, recommendations are made to address salient issues raised in the study. Recommendations arising from this study are addressed to small scale crop farmers, the Ministry of Agriculture and Food Cooperatives and other agricultural sector lead ministries, agricultural stakeholders, policy makers and agricultural information service providers.

7.4.1 Recommendations to Small Scale Crop Farmers

Small scale crop farmers are the primary consumers of agricultural information services. In this regard, the following recommendations are made to improve access to information.

1. Demographic characteristics of respondents such as age, gender, education, crop yield in bags per acre and income level influence information service provision in terms of agricultural information needs, seeking behavior and the use of ICTs in accessing and using agricultural information services. Based on these findings, it

is recommended that agricultural information systems, services and resources should consider these demographic characteristics in order to facilitate effective agricultural information service provision.

2. Since the findings indicated that small scale crop farmers have diverse agricultural information needs which were dynamic in nature depending on agricultural activities done by individuals and the agro- ecological environment, it is recommended that their needs should be frequently and consistently identified and properly addressed.
3. Small scale crop farmers should be receiving transcribed, translated and repackaged information from professional information service providers in print and electronic format. The preferred sources of information should be used with a gradual and steady transition to modern ICT related sources of information.
4. There should be a linkage between various agricultural information systems, services and sources in providing well coordinated and organized information services to small scale crop farmers to ensure that their information needs are met to enhance crop production.

7.4.2 Recommendations to Policy Makers

The dynamic nature of agricultural information needs which are not satisfactorily addressed by the existing information services calls for appropriate measures to minimize the situation in the country. Since the Ministry of Agriculture and Food Cooperatives and other Agricultural Sector Lead Ministries as identified in chapter two are responsible for

production and dissemination of agricultural information services through information service providers, it is recommended that;

1. There should be proper coordination among agricultural sector lead ministries, research institutions like COSTECH, REPOA, ESRF, universities and other responsible bodies in terms of agricultural information management. There should be a centralized agricultural database management system to collect, organize, translate and disseminate agricultural information to small scale crop farmers countrywide based on their information needs.
2. The government, in collaboration with information experts like librarians, database management experts, social media experts and IT experts should ensure that all aspects related to agricultural information service provision are properly managed to meet the dynamic needs of the farming community in the country.
3. The findings show that small scale crop farmers prefer verbal/informal sources of agricultural information. Consequently, it is recommended that the government should consider the use of agricultural information gatekeepers and brokers at village, ward and district levels as intermediaries between small scale crop farmers and the government. There should also be frequent capacity building to enhance their knowledge and skills.
4. The government should consider agricultural information as a resource of immense importance in this information-driven agricultural economy. Thus, investment in information infrastructure should be given priority backed by a strong information

policy which should address agricultural information service provision in the country.

7.4.3 Recommendations to Agricultural Stakeholders

Agricultural stakeholders play an important role in agricultural development and agricultural information service provision in the country. Based on the findings of this study, the following recommendations are made to agricultural stakeholders;

1. Since agricultural information is frequently generated through research activities conducted by various research institutions in the country, there should be proper agricultural information coordination and dissemination system to ensure that small scale farmers in the country benefit from the knowledge generated from these research institutions.
2. Agricultural institutions, curriculum developers and information experts should work together to develop long term and short term courses in agricultural information management to acquaint information service providers with necessary knowledge and skills in agricultural information service provision.
3. The findings indicate that small scale crop farmers are in need of information on credit and loan facilities. It is therefore important that financial institutions market their services in rural areas where most farmers reside. They should also arrange for soft loans to individual farmers and FFSs to facilitate crop production.

7.4.4 Recommendations to Agricultural Information Service Providers

Agricultural information service providers are the engine that propels agricultural development in the country through information service provision. Based on the findings of this study it is recommended that;

1. Agricultural information service providers should frequently conduct agricultural information needs identification. They should find proper ways of addressing them based on small scale crop farmers preferred information products and medium of instruction. Information products should be translated and repackaged to suit the needs of the farming community.
2. Since the findings of the study established that small scale crop farmers were not aware of available agricultural information services, it is recommended that there should be frequent awareness creation on available agricultural information services in their vicinity.
3. The findings indicated that information service providers were not professionally trained to provide agricultural information services. It is recommended that agricultural information service providers should be equipped with knowledge and skills to provide a variety of information services like CAS, Information consultancy and brokering, SDI and Information outreach services. They should also conduct research related to agricultural information to identify challenges facing agricultural information service provision in the country and propose practical measures to minimize the challenges.

4. Information service providers should initiate tailor made agricultural information literacy training to maximize access and use of the existing agricultural information systems, resources and services, particularly in rural areas.
5. Although the findings indicate that small scale crop farmers preferred verbal communication, this study recommends that agricultural information delivery strategies should use multiple communication methods. They should include audio-visual materials, traditional dances, market days and ICTs and its related technologies.

7.5 Proposed Model for Agricultural Information Service Provision

The last objective of the study was to propose a suitable model for effective agricultural information service provision. Based on literature review conducted and the findings of this study, a proposed model is rooted from the ISCM model used to inform this study.

A literature review conducted indicated that there is a huge amount of agricultural information generated in various formats from multiple information systems and resources as discussed in chapter two and three of this study. However, the findings of this study indicate that small scale crop farmers are not aware of their existence. The study findings further established that information service provision to small scale crop farmers remains ineffective and inefficient because it does not focus on their information needs. Small scale crop farmers are faced with several challenges as presented in sections 5.8. Despite these challenges, there is ample possibility of improving agricultural information service provision to small scale crop farmers to enhance crop production in Rukwa region. Based on the findings of this study there is a need for a comprehensive

information service provision model which will be able to address small scale crop farmers' information needs to enhance crop production. Provision of agricultural information services with high utility and credibility is vital for enhancing crop production. This study, therefore, proposes a model for agricultural information service provision to small scale crop farmers with the following elements; The Ministry of Agriculture and Food Cooperatives, information service providers, small scale crop farmers, information services, information needs context, Information searching, sources/products, communication channels, barriers and the feedback mechanism.

The Ministry of Agriculture and Food Cooperatives

The study observed that the Ministry of Agriculture and Food Cooperatives is responsible for agricultural information management in the country. The findings of the study show poor coordination between information service providers and organizations responsible for agricultural information generation. This situation causes uncoordinated, unorganized and fragmented agricultural information, a situation which makes it difficult to reach scattered small scale crop farmers throughout the country. This study proposes that there should be a centralized agricultural information database management system in the ministry to coordinate, organize and disseminate agricultural information through appropriate channels. There should also be a close connection and regular communication between the ministry and information experts like librarians, database managers and extension officers.

The literature review showed that there is a poor linkage between the department of agricultural research and development, agricultural research institutions and the users of

agricultural information, in this case, small scale crop farmers. It is proposed that there should be a two-way communication between the ministry and small scale crop farmers through their village government and village leaders. The findings show that small scale crop farmers used village leaders as one of their sources for obtaining agricultural information. It is through these village leaders and village local governments that small scale crop farmers will be passing their information needs to the government and receiving feedback. Local village governments should act as intermediaries between small scale crop farmers and the central government.

Small Scale Crop Farmers

Small scale crop farmers, aspire to improve production their crops. To fulfill this goal, they need agricultural information services. In trying to address their information needs, they actively seek agricultural information and exchange agricultural information among themselves or with information service providers through a two-way communication process which involves frequent feedback.

Agricultural Information Service Providers

According to Robson and Robinson (2013), information providers are individuals, groups or organizations that produce, supply/ disseminate or communicate information to users. They also facilitate, organize, coordinate and control information access. The proposed model proposes that agricultural information service providers should include the Ministry of Agriculture and Food Cooperatives, Agricultural Sector Lead Ministries, and the Tanzania National Central Library through librarians and extension officers. The National Central library is included because it has the mandate of coordinating all public

libraries in the country. It is also a legal depository center of all published works including agricultural materials as discussed in chapter two of this study. The model proposes a two-way communication between small scale crop farmers, the Ministry of Agriculture and Food Cooperatives and information service providers.

