INFORMATION AND KNOWLEDGE SHARING USING INFORMATION COMMUNICATION TECHNOLOGY (ICT) APPLICATION AMONGST SMALL SCALE FARMERS IN LUSAKA PROVINCE OF ZAMBIA

By

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DECLARATION

I, **Catherine Shawa,** hereby declare that the work presented in this dissertation is the result of my research work and that it has never been produced or submitted before at this University for academic purposes, and that all sources of information have been duly acknowledge.

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APPROVAL

The University of Zambia approves this dissertation as fulfilling the partial requirements for the award of the Master of Engineering degree in Project Management.

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DEDICATION

This dissertation is dedicated to my dearest children Mwape Christabel Musonda, Gomezyani Kunda Musonda and the entire Shawa family for their love, patience, sacrifice, support and encouragement during the course of my studies. May God continue blessing everyone and and guiding us on our life journey.

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ABSTRACT

Evolution of Information Communication Technology (ICT) has led to various tools and methods being developed enabling communities and individuals to create online social networks known as Social Media platforms. Online social networks are platforms for sharing information and knowledge in real time. The main objective of the study was to evaluate current Social Network platforms being accessed by Small Scale Farmers in Lusaka Province of Zambia and develop an integrating small scale farmers' information and knowledge into a single online support system. The research study design was qualitative, quantitative method and empirical study was conducted using questionnaires. The target population was 46,000 of which a sample size of 397 (at 95% confidence level) was calculated using Epinfo start calc. Stratified sampling method was applied. Statistical analysis was performed using SPSS and Excel. Inclusive, are views from Small Scale farmers' partners. In this study 91% of people who took part were successful respondents. Using detailed literature review, questionnaire and structured interviews, the study deduced that 97% of small scale farmers searched for information using ICT applications. Of the successful respondents, 51% cited none availability of required searched information. Notably, 61% of information available was believed not to be authentic. However, only 52% of respondent who believe information not being authentic said they required expert advice on available information. Incidentally, 84% of respondents agreed to the idea of having a single integrated information support system.. The study yielded that farmers face various challenges including inadequate information, difficulty in accessing information, none availability of searched material, lack of authenticity and lack of expert advice respectively. The study recommends that deliberate Agriculture ICT policy be in place on small scale farmers' information. Through this, implementation of single online support system with expert presence be effected. This will lead farmers to access different agricultural information needs.

Keywords: *Real time, Social Media, Small Scale Farmers, Information Communication Technology, Knowledge, Information.*

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ABBREVIATION AND ACRONYMS

Facebook	An online social network platform that has various common interest groups where by the users share videos, links, pictures and messages.
Internet	A system of interconnected computer networks around the world.
Social Network	Use of dedicated websites and applications to interact with other users or to find people with similar interests to one's own.
Blog	A web page in which writer can publish their opinions and allow for comments.
Twitter	Online Social networking and micro blogging service that allow users to send and receive messages which are called ‘tweets’.
Users	Audiences of Social Networks who generate and use the content on Social Networks.
Web 2.0	World Wide Web technologies that allow users to interact and generated content for discussion.
You Tube	Video sharing website where by users upload videos and individuas and can also upload tutorial videos.
ICT	Information Communication Technology.
IT	Information Technology.
FAO	Food Agriculture Organization.
NAPSSFZ	National Association for Peasant and Small Scale Farmers of Zambia.
ZAYFA	Empowering Young Farmers for National Development
WFP	World Food Programme

CHAPTER ONE: INTRODUCTION

1.1 Background

A considerable amount of literature highlights that information and knowledge is essential for educating the public on various issues. People will always try to find information according to their needs (Wilson, 1999). There are various medium that are used to relay information and knowledge that helps the audiences to solve their problems and also influence their decisions. According to Lievrouw and Livingstone (2006) when it comes to information and knowledge, there is a key theme which emerges in literature by examining interaction with content of information and also information content creators where the audience is not passive receiver of information but an active co-creator.

One of the medium for relaying information and knowledge is the use of Information Communication Technology (ICT). Several definitions have been given to explain and interpret the acronym ICT. However, Kundishora and Phil (2010) defines ICT as a generic term referring to technologies that are used for collecting, storing, editing and passing on (communicating) information in various forms.

The evolution of Information Communication technology has led people to become computer literacy as various methods of sharing information and knowledge has also emerged (Hess, 1994). For instance internet has become a source of social network communities. Social Network communities has led to social media platform being created where forums are formed consisting of users with common interest contribute and share information in real time. Rainie et al.(2011), illustrates that the social side of the internet technology use has become very much embedded in group life and it also affects the way civic and social groups behave which impact their communities. Some of the common social network application are website, blogs, Facebook, twitter, WhatsApp, Instagram, skype, pinterest, and message boards respectively.

Agreeing with the above, Kiertzman et al. (2011), illustrated that mobile, web based technologies and social media have created interactive platforms through which

individuals, groups and communities share, create, discuss and modify the content that they continue to generate. This has enabled communities and individuals to share, create, discuss and modify the content they generate. Social network communities have been known to be a 'One Stop For All' as these communities allows users to share experiences and opinion with other users in real time. The sharing of information is usually in the form of video (multi media), text, and audio and pictures (Salfo and Brake, 2009). Studies have also shown that Social media has taken its root in Zambia with 14% of Zambians not just using Social media for information and knowledge sharing but also for latest news (Zambia Business Times, 2016).

Balkrishna et al.(2017) and Mushfiq et al. (2013) highlights that Small-scale farmers have not been left out in the creation and use of social network technology when it comes to sharing information and knowledge. Small Scale farmer is define as those who general depend on family labor, use hand implements and their motive for cultivating 1 or 5 hectares and often for household food security and generally depend on extension workers for social gatherings for agriculture information (Ministry of Agriculture, 2017).

Despite small-scale farmers being the contributor of between 50 and 70 percent of the global food supply, small scale farmer do not have adequate information for decision making and do not use information effectively in agricultural sector (Group, 2009). This has been caused by lack of application of information support systems in the field of agricultural information and knowledge sharing (Voraphaan and Phannaphatr, 2017). Ideally with relevant agricultural knowledge and information, small scale farmers could improve their work in order to sustain agriculture and also benefit economically (Lesaoana, 2003). Kalusopa (2005) also agrees that information and knowledge being shared by farmers should be regularly updated and be accessed in real time.

ICTs in agriculture has potential to help facitlitate greater access to information which can drive or support information and knowledge sharing amongst farmers. Food Agriculture Organisation (2012) estimated that Zambia has about 600,000 farmers of whom 76% are Small Scale Farmers. Of the 600,000 farmers Central Statistical Office (2015) reports that 46,213 are found in Lusaka Province. Some of these farmers found in Lusaka province

have embraced the use of ICT applications such as social media. This is evident by the number of different Facebook groups of Small Scale Farmers in Zambia who using social media to share knowledge and information in real time (Facebook, 2017). Small Scale Farmers not only require relevant advice to increase farm production but latest farming information on markets including funding opportunities.

As stated by Burbi and Rose (2016), farmers in general often share knowledge and innovations when they are solving problem through social networks or other means of internet application. Usually farmer to farmer knowledge sharing is an important source of information.

Facebook has been cited as one of the social media platforms were small scale farmers not only exchange information but also discuss issues parting to agriculture based on their experience and knowledge. They also share information as to where to obtain different farm requirements such as pesticides, seeds and equipment respective. Small scale farmers also share links, latest farming news and different pictures of their farm produce (Irungu et al, 2015).

Kalusopa (2005) also agrees that information is crucial in agricultural development as it a tool for communication between stakeholders and it also serves as a channel for monitoring of trends and shaping decisions for farmers.

From the above statement information and knowledge sharing using Social Media has become important as the audience is more virtual than physical which has made people being fascinated by its capability to share information and knowledge in real time.

1.2 Problem Statement

In recent years there has been a rapid growth of online communities whose inception has been due to coming of ICT social media platforms. The success of ICT social network application has helped to facilitate the sharing of information and knowledge amongst different groups with same interests (Osterrieder, 2013). Incidentally, with the coming of social media applications, small scale farmers have also embraced the tool which has

allowed them to share farming information and knowledge in real time (Wangu, 2014). Currently, Zambia has more than 50 different Small Scale Farmers' social media groups on different platforms one notably being Facebook. The use of Facebook as one of the social network tool has presented great opportunity for small scale famers to interact, share information and knowledge asset at fast speed and in real time (Facebook, 2017).

Despite all the effort of having ICT network platforms such as Facebook to share knowledge and information by different small scale farmers, it has been discovered that the effort is disintegrated. The different ICT network Social platform groups have similar agendas on farming activities under different online group names. With so many duplicates of social network groups on different ICT platforms it has become difficult for Small Scale Farmers to access all the information that they need quickly from one central place. The other difficult has been that of accessing information that is from a genuine source. Additionally, there are other limitation of the information and knowledge being shared on ICT social networks such as not having agriculturist to give advice or share expertise which is much needed by the small scale farmer.

Moreover, lack of similar studies in Zambia on the use of ICT applications such as social networks by small scale farmers as a tool for sharing knowledge and information led to this study being undertaken. Previous studies by other researchers have concentrated more on using ICT tools such as the use of mobile phone or computer to share knowledge and information through text messaging and electronic mail than information sharing and collaboration in real time by use of Social Medias such as Facebook (PANOS, 2010). Therefore, this study brings a new dimension of how small scale farmers can utilize ICT application for information and knowledge sharing.

The main objective of the study was to develop a Small Scale Farmers' information and knowledge single ICT application support system by use of ICT application for farmers in Lusaka Province of Zambia. Once the single ICT application support system is developed it will help small scale farmers be able to access information in one place. A prototype of an integrated single ICT application support system will be developed to depict how the integrated support system will be achieved by using the Project management life cycle. A

project management life cycle is a series of phases that a project passes through from the initiation to its closure (Project Management Institue, 2013). The main purpose of using the project management life cycle is to ensure there is monitoring and control and also quality is implemented as the project is being implemented.

The project management life cycle phases are namely; project initiation, project planning, project execution, project monitoring and control and project closure respectively. These process will be discussed more under methodologies.

1.3 Main Objectives:

To develop a single support system using ICT application for sharing information and knowledge by small scale farmers.

1.3.1 Specific Objectives

i) Identify the current platform available for information and knowledge sharing amongst small scale farmers.
ii) Identify information and knowledge being shared amongst small scale farmers.
iii) Identify challenges experienced by small scale farmers in accessing agriculture information and knowledge on ICT Platforms.
iv) To develop a single support system using ICT application for sharing information and knowledge by small scale farmers

1.3.2 Research Question

i) Which platforms are available for information and knowledge shared for small scale farmers in Lusaka Province?
ii) What type of information and knowledge is being shared on the ICT Platforms by small scale farmers?
iii) What are the challenges experienced in accessing agriculture information and knowledge on ICT platforms by small scale farmers?
iv) How can this information and knowledge be integrated into one place?

1.4 Significance of the study

The main purpose of the study was to come up with an integrated single ICT application support system where small scale farmers can share information and knowledge. This integration was carried out by following the 5 phases of project management life cycle and also the use of ICT application. Having noted with concerned on the number of different websites and face book pages that small scale farmers have come up with, it was therefore imperative to come up with an integrated single ICT application support system which is 'A One Stop for All'.

The study also provided the understanding of how small scale farmers share information and knowledge using ICT application such as Social network tools. It also highlighted the different platforms being used in accessing the information and the type of information that small scale farmer's access.

The study was the first in Zambia and therefore, it is significant in that it will enhance the use of ICT network applications such as Social Media as an information and knowledge sharing tool. This study will be useful by researchers and organizations who have the interest in understanding how ICT applications such as Social networks can benefit them as a medium for communication amongst small scale farmer.

Further studies should be undertaken on the benefits of using ICT applications such as Social Media in Lusaka Province. A survey should be carried out on the need for ICT Policy for small scale farmers. Small scale farmers should be the custodian of the content of this study so as they can own the Policy document.

1.5 Organisation of Dissertation

This study consist of five chapters organized as follows:

Chapter One: This section discusses the background, aim and objectives of the study. It also outlines the justification and the application of the research.

Chapter Two: The purpose of literature review is to review and compares the study of the many different scholars who have research on similar topic and their findings.

Chapter Three: The Chapter highlights the various research methodologies and also justifies the method adopted in this study. It outlines the specific methods, techniques, tools and research instruments. Inclusion in this chapter are the 5 phases of the project lifecycle that were used to come up with the integrated single support system.

Chapter Four: This chapter presents the results and analysis of the research findings.

Chapter Five: This Chapter presents conclusions, recommendations and also limitation which are directed at the areas for future studies.

1.6 Chapter Summary

The summary presented the background and objectives of the study. It also give the directions taken by highlighting the objective of the study, research questions, methodology and also significant of the study. It also presented the benefit of the study.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter is a critical review of literature from journals, books, dissertations, thesis, and other research studies pertinent to the area of the study. It begins by discussing ICT and its role in information sharing, ICT social network or social media, small scale farmers and ICT social network in general and lastly small scale farmers and ICT social network in Zambia.

2.2 Information and Communication Technology (ICT)

Information technology has been around for a long time and basically as long as people have been around (Unversity of Southern Illinos, 2016). Information and Communication Technology (ICT) has an important role to play in the provision of real time communication and information sharing. With the coming of internet, sharing of information and knowledge has become dynamic and fast leading to the creation of vast opportunity for online communication between producers and consumers (Attra Sustainable Agriculture, 2017). As argued by Staubaar and LaRose (1996), interactivity should be used to refer to situation where real time feedback is also being collected from the recipient of the communication channel and also being used as a source to continually modify the message as it is being delivered to the recipient.

By using ICT tools, information and knowledge is transmitted through use of internet which has evolved extensively over the past decade. Different ICT applications have been developed to enhance communication faster through the use of internet. This has made the process to be fast, dynamic and in real time. .

Notably, new discoveries in ICT has drawn a lot of people to be able to access information at a click of the button. These discoveries have helped improve the speed at which information and knowledge are being shared. There are also available limitless options to transfer information and knowledge from one person to another instantly by using information technology. Studies on ICT social network has also showed that internet and mobile platforms are getting more and more popular, that people and companies are

drowned into the digital world, communicating through all types of applications and networks (Gherghita, 2016). Internet has not only been the important source of information and knowledge especially with the incorporation of ICT social network platforms but also a forum where many users are able to contribute, share and receive information.

Incidentally, new medium of communication such as internet offer massive storage where users or surfer can find more detailed and content that they can customized for their use with the help of browsing software. Internet has also made it easy for user to retrieve, access, interact and get feedback immediately (Dennis and Merill, 2006).

2.3 ICT Social Network (Social Media) Concept

Communication has taken another dimension with the coming of the internet. As observed by Dennis and Merill (2006), the internet has been known as the platform where people can easily obtain information. The internet is marvel as users increased globally from 0.4% in 1995 to almost 54% internet users in 2018 (Stats, 2018). Most people access the internet mainly for personal. Communication through exchange of data, email, electronic commerce and information access. The internet allows access to an infinite storage of information at a click of a button.

The internet has also allowed the revolution of ICT social network (social media). Social Media refers to the use of web based and mobile technology that can be used for interactive dialogue. Social media tools such as Facebook, twitter, MySpace, Skype blogs are being used extensively for the purpose of communication. One of the most important advantages of the use of social media is the online sharing of knowledge and information among the different groups of people in real time, (Baruah, 2012). Merriam-Webster Dictionary further defines Social Media as a forms of electronic communication, such as websites for social networking and microblogging through which users create online communities to share information, ideas, personal messages, and other content such as videos and voice (Merriam-Webster Dictionary, n.d.).