Agricultural Information Services

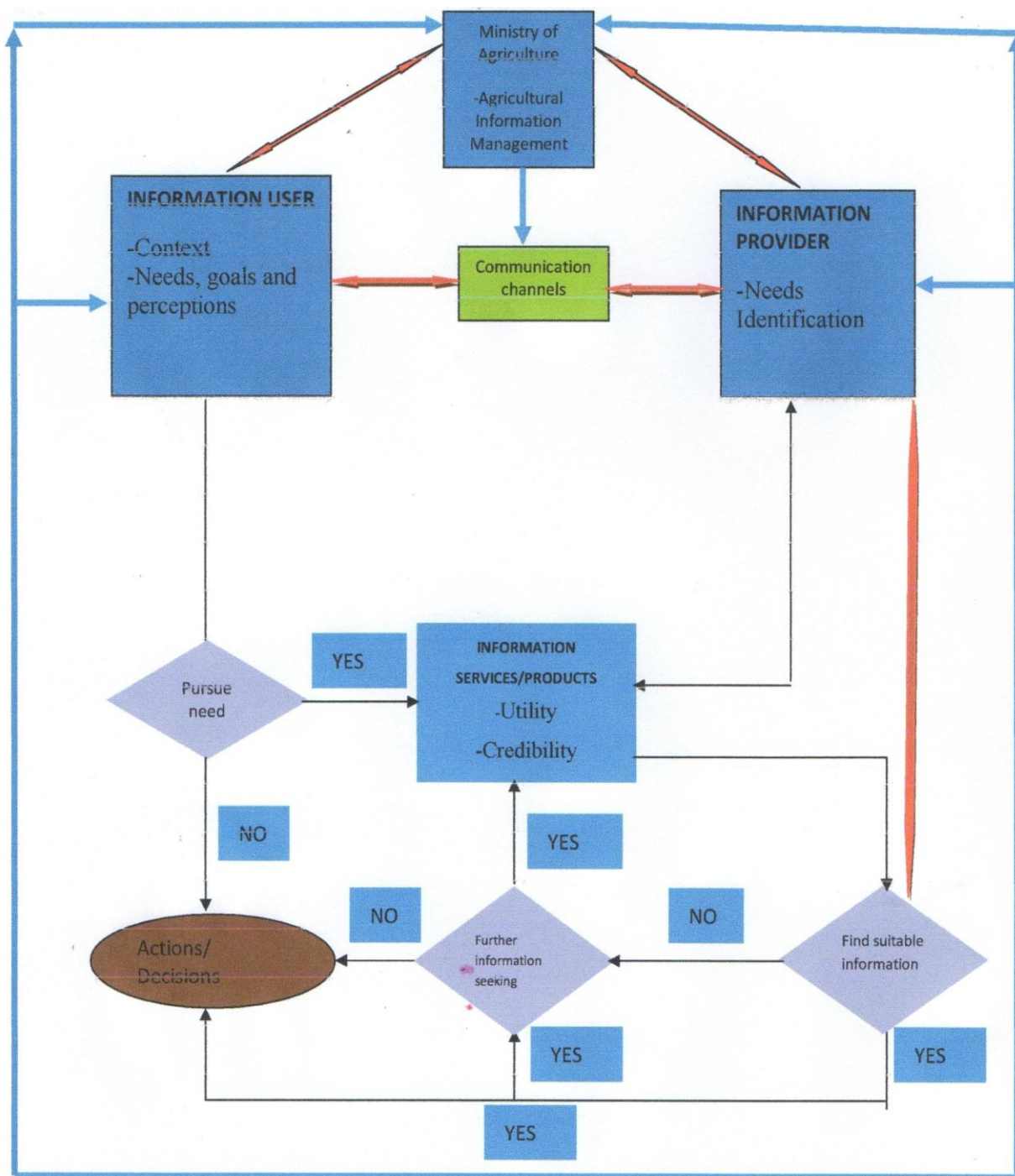
Agricultural information services to be provided to small scale crop farmers should include but not limited to the following; current awareness services, selective dissemination of information, agricultural information provision both on demand and in anticipation. They should also include training on different agricultural issues, “on farm reference services,” provision of agricultural documents such as leaflets, brochures, manuals, agricultural digests, among others. There should also be routing of documents especially rare documents which are useful to small scale crop farmers. Furthermore, small scale crop farmers should be provided with technical advice and agricultural information consultancy in case of need, information referral services, abstracting and indexing services accompanied with a bibliographic compilation of new agricultural innovations. Translation services and information repackaging are also important for effective agricultural information service provision. Furthermore, agricultural newspaper clippings and agricultural information literacy training are essential.

Context

From the findings, it was shown that the context from which small scale crop farmers exist affects agricultural information service provision directly or indirectly. The context included the physical environment where small scale farmers reside, daily farming

activities, social economic status, and demography, exposure to information environment, knowledge and skills.

This model proposes that information service providers should take into consideration these factors to ensure effective agricultural information service provision. The findings indicated that most of the areas studied did not have village information resource centers. It is suggested that village halls should be used as village information/ resource center where small scale crop farmers can access agricultural information. Additionally, there should be frequent agricultural information literacy training at the village level to enhance the knowledge and skills of small scale crop farmers. Effective agricultural information literacy training will facilitate access and use of agricultural information services. Figure 19 present the proposed agricultural information service provision model.



Information Seeking and Communication Model (KEY)

- Information Seeking Activities
- Information Communication
- Inhibiting Factors

Information Needs, Goals and Perceptions

The ultimate goal of small scale crop farmers is to improve their crop production so that they can have enough food and sell the surplus to raise their economic condition. The findings indicate that small scale crop farmers have various unmet information needs. In order to achieve their goals and make well-informed choices regarding their farming activities, they need agricultural information services with high utility and credibility. That is information services which are useful, accessible, relevant, timely, and user-friendly. Since they have different perceptions of agricultural information service provided, they need information service providers who are trustworthy, authoritative and reliable.

Information Searching

The findings show that small scale crop farmers are not aware of the existing agricultural information systems and services available. They also lack necessary skills in searching, accessing and using available information services. The model proposes frequent tailor made adult training and agricultural information literacy training to improve awareness of available information services, systems and resources. Training should also be geared towards enhancing their information searching, access and information user skills.

Communication Channels

The study established a communication gap between the Ministry of Agriculture and Food Cooperatives, agricultural research institutions, agricultural information service providers and small scale crop farmers. In this regard, this study proposes a model which will provide a two-way communication channel between the ministry, information service providers and small scale crop farmers. The findings show that small scale farmers use informal channels of communication like extension officers, village leaders and friends. It is recommended that these channels should be used but with a caution that there should be frequent and consistent capacity building in the form of short training and seminars. Other channels to be used should include village meetings, market days and traditional dances.

Information Sources / Products

Although the findings clearly showed a preference for informal sources of information, this model proposes a blend between informal and formal sources of agricultural information. For effective agricultural information service provision both print and electronic sources of information should be utilized. These should include books, journals, brochures, newspapers, technical reports, conference proceedings, official publications, reference sources and CD-ROMS. The channels may also include databases, websites, blogs, presentations, agricultural educational materials, and television and radio programs.

Feedback

Every effective agricultural information service provision involves feedback. It ensures continued information exchange between the information service providers, the sources/ services involved and small scale crop farmers. Through feedback, information service providers and the government will be able to know if the identified agricultural information needs and the services provided clearly address what it was supposed to do. Also through a feedback mechanism, challenges facing small scale crop farmers will be identified and measures to minimize them will be established.

Inhibiting Factors

The study established several barriers that inhibit agricultural information service provision to small scale crop farmers. Barriers emanated from small scale crop farmers, the government, information service providers, the channels, sources or in the process of seeking, accessing and using agricultural information services. The findings of the study established that the named barriers affect effective agricultural information service provision. It is therefore suggested that barriers should be minimized right from an individual level to the national level through frequent capacity training, seminars and workshops at a village to national levels. Small scale crop farmers participating in FFSs should be trained and facilitated to train their fellow farmers in villages.

7.6 Suggestions for Further Studies

1. This study focused on agricultural information service provision to enhance crop production to small scale crop farmers in Rukwa region. It is suggested that a comparative study should be carried out to include livestock farmers. The study will

be useful in formulating strategies for effective agricultural information service provision to the entire farming community in the country.

2. The current study investigated the provision of agricultural information services to small scale crop farmers. Further research should be conducted in a similar area but should target the effectiveness of the existing agricultural information systems and resources in providing information services in the country. This should give a more comprehensive understanding of the subject at hand.
3. The study established that small scale crop farmers preferred informal sources of communication compared to formal sources. It is suggested that a study should be carried out to investigate the effectiveness of the two sources and suggest proper approaches of providing agricultural information services.
4. The study established that information service providers mainly used their experience in agricultural information service provision. What about their knowledge and skills in agricultural information service provision? What about their effectiveness in agricultural information service provision? A study should be conducted to investigate the above aspects

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APPENDICES

APPENDIX I : INTRODUCTION LETTER

Dear respondent,

My name is Getrude Robert Ntulo, A PhD student at the school of Information Sciences, MOI University in Eldoret, Kenya. I am currently doing a research entitled “*Provision of Agricultural Information Services to Enhance Crop Production to Small Scale Crop Farmers in Rukwa Region, Tanzania.*” Specifically, this study endeavors to: determine the information needs and seeking habits of small scale crop farmers; establish the types and range of information services offered; examine the application of ICTs in the provision of information services; ascertain the challenges experienced by small scale farmers in accessing and using information services; and to propose a model to improve agricultural information service provision.

I request you to contribute towards attaining the goals of this study by openly giving your experiences, views, ideas and opinions on this topic. Note that the information you provide will be treated with High Confidentiality and will only be used for academic purpose.

Thank you very Much for your assistance, time and cooperation

Gertude Robbert Ntulo

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APPENDIX II : QUESTIONNAIRE FOR FARMERS

District:.....
 Ward:.....
 Village:.....

Section A: Personal Information

1. Gender : Male Female
2. Age (years):
 a) 19-29 years (b)30 -39 years (c) 40-49 (d) 50-59 (e) 60-69
3. Highest education level.....
 a) None (b) Informal schooling (c) Primary education
 d) Secondary education (e) Vocational education
 e) Tertiary /degree Any other (specify).....

Section B: Agricultural Information Needs and Information Seeking

4. What kind of crop do you grow? (You can have more than one response)... ..
 (a)Maize production (b) Wheat (c) Sunflower (d) Simsim
 (e) Paddy (f) Beans . (g) Sogham Any other (Please Specify).....
5. For how long have you been a farmer.....
 (a) 1-5 years (b) 6-10 years (c) 11-15 years (d) 16-20 years (e) 21+ years
6. What is the size of the land in acres set aside for farming?.....
 (a) Less than an acre (b)1-5 acres (c) 5-10 acres (d) More than 10 acres
- 7.(I) How much yield(s)/Farm Produce do you get per year?.....
 (Quantify it)
- (II)What do you think is the reason behind your yield(s)/Farm produce?.....

8. I). Do you sell your farm produce (a) YES (b) NO
- II). If YES, how much money do you get per season?.....
- III). If NO, why.....

9. What kind of information do you need for your daily crop farming activities?.. (Tick all that applies).....

SN	Information Needed	Not needed	Not sure	Needed	Highly Needed
1.	Equipment sourcing				
2.	Trade fairs				
3.	Plant breeding/ animal breeding				
4.	Traditional methods of farming				
5.	Proper use of fertilizers				
6.	Sustainable agriculture				
7.	Plant/ Animal diseases				
8.	Proper methods of farming				
9.	Warehouse Receipt System				
10.	Modern storage technology				
11.	Storage facilities				
12.	Improving products				
13.	Plant / Animal grading systems				
14.	Where and how to get market for products				
15.	Crop/ Animal varieties				
16.	Horticulture				
17.	Organic farming				
18.	Credit and loan facilities				
19.	Legal issues				
20.	Food Processing and storage				
21.	Product Packing technology				
22.	Soil classification				
23.	Weather related information				
24.	Input Subsidy				
25.	Information about pest management				
26.	Irrigation farming				
27.	Any other....? (Please specify)				

10. For what purpose do you need that information.....

.....

.....

.....

.....

.....

.....

11 .Where and how often do you turn to for your information needs? (Tick all that applies)

SN	Information Source	Frequency of Using the Source			
		Never	Rarely	Often	Very often
1.	Friends/ colleagues				
2.	Gatekeepers				
3.	Government publications				
4.	Leaflets and Brochures				
5.	Internet				
6.	Television programmes				
7.	Radio programmes				
8.	Personal collections				
9.	Church/mosque				
10.	Village leaders				
11.	Extension officers				
12.	Clubs and Associations				
13.	Video/ radio cassettes				
14.	CD-ROMs				
15.	Agricultural exhibitions				
16.	Newspapers				
17.	Magazines				
18.	Journal articles				
19.	Mobile phones				
20.	Library				
21.	Databases i.e Tanzania online, AGRICOLA, among others				
	Any other (Please Specify).....				

12. Which sources do you frequently use and why?

.....

.....

.....

13. What were the most important reasons for choosing the information sources?..... (Tick all that applies)

SN	Reason for Choosing the Source	Ranking			
		Not Important	Somewhat Important	Important	Very Important
1.	The source's closeness to my place of residence				
2.	Ease of use				
3.	Source's availability				
4.	Language familiarity of the source				
5.	Adequacy of the information contained				
6.	Source's reliability				
7.	Affordability of the source				
8.	Format of the source				
	Any other reason (Please Specify).....				

14. (I) How can you rank the level of information sources you have used in satisfying your information needs? (You may choose more than one)

SN	Information Source	Level of Satisfaction				
		Never Used	Not at all Satisfied	Somewhat Satisfied	Satisfied	Very Much Satisfied
1.	Friends/ colleagues					
2.	Gatekeepers					
3.	Government publications					
4.	Leaflets and Brochures					
5.	Internet					
6.	Television programmes					
7.	Radio programmes					
8.	Personal collections					
9.	Church/mosque					
10.	Village leaders					
11.	Extension officers					
12.	Clubs and Associations					
13.	Video/ radio cassettes					
14.	CD-Roms					
15.	Agricultural exhibitions					
16.	Newspapers					
17.	Magazines					
18.	Journal articles					
19.	Mobile phones					
20.	Library					
21.	Databases i.e Tanzania online, AGRICOLA, among others					
	Any other (Please specify).....					

(II) Give reasons for your response.....

II). What is your opinion on the relevance and usefulness of the content of the sources available to you?.....

15.(I) In what format do you consult the source?.....

(a) Print format (b) Electronic format (c) Both print and electronic format

(d) Audio format i.e radio (e) Audio visual i.e TV

Any other (Please Specify).....

II) Which format do you prefer? Give reasons for your response.....

16.(I) Which language do you prefer in using the sources?.....

(a) Swahili (b) English (c) Local language i.e Fipa, Mambwe (d) Both English and Swahili (e) Any of the above languages

(II) Why do you prefer the above language?.....