Table 2.1 shows the different types of Social Network platforms, their descriptions and what they are used for. The description states what each different type oc Social Networks platforms can be use for. This description is important and helps one to determine the type of media that they can use for different type of interaction.

Table 2.1: Description of different ICT Social Network platforms

Type of platform	**Examples**	**Description**
Social networking sites	Facebook, Friendstar, MySpace, Google+ messenger, Snapchat WhatsApp, Facebook,	These platforms are mostly used for creating personal profiles and networks with friends, colleagues, and peers. Have the highest reach, mainly because of the personal reach.
Content communities	Video (YouTube, Instagram (Flick, Tumbler) Audio (Soundcloud ,Podcasts) (Slideshare)	They are mostly formed to share specific type of content easily amongst many users. They are easy means to reach a global user base in an interesting way.
Blogs	Blogger, Wordpress	These are the earliest form of social media. They are mostly personal web pages but are increasingly being used by corporate houses to reach their clients.
Micro-blogs	Twitter, Instagram	They are similar to blogs with restriction of characters (140 for Twitter) and allow users to create and share content.
Collaborative projects	Wikis	The main source of information for users due to mere diversity and broad base coverage.
Forums, discussion boards	Google hangout, Blackboard, Discussion groups (Dgroups)	Content creation and sharing among users with specific interests or activities is easier.
Professional networking	ResearchGate, Academia.edu, LinkedIn	Meant for professional networking, these platforms increase the scope for scientific discussions among peers and experts in specific fields. Increased networking among professionals increase the scope of researches to be disseminated amongst wider audience.

Inclusive, Safko and Brake (2009) also defines Social Media or ICT social networks as a collection of online technologies in real time which allow the users to share experiences, opinion and insights for their benefit. This sharing is done in the form of text, audio, video or multimedia. Tang, et al., (2012) agrees with (Salfo & Brake, 2009) that using ICT social network has extended to not only sharing social information but to build reputation and also it has brought in career opportunities and monitory income

ICT Social networks is not about what each individual does but about what everyone say together to communicate valuable information in all direction at any time by any possible digital means. One could consider Social Network as an evolution in how communication is taking place (Schaefer, 2011). The features of social media is where the power lies as it allows users to be able to apply a whole range of application which involve interactions amongst people. Social Media or Social Network has also removed limitation of geographical distances from the people using it hence playing an important role of information and knowledge sharing in real time (Chui, et al., 2016).

As urged by Kiertzman et al (2011), ICT Social network has created a highly interactive platform due to the mobile and web based technology where individuals and communities can sharing, create, co-create, modify and also create user generated information. Not only has social media become highly interactive, it has overcome geographical boundaries and create communities who share not only information and knowledge but also common interest. The users of Social Media seek out information not only from traditional media but it has also been known as the new upcoming era in not only information and knowledge sharing but agriculture marketing (Balkrishna & Deshmukh, 2017).

Incidentally, the coming of ICT Social Network has revolutionized the way people have been communicating and it has surpassed traditional media that is decision makers and editors respectively. However, ICT Social Network(social media) has not entirely overthrown the traditional media but complementing the traditional media in information dissemination. Many companies still use the traditional media as the medium for communicating with their audience.

Apart from being an evolutionary stimulus, ICT social network is dominated by user generated content. This is because not only do users organize the content but also control the creation, sharing and distribution of information. This has led to social media bypassing traditional information gatekeeper such as editors (Coombs, 2012).

For a long time period in future, ICT Social Network is going to shape the way people interact, share information, form opinion and also lead individual and collective actions. Social Media are becoming one of the dominant ways we communicate (Global Forum for Rural Advisory Service Forum, 2016).

2.4 Small Scale Farmers, ICT Social Network and Information sharing

Oxfam international annual publication (2009) observed that Small Scale Farmers are often marginalized by having no access to information about both crop growing conditions and markets for their produce.

Incidentally, a study was conducted by Kalusopa (2005) on the Challenges of Utilizing Information Communication Technologies (ICTs) by Small Scale Farmers in Southern and Central Province of Zambia. Kalusopa (2005)'s findings were on the weak human capital and technical infrastructure, lack of clear national information policy and lack of a coordinated agricultural information support system for small-scale farmers anchored on ICTs. These finds states that the changes in socio-economic and political arena in Zambia have also had a drastic effect on the management of the agriculture sector. The findings were that despite there being a perception that information plays an important role in agricultural and rural development in Zambia, this perception has received less attention and there seems to be less consolidated over time. The conclusion of the study was that the central role of information in agriculture sector has thus been superficial. It was also concluded that there was need for a clear national policy framework on the use of ICTs for the small-scale farmers to enhance national development.

Another similar study was carried out by Munyua and Stilwell (2010), in Kenya where 80% of Small Scale Farmers produce for subsistence and sale. Small scale farmers are faced with many barriers one being that of not being able to adequately having access to agriculture information. The barrier to agriculture information access makes it difficult for these farmer to improve or influence their food production and market access. However, this is changing as globally, the agriculture sector is quickly embracing ICT Social network and using it to promote information and knowledge sharing as well as networking with like-minded farming communities (European Centre for Research Training and Development UK, 2016).

As stated by Alliance (2015), sharing information on Social media allows one to develop a community and share their story in such a way that was never possible before in the past. ICT which has facilitated Social Media has continued to change every aspect of our lives making it easier to overcome time and distance impediments in sharing information and knowledge including agricultural research, information and knowledge sharing (Chisita, 2012).

Sharker (2008) also highlights the need for agricultural information as the basic necessity for small scale farmers as it plays a pivotal role in enlightening them and also raising their level of knowledge and eventually helping in their decision making process regarding farming activities

Another case study was conduct in Zimbabwe entitled, Knotting and Networking Agricultural Information Services through Web 2.0. The study looked at Web 2.0 as an ICT tool to be used to create an informed farming community. This case study of Zimbabwe highlighting the utilization of Information Communication Technology in facilitating access to agriculture information by use of not only mobile technology but web technology as well (Chisita, 2012). The findings were that there was prevalent use of social media amongst small scale farmers which could help knot and network disadvantaged small scale farmers to share information and knowledge. The study concluded that having a strong sense of community could utilize information communication technology to network and boost agriculture production. Web 2.0 was also cited as the ideal tool to knot

and network agriculture populations that are geographically isolated and empower them to share agriculture information to increase productivity

Another example is farmers using ICT social network is that of India's Nabarangpur were a study was conducted on The Role of Information and Communication Technology in Agriculture Development (Pandey, 2017). The conclusion of this study brought to light findings such as number of farmers using the internet for different activities, type of tool and applications being used to access internet and also the type of information that the farmers search for on the internet.

Therefore, it is also important to take note that there is a strong link between agriculture and ICT. ICT applications facilitates quick information and knowledge sharing which in turn helps small scale farmers enhance their farming activities. Additionally, the facilitation of information sharing by use of ICT applications helps Small Scale Farmers to market their produce and also get latest information on agriculture. Depending on information gathered, Small Scale Farmers can make informed decision for their produce by having access to latest agriculture news which may be trending on the agriculture markets (Mugesa, 2015).

Social Media has continued to gaining popularity in the agriculture sector. In some sectors you find agricultural applications being developed for farmers which they are using for receiving information pertaining to agricultural practices, interacting with clients online and also receiving latest news (Jijina & Raju , 2016).

For some time now Small Scale Farmers are also putting a face on how food is grown by using Social media to share farming information such as photos and stories on their activities and also connect with consumers (Post, 2012). Social Media is now being known to be shaping the future of agriculture in countries such as India. It has also been found that in India the most popular Social Network platform being used by Small Scale Farmers to network and communicate with consumers is Facebook (Global Forum for Rural Advisory Service Forum, 2016).

Another success story is that of the study that was conducted in Kenya where young farmers have also taken the led by using social media to advertise their farming activities. These youths are able to share agriculture information using social media tools such as Facebook and Short Message Services (SMS) to discuss agricultural topics and share success stories. Marketing information is also shared amongst the youth on Facebook as well as promoting agriculture to fellow youths as a career option (Irungu, et al., 2015).

2.5 Small Scale Farmers and ICT Social Network in Zambia

Most studies conducted on ICT and agriculture in Zambia have centered on general ICT needs for small-scale farmers. One such a study was carried out in a number of selected provinces in Zambia. The studies mainly concentrated on evaluating the existing information infrastructure through ICTs and how this could provide information support to small-scale farmers in Zambia (Kalusopa, 2005).

However, according to Litondo, et al. (2016), ICT has been known to be the largest platform on which Small Scale Farmers can participate in sharing of information concerning their produce and market trends. Unfortunately, despite Small Scale Farmers being the bulk producers of Zambia's food stuff, they still experience barriers of not having adequate information and knowledge on farming activities using modern ICT tools.

It has also been noted that in Zambia there is a lack of clear national information policy and coordinated agricultural information support system for small-scale farmers anchored on ICTs. Many of the Small Scale Farmers in Zambia face a number of barriers one being that of not having a ICT support system for the agriculture information and knowledge that they need for their markets, products and latest agriculture news (Kalusopa, 2005).

Most studies have concentrated on the utilization of ICT tools in general and not necessarily Social network as a tool for information and knowledge sharing amongst small scale farmer. A paper by Zambia National Farmers' Union (2016) which was submitted to the Zambia Parliamentary Committee on Communications, Transport, Works and Supply

highlighted some of the benefits of ICTs in Agriculture sector in Zambia but not ICT applications such as Social Media as a communication tool.

Finally, in Zambia the National Agricultural Extension and Advisory Services Strategy 2017– 2010 by the Ministry of Agriculture and Ministry of Fisheries and Livestock has highlighted Information Communication Technology with in the agriculture sector as being a means of scaling up information sharing and availability amongst small scale farmers. This policy documents has highlighted some of the ICT issues that they need implementing such as use of mobile devices to enhance communication by advisory services, internet based tools for information dissemination and also equipping agricultural staff with ICT tools to be able to deliver required information by farmers.

2.6 Chapter Summary

Notably, after literature review there seems to be little or no research known on how ICT application is being utilized by Small Scale farmers through the sharing of information and knowledge in Zambia. It is important to take note that most of the studies have concentrated on mobile phones and computers as a means for sharing information in general and not identifying particular ICT tools or applications that could enhance the provision of information and knowledge for Small Scale Farmers. This prompted the need to carry out the research on the subject in order to add to the body of knowledge information on how farmers are utilization ICT applications in sharing information and knowledge.

This research's focus was based on Information and Knowledge sharing amongst Small Scale Farmers in Lusaka Province of Zambia using ICT application such as Facebook, twitter, google plus and You Tube respectively. This study might be the first of its kind as it explored how ICT applications are being used to share information amongst small scale farmers in Lusaka Province of Zambia. Numerous literature were also reviewed and summary of some of the literature have been included in this thesis in Appendix B.

A framework was developed from the literature reviewed which led to the development of an information and knowledge sharing ICT single support system for Small Scale Farmers

in Lusaka Province of Zambia known as ‘A One Stop for All’ as farmers will be able to access all their need.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

This chapter discusses the methods, approaches and design in details which were used in the study. In order to achieve the research objectives an appropriate method has to be adopted for a particular type of study. This chapter includes approach taken in the collection and interpretation of data and includes the data collection methods and instruments, target population and population sampling techniques.

3.2 Research methodology

In any research, a research method is known as a technique or a route that is taken to gather data. According to O'Leary (2010) research method is a framework that offers both strategies and grounding or conduction research. Research methods are a range of tools that are used for different types of enquiry in research. The first stage is to identify the characteristics of the data collection tool and its reliability (Wade, 2015). Choosing an appropriate research method is crucial in the achievement of the study objectives (Bowling, 2002). Allan and Randy (2005) agrees with Bowling (2002), that apart from the methodology being appropriate to achieve objectives of the research, it should also be possible to replicate the methodology used in other researches of the same nature.

Therefore, this chapter highlights the commonly used research techniques in detail, including the choice which of the most appropriate methods and methodologies to be used in this research. The methodology adopted for this research was designed to assist in understanding the problem and also find a workable solutions and answers to the research questions.

Research methods are the technique used to collect and analyze data (Welman and Kruger, 2001). Method of Data collection includes interviews, surveys, observation whilst method for analysis comprises quantitative and qualitative strategies (Neville, 2017). As stated by

Dawson (2007) Research methods are cardinal to conducting of research and also offers the choice of direction which a research is able to take towards conducting research and achieving objectives.

3.2.1 Research Design

Research design is the actual plan, strategy and structure of investigation arranged in order to obtain answers to research question or problem to the study (Kumar, 2011). Welman and Kruger (2001) states that research design assists the research to communicate to others what the proposed design is about and how data will be collected as well as the selection of the respondents and procedures on how data will be analyzed. Research design also states how findings will be communicated to the others.

3.2.2 Structure of the research design for the study

For this study the research design was structure in a manner that guided the research to find solutions to help small scale farmers have an ICT integrated support system by bring all the information requirements in one place. The research plan was drafted with the following in mind;

i) Identifying the research topic
ii) Defining the research problem
iii) Reviewing literature available on the research topic
iv) Formulate data collection tools
v) Analyze research data
vi) Summarizing of conclusion and recommendations

3.3 Research Approaches

There are two basic approaches to research, the quantitative approach and qualitative approach (Kothari, 2004).

3.3.1 Quantitative Approach

Quantitative research is based on the use of statistics to interpret data that is in numerical form (Kothari, 2004). It is applicable to phenomena that can be expressed in terms of quantity. Quantitative data can be measured more or less accurately mathematically due to its number content. Research data that is collected through questionnaire or structured interviews can be manipulated using statistical software to interpret results (Dawson, 2007). The benefit of a quantitative research is that the study can be replicated for verification and reassurance by another researcher (Kothari, 2004).

3.3.2 Qualitative Approach

The main focus for qualitative approach is the focus to understand, explain, explore, discover clarify solutions, beliefs, feelings, perceptions, values and experiences of the research (Kothari, 2004). Qualitative research is dependent on carefully defined meanings of words, variables and developed concepts (Walliman, 2011). Data that is collected in a qualitative research is not numerical in nature and does not use statistical analytical packages as key analysis tools (Wellington, 2015). Qualitative data analysis involves the identification, examination, and interpretation of patterns and themes in textual data and determines how these patterns and themes help answer the research questions at hand.

3.3.3 Mixed Method

Mixed methods research is a method for conducting research that involves collecting, analysing, and integrating quantitative and qualitative research in a single study or a longitudinal program of inquiry (Creswell, 2008). Saunders, et al (2009) advises that research must include clarification and explain methods and approaches used in the collection of data and also justify why the results obtained are valid and including the limitation associated with the results.

Additionally, basic premise of mixed method is that whose integration allows a more complete and synergistic utilization of data than separating quantitative and qualitative data collection and analysis (Agency for Health Care Research and Quality, 2013).

3.3.4 Rational for selecting mixed method for this study

The research approach that was adopted for this study was based on mixed method research. Mixed methods study addressed overall objective of the study. An embedded mixed method design was used in this study which is an approach in which one data set provides a supportive, secondary role in a study based primarily on the other data set. The primary purpose of this study used quantitative instruments.

A secondary purpose that was used to gather qualitative data were structured interviews. The reason for collecting the secondary database was to address different question and to provide support for the primary purpose (Creswell, 2008).