Section C: Agricultural Information Services Provided to Small Scale Farmers

17. I. Do you get agricultural information services in your village? I. YES II. NO

II. If YES, how often do you receive agricultural information services?

a. At least once per week b. Daily

c. Once per month d. Once after every three months

e. Twice per year

III. Give reasons for your response in qn. 17 (I) above.....

18. What type of information services do you obtain from information service providers?..... (Tick all that applies)

Information service	Response	
	YES	NO
Document delivery service		
Current awareness services		
Selective dissemination of information		
Information repackaging		
Training on different farming issues		
On farm reference service		
Routing of documents on new innovations		
Technical advice		
Photocopies of available literature		
CD-ROM database provision i.e AGRICOLA		
Translation services of available literature		
Instant massaging through mobile phones		
Instructions on how to use information sources		
Information referral services		
Abstracting services		
Any other (Please specify).....		

19. I. How competent are information service providers in the provision of information services? (You may have more than one response)

Skills and Competencies of Information Service Providers	Response			
	Not competent	Somehow competent	Competent	Very competent
Information Provision skills				
Information delivery process				
Customer care				
Consistency in information service provision				
The quality of information services provided				
Relevance of information provided				
Knowledge on the subject matter in hand				
Sustainability of information service provision				
Assessing information needs and addressing it appropriately				
Developing specialized information products				
Using appropriate information dissemination technology				
Continuously improving information service provision				
Planning and priotizing information service provision on what is critical				
Any other (Please specify).....				

II. Please justify your response in (qn 19)

.....

20. How can you rate the quality of information provided to you in terms of the following Attributes? (You can choose more than one)

SN	ATTRIBUTE OF ONFORMATION	RANKING				
		Excellent	Very good Good	Good	poor	Very poor
1	Objectivity ; the extent to which information is unbiased, true and credible					
2	Relevancy : The extent to which information is applicable and helpful for your daily farming activities/ task at hand					
3	Authority : The extent to which information is highly regarded in terms of its source or content					
4	Reliability : The extent to which information is dependable and free of error					
5	Currency : The extent to which information is sufficiently up to date for the task for the task at hand/ information requirement of the farmer					
6	Accessibility : The extent to which information is available and quickly retrievable					
7	Completeness : The extent to which the volume and coverage of information is sufficient to address the information needs of a farmer					
8	Concise Representation : The extent to which information is presented in the same format, language and is easily understood					
9	Value added : The extent to which information provided is beneficial and provides competitive advantage to farmers					
	Any other attribute.. (Please specify).....					

21. How effective are the information services provided to you? Give reasons for your response.....

22. In your opinion, do you think that there is an opportunity of improving information service provision in the region?..... (I) YES []
(II) NO []

Please Justify your response.....

Section D: The Use of ICTs in Agricultural Information Service Provision

23. What ICT facility(s) do you own? (Multiple responses are allowed).

SN	ICT FACILITIES	RESPONSE	
		YES	NO
1	Television set		
2.	Radio		
3	Computer (Specify i.e desktop, laptop,tablet among others)		
4	Mobile phone		
5	Fixed landline telephone		
6	CD-ROM/ DVD		
7	I pad		
8	Audio cassette		
9	Video tapes		
	Any other (Please specify).....		

24. Which among the following ICT tools and services are available in your village?
 (Multiple responses are allowed).....

ICTs Services	Available	Not Available
Television programs		
Radio program services		
Computer Services		
Mobile phone services		
Landline telephone services		
Agricultural CD/DVD ROM Database services		
Internet services		
Online agricultural books and journals		

Any other (Please specify).....

25. Which ICT tools and services among the following are accessible in your village.

(Multiple responses are allowed).....

ICT FACILITY/SERVICE	ACCESSIBILIY			
	Very accessible	Accessible	Less Accessible	Not Accessible
Internet/World Wide Web				
Mail				
Agricultural electronic journals/books				
CD- ROM Databases				
Computer				
Radio programmes (Please Specify)				
TV programmes (Please Specify)				
Fax				
Landline telephone				
Mobile telephone				
Social media(Please specify)				
Geographic information system				
Agricultural databases i.e AGRICOLA				
Agricultural information gateways (Please Specify)				

26. I. Have you ever used ICT tools and services to obtain agricultural information services?.....

1. YES [] II. NO []

II. Please explain your response.....

27. If the answer is YES, how frequently do you access the following kind of information using these ICT facilities.....(You may select more than one response)

Information Needed	Very Often	Often	Neither Often Nor Seldom	Seldom	Very seldom
Equipment sourcing					
Trade fairs					
Plant breeding/ animal breeding					
Traditional methods of farming					
Proper use of fertilizers					
Sustainable agriculture					
Plant/ Animal diseases					
Proper methods of farming					
Warehouse Receipt System					
Modern storage technology					
Storage facilities					
Improving products					
Plant / Animal grading systems					
Where and how to get market for products					
Crop/ Animal varieties					
Horticulture					
Organic farming					
Credit and loan facilities					
Legal issues					
Food Processing and storage					
Product Packing technology					
Soil classification					
Weather related information					
Input Subsidy					
Information about pest management					
Irrigation farming					
Any other (please mention).....					

28. If the answer was NO in question (26) please give reasons for your response.....

29. Is the information obtained relevant to you?..... (I) YES [] (II) NO []

Please explain your response.....

30. How often do you use these ICT facilities/ services in accessing agricultural information for your daily activities?..... (You may have more than one option)

SN	ICT FACILITY/SERVICE	Frequency				
		Daily	Weekly	Monthly	Occasionally	Never
1	Internet/World Wide Web					
2	Mail					
3	Agricultural electronic journals/books					
4	CD- ROM Databases					
5	Computer					
6	Radio programmes (Please Specify)					
7	TV programmes (Please Specify)					
8	Computer facilities					
9	Social media(Please specify)					
10.	Geographic information system					
11.	Agricultural databases i.e AGRICOLA					
12	Agricultural information gateways (Please Specify)					
	Any other (please specify).....					

31. How effective are the ICTs tools and services in providing agricultural information Services in your village? (Please explain your response).....

.....

Section E: Challenges Experienced by Farmers in Accessing and Using Information Services Provided.

32. What challenges do you face while trying to access and use agricultural information services from the available sources/ systems/ channels?

.....

Section F: Recommendations to Improve the Provision of Agricultural Information Services

33. What recommendations would you propose to minimize the stated challenges that hinder you in accessing agricultural information services from the available sources/ systems/ channels?

.....

THANK YOU FOR YOUR TIME AND COOPERATION

**APPENDIX III: (SWAHILI VERSION) DODOSO KWA WAKULIMA WADOGO
WADOGO**

Wilaya:.....

Kata:.....

Kijiji:.....

Sehemu A: Taarifa Binafsi

1.Jinsia: Kiume [] Kike[]

2. Umri (Miaka):

- a) Miaka 19-29 [] (b) Miaka 30 -39 [] (c) Miaka 40-49 [] (d) Miaka 50-59 []
(e) Miaka 60-69 []

3. Kiwango cha juu cha elimu.....

a) Hakuna [] (b) Elimu isiyo rasmi [] (c) Elimu ya msingi []

d) Elimu ya sekondari [] (e) Elimu ya ufundi []

e) elimu ya juu/shahada [] Nyingine (Tafadhali taja).....

Sehemu B: Mahitaji na Utafutaji wa Habari za Kilimo

4. Ni mazao gani ulimayo katika shughuli zako za Kilimo? (Waweza kuchagua zaidi ya moja)

(a) Kilimo cha mahindi [] (b) Ngano [] (c) Alizeti [] (d) Ufuta []

(e) Mpunga [] (f) Maharage [] . (g) Mtama [] Nyingine (Tafadhali taja).....

5. Umekuwa mkulima kwa muda gani?.....

(a) Mwaka 1-5 [] (b) Miaka 6-10 [] (c) Miaka 11-15 [] (d) Miaka 16-20 [] (e) Miaka 21+ []

6. Ni ekari ngapi zimetengwa kwa ajili ya kilimo?.....

- (a) Chini ya ekari moja (b) Ekari 1-5 (c) Ekari 5-10 (d) Zaidi ya ekari 10

7. (I) Je unapata mazao/ mavuno ya shamba kiasi gani kwa mwaka?... (Taja idadi).....

(II) Unafikiri ni kwa nini unapata mazao /mavuno hayo?.....

8.I. Je unauza Mazao/ mavuno yako? (a) NDIYO [] (b) HAPANA []

II. Kama jibu ni NDIYO? Unapata kiasi gani cha pesa kwa msimu?.....

III. Kama jibu ni SIYO, kwa nini huuzi?.....

9. Aina gani ya taarifa unazozihitaji katika shughuli zako za kila siku za ukulima wa mazao? (Waweza kuchagua zaidi ya moja).....

SN	Taarifa unazohitaji	Hazihitajiki	Sina uhakika kama nazihitaji	Nazihitaji	Nazihitaji sana
1.	Upatikanaji wa zana za Kilimo				
2.	Taarifa kuhusu maonyesho ya kibiashara				
3.	Uzalishaji wa mimea				
4.	Taarifa kuhusu ukulima wa asili				
5.	Taarifa kuhusu matumizi bora ya mbolea				
6.	Taarifa kuhusu ukulima bora na endelevu				
7.	Taarifa kuhusu magonjwa mbalimbali ya mimea				
8.	Mbinu bora za kilimo cha kisasa				
9.	Taarifa kuhusu stakabadhi ghalani				
10.	Teknolojia mpya ya kuhifadhi mazao				
11.	Vifaa bora vya kutunzia mazao				
12.	Namna bora ya kuboresha uzalishaji				
13.	Mfumo bora wa kupanga madaraja ya mazao				
14.	Mahali na namna ya kupata masoko ya mazao				
15.	Aina za mimea				
16.	Klimo cha mbogamboga na matunda				
17.	Ukulima wa kutumia mbolea ya mimea/mboji				
18.	Taarifa kuhusu upatikanaji wa mikopo				
19.	Masuala ya kisheria mfano, sheria za ardhi				
20.	Utengenezaji na usindikaji wa chakula				
21.	Namna bora ya kufunga mazao ya chakula				
22.	Namna ya kutambua na kupanga madaraja ya udongo				
23.	Taarifa zinazohusiana na mambo ya hali ya hewa				
24.	Taarifa kuhusu punguzo la bei katika vifaa vya Kilimo				
25.	Taarifa kuhusu namna bora ya kukabili wadudu waharibifu				
26.	Kilimo cha Umwagiliaji				
27.	Nyingine (Tafadhali taja).....				

10. Je, nahitaji taarifa hizi kwa malengo gani?.....

.....

11 . Ni vyanzo vipi vya habari unavyovitumia na unatumia mara ngapi katika kukidhi mahitaji yako ya habari za Kilimo?..... (Waweza kuchagua zaidi ya moja)

SN	Chanzo cha Habari	Kiwango cha Kutumia Chanzo cha Habari			
		Sijawahi	Mara Chache	Mara Nyingi	Mara Nyingi Sana
1.	Marafiki/ Wenzangu				
2.	Watu wanafahamu sana habari katika kijiji				
3.	Machapisho ya serikali				
4.	Vipeperushi				
5.	Intaneti				
6.	Vipindi vya television				
7.	Vipindi vya redio				
8.	Makusanyo yangu binafsi				
9.	Kanisa/ msikiti				
10.	Viongozi wa kijiji				
11.	Maafisa ugani				
12.	Vikundi vya ushirika				
13.	Mikanda ya Video/ radio cassettes				
14.	CD-Roms				
15.	Maonyesho ya Kilimo				
16.	Magazeti				
17.	Magazine				
18.	Majarida				
19.	Simu za mkononi				
20.	Maktaba				
21.	Database kama Tanzania online, AGRICOLA, among others				
	Nyingine (Tafadhali taja).....				

12. Vyanzo vipi vya habari unatumia mara kwa mara? Kwa nini?

.....

.....

.....

13. Nini sababu ya/za msingi zilizokufanya uchague vyanzo hivi vya habari? (Waweza kuchagua zaidi ya moja).....

S N	Sababu ya kuchagua chanzo cha habari	Viwango			
		Si Muhimu	Kiasi Fulani Muhimu	Muhimu	Muhimu Sana
1.	Ukaribu wa chanzo cha habari na mahali ninapoishi				
2.	Urahisi wa kutumia chanzo hiki cha habari				
3.	Upatikanaji wa chanzo hiki cha habari				
4.	Kufahamika kwa lugha iliyotumika kaktika chanzo cha habari				
5.	Uwingi wa habari katika chanzo hiki cha habari				
6.	Uhakika wa upatikanaji wa habari katika chanzo hiki cha habari				
7.	Uwezo wa kulinunua				
8.	Muundo wa chanzo cha habari				
	Nyingine (Tafadhali taja).....				

14. (I) Ni kwa kiwango gani vyanzo hivi vya habari vinakidhi mahitaji yako ya kupata habari za kilimo?.....

SN	Chanzo cha Habari	Kiwango cha Kukidhi Mahitaji ya Habari za Kilimo				
		Sijatumia kabisa	Hakikidhi mahitaji kabisa	Kwa kiasi Fulani kinakidhi mahitaji	Kinakidhi mahiaji	Kinakidhi sana mahitaji
1.	Marafiki/ Wenzangu					
2.	Watu wanafahamu sana habari katika kijiji					
3.	Machapisho ya serikali					
4.	Vipeperushi					
5.	Intaneti					
6.	Vipindi vya television					
7.	Vipindi vya redio					
8.	Makusanyo yangu binafsi					
9.	Kanisa/ msikiti					
10.	Viongozi wa kijiji					
11.	Maafisa ugani					
12.	Vikundi vya ushirika					
13.	Mikanda ya Video/ radio cassettes					
14.	CD-Roms					
15.	Maonyesho ya kilimo					
16.	Magazeti					
17.	Magazine					
18.	Majarida					
19.	Simu za mkononi					
20.	Maktaba					
21.	Database kama Tanzania online, AGRICOLA, among others					
	Nyingine (Tafadhali Taja).....					

II). Tafadhali toa maelezo ya jibu lako hapa juu.....

III).Kwa maoni yako, maudhui ya vyanzo hivi vya habari ni sahihi na muhimu kwako?
Tafadhali toa maelezo

15.(I) Ni katika muundo upi unapendelea kupata vyanzo vya habari za kilimo?.....

- (a) Maandishi [] (b) Electroniki [] (c) Maandishi na electronic []
(d) Mfumo wa sauti mfano. radio [] (e) Mfumo wa sauti na kuona mfano. televisheni []
Nyingine (Tafadhali taja).....

II) Ni muundo upi unapendelea zaidi? Tafadhali elezea.....

16. (I) Unapendelea kutumia lugha gani unapotumia vyanzo hivi vya habari?

- (a) Kiswahili [] (b) Kiingereza [] (c) Lugha za asili Mf. Kifiipa, Kimambwe [] (d) Zote
Kiingereza na Kiswahili [] (e) Lugha yeyote hapo juu []

(II) Ni kwa nini unapendelea lugha hii/hizi?.....

Sehemu C: Huduma za Utoaji wa Habari za Kilimo kwa Wakulima Wadogo Wadogo

17. I. Je, mnapata huduma ya habari za kilimo katika kijiji chenu? I. NDIYO [] II. HAPANA []

II. Kama jibu ni NDIYO, je ni mara ngapi unapata huduma hizo?

- b. Walau mara moja kwa wiki [] b. Kila siku []
c. Mara moja kwa mwezi [] d. Mara moja kila baada ya miezi mitatu []
f. Mara mbili kwa mwaka []

III. Tafadhali toa maelezo kwa swali namba 17 (I)

.....