The decision for using mixed method was arrived at for the following reasons:

i) Mixed methods research provides a more complete understanding of the research problem than either quantitative or qualitative alone (Crewswell, 2009).

ii) As stated in the previous paragraphs, mixed methods helped the researcher to be able to assess the objectives of the study better because some objectives are better assessed by using quantitative then qualitative methods only. One of the objective was that of coming up with an integrate single support information and knowledge support system that required conducting interview with the organizations that partners of small scale farmers apart from distributed questionnaire to small scale farmers.

iii) Using mixed method in this study helped the research to provide a better understanding of a research problem or issues by gathering data from both research approaches namely qualitative and quantitative. The integration of mixed method for Lusaka small scale farmers lead to the use of structured interviews as the data will be record and put in a descriptive method (Creswell, 2012).

iv) Qualitative research was used to help add a voice to quantitative findings by conducting interviews with small scale farmers' partners.

v) Mixed method is a preferred approach so that data from interviews is inclusive to overcome either of their shortcomings.

3.4 Data Collection Techniques

The two major ways a researcher can collect data namely Primary and Secondary Data Collection (Kumar, 2011). As defined by Kothari (2004) primary data is data that is collected afresh and for the first time, and this data happens to be original in character. Whilst secondary data on the other hand are those which have already been collected by someone else and already been passed through the statistical process. In this study both Primary and Secondary data collection was used.

3.4.1 Primary Data collection techniques

The primary data are the first and most immediate recording of a situation. This includes one's own information or data. The primary data collection techniques include some but not all, measurement, observation, interrogation and participation (Walliman, 2011). Primary data are the first and most immediate recording of a situation with which without this kind of recorded data it would be difficult to make sense of anything.

i) Types of Primary Data collection methods

a) Observation

Observations can be conducted on almost any subject matter one is researching on and again the kinds of observations you will do depend on your research question. Conversely, in unobtrusive observation, one does not necessarily need to interact with participants but rather simply record their behavior (Driscoll, 2011).

Observation data collection method has it advantages and disadvantage. When carrying out observation as a type of data collection the subjects behave in the desired natural manner and do not get influenced by what the observer wants to listen. It is also cost effective and produce valid results. However, it can be time consuming and may involve large amount of inactivity. Observations may also lack depth and qualitative richness. In observation as type of data collect if ethics are not handled properly, legal action could take place.

b) Questionnaire

Adams and Cox (2018) urgues that a questionnaire is essentially a structured technique for collecting primary data. Questionnaire are commonly used in research in order to obtain information about a population. Each questionnaire should contain items that are developed to address the research's specific objectives or research questions (Mugenda and Mugenda, 2003). While authors such as Kervin (1999) offer a very narrow definition of questionnaire by stating that in a questionnaire the person answering the questions actually records his or her own answers, de Vaus (1996) seems to disagree as he sees a questionnaire in a much wider context and defined it as a technique in which various persons are asked to answer the same set of questions. A questionnaire should be understood as a tool and as such must be used so that the reader can easily understand, interprets and complete it without difficulty. This in turn increases the accuracy of responses. A research tool, must be considered with two important concepts in its design: 'reliability' and 'validity' (Adams and Cox, 2018).

There are two types of questionnaires, self-administered and administered questionnaires. In this study both self-administering and administered questionnaire were used respectively. The self-administering questionnaires were distributed to respondents whilst the administered questionnaires were the ones used by the researcher to ask questions during interviews and writing answers from the respondents. Despite questionnaires having been selected as the best choice for this study, questionnaires have their advantages and disadvantages.

c) Questionnaires as a method of data collection has its advantage and disadvantage. Some of the advantages are:

i) Cost Effectiveness and Economical

Questionnaire have been known to be cost effective as they can be placed on a respondent's website or emailed to the target population at no cost. It is also important to note that their cost-efficient, standardized answers allows easy data analysis and do not require much effort from the research as compared to other tools such as telephone survey (Katebire, 2007).

ii) Wide Coverage

Kothari (2004) states that when a researcher has wide coverage of responders who are geographically dispersed, one can send a questionnaire through email to minimize the cost and is quickly received.

iii) Speedy results

Questionnaire are quick and easy to collect results with online and mobile tools. This entails that the researcher can gain insights in as less than 24 hours, depending on the scale and reach of your questionnaire (Groat & Wang, 2013).

iv) Respondent Anonymity

Both online and email surveys allow respondents to maintain their anonymity. This concealment of respondents make them at ease and encourages them to answer truthfully. The respondents have greater confidence that they will not be identified by anybody for giving a particular view or opinion. They feel more comfortable and free to express their view in this method.

v) Validity

Questionnaire have some unique merits as regards validity of information. In methods like interview and observation, the reliability of responses depends on the way the investigator has recorded them. Therefore, they may present biased or prejudiced information of their own.

Validity in this study pertaining to questionnaire was based on the responses given by the respondents in their own language and version. Therefore, it cannot be wrongly interpreted by the researcher.

vi) Scalable

It is also evident that questionnaire allow a researcher to gather information from a large audience. Using questionnaire online, a researcher can literally distribute the questions to anyone, anywhere in the world as long as there is internet connection. This entails that all this is done at a relatively low cost.

d) Incidentally there are also a number of disadvantages for using questionnaire in data collection.

i) Some people may not be willing to answer questions and might not want to reveal information that they think they will not benefit from the responding.
ii) Questionnaire usually invite people to lie and answer the questions very vaguely which they would not do in an interview.
iii) Once you forget to ask a certain question, you cannot go back to the respondents as usually they respondent are anonymous.
iv) Respondents may answer the questions superficially if its time consuming to answer question. This might lead to having inadequate and unwanted data to analyses the final results.
v) Respondents may ignore certain questions without giving a proper answer.
vi) Questionnaire can be incorrectly filled.

e) Questions for Questionnaire

There are many types of survey questions and each one has its own pros and cons. The type of information you need, the depth of information you need, and the amount of time your respondents have available will all influence your choice of survey time (Network, 2018).

However, the most commonly used are types of questionnaire questions which are known as Closed-ended and Open-ended questions.

i) Open-ended questions

These are the type of questions that are used to allow the respondents to express their views in a free flowing manner. Open-ended questions are questions that allow someone to give a free-form answer. Using this type of questions, the respondents does not follow the criteria for answering questions and he or she can easily express their beliefs and suggestions. An ideal questionnaire is a type of questionnaire that includes open ended questions.

Open-ended questions do not have any predetermined set of responses and the respondent is very free to answer whatever he or she feels right. The ideal questionnaire would include an open-ended question at the end of the questionnaire that seeks feedback and also suggestions for improvements from respondents. Qualitative questions fall under this category.

Open ended question has its advantages and disadvantages (Copeland, 2018). Open ended question permits an unlimited range of answers. They also reveal how the respondents think about the question. Usually responses to open ended questions can be used to expand on and clarify closed responses.
However, there are also a number of disadvantages of open ended Questions. These types of questions take more time and effort to respond to the questions. Responses are quite difficult for respondents not familiar with expressing their views and opinions. Answers to open ended questions may vary in level of details or scope of questions. It may be difficult, costly, and time consuming as analysis relies on coding it may be. Misinterpretation of a question in the questionnaire might go unnoticed.

ii) Closed-ended questions

A closed-ended survey question are the one that provides respondents with fixed number of responses from which to respondents choose an answer. These questions are made up of a question stem and a set of answer choices or the response alternatives. When administered by a survey interviewer, a closed-ended question is expected to be read exactly as it was written to the respondent, together with the full set of response alternatives (Lavrakas, 2008).

In closed ended questions the set of answer choices must always fulfill two properties; they must be firstly be mutually exclusive and secondly be exhaustive. Mutually exclusive means that there should be no two answers overlapping in conceptual meaning. Exhaustive means that the answer choices must cover all logically possible answers for the question. Incidentally closed ended question also has its advantages. Some of them are that respondents find them easier and quicker to answer. It is also easir to compare answers with other respondent. Respondents are also likely to answer about sensitive topics.

Similarly there are a number of disadvantages for using closed ended questions. These questions can evoke ideas that the respondent would not otherwise have. Respondents with no opinion or no prior knowledge may not answer the questions. Respondents can be frustrated because their desired answer is not a choice or because they may not know the right answer.

The researcher chose to use closed ended questions which were used in the questionnaire for the study. The reason for selecting the closed-ended question was because they are always conclusive in nature as they are designed to create data that is easily quantifiable. The other reason was that the questions of this type are easy to code it makes them particularly useful when trying to prove the statistical significance of a study's results. Furthermore, the information gained by closed-ended questions allows researchers to categorize respondents into groups based on the options they have selected (FluidSurvey University, 2018).

iii) Construction of the Questionnaire, distribution and collection

Constructing or developing a questionnaire seems to be quite simple but it is complex and taxing in that one has to formulate and select questions careful (Mathers, et al., 2009). The construction of the questionnaire for this study was carried with the objective of the study in mind. This was to ensure the correct data is collected pertaining to the objectives.

The questionnaire developed for this study constituted closed ended questions. A closed question is one where the possible answers are defined in advance and so the respondent is limited to one of the pre-coded responses given (Mathers, et al., 2009). The questionnaire were divided into sections based on information requirements by ensuring that they are easy to be self-administered and eventually easy to understand and provide quick responses.

The main reason for selecting structured type of questionnaire with closed ended question was that it forces respondents to choose from a list of alternatives. It also proved to be relatively time and cost effective.

iv) Item Scaling for questionnaire

In this research A 5-point Likert scale was used by using the anchor point of;Strongly Agree, Agree, Neither Agree nor Disagree, Disagree, and Strongly Disagree.

This five points weights from 1 to 5. Likert scale proved to have a strong potential to produce distribution that was treated as internal data (Kothari, 2004). The most commonly used scales are 5 and 7 point scales.

The respondents were more willing to complete the questions in the questionnaire which gave the questionnaire an advantage over other methods of data collection. By user of the Likert scaling method the chances of a researcher being biased in a structured questionnaire are lessened as the questions are of an impersonal nature.

To get a high response from respondents for the study following was done. The questionnaire was brief and to the point with time maximum of 20 to 30 minutes. The questionnaire was simply to understand. No personal information was to appear on questionnaire such as name and address. The purpose of the research was explained in advance. Name of research was identified and inclusive was a letter cover accompanied the questionnaire.

The questionnaire were distributed by hand, email and delivery to the different respondent by the researcher.

Finally, disadvantages of using a questionnaire were overcome by ensuring the questionnaire was well designed and the administration process was accepted as a research method. The use of questionnaire proved to be more advantageous than other method of collecting data.

f) Key Informant Interviews

Another instrument that was used to collect data for the research was the use of structured interviews. As stated by Mugenda and Mugenda (2003), interview is an oral administration of a questionnaire or an interview. Kotheri (2004) also urges that the interviewing method

of collecting data involves presentation of the oral-verbal stimuli and reply in terms of oral-verbal responses. The interview schedule differs from questionnaire in that respondents are not given precise measures (Hocking, et al., 2003).

Furthermore, Boyce and Neale (2006) defines interviews as a qualitative research technique which involves conducting intensive individual interviews with an individual or a small number of respondents to explore their perspectives on a particular idea, program or situation. Interviews are different from questionnaire as they involve social interaction (Saul, 2018). This involves an interviewer reading questions to respondent and also having answers recorded (Wilkinson and Birmingham, 2003). Interviews or question and answer sessions with one or more people are a way to get the in-depth information from a person or persons group for primary data collection (Driscoll, 2011).

In this study structured interviews were used for farmers partners namely Livestock Services Co-operative of Zambia, National Association for Peasant and Small Scale Farmers of Zambia (NAPSSFZ). Food Agriculture Organization (FAO) and Empowering Young Farmers for National Development (ZAYAFA). An interview schedule was used which is a guideline for asking questions in person or over the telephone by the researcher. Interview schedule are different from questionnaire in that precise measure are not given to the respondents (Hocking et al. 2003).

Interview schedule which contained questions where structured and the responses were filled in by the researcher. This helped the responded to speak and give more details on the issues raised (Briony, 2005). In this case, as mentioned by Bartlett and Erling (2013) the interview resembled a conversation to some extent, as the participants' answered frequently directed the interview towards discussing a related issue. Though the interviews were time consuming and expensive, they were also advantageous in that they helped minimize non-responses.

i) Justification of respondent for interviews

In this study the interview was mainly used for those partners who work with small scale farmers on a number of developmental projects and Farmers Associations. Livestock

Services Co-operative of Zambia, National Association for Peasant and Small Scale Farmers of Zambia (NAPSSFZ). Food Agriculture Organization (FAO) and Empowering Young Farmers for National Development respectively.

ii) Types of Interviews

Kumar (2011) highlights that interviews are classified into distinct categories such as unstructured and structured interviews. An interview is a conversation for gathering information. A research interview involves an interviewer, who coordinates the process of the conversation and asks questions, and an interviewee, who responds to those questions. Interviews can be conducted face-to-face or over the telephone. The internet is also emerging as a tool for interviewing.

iii) Structured Interviews

Structured interviews are also known as formal interview. The questions in the structured inter are standardized forbidding the researcher to deviate from the questions. Most structured interview questions are closed-ended questions (Saul, 2018). In structured interviews the researcher asks predetermined set of questions for every interview without altering them. Structured interviews can be used through open or closed ended questions, person to person or telephone.

Advantages of Structured Interviews

Structured interviews allows researcher to prompt interviewee by providing a set of example responses. It has also the potential to be quick and easy to conduct meaning they take place within short amount of time. Specific data related directly to research topic is easy to obtain. Structured interviews being a structured environment helps to reduce nervousness or fear.

Disadvantaged of structure interviews

However there are also disadvantage of using structured interviewe to collect data. The researcher may generate bias by the communication style used to deliver questions or

possible responses. There is also limited opportunity for interviewees to go beyond them set questions unless prompted by researcher

i) Unstructured interview

The unstructured interview the interviewer asked broad questions to engage the respondent in open discussion. The interviewer probes with further questions to engage the respondent in open, informal and spontaneous discussion (Easwaramoorthy & Zarinpoush, 2017).

Advantages

The advantages of the unstructured interview is that it allows for interviewee to offer their own response without being influenced by set responses. Equally detailed information can be obtained. Its relaxed structure supports interviewees to be open and honest.It also allows the researcher to focus as the interview progresses.

Disadvantages

Incidently the Interviewees in an unstructured interview can go off topic when responding. This type of data collection also has the potential to go longer than the allocated time. It also can be difficult to report findings and compare data due to various responses from interviews.

g) Focus Group

Hocking et al. (2003) states a focus group as a group of people collected through some mehtod that dicsusses topic of concern to the research. They further state that focus group and in depth interviewing are used to understand how people use communication in their daily lives. In Focus group the main facilitator for the focus group introduced the topic, asks specific question and also controls the discussion, (Dawson, 2007).

Advantages of Focus Group

The focus group type of data collection a researcher can receive a wide range of responses during one meeting.There is also interaction from participants which is useful to analyze. Respondents also tend to remember issues they had forgotten.

Disadvantages of Focus Group

In focus group, repondents tend to be uncomfortable in a group setting and some become nervous to speak in front of others. Not everyone may contribute to the discussion and some researchers find it difficult or become intimidating to moderate a focus group.It also becomes difficult to extract individual view during the analysis.

3.4.2 Secondary Data collection techniques

Anon (2018) also states that secondary data is the data that have been already collected by and readily available from other sources. He also states that secondary data are cheaper and more quickly obtainable than the primary data and also may be available when primary data cannot be obtained at all. Secondary data is also known as information which has been collected previously, by another person other than the researcher. This data could either be qualitative, such as diaries, newspapers or government reports, or quantitative, which is mainly in statistical form such as league tables.