.....

.....

.....

18. Ni aina gani ya huduma za habari uzipatazo toka kwa watoa huduma/ maafisa ugani?
(Waweza kuchagua zaidi ya moja).....

Huduma za upataji habari	Mwitikio	
	NDIYO	HAPANA
Huduma za utoaji wa nyaraka mbalimbali za kilimo		
Utoaji wa tarifa kuwafanya watu waendane na wakati		
Utoaji wa taarifa mahususi kulingana na mahitaji		
Kukusanya taarifa kuhusiana na mahitaji ya wakulima		
Kutoa mafunzo kuhusu mambo mbalimbali ya kilimo		
Utoaji huduma za habari za Kilimo shambani		
Kusambaza machapisho kuhusu mambo mapya ya Kilimo		
Ushauri wa kitaalamu		
Utoji vivuli vya machapisho muhimu		
Utoaji wa CD-ROM database, Mfano. AGRICOLA		
Kutafsiri machapisho yaliyopo katika lugha rahisi		
Utoaji wa taarifa kupitia simu za mkononi		
Maelekezo ya namna ya kupata na kutumia vyanzo mbalimbali vya habari		
Kuelekezwa mahali pa kupata habari za kilimo		
Kuandika machapisho ya Kilimo kwa ufupi		
Nyingine.(Tafadhali taja).....		

19. Je watoa taarifa wanauwezo kiasi gani katika utoaji taarifa, kwa kuzingatia mambo yafuatayo)

Ujuzi na Uhodari wa watoa huduma za habari	Mwitikio			
	Si Hodari	Kiasi Fulani Hodari	Hodari	Hodari sana
Ujuzi katika utoaji wa habari				
Ujuzi katika uwasilishaji mzuri wa taarifa				
Ujuzi juu ya huduma kwa wateja				
Uthabiti katika utoaji wa huduma za habari				
Ubora wa habari zinazotolewa				
Usahihi wa habari zinazotolewa				
Ujuzi wa somo husika analolitolea habari				
Uhakika wa utoaji wa habari				
Kutathmini juu ya mahitaji ya habari na kuyakidhi				
Kuandaa machapisho maalumu kwa ajili ya utoaji habari				
Kutumia tekinolojia sahihi ya utoaji habari				
Kuendelea kuboresha namna ya kutoa habari za Kilimo				
Kupangilia na kutoa vipaumbele kulingana na umuhimu wa habari				
Nyingine (Tafadhali Taja).....				

Tafadhali toa maelezo ya jibu/majibu yako kwa swali (19) hapo juu.....

20. Je unazungumziaje thamani ya taarifa unazopewa kwa kuangalia mambo yafuatayo?

SN	Sifa za Habari Upewazo	Viwango				
		Nzuri sana	nzuri Good	wastani	Mbaya	Mbaya sana
1	Objectivity ; Taarifa kuwa za kweli, za kuaminika na kutegemewa zisizo na upendeleo.					
2	Relevancy : Kiwango ambacho taarifa zinakuhusu na kukufaa kwa matumizi yako ya kila siku katika shughuli za kilimo					
3	Authority : Kiwango ambacho taarifa ni za kutegemewa kulingana na chanzo chake cha habari kuwa sahihi.					
4	Reliability : Kiwango ambacho taarifa ni thabiti na za kutegemewa					
5	Currency : Kiwango ambacho taarifa ni mpya na za kufaa kwa wakati huo katika shughuli za Kilimo					
6	Accessibility : Kiwango ambacho taarifa zinapatikana					
7	Completeness : Kiwango ambacho taarifa zipatikanazo ni nyingi na zinazotosheleza kukidhi mahitaji yako ya habari za kilimo					
8	Concise Representation : Kiwango ambacho taarifa zinawasilishwa kwa lugha rahisi inayoeleweka.					
9	Value added : Kiwango ambacho taarifa zinazopatikana zinakufaa katika kumudu ushindani wa soko.					
	Nyingine (Tafadhali taja).....					

21. Kuna ufanisi gani katika utoaji wa huduma za habari kwa wakulima wadogowadogo? (Tafadhali toa maelezo ya jibu lako.)

22. Kwa maoni yako, je unafikiri kuna fursa ya kuboresha upatikanaji wa huduma ya habari za Kilimo kwa wakulima wadogo wadogo? (I) NDIYO [] (II) HAPANA []
Tafadhali toa Maelezo ya jibu lako.....

Sehemu D: Matumizi ya Teknolojia ya Habari na Mawasiliano (ICT) Katika Utoaji wa Huduma za Habari za Kilimo kwa Wakulima Wadogo Wadogo

23. Ni kifaa/vifaa gani vya Teknolojia ya Habari na Mawasiliano unavyomiliki?

(Waweza kuchagua zaidi ya moja).....

SN	Vifaa vya Teknolojia ya Habari na Mawasiliano (ICT)	Mwitikio	
		NDIYO	HAPANA
1.	Runinga		
2.	Redio		
3	Kompyuta (Taja Mf. Kompyuta ya mezani , Kompyuta Mpakato n.k)		
4	Simu ya mkononi		
5	Simu ya mezani		
6	CD-ROM/ DVD		
7	I pad		
8	Kanda za redio		
9	Kanda za video		
	Nyingine (Tafadhali taja).....		

24. Ni huduma zipi za Teknolojia ya Habari na Mawasiliano zinazopatikana katika kijiji chako? (Waweza kuchagua zaidi ya moja)

Huduma za Teknolojia ya Habari na Mawasiliano	Zinapatikana	Hazipatikani
Vipindi katika runinga		
Vipindi katika redio		
Huduma za komputa		
Huduma za simu za mkononi		
Huduma za simu za mezani		
Huduma ya CD/DVD ROM Database za kilimo		
Huduma za mtandao wa Intaneti		
Huduma za vitabu na majarida ya kilimo katika mtandao		

25. Ni huduma zipi zinazotumia teknolojia ya habari na mawasiliano kati ya zifuatazo zinazokufikia wewe/ waweza zitumia? (Waweza chagua zaidi ya moja).....

Vifaa/ Huduma ya Teknolojia ya Habari na Mawasiliano (ICT)	Kiwango cha kunifikia			
	Kiwango kikubwa sana	Kiwango kikubwa	Inanifikia Kiasi	Hainifikii kabisa
Intaneti/ Mtandao				
Barua pepe				
Huduma za vitabu na majarida ya kilimo katika mtandao				
CD- ROM Databases				
Compyuta				
Vipindi katika redio (Tafadhali taja)				
Vipindi katika runinga (Tafadhali taja)				
Faksi				
Huduma za simu ya mezani				
Huduma za simu ya mkononi				
Mitandao ya kijamii (Tafadhali taja)				
Taarifa za mifumo ya kijiografia				
Database za kilimo kama AGRICOLA				
Mitandao mingine ya Kilimo (Tafadhali taja)				

26. Je umewahi tumia huduma za teknolojia ya habari na mawasiliano katika kupata taarifa za Kilimo?

1. NDIYO [] II. HAPANA []

27 . Kama jibi ni NDIYO, kwa swali namba (26) ni mara ngapi unapata taarifa zifuatazo za Kilimo kwa kutumia huduma ya teknolojia ya habari na mawasiliano?.....(Waweza chagua zaidi ya moja)

Taarifa unazohitaji	Mara kwa mara	Si mara kwa mara	Sina uhakika	Mara chache	Mara chache sana
Upatikanaji wa zana za Kilimo					
Taarifa kuhusu maonyesho ya kibiashara					
Uzalishaji wa mimea					
Taarifa kuhusu ukulima wa asili					
Taarifa kuhusu matumizi bora ya mbolea					
Taarifa kuhusu ukulima bora na endelevu					
Taarifa kuhusu magonjwa mbalimbali ya mimea					
Mbinu bora za kilimo cha kisasa					
Taarifa kuhusu stakabadhi ghalani					
Teknolojia mpya ya kuhifadhi mazao					
Vifaa bora vya kutunzia mazao					
Namna bora ya kuboresha uzalishaji					
Mfumo bora wa kupanga madaraja ya mazao					
Mahali na namna ya kupata masoko ya mazao					
Aina za mimea					
Klimo cha mbogamboga na matunda					
Ukulima wa kutumia mbolea ya mimea/mboji					
Taarifa kuhusu upatikanaji wa mikopo					
Masuala ya kisheria mfano, sheria za ardhi					
Utengenezaji na usindikaji wa chakula					
Namna bora ya kufunga mazao ya chakula					
Namna ya kutambua na kupanga madaraja ya udongo					
Taarifa zinazohusiana na mambo ya hali ya hewa					
Taarifa kuhusu punguzo la bei katika vifaa vya Kilimo					
Taarifa kuhusu namna bora ya kukabili wadudu waharibifu					
Kilimo cha Umwagiliaji					
Nyingine (Tafadhali taja).....					

28. Kama jibu lako ni HAPANA kwa swali la 26 hapo juu, toa sababu za jibu lako

.....

.....

.....

29. Je taarifa unazozipata ni sahihi kwako?

(I) NDIYO [] (II) HAPANA []

Tafadhali toa maelezo ya jibu lako

.....

.....

30. Je, ni mara ngapi unatumia huduma na vifaa vinavyotumia teknolojia ya habari na mawasiliano kupata taarifa kwa ajili ya shughuli zako za kila siku za kilimo ? (Unaweza chagua zaidi ya moja).

SN	Vifaa/ Huduma ya Teknolojia ya Habari na Mawasiliano (ICT)	Kiwango cha matumizi				
		Kila siku	Kwa wiki	Kwa mwezi	Mara chache	Situmii kabisa
1	Intaneti/ Mtandao					
2	Barua pepe					
3	Huduma za vitabu na majarida ya kilimo katika mtandao					
4	CD- ROM Databases					
5	Compyuta					
6	Vipindi katika redio (Tafadhali taja)					
7	Vipindi katika runinga (Tafadhali taja)					
8	Faksi					
9	Huduma za simu ya mezani					
10.	Hduma za simu ya mkononi					
11.	Mitandao ya kijamii (Tafadhali taja)					
12	Taarifa za mifumo ya kijiografia					
	Nyingine (Tafadhali taja).....					

31. Je kuna ufanisi katika utoaji wa huduma za habari za Kilimo kwa kutumia vifaa na huduma zinazotumia teknolojia ya habari na mawasiliano? (Tafadhali toa ufafanuzi wa jibu lako).....

.....

.....

Sehemu E: Changamoto wapatazo wakulima wadogo wadogo katika kupata na kutumia habari za Kilimo zitolewazo

32. Je unapata changamoto gani unapajaribu kupata na kutumia huduma za habari za Kilimo zipatikanazo katika vyanzo na mifumo mbalimbali ya habari?

.....

Sehemu F: Mapendekezo ya namna ya kuboresha utoaji wa huduma za utoaji habari za kilimo

33. Je unatoa mapendekezo gani katika kupunguza changamoto ulizozitaja hapo juu unazozipata katika kupata na kutumia huduma za habari za kilimo kutoka katika vyanzo na mifumo mbalimbali ya habari?

.....

ASANTE SANA KWA MUDA WAKO NA USHIRIKIANO

APPENDIX IV: INTERVIEW SCHEDULE FOR KEY INFORMANTS

(FARMERS)

District:.....

Ward:.....

Village:.....

1. Average Age (years):
2. Highest education level.....
3. How long have you been living in this village?
4. Can you please recall, for how long have you been practicing crop farming in this village?
5. How many acres of land have you set aside for crop production? Why?
6. What type of crops do you grow? What is your average yield in bags per year?
7. In your opinion, why do you get such crop yields?
8. Do you sell your crops? If YES, what is your average income per year? If NO, Why?
9. Have you ever experienced a desperate situation when you needed information to solve your daily crop farming activities?
10. What kind of information did you need? Why?
11. Where did you turn to seek the kind of information you needed?
12. Were you satisfied with the sources you sought to get the information? Why?
13. In your view, which sources do you prefer? Why?
14. What agricultural information services do you get from information service providers?
15. In your view, how effective are these services in addressing your agricultural information requirements?
16. How does information technology play a role in providing agricultural information services in your village?
17. What is your opinion on its effectiveness in providing agricultural information services?
18. What challenges do you face in accessing and using agricultural information services?
19. What suggestions would you give on improving agricultural information service provision?
20. What are your overall comments/opinion on an ideal agricultural information delivery system for small scale crop farmers?
21. Any other comment?

THANK YOU VERY MUCH FOR YOUR COOPERATION

APPENDIX V :INTERVIEW SCHEDULE FOR INFORMATION SERVICE

PROVIDERS

1. Sex: Male [] Female []
2. Experience (years):
3. Highest education level.....
4. Which college/ Institution did you attend?..... Duration.....
5. Professional occupation.....
6. What work activities do you perform to enhance agricultural production in the region?
7. As an information service provider, what are the common problems brought to you by small scale crop farmers for assistance?
8. How often do small scale crop farmers seek your assistance?
9. What kind of agricultural information do you provide to small scale farmers to enhance crop production?
10. In which season and how often do you provide that information?
11. Which sources/channels do you frequently use to provide information to crop small scale farmers and why?
12. Which type of agricultural information services do you provide to small scale crop farmers?
13. Have you ever attended any professional training on information service provision? If YES, when? for how long? If NO, why?
14. Which specific skills did you acquire? In your opinion, was the training relevant to you? Please explain?
15. How many times **in the last 3 months** have done the following?
 - a. Visited farmers to provide specific information related to their farming activities? How did you do it? Please explain.
 - b. Visited Rural Extension Centers/ information center to seek information to address small scale farmer's information needs?
 - c. Sought information/ Repackage information to answer questions from small scale farmers? Which language and format did you use? Justify your response.
 - d. Read articles in scientific journals/ databases? Which journals/ databases?
 - e. Abstract information and provide it to farmers?
16. Which local and international databases/ internet sources do you use to access information for small scale farmers? Why did you use it?
17. a) Which ICT facilities/ services do you use to provide information services to farmers?
 - b) How often do you use it? Why?
- c) How effective is it in providing information services to small scale farmers?
16. In your opinion, which ICT facilities and services should be used to provide information to farmers? Justify your response.
17. Which methods/techniques do you use to obtain feedback from small scale farmers on the utility and credibility of the information services provided?

18. Please describe some of the critical or pressing problems you face in assisting small scale crop farmers with their crop production-related problems.
19. In your opinion, what do you think are the factors hindering effective and efficient agricultural information service provision to farmers?
20. What strategies/ measures should be put in place to enhance agricultural information service provision?

THANK YOU FOR YOUR COOPERATION

APPENDIX VI: INTERVIEW GUIDE FOR DALDOs

1. District.....
2. Date of interview.....
3. For how long have you been in this position? (years).....
4. Highest educational level reached.....(mention the institution and qualification obtained).
1. What is your strategy as a district/ municipal in implementing the Agricultural Sector Development Plan? (Specifically in the aspect of information service provision?).
2. What information sources, service and systems are in place to disseminate agricultural information to small scale farmers?
3. In your opinion, how effective are the existing sources, services, systems and channels which you have stated above in provision of information to small scale farmers? Give reasons for your response.
4. Do you have a training policy for information service providers? How many people are trained per year? What is the duration of the training and in which specific areas are they trained?
5. What strategies do you have in place to enhance the use of ICT facilities and services in the provision of information to small scale farmers?
6. What are the challenges related to agricultural information service provision do you face as a department?
7. In your view, what strategies should be put in place to enhance provision of agricultural information services to small scale farmers?
8. Any other comment.....