In this study secondary data was used in the review of documents. Literature review was carried out in order to appreciate similar studies by other scholars and be aware of the findings to their studies. This helped me to identify the gaps in the different studies that I carried out literature review on.

a) Literature Review

The purpose of a literature review in secondary data collection is to gain an understanding of the existing research and debates relevant to a particular topic or area of study, and to present that knowledge in the form of a written report (Sydney, 2017). The other reason for literature review was to compile and evaluate the research available on the topic in question.

The main purpose of literature review for this study was to;

i) Show particular readers that the researcher had read and has a good grasp of the main published work concerning the topic.

ii) To make sure the review was guided by research objective and will provide the framework.
iii) Ensure that there are no duplicates of the Study.
iv) Provide a historical background for the research in question.
v) Introduce relevant terminology and also provides definitions to clarify how terms in the research were used in the context of the research.

A number of sources for literature review were used in this research. One of the sources for literature review was thesis dissertations. These were useful in that there were many studies similar to the research in question. However, many dissertation and thesis requires one to be a member of a researcher's group or pay for the document that one requires. A number of Journal articles were also reviewed and most of the articles were available for free and also had the latest information. This proved useful for literature review. Other literature reviewed were books which had a lot of secondary data that proved to be useful but mostly not with the latest information. Some newspaper articles were also reviewed as they had latest information meant for the general public and a few articles proved to be used as they related to the study in question.

Finally, websites being full of information which are both authentic and non-authentic was useful not only for it providing information immediately but also quick access to information. Most information that were used from the websites had been cited and cross check for the sources.

Advantages of Secondary Data collection technique

i) It is economical and it saves efforts and expenses as many public documents and official statistics are freely available to the researcher.
ii) Secondary data make primary data collection more specific since with the help of secondary data, a research is able to make out what are the gaps, deficiencies and additional information needs to be collected.
iii) It also helps to improve the understanding of the problem in research.

iv) Secondary data does provides a basis for comparison for the data that is collected by the researcher.

Disadvantages of Secondary Data collection techniques

i) Secondary data documents may lack authenticity as parts of the document might be missing because of age, and there will be no one to actually verify who actually wrote the document, meaning one cannot check whether its biased or not.
ii) Secondary data documents may not be representative of the wider population especially older documents.
iii) Many secondary data documents do not survive because they are not stored, and others documents deteriorate with age and become unusable.

3.5 Instruments used to collect data for the research

There are various method of data collection. As such it is important that the researcher selects the method keeping in mind the following factors; objective of the study, funds available need when collecting data, time factor which takes into consideration how long it will take to collect data (Kothari, 2004).

Having taken into consideration the above mentioned factors the instruments that were used for this study are questionnaire, interview and focus group discussion.

3.5.1 Questionnaire

In a nutshell, this study used questionnaire as one of the method for collecting data because from the advantaged and disadvantages cited. The advantages of using questionnaire outweighs the disadvantaged in that questionnaire are a useful method to investigate for patterns and are reliable when collection data.

3.5.2 Pre-testing, Validity and Reliability of the Questionnaire for the Study

Reliability is the "consistency" or "repeatability" of your measures (method, 2018). According to Creswell, validity of the instrument should be determined to verify the instrument to be used interprets the proposed user (Creswell, 2012). Whilst validity is

an indication of how sound your research is, it is also the extent to which an instrument measures what it is supposed to measure and performs as it is designed to perform (Lincoln & Guba, 1985).

In this study reliability was assessed by carrying out Pre-Testing survey of the questionnaire. The main reason for pre-test was that questionnaire design is a frequent difficulty in that respondents usually misinterpret questions and this difficulty has been consistently recognized within the literature by Belson(1983) and Hunt et al.(2016).

The researcher distributed ten copies of the questionnaire were circulated amongst small scale farmer. The other reason for pretest was to ensure that the researcher was able to get the responses required to meet the objectives of the study. Respondents were asked to measure how much time it would take them to complete the questionnaire, whether the questions were relevant to the study and if there was need to add or remove some questions. The information provided by respondents in the pretest exercise was analyze to see if there was need to change or add some of the items in the questionnaire. More importantly pre-test was useful as the respondent suggested what other research question should be added to concretize the research. One additional research question that was included suggested by the responded was, what the challenges farmers were facing in accessing information and knowledge from social media. The researcher received feedback which was both verbal and written. Some of the feedback were considered and integrated in the questionnaires.

3.5.3 Interviews

Berg (2007) highlights that the value of interviewing is not only because it builds a holistic snapshot, analyses words, reports detailed views of informants; but also because it enables interviewees to speak in their own voice and express their own thoughts and feelings

One of the decision to use the interview method was to develop a relation between the researcher and the respondent so as to increase mutual understanding and cooperation.

The other reason for using interviews by the research was that using this method the researcher was able to select suitable respondents through interviews because the researcher can know a lot about the candidate by this process. Sufficient information will be collected through the interview process as the researcher will be able to any the respondent any question (Communication, 2014).

3.5.4 Study Population

The study population in this research consisted of small scale farmers' within Lusaka Province. The map in Figure 3.1 shows Lusaka Province and with the different distircts found in the Province. Lusaka Province is one of the ten provinces of Zambia.

Lusaka Province is one of the ten provinces of Zambia. The province has the smallest surface area covering 21,896 square kilometers, which is about 2.9 percent of the total area of Zambia. It consists of seven districts as shown in Figure 3.1. and has the smallest surface areas. The provincial capital of Lusaka Province is Lusaka, which is also the national capital.

Population

The total population for Lusaka Proince is 2,191,225 (Central Statistics Office, 2010). As stated in Post Harvest Survey - 2014 and 2015 Agriculture Season for Small and Medium

Scale Farmers revealed that the population for small scale farmers in Lusaka Province is about 46,000 (Central Statistical Office, 2015).

In this study the target population refers to all members who meet the particular criterion specified for a research investigation (Alvi, 2016). Steinberg (2011) also defines population as a group of participants from which a researcher would want to draw the conclusions. The study population in this research consisted of small scale farmers around Lusaka Province.

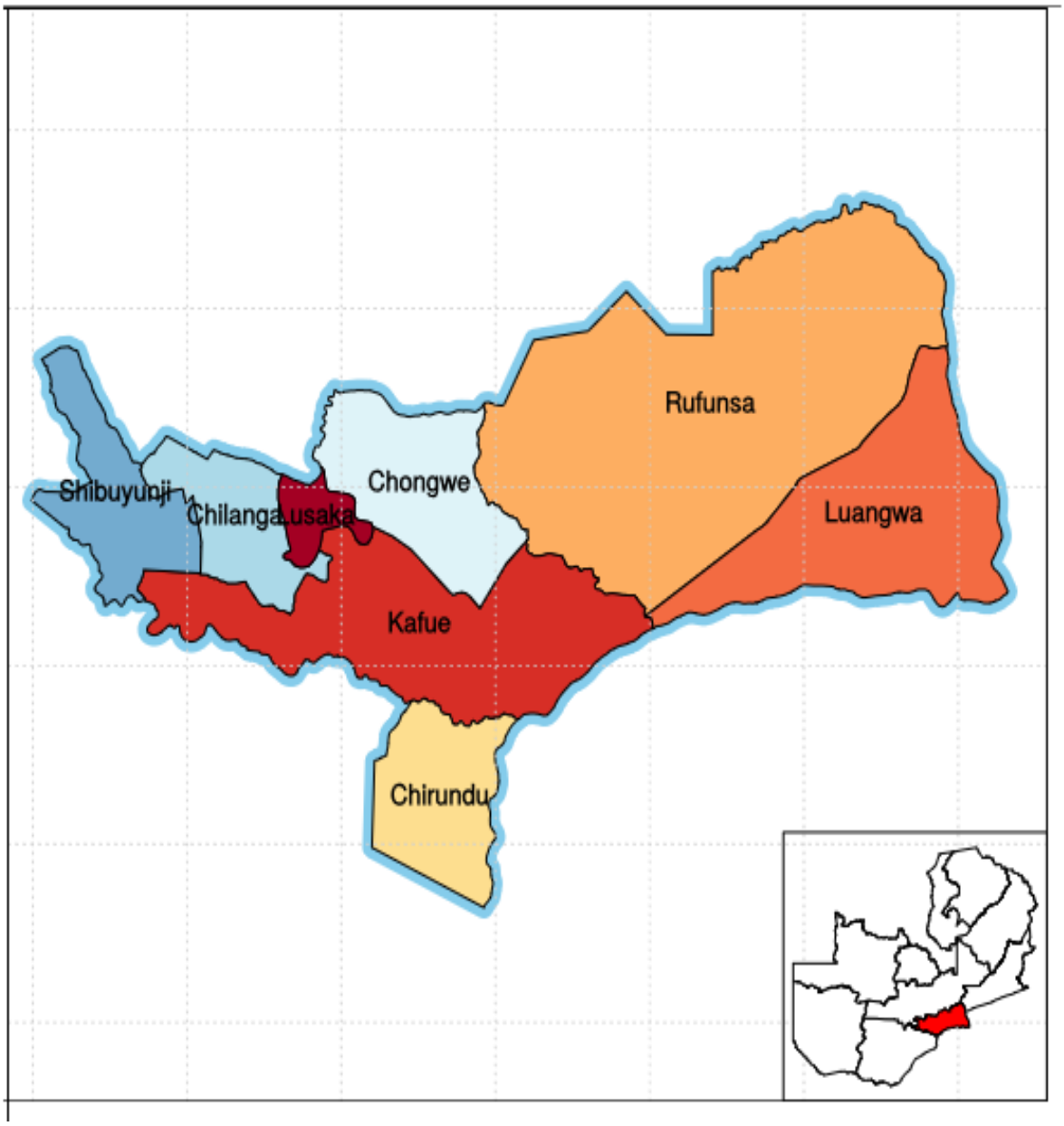

Figure 3.1: Map of Lusaka Province. Source: Map data@2018 Google

3.5.5 Sampling method

A sample can be defined as a group of relatively smaller number of the people selected from the population for investigation purpose whilst a member of the sample are called participants. The more the sample is representative of the population, the higher is the accuracy (Alvi, 2016).

The process through which a sample is extracted from a population is called as sampling. In research it is impossible to assess every single element of a population so a group of people which is smaller in number than the population is selected for the assessment.

As argued in Dissertation (2018), reducing sampling error should be the goal of any selection technique. A sample should be big enough to answer the research question, but not so big that the process of sampling becomes uneconomical. In general, the larger the sample, the smaller the sampling error and the better job you can do (Laerd Research Limited, 2018).

In this study in order to save time and money, a more feasible approach was undertaken by selecting a small group from the small scale farmer population in Lusaka. This small group which was used is what is referred to as a sample size.

.

i) Calculating Sample Size

The (Yamane, 1967) formula that provided a simplified way of calculating sample size was adopted. This formula was borrowed from University of Florida Fact Sheet PEOD-6 (Service, 1992). The formular for calculation population sample where N is the population which is 46,000 small scale farmers and n is the sample size.
The letter ‘e’ is level of precision or sometimes called Sampling error which is 0.05. This

is the range in which the true value of the population is estimated to be. The range is often expressed in percentage points, (e.g., ±5 percent).

$$n = \frac{N}{1 + N(e)^2}$$

N = 46,00 small scale farmers in Lusaka Province

n = sample size

e = level of precision or sometimes called Sampling error which is 0.05

Therefore, having 46,000 Small Scale Farmers the calculation for sample size using the formular as follows:

$$n = \frac{\mathbf{N}}{1 + N(0.05)^2}$$

$$n = \frac{\mathbf{46,000}}{1 + 46,000(0.05)^2}$$

$$n = \frac{\mathbf{46,000}}{116}$$

n = **397 small scale farmers**

In conclusion the sample size for the study was 397. For accuracy and confirmation purposes of calculating the sample size Epinfo start calc was also used

ii) Respondents Questionnaire feedback

A total number of 397 questionnaires were distributed. A total of 318 questionnaire were returned by respondents. However, of the returned 318, the spoilt ones were 6 which left 312 questionnaires on which Stratified Sampling method was conducted.

3.5.6 Stratified Sampling Method

Stratified Sampling Method was used in this research. This method also known as representative sampling involved the division of a population into smaller groups known as strata. In stratified sampling, or stratification, the strata are formed based on members' shared attributes or characteristics. (Investopedia.com, 2018).

Stratified sampling method was chosen because the population in this study is heterogeneous. Heterogeneous is an example where every element of population does not matches all the characteristics of the predefined criteria (Alvi, 2016). This study consisted of the following type of farmers namely, pig production, poultry production, vegetable, calf management, goat production, fish farming. In this case small scale farmers were put in strata (groups) which contained equal number of men and women so that the strata become homogenous resulting into all elements in the strata have same characteristics (Farmer et al. 2018).

The other reason for using stratified Sampling was arrived at due to the population size being too large to run a research on. This is a fine way for a population that is very precisely defined such as small scale farmers. (Alvi, 2016).

The researcher grouped the small scale farmers into 6 strata namely poultry, piggery, calf management, goat, fish farming and vegetable farming. Of the 312 successful respondents, six strata were created by equal division. This resulted is 56 respondents in each strata. However, the researcher required only 26 respondents from each strata. A random sampling method was used to get equal representation from the 6 strata. This resulted into having a total of 26 members of each strata giving the researcher 156 questionnaire for analysis.

As stated by Alvi (2016) the larger the sample the more representative it is vis via smaller sample which produce less accurate result as they are less represented.

The researcher used stratified random sampling due to the following advantages which outweighs the disadvantage of using stratified random sampling. In a heterogeneous population stratified random sampling produces a representative sample as it captures the

diversity which otherwise is likely to be undermined through simple random or systematic random sampling (Alvi, 2016). Stratified sampling method reduces potential human bias in the selection of cases to include the same making it a highly representative way of the population being studied as long as there is limited missing data. Overall, stratified random sample helps in improving the representation of strata (groups) within the population which leads to ensuring that these strata are not over-represented. Together, this helps the researcher to compare strata properly as well as make more valid inferences from the sample to the population (Laerd Research Limited, 2018).

Incidently, Stratified Random sampling has its disadvantages**.** A stratified random sample can only be carried out if a complete list of the population is available.

In conclusion, to avoid potential bias in any sample, there is need to try and ensure that an adequate proportion of the sample takes part in the research. This requires re-contacting non-respondents which can be very time consuming, or even reaching out to new respondents (Laerd Research Limited, 2018).

3.5.7 Sample Size

Judd, et al. (1991), states that in order for any sample size to be representatively of the selected population, it should not be less than 5% of the population. In this study 397 elements were selected from the population to be participants who were handed questionnaire.

3.6 Duration for Data Collection Process

The collection of data took close to 70 working days. Respondent were given brief information on the main objective and purpose of the study. Thereafter, the questionnaire were distributed to all respondent. Follow ups were done thereafter by waiting on respondents until they have finished answering question and questionnaires were collected.

3.7 Data Analysis

Data analysis is a process a researcher uses to reduce data to a story and its interpretation. It is a process of reducing large amount of collected data to make sense of them (LeCompte

& Schensul, 1999). Patton (1987) states that three things happens during analysis as follows; data is organized, data is reduced through summarization and categorization and patterns in the data are identified and linked.

The tools that were used for data capture and analysis are Statistical Package for the Social Science (SPSS) and Microsoft Excel 2016. SPSS is one of the most popular statistical packages used for data analysis and can perform highly complex data manipulation and analysis with simple instructions.

The data collected was analyzed as follows:

i) Qualitative data from interview and questionnaire were analyzed through interpretation, comparisons and drawing of inferences.

ii) Quantitative data was analyzed using Statistical Package for Social Science (SPSS), which is a data analysis tool.

3.8 Ethical consideration of the study

During the study, ethical and profession conduct were adhered to by following all the necessary processes and procedures pertain to research and ethics. Authorizations was sort from the University of Zambia to allow the study to be conducted.

Some of the ethical procedure are cited below:

i. All respondents will be protected by keeping the information they will share confidential.
ii. All individual's identity will be protected by using numbers or pseudo names.
iii. All respondents will urged to participate on a voluntary basis and participants will be required to sign off for consent.

3.9 Limitations of the Study

All necessary procedure for collecting samples were followed accordingly in order to avoid any bias. However, due to time and resource constraints samples were only collected from

selected parts of Lusaka Province Small Scale Farmers namely; Small Scale Farmers associations and Small Scale Farmers training groups around Lusaka Province.

3.10 Chapter Summary

The chapter discussed the methodology adopted in achieving the objectives of the study. This was accomplished by the appropriate research approach, design and target population. Thereafter, the sample size, sampling process as well as its reasonable justification was important in ensuring representativeness of the research population. Inclusive, the methods and instruments of data collection employed have been discussed together with the research methodological reliability and validity. The chapter also indicated how ethical issues were handled to protect the respondents and integrity of the study.

CHAPTER FOUR: DATA ANALYSIS AND INTERPRETATION

4.1 Introduction

The previous chapter discussed the research methodology that were employed to carry out the research and methods used to analyses data collected to satisfy the research objectives as indicated in chapter one. This is critical as it provides mainly the basis on which the research findings can be generalized and authenticated. The chapter presents the findings of the study "Information and Knowledge Sharing Amongst Small Scale Farmers in Lusaka Province. A probability value (Pr) of 0.05 with 95% confidence Level whilst Likert analysis was amongst other techniques used to scale responses in the survey research.

4.2 Respondent Rate

The information that was obtained from respondents during the survey is presented and analyzed so as to draw recommendation, implication and conclusion for the research. The survey questionnaires was administered directly to respondents. Table 4.1, shows the total number of questionnaires distributed which were 397(100%) with a total return rate of 312(78%). The remaining 79 questionnaire were not returned and 6 questionniare were returned but spoilt which totaled the unreturned and spoilt to 85 (21%). Also explained in Table 4.1 are respondent rate by frequency and also percentage as explained.

Table 4.1: Respondents rate by frequency and percentage

Questionnaires	Frequency	Percent (%)
Returned	312	79%
Unreturned/spoilt	85	21%
Distributed	347	100%

The study's questionnaire response rate archived 79% response rate. As argued by Mugenda and Mugenda (2003), any response rate that reaches above 50% is adequate

enough for analysis and reporting the findings. He goes on to state that 60% is good, 70% and over is excellent. The 79% excellent response was due to the fact that respondents were given the questionnaires directly whilst the researcher waited for them to be filled in and returned

4.3 Background characteristics of Respondents

4.3.1 Gender

This section starts by capturing the demographic and socio-economic characteristics which include age, gender and highest education. Respondent gender, age and education level were covered in the questionnaire. Below here are the presentations of the information on the profile of the respondents.

In order to show the gender distribution in the study, the study decided to determine the respondents' gender as shown in Table 4.2 are the results

Table 4.2: Frequency and percentage of respondents by Gender

Gender	Frequency	Percent (%)
Male	120	77%
Female	36	23%
Total	156	100%

From the results in Table 4.2, it can be deduced that male respondents were 120 (77%) and this making them the highest respondents unlike the female respondents who were at 36 (23%) respectively.

4.3.2 Age

The age bracket was equally analyzed in order to ascertain the diversity in perspective and also the representation. Results in the above Table 4.3 revealed the most of the respondents are in the age category above of 37 years old which are at 51%. Those in second place are

Table 4.3: Frequency and percentage of respondents by Age

Age of respondent	Frequency	Percent (%)
18-22	40	2%
23-27	20	13%
28-32	28	18%
32-37	24	15%
37-above	80	51%
Total	156	100%

in close range of the category of 23-27 years old which is 13%. In the age range of 28-32 years of age at 18% and 32-37 years at 15% respectively. From the study you can deduce that 50% of small scale farmers are below 37 years of age.

4.3.3 Level of education

From the analysis in Table 4.4, it is revealed that 28% of respondents have diplomas, second were was 22% who hold degrees. Further primary and secondary are at par with those holding certificates at 20%. Inclusive are the respondents that have Masters at 9% and 1% Doctorate respectively.

Table 4.4: Frequency and percentage of respondents by level of education

Education Attained	Frequency	Percent (%)
Primary/Secondary	31	20%
Certificate	32	20%
Diploma	43	28%
Degree	35	22%
Masters	14	9%
PHD	1	1%
Total	**156**	**100%**

4.3.4 Type of farming taken up by different age group.

Analysis were also carried out on demographic information to find out which age group undertake which type of farming. From Table 4.5 the study deduced that small scale farmers above 22 years preferred livestock production than horticulture. Whilst those below 37 years preferred horticulture.

Table 4.5: Respondents on the age versus type of farming

Age	Horticulture	Livestock
18 – 22	50%	50%
23 – 27	20%	80%
28 - 32	3.6%	96%
33 - 37	25%	75%
>37	17%	82%

4.4 Small Scale Farmers Information Needs

This section presents findings to questions on the need for agriculture information in the area of sharing information, searching information, availability of information, different

platforms were information is share and also different platform were small scale farmers search for information.

4.4.1 Small Scale Farmers search and sharing of information

The study sought to establish as to whether farmers search for information and also share the information. This will help build on the use of social networks as source for agriculture information.

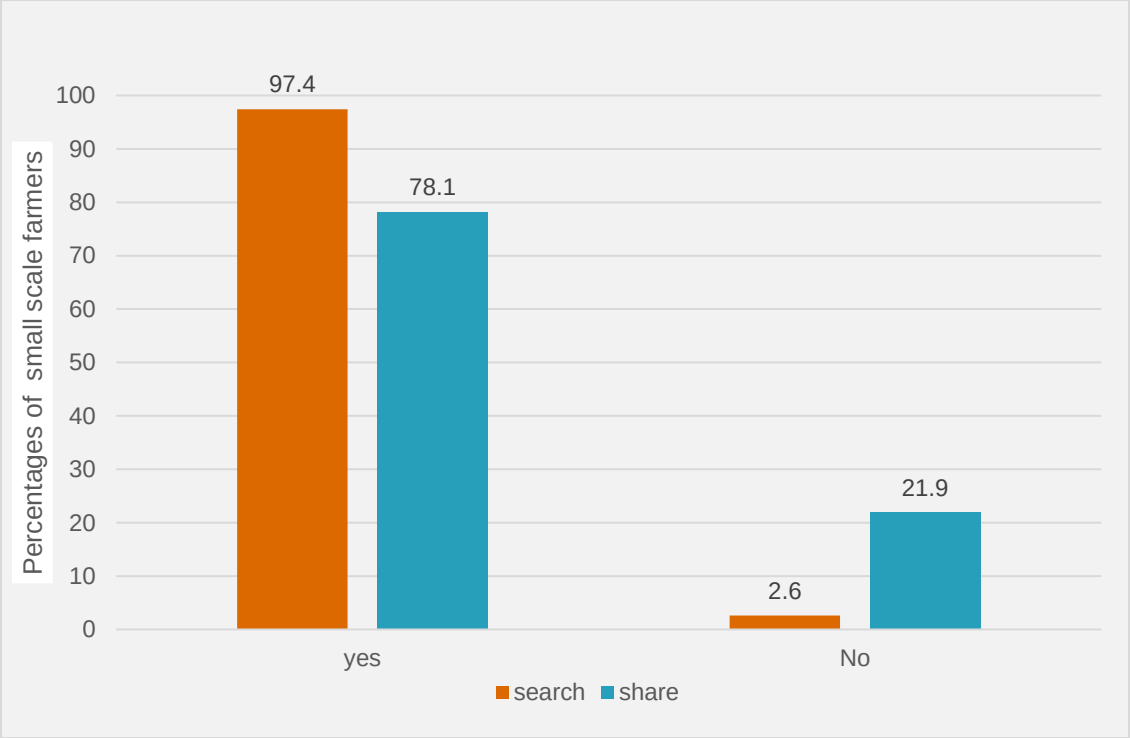

Figure 4.1: Whether farmers search and share information

Presented in Figure 4.1 states that 97.4% of the respondents confirmed that they search for information online whilst only 2.6% mention that they do not do so. However, 78.1% of respondents affirmed that they share information as contrary to 21.9% who confirmed that they do not share any information.

4.4.2 Information search between livestock and horticulture small scale farmers

Table 4.6, shows that 96% of livestock small scale farmers search for information on ICT applications whilst 3.9% do not search for information. However, 100% of horticulture small scale farmer search for information on ICT application.

Table 4.6: Percentage of different type of information searched by different farmers.

Type of farming	Information search – Yes	Information Search - No
Livestock	95%	3.9%
Horticulture	100%	0%

4.4.3 Availability of information

Figure 4.2 depicts respondents divided as to whether information they seek is always available. From the results in Figure 4.2 there was a close division as to whether information is always readily available.

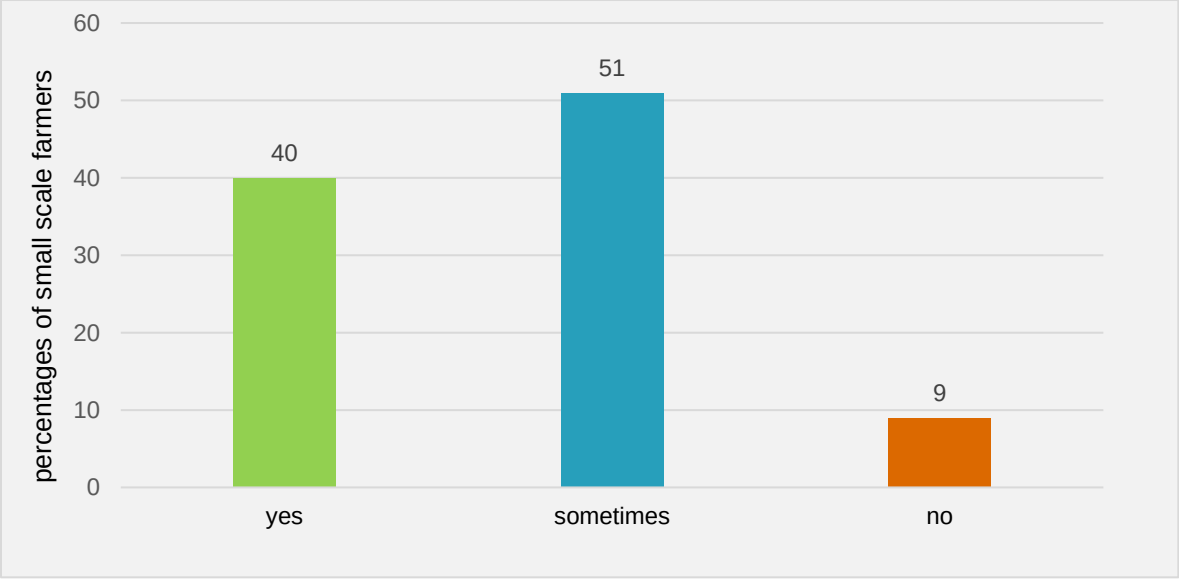

Figure 4.2: Availability of information on ICT applications

The results stated that 40% of responded agreed to information they sought as always being available whilst 51% responded mentioned that sometime the information was no longer available. Moreover 9% stated that they do not usually find the information that they seek.

4.4.4 Different platforms where farmers search and share information

The study also sort to find out the different ICT platforms where farmers share and seek for information.

i) Platforms where farmers seek for information

In the results in Figure 4.3 the study sought the different source of information by respondents. This was to establish if social network does play a role in information seeking

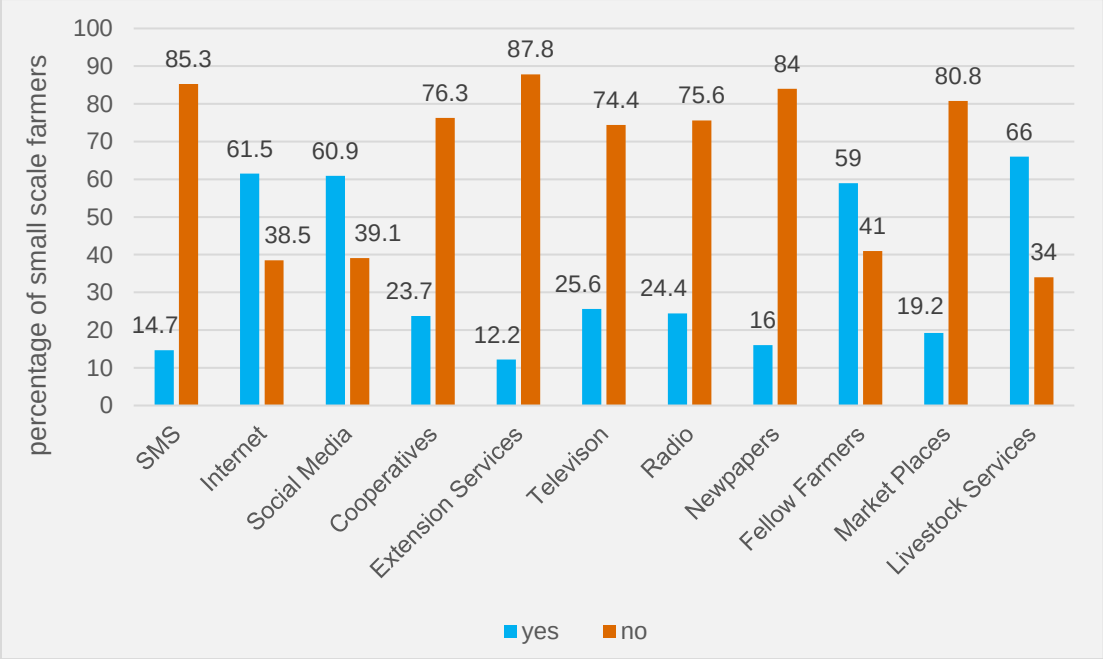

Figure 4.3: Platforms were small scale farmers seek agriculture Information

amongst small scale farmers. The two place which ranked the highest were respondents seek for information is the Livestock services cooperative at 66% with the internet at 61.5% and lastly social media at 60.9%. The least platform where farmers seek for information was through SMS and extension services.

ii) Platforms where farmers share information

Figure 4.4 above the study established that 53.8% of the respondents share information through Social media followed by 51.9% where farmers share information

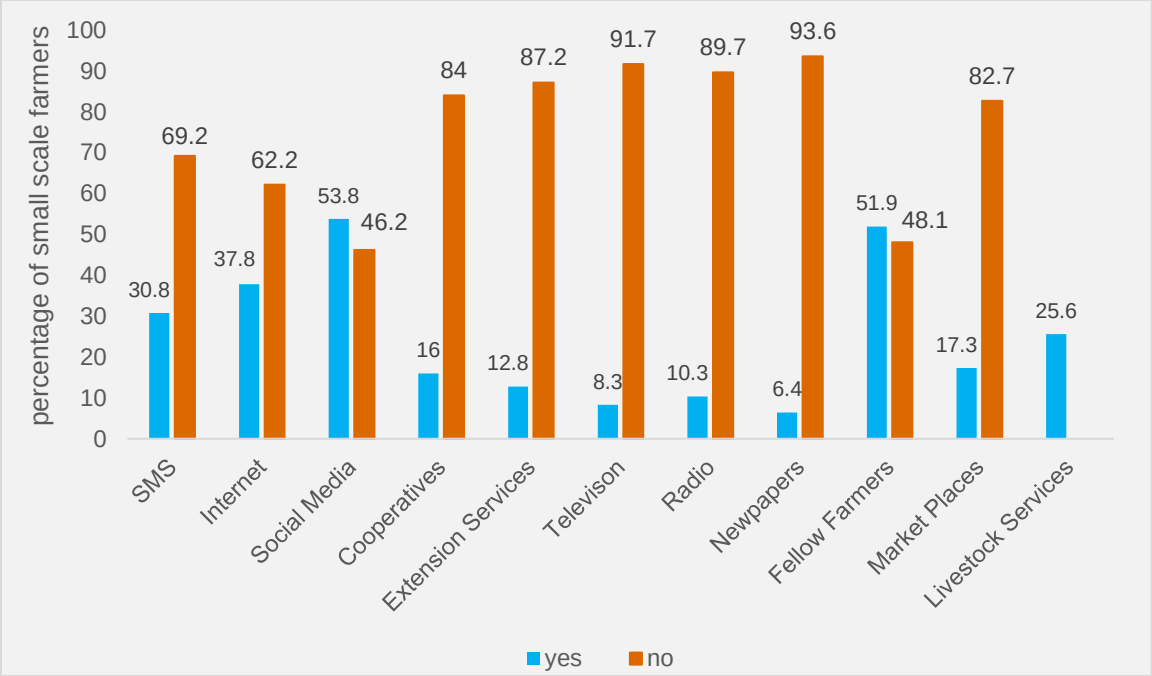

Figure 4.4: Platforms were Agriculture Information is shared

amongst themselves. The least of the platform where information is shared is television at 8.3% followed by the lowest which is the newspapers at 6.4%.

This analysis was to help find out whether farmers share information on different platforms and which platform was more prominent for information sharing. This shows that Social media is one place where most farmers share information as it had the highest score of 53.8% out of 100%.

iii) Most and least used ICT applications by various categories of small scale farmers

The table 4.7 shows the most used and least used ICT platform by the different categories of small scale farmers.

Table 4.7: Most and least used ICT platform by different small scale farmers

Type of Farmer	Source of information	
	Most used (%)	Least Used (%)
Aquaculture	Newspaper (24)	Radio (7.9)
Dairy	Social Media (17.9)	SMS (4.3)
Goat	SMS (21)	Newspaper (4)
Piggery	Magazine (41)	SMS (13)
Poultry	Radio (31.6)	Extension Services (10.5)
Vegetable	Market places (23.3)	Radio (10.5)

Table 4.7, shows the findings of the most and the least accessed ICT platforms by small scale farmers according to the type of farmers. The highest accessed by category was piggery farmers whose population of 41% access information from magazines whilst the least is information about goats which was at 4%.

iv) Frequency of Access to Social network Platforms

Furthermore, the study sort to establish as to which ICT platform the respondents' access frequently in seeking for information as shown in Figure 4.5.

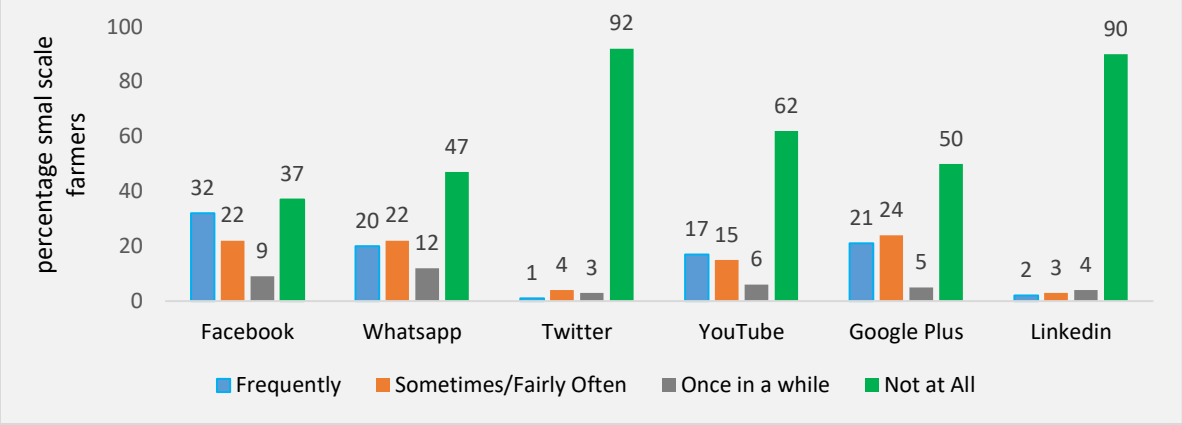

Figure 4.5: Frequency of access of ICT social media platforms

It has been deduced that Facebook scored 32% as the most frequently accessed platform. This has been followed by Google plus scoring 21% with the least being Twitter and LinkedIn as shown in Figure 4.5.

As Gakuru et al (2003) states in his findings that with the rapid evolution of ICT agricultural information is the new concept that has come into play. He also referred to it as the e-agriculture which combines enhanced technology and information delivery using ICT applications and internet.

4.5 Type of information frequently search for by farmers

Figure 4.6 deduced the frequency with which farmers seek different type of information needs on different social media platforms. The graph below was derived from a five-point likert scale. The scale was plotted as 5 = frequently, 4=sometimes, 3= fairly often, 2=once in a while and 1= not at all.

From the results in the graph Figure 4.6, the highest frequently search for information is seeking government agriculture policies whose score ranks highest at 51%. The second frequently sought for information is advice from fellow small scale farmers which ranked at 40%.

However, Figure 4.6, Sometime and FairlyOften represent the moderate seeking for information by farmers with the highest score being 36% of farmers who seek information sometime on variety of sends. It is also important to note that 16% of the farmers stated that they seek government policies Once in a while. Finally , the results revealed that 66% of small scale farmers do not seek for credit facilities information and this was followed by 54% respondents not seeking information on whether and environmental issue. The

result score for frequently and also Fairly often represents the information that farmers often seek on different ICT platforms.

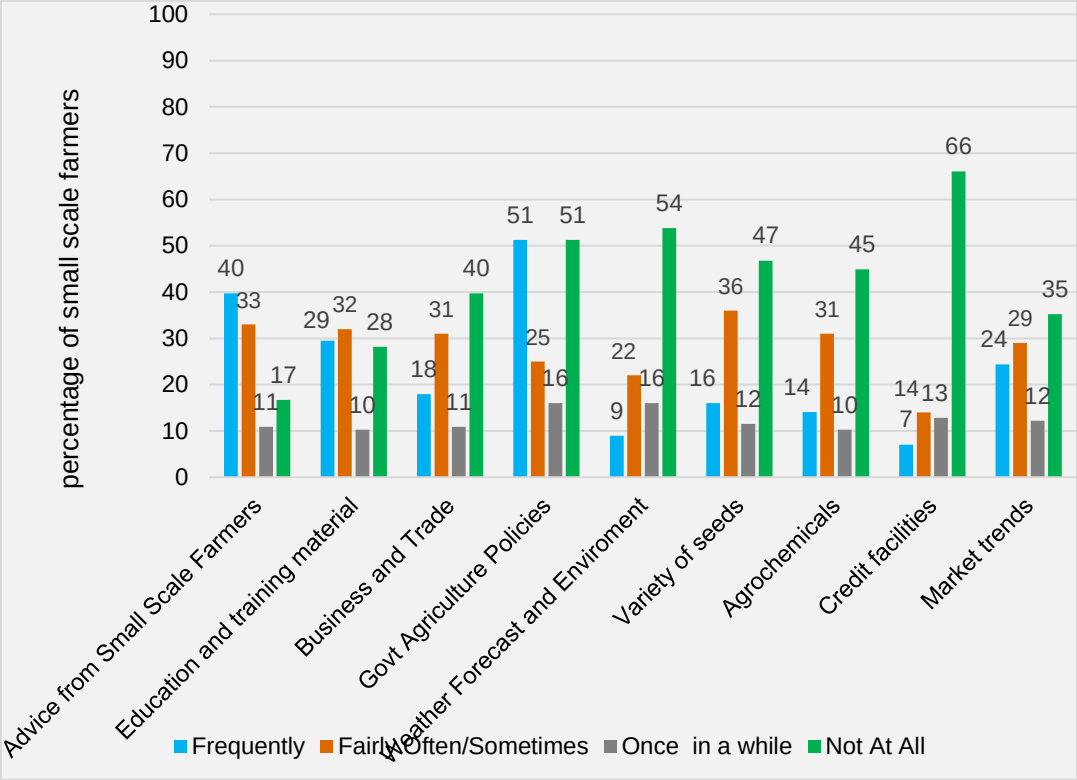

Figure 4.6: Different types of information frequently searched by small scale farmers.

From the above findings we can conclude that a majority of small scale farmers do seek information on various topics for their use in their farming activities. The most prominent information from the findings that farmer look for in their highest order are; government agriculture policies, advice from other small scale farmers, educational and training information. You will also take note that farmers have little interest in information on topics such as market trends, credit facilities and whether and environment.

As stated by Anwar and Suppat (1998) users seek information to solve problems and also the consideration of users' information needs is very critical in providing of needed based relevant information.

4.5.1 Frequencey of type of informaiton searched for by different small scale farmers groups.

Table 4.8 depicts the highest frequency that each type of small scale farmers' group spend to search for information. The highest frequency score was that 70% of Horticulture small scale farmers' search was on government policies. Whilst the least was that of Poultry farmers who spend 36% of their search on weather condition.

Table 4.8: Small scale farmers category and frequency of information search.

Type of small scale farmers	Information searched	Percentage %
Aquaculture	Educational materials	40
Dairy	Market trends	47.6
Goat Rearing	Business trends	47.2
Pggery	Market trends	45.8
Poultry	Weather conditions	36.5
Vegetable	Government policies	71.4

4.5.2 Opinion on informaton that small scale farmers search for on social media

Respondent were asked to give their opinion by agreeing or disagree on a number of issues concerning the information that they searched for on social media. The Table 4.9 below was derived from a five-point likert scale. The scale was plotted as 5=strongly agree, 4=agree, 3=moderately agree, 2=disagree and 1= strongly disagree. The researcher decided to combine number 5, 4 and 3 as their meaning are almost the same. Disagree and strongly disagree are also combined as they also mean the same.

Table 4.9: Opinion on the information that small scale farmers search for on social media

Opinion(Likert)	Agree (%)	Disagree(%)
Compare information from different sources	90.9	9
Selecting source is important	81.4	3.2
Need Agriculturist Assistance	78.8	5.8
Too much effort in search	61	23
Confused by too much information	42	41
Hard to trust information	52	32.7
Too much time taken	56.5	28.2
Information is beneficial	79.6	4.5
Difficult make decision many sources	79.5	5.1
Challenges in access social media information	47.4	37.1

In Table 4.9 reveals that 90% of respondents not only compare information to help them make decision but also 81% stated that they selected the source where to search for information. However, 42% found the information to be confusing. Moreover, 52% found it hard to trust the information that they found available. Amongst the respondents who searched for information 79% stated that they needed an Agricuturist or agriculture expert to be on some of the ICT social network applications which they visit when searching for informaiton as 52% of respondent mentioned that it was hard to trust the information they found. Despite 80% of respondents stating that information they found was beneficial, 42% found the information confusing with 79% of the respondents finding decision making difficult on the information available.

4.6 Challenges faced when accessing information

The study also established that small scale farmers faced a number of challenges when access agriculture information from Social Media. The study deduced that 56% respondents stated that they did not face any challenges whilst 44% of the respondents stated that they did face problem when accessing information. It is also important to take

note that the results showed that the respondent were equally divided as 56% of the respondent stated they faced challednges whilst almost 44% said they did not and the margin was very close.

4.6.1 Different challenges faced by respondents when access ICT applications

Different types of challenges were cited by respondents as satated in Figure 4.7. In Figure 4.7, the respondents showed that there were a number of factors that affected their access to information. The highest score of challenges was 74% which showed that farmers found it hard to make decision as there were too many sources available.

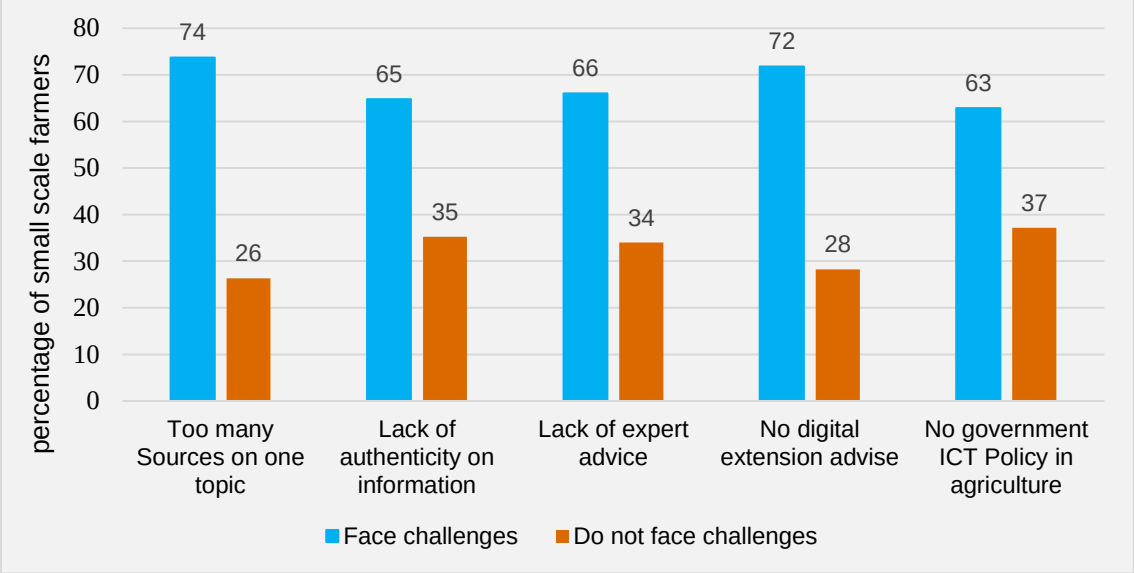

Figure 4.7: Challenges faced by farmers when accessing information on Social Media.

Small Scale farmers also cited that there was no digital extension advice which scored 72%. However, it is important to also take note of scores for the following challenges with almost similar scores;

Lack of authenticity on information	65%
Lack of expert advice	66%
No government ICT Policy in agriculture	63%

The above three similar scores depicts challenges that small scale farmers face when accessing social media information on farming.

4.6.2 Small scale farmers' partner on challenges when access information online

Farmers' partners also gave their view when asked if they were aware of the challenges that small scale face to obtain information and knowledge from different ICT application.

> *"There are many challenges when accessing information on ICT platform. Most farmers fail to select the information available as there are too many sources. There is also the issue of authenticity pertaining to social media information as the source is not verified.* (Empowering Young Farmers for National Development (ZAYAFA))

4.6.3 Farmers that faced challenges due to too many sources based on the same topic

Table 4.10 shows that 27.8% of small scale farmers face challenges due to too many source on the same topic. However, 72% of the respondents in Table 4.10 stated that they did not face any challenges despite there being too many source of information on same topic.

Table 4.10: Challenges faced by small scale farmers in information search

	Percentage %	Cumulative
Farmers that did not face challenges	72.2	83
Farmers who faced challenges	27.8	32

4.7 Need for Integrated Information and knowledge sharing support system

The main objective was to find out from small scale farmers if they required an information and knowledge sharing single support integrated system where they can find all the information that they require with minimum time of searching.

The results showed that 90.09% of the respondents were for an integrated single support system whilst 9.1% refuted the ideal of having an integrated information and knowledge sharing support system.

Table 4.11 show the results of different type of informaiton that small scale farmers would want to be foung on the integrated single support system. The topics of the information are listed in the Table 4.11.

Table 4.11: Different types of topics to be included on the integrated single support system

No.	Topic to include on the integrated information and knowledge sharing support System
1	Advice from other small scale farmers
2	Educational and training information
3	Advice from agriculture experts
4	Business and trade information
5	Government agricultural policies
6	Weather condition and Environmental information
7	Variety of seeds
8	Agrochemicals
9	Credit facilities, source, terms and conditions
10	Market trend,
11	Price and stock available
12	Animal Disease alerts
13	Agriculture research
14	Donor Partnership

4.7.1 Small scale farmers' partner on having an integrated single support system

Additionally, one other small scale farmers' partner advise that there was need for a central place
where farmers could access all their information needs;

> *"Most Small scale farmer would like to have a central place where they can access all information that they require and training. However, that is not evident in Zambia as most small scale farmers depend on Livestock services cooperation. It would be ideal for them to access information without leaving their areas as it tend to be costly. Extension services office are non existence in Zambia." (* National Association for Peasant and Small Scale Farmers of Zambia – NAPSSFZ)

4.8 Implementation of Information and Knowledge Sharing Support System

This section looks at the implementation of Information and Knowledge sharing single support system for small scale farmers in Lusaka Province. Incidentally, Rolling (1988), uses a systems approach to describe agricultural information as;

> *" ...a system in which agricultural information is generated, transformed, consolidated, received and fed back….to underpin knowledge utilization by agricultural producers".*

From the above quote it is imperative that an information and knowledge sharing information system be set up where farmers could access all the information that they require in one place.

4.8.1 Conceptual Framework for Small Scale Farmers Knowledge and information sharing

In this study a conceptual framework was necessitated after having reviewed literature and also seeing the findings of the study which deduced that small scale farmers would want an integrated single support system.

The term concept means something which is conceived in the mind. The conceptual framework diagram is essentially an illustration showing the arrangement and relationship of key variables within a system by using symbols that can easily be understand. A conceptual diagrams is 'thought drawing' which means putting thoughts on a visual diagram (Maryland, 2018).

The reasons for using the diagram in this research were to help communicate the key message and visualize scientific data, provide a better understand of the big picture which one cannot capture with a single photograph and lastly better define words that are ambiguous by committing the image to the message being portrayed.

In this study conceptual framework was derived from the literature reviewed and data collected and analysed. The variable identified were ICT platform available, information shared, challenges faced in accessing and sharing knowledge and Information and also developing a single support system. The Conceptual framework consisted of four stages depicting the availability of platforms, accessibility of information sought, challenges being faced and farmers' information need search and sharing of information by small scale farmer. Figure 4.8 depicts independent variables which are the different platforms, accessibility of information, sources of information and challenges experienced by Small Scale Farmers in accessing agricultural information. These are depicted as influencing the effectiveness of ICT social social networks as the source of agriculture information which forms the dependent variables which are authenticity and reliability of ICT Social Networks.

Incidently, another conceptual framework was adopted from review of literature from a study 'Use of ICT Social Network as a source of agricultural information by small scale farmers (Apppendix E). A Case Study of Lower Kabete, Kiambu Country' (Wangu, 2014) which is one example of a conceptual Frame work. In this concept Wangu (2014) depicts independent variables as being farmers' information needs, farmer information seeking behavior, accessibility and utilization of agricultural information and challenges experienced in accessing agricultural information. These independent variables are conceptualized as influencing the effectiveness of social media as a source of agricultural information. Wangu (2014) also look at what factors affect the independent varibles being

awareness and literacy levels and agricultural extension support, which form the intervening variables.

However, for this study as shown in Figure 4.8, the independent variables are the different platforms, accessibility to information, sources of information and challenges experienced by Small Scale Farmers in accessing agricultural information. These are conceptualized as influencing the effectiveness of ICT social networks as the source of agriculture information which forms dependent variable. This association is also further conceptualized as being affected by factors such as information authenticity and information availability.

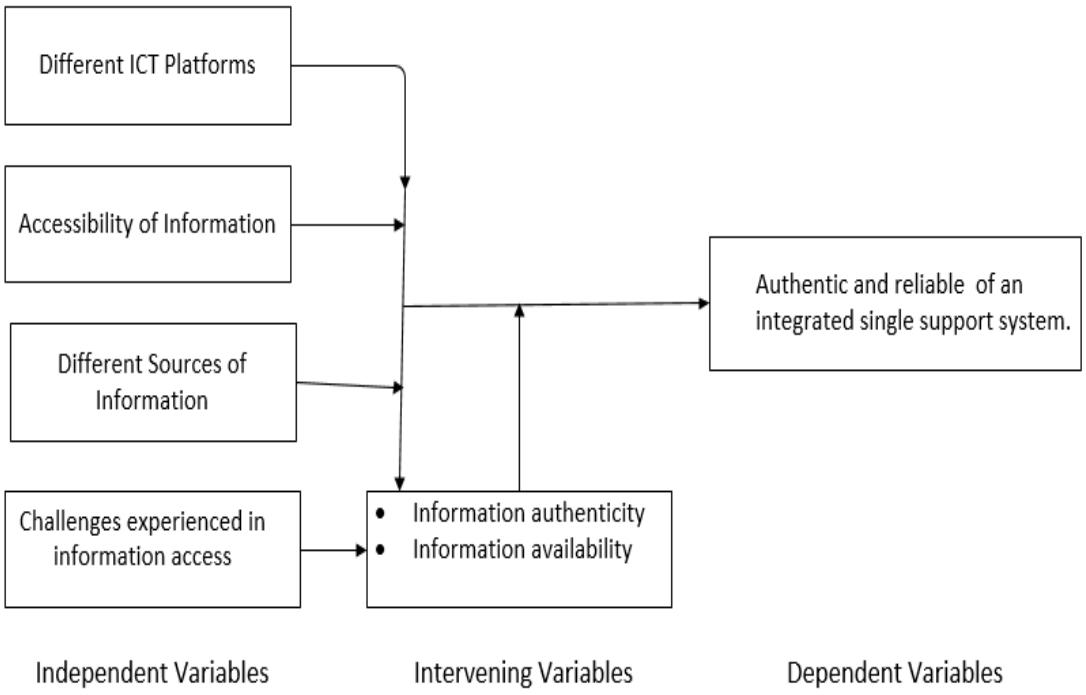

Figure 4.8: Conceptual Framework for Small Scale farmers information and knowledge sharing platform (created by researcher)

The single support system prototype whose homepage is shown Figure 4.8 was derieved from the Conceptual Framework in Figure 4.8.

4.8.2 Small Scale Farmers Hub Implmentation

In this section, we look at the results of information and knowledge sharing amongst small scale farmers and their need to have a 'One Scale for all Single Support System.

The small scale farmers' hub depicted below here was developed by the researcher to show what the respondents want to see when accessing information and knowledge on a 'One Stop for All' ICT platform. The hub has a home page and also a number of options to cater for different type of farming production information.

Once a small scale farmer go the the home page, they will be able to select under the different type of farming activities what their needs are. It is from here where they will be able to navigate to more pages to get information. This is all depicted in the pages following from here.

4.8.3 Home Page of the Website

Figure 4.9 depicts a homepage that shows different links about the different farming information that a farmer can access when they open the home page. The home page displays a window where respondents an send questions to the the experts on the different issue that they might required information.

The interaction on this hub is dynamic in the responses are sent to each individual respondents without showing it on the site.

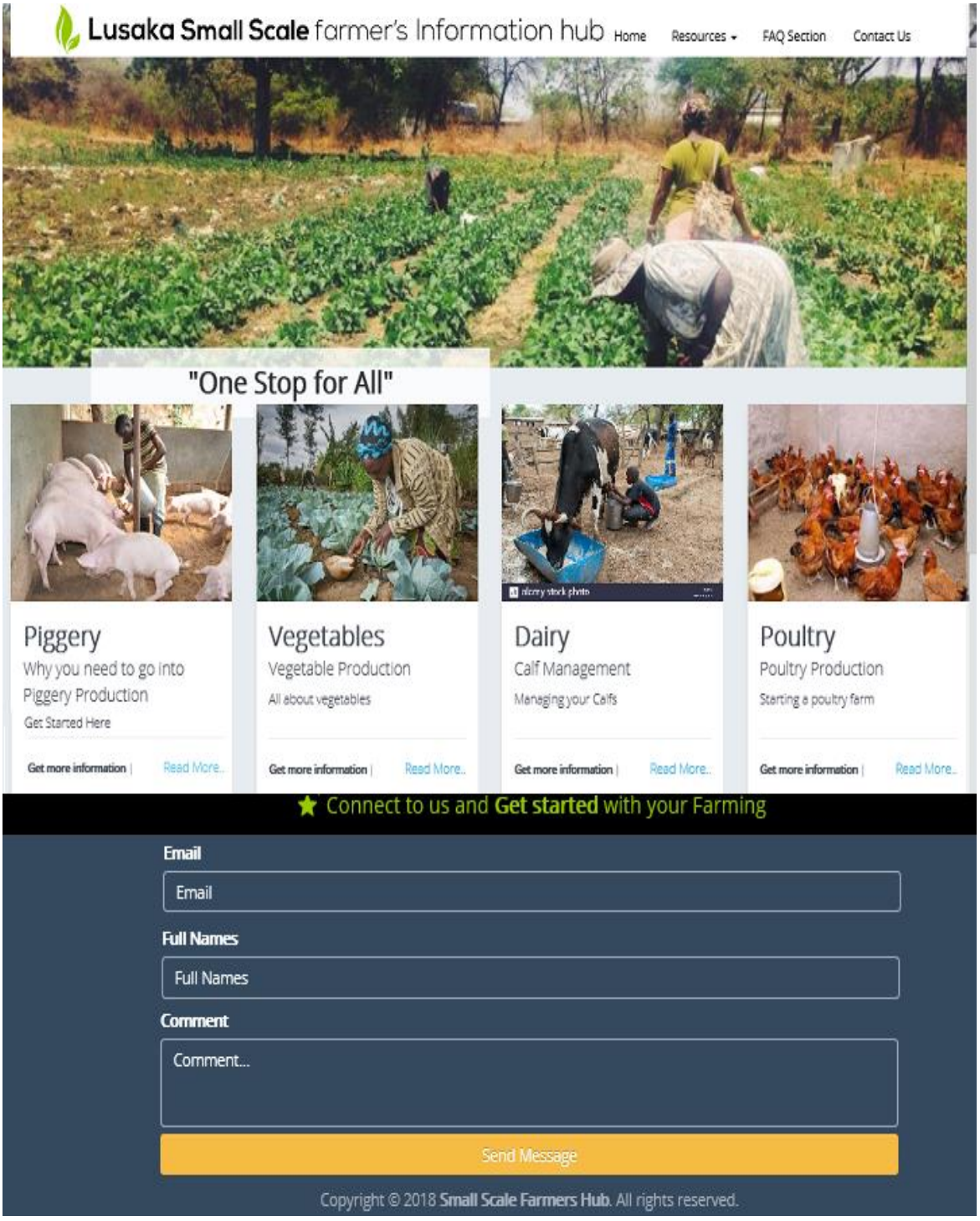

Figure 4.9: Home page for Small Scale Farmers single support system (created by researcher)

4.8.4 Different categories of information

A farmer can also choose what they are looking for by selecting one of the links as shown below in Figure 4.10. The categories were created so that it is easy for the small scale farmers to choose which type of information pertaining to farming activity they can need.

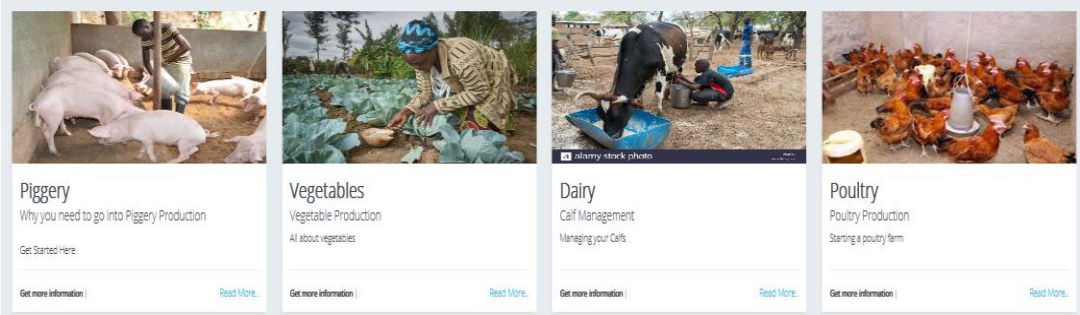

Figure 4.10: Different type of information on the support system(created by researcher)

If one clicks on Piggery category in Figure 4.10 and they select "Read More", they will get more information on as shown below here in 4.8.3.

4.8.5 Choosing a Specific category – Piggery

Once a small scale farmer decides to select for one of the options such as the first option shown in Figure 4.11 which is Piggery, a page will open as shown in Figure 4.11 giving more information.

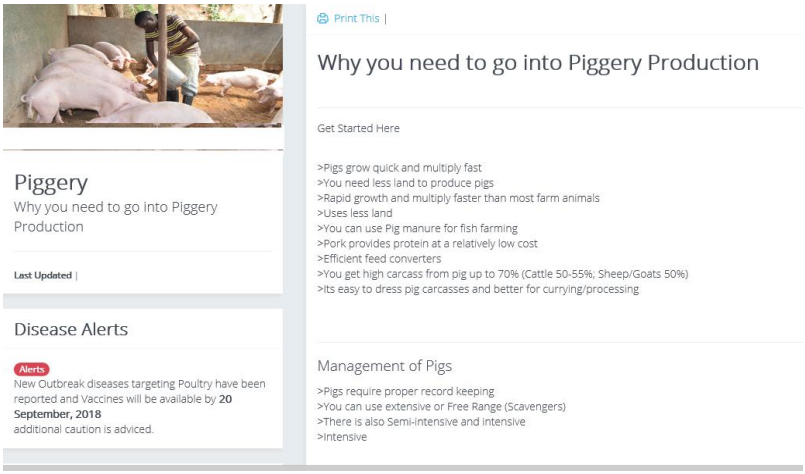

Figure 4.11: Page dedicated to Pig production on the Hub(created by researcher)

4.8.6 Expert Presence

Provision for asking questions through email which will be responded to by the veterinary doctors behind the scene was included. Figure 4.12 is an addition to the hub where questions can be asked and sent to experts who are members or administators on the hub. These questions will be answered by different agriculture experts inclusive veterinaries.

Figure 4.12: Expert presence for answering questions(created by researcher)

4.8.7 Process of the interaction between expert and small scale farmer

Figure 4.12 is a screenshot of a farmer sending a question through the page shown in Figure 4.13 window. The sender gets a prompt shown at the bottom of Figure 4.13 advising that the question is awaiting a response from the experts.

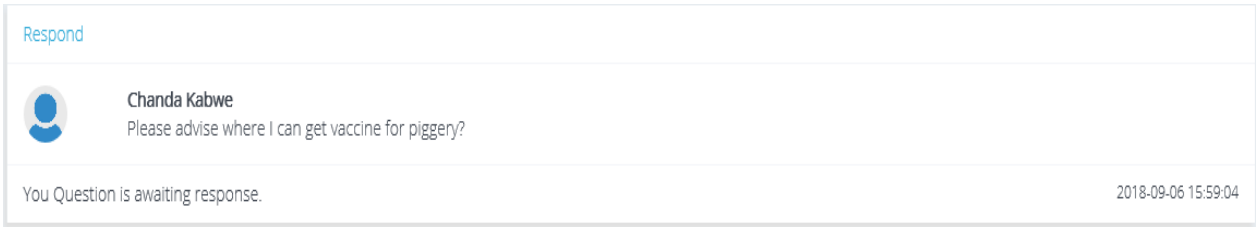

Figure 4.13: View of question asked by a farmer(created by researcher)

4.8.8 Viewing response to question

Figure 4.14 is a window prompting the farmer to view the answer. Once the farmer clicks on on view answers he or she gets a response where to get the items which they were asking in the question.

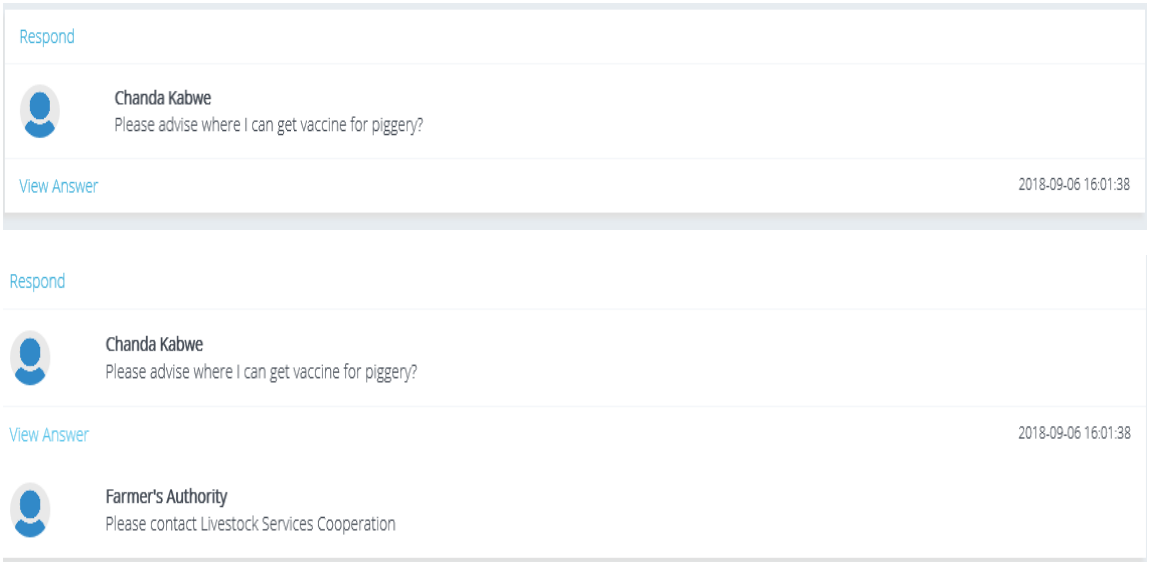

Figure 4.14: View of the response by expert(created by researcher)

4.8.9 Administrator View for small scale farmers' hub

To make it easier for administrator and experts on the small scale farmers' hub to make changes. The administrator backend was created as shown in Figure 4.15. In Figure 4.15 is the administrator's window which require credentials to log in. This is the backend of the system that is used by the experts to answer questions.

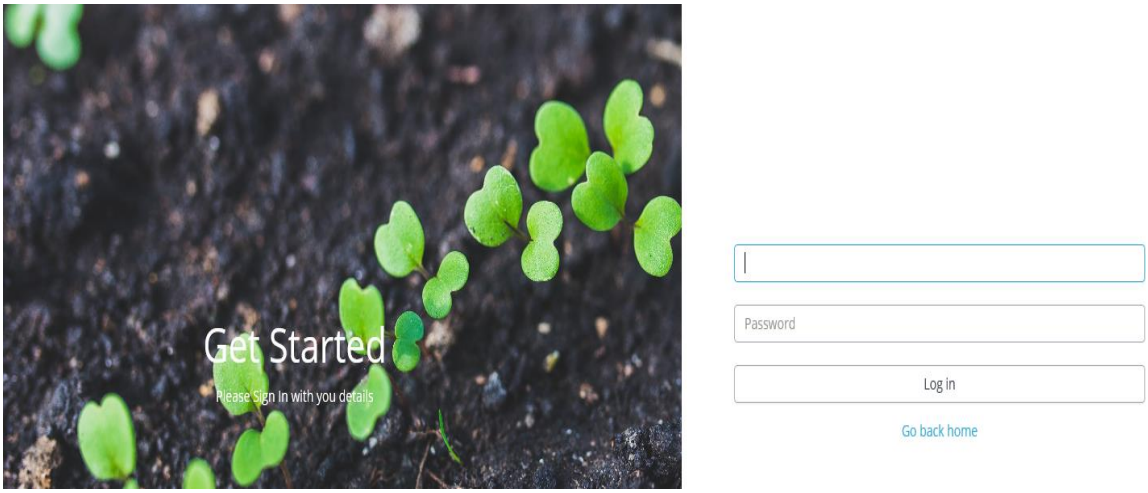

Figure 4.15: Administrative window(created by researcher)

4.9 Summary of Findings

This chapter has presented the findings from the participants on the Information and Knowledge sharing using ICT amongst small scale farmers in Lusaka Province. It begun by presenting quantitative results obtained through the questionnaires which the small scale farmers in Lusaka Province completed. This is followed by interview results from some of the small scale farmers partners.

The prototype for a single support system was also implemented that was able to send responses of questions depicting expert responses.

CHAPTER FIVE: CONCLUSION AND RECOMMENDATION

5.1 Introduction

From the research findings, the researcher, directed the objectives of the study at hand by concluding, stating implication and recommending the following to help small scale farmers in their implementation of an integrated single support system for their information and knowledge access and sharing in real time.

5.2 Discussion

From this study it is deduced that small scale farmer so search and share information on Social Networks. They compare information in order to try and find authentic information. The findings of this study is important for policy makers, small scale farmers's partners and the government through Ministry of Agriculture and Minsitry of Fisheries and Livestock as they are the main stakeholders. These stakeholders should implement an ICT integrated single support system.

The findings will also enable small scale farmers' partners come up with deliberate policy on the use of ICT applications for small scale farmers in the way that can help them access and share information in real time which is authentic

There is also need for periodical research to be conducted so as to continute ascertaining the use of ICT applications for information and knowledge sharing amongst small scale farmers which should include the study on the impact and benefits of using ICT applications in other provinces of Zambia.

5.3 Conclusion

There are various social networking knowledge and informaiton sharing application available. Using the various social networks for sharing knowledge and information, differen type of information is shared and searched for amongst small scale farmers.

However, most of the informatiion on the sites lack authenticity, not scientifically backed and also not always available.

In order for small scale farmers' informtion requirement to be fullfilled, research findings showed that small scale farmers would want an ICT single support integrated information system where they can find information they require in real time. The research developed a prototype of an ICT single support system. The prototype depicts the involvement of expert presence to provide the small scale farmers with the authenticity that they require from the information being sought. The integrated single support system is not to do away with social networks but the whole purpose is having a 'One Stop for All' system where agriculture authentic information could be accessed in real time. This will save small scale farmers time by not spending too much time searching and comparing information.

Additionally, small scale farmer would want government to come up with deliberate Agriculture ICT policy on use of ICT applications in the way that will help them have access to information in real time. It is also important to take note that in the National Agricultural Extension and Advisory Services Strategy - 2017-2020 by Ministry of Agriculture and Ministry of Livestockand Fisheries, one of the objective the Ministry has put across for implementing is the use of ICT technology to disseminate information using mobile technology and internet. This will be through digitized extention service which will help avoid delays in acess and sharing with farmers.

5.4 Recommendation

The findings rasied in this study show that small scale farmers are always seeking and sharing information pertaining to their needs. Incidentally, Rolling (1988), uses a systems approach to describe agricultural information as;

> " …a system in which agricultural information is generated, transformed, consolidated, received and fed back….to underpin knowledge utilization by agricultural producers."

From the above quote it is imperative that a single integrated support system for information and knowledge sharing is set up where small scale farmers could access all the information that they require in one place. However, whilst many small scale farmers are increasingly using ICT platforms, information requirements should be analysed and documented and then adequate information system be developed (Samah, et al., 2009). Hence, there is need to carry out continuous research to update these the stakeholders as ICT continues to envolve.

5.5 Suggetion for further studies

The present research focused on the use of ICT application as a means for searching and sharing information with reference to small scale farmers in Lusaka Province. Some of the studies should focus on benefits of using ICT applications by Small Scale Farmers and also need to have an ICT policy for small scale farmers.

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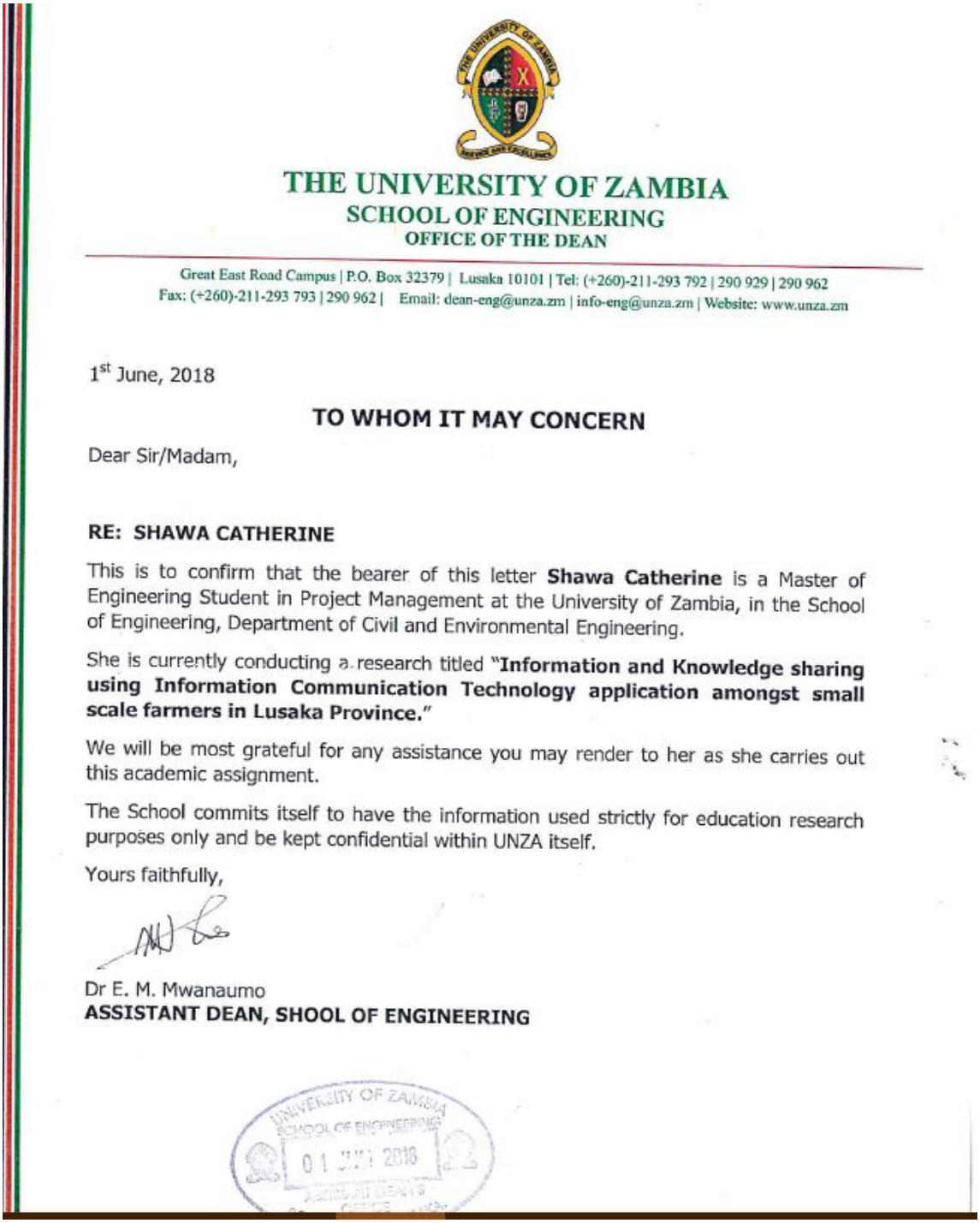
APPENDICES

Appendix A:

Authorisation letter to conduct Research



THE UNIVERSITY OF ZAMBIA
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1st June, 2018

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

RE: SHAWA CATHERINE

This is to confirm that the bearer of this letter **Shawa Catherine** is a Master of Engineering Student in Project Management at the University of Zambia, in the School of Engineering, Department of Civil and Environmental Engineering.

She is currently conducting a research titled **"Information and Knowledge sharing using Information Communication Technology application amongst small scale farmers in Lusaka Province."**

We will be most grateful for any assistance you may render to her as she carries out this academic assignment.

The School commits itself to have the information used strictly for education research purposes only and be kept confidential within UNZA itself.

Yours faithfully,

Dr E. M. Mwanaumo
ASSISTANT DEAN, SHOOL OF ENGINEERING

UNIVERSITY OF ZAMBIA
SCHOOL OF ENGINEERING
01 JUN 2018
ASSISTANT DEAN'S OFFICE

Appendix B:

Summary of Literature Review and Critique

No.	Year	Study Site	Author	Title	Objectives	Methodology/Methods	Conclusion	Comments/Critique
1	2014	Kenya	Kuria Catherine Wangu	Use of Social Medial as a source for Agriculture Information by Small Scale Holder Farmers: A case study of lower Kabete, Kiambu County.	Investigate use of Social Media as a source of agriculture information with reference to Kiambu County	Questionnaire	Agriculture information sort by farmers. Majority go a step further seeking by use of social media. Majority do not seek market based information, price, stock and credit facilities. Farmer seek information from various avenues on the internet.	Despite the study being general, the researcher deduced social media is largely beneficial as a source of agriculture information. Again she contradicted herself by saying majority are discouraged by the technical difficulties in access information. I believe if she had narrowed the study it was going to give a more definite result or conclusion.
2	2016	Kenya	Kipkurgat Thomas and Onyiego Michael et al; 2016	Impact of Social Media on Agicultural Extension in Kenya: a Case of Kesses District.	To assess the use of social media as a source of agricultural information with reference to farmers in Kesses District.	Interviews	Found majority of farmers see information through social medial mostly on scientific, educational and technology based, training information, agrochemical and technology information.	The research focused on a number of ICT tools and not one in particular. Therefore, it is difficult to pin point as to which one will be more ideal for Small Scale Farmers.

No.	Year	Study Site	Author	Title	Objectives	Methodology/ Methods	Conclusion	Comments/Critique
3		Kenya	(Irungu, et al, 2015)	Information and Communication Technologies (ICTs) Attract Youth into Profitable Agriculture in Kenya.	Show the beneficial use of Information and Communication Technologies (ICTs) in agriculture among youth in Kenya. Assessed ICT application and used tools, experienced challenges, impacts and suggested future ICT use.	Review of studies, focus group discussions, personal interviews and key informant interviews.	ICTs in agriculture increased opportunities, increased the capacity of the youth to engage in profitable agriculture.	The researcher looked at a number of ICT tool which are used by farmers in Kenya and not just one specific tool so that he can get more insight on it. The research was too broad. .
4	2012	Zimbabwe	(Chisita, C.T., 2012)	An investigation into the impact of ICT's in the provision of agricultural information to small scale farmers in Harare, Zimbabwe.	To find out methods and means of disseminating agricultural information to the small scale. Explain how I.C.T's impacts on agricultural production among small scale farmers in Zimbabwe