THANK YOU VERY MUCH

APPENDIX VII: OBSERVATION CHECKLIST

1. District:.....
2. Ward:.....
3. Village:.....
4. Date of observation:.....

5. Farming activities practiced in the village.
 - a. What are the crops grown in the village?
 - b. How are crops planted?
 - c. What are the tools and other farm implements used for cultivation? .
 - d. Who is involved in crop production? (Men, women, youth)
 - e. Where do they sell their crops? How do they store the surplus?

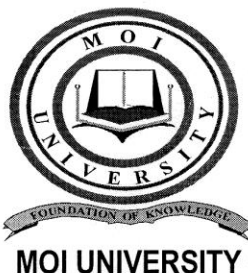
6. Information seeking habits
 - a. Where do farmers obtain information regarding their crop farming activities?
 - b. Which sources do they frequently use?
 - c. Which format do they prefer?

7. The range and type of agricultural information services offered.
 - a. Information infrastructure available in the village (Library, telecommunication among others.)
 - b. Agricultural information services provided in the village

8. Application of ICTs in agricultural information service provision.
 - a. Which ICT tools do small scale crop farmers own?
 - b. Which are the ICT tools and services available and accessible in the village?
 - c. Which ICT tools and services do they use to acquire agricultural information?

9. What challenges do small scale crop farmers face in accessing and using agricultural information services provided?
 - a. Challenges related to their crop farming activities
 - b. Challenges related to agricultural information needs expression
 - c. Challenges related to how they seek agricultural information
 - d. Challenges related to how they access and use agricultural information services provided
 - e. Challenges related to how they use ICT tools and services in accessing and using agricultural information services provided.

APPENDIX VIII: AUTHORISATION LETTER



MOI UNIVERSITY

DEPARTMENT OF LIBRARY, RECORDS MANAGEMENT AND INFORMATION STUDIES

Tel: (053) 43231

Fax No. (053) 43292

Telex NO: 35047 MOIVASITY

E-Mail: hodlis@mu.ac.ke OR deanis@mu.ac.ke

P. O. Box 3900

Eldoret

Kenya.

REF: IS/DPHIL/02/12

11th November, 2013

TO WHOM IT MAY CONCERN

RE: NTULO GETRUDE ROBERT – IS/DPHIL/02/12

The above named is a postgraduate student in the Department of Library, Records Management and Information Studies, School of Information Sciences, Moi University pursuing a Doctor of Philosophy degree in Library and Information Studies. She is carrying out a research programme entitled ***“Provision of Agricultural Information to Enhance Agricultural Production Among Small Scale Farmers in Rukwa Region, Tanzania”*** under the supervision of Prof. Japhet Otiike and Dr. Alice Kwake.

The purpose of writing is to request you kindly to allow Ms. Ntulo to conduct the research in your organization and request your staff to assist her collect the necessary data. The information given will be treated with utmost confidentiality and will be used only for the purpose of the research. We look forward to your continued support and co-operation.

Yours sincerely,

PROF. JAPHET OTIKE
DEAN,
SCHOOL OF INFORMATION SCIENCES

DEAN
SCHOOL OF INFORMATION
SCIENCES
MOI UNIVERSITY

JO/mn

APPENDIX IX: RESEARCH PERMIT

**UNITED REPUBLIC OF TANZANIA
PRIME MINISTER'S OFFICE
ADMINISTRATION AND LOCAL GOVERNMENT**

**RUKWA REGION
Tel. Address: "REGCOM"
Tel. (025)-2802137,
2802138
Fax No. (025) 2802217**



**Regional Commissioner's Office,
P.O. Box 128,
SUMBAWANGA.
RUKWA**

Kumb. Na.CB.190/232/01/107

18TH FEB. 2014

Dean,
School of Information Sciences,
Moi University,
P.O.BOX 3900,
Eldoret – Kenya.

Ref: RESEARCH PERMIT FOR GETRUDE ROBERT NTULO (PHD CANDIDATE)

The heading above refers together with your letter dated 11th November 2013 reference No IS/ DPHIL/02/12.

The Regional Administrative Secretary has received your request for a research permit for Getrude Robert Ntulo (PHD candidate).

The Research topic is ***"Provision of Agricultural Information to enhance Agricultural Production Among Small scale Farmers in Rukwa Region, Tanzania"*** The research will be supervised by prof.Japhet Otike and Dr. Alice kwake.

I am happy to inform you that research permit has been granted to the afforesaid candidate. The area of study is Rukwa Region.

I hope the student will show co – operation to all officers and other people she will encounter in her study.

Wishing you a successful study.

**F. M. Mbenjile
For. REGIONAL ADMINISTRATIVE SECRETARY
RUKWA.**

C. C.
RAS – SEE IT IN FILE
Getrude R. Ntulo - For your reference.
DAS - Sumbawanga, Nkasi and Kalambo

APPENDIX X: AN EXAMPLE OF CURRENT AWARENESS SERVICES

TANGAZO TANGAZO TANGAZO

TAREHE: 9/01/2014

KUTOKA –OFISI YA MKURUGENZI (W) KALAMBO, IDARA YA KILIMO, UMWAGILIAJI NA USHIRIKA

KWENDA-WAKULIMA WOTE WILAYA YA KALAMBO

Kuna uvamizi wa wadudu waharibifu wa mazao ya mahindi na baadhi ya mazao jamii ya mikundekunde katika baadhi ya kata/Vijiji vilivyopo Wilaya ya Kalambo.mfano kata ya Katete kumeripotiwa kuwepo kwa uvamizi wa wadudu hao aina ya **VIWAVI JESHI (ARMYWORMS-SPODOPTERA EXEMPTA)** Kwa lugha ya kifipa hujilikana kama "ULULELE".

DALILI ZA KUWEPO KWA WADUDU HAO WAHARIBIFU AINA YA VIWAVIJESHI KATIKA SHAMBA LAKO.

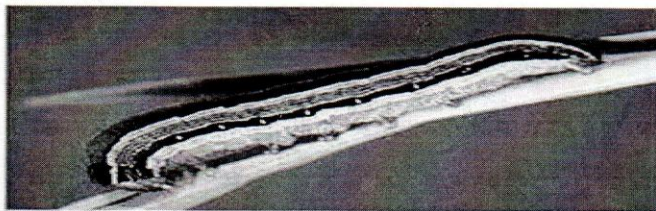
- Utaona kundi jamii ya ndege tofauti tofauti wakizungukia shamba lako .Ndege hao huzungukia shambani kwani huwala wadudu hao kama chakula.Utawaona majani ya mahindi au maharage yakiwa yameliwa na kubaki kama skeleton.Utawaona wadudu hao kwa hatua ya lava(finye) wakionekana kwenye shina la zao la mahindi au maharage.

Tabia ya wadudu hao

- Huharibu sana mazao nyakati za usiku kuliko mchana.
- Wadudu hao ni waharibifu wakiwa kwenye hatua ya lava(larva stage)

N:B UKIONA DALILI HIZO AU WAKIONEKANA KWENYE SHAMBA LAKO RIPOTI HARAKA IDARA YA KILIMO AU PIGA SIMU NA 0756496925

PICHA/MWONEKANO WA KIWAVIJESHI (ARMYWORM-SPODOPTERA EXEMPTA)



JINSI YA KUWADHIBITI

Endapo wadudu hao wameonekana kwenye shamba lako tumia dawa za viywa dudu ambazo zinapatikana katika maduka yote ya pembejeo na Upulizie haraka ili wasiendelee kuharibu mazao.Dawa hizo ni **DUDU-ALL 450EC,MO-KARATER SEC.,NINJA SEC**

**LIAMPAWE GOTHARD SAMMY
KNY MKURUGENZI MTENDAJI (W) KALAMBO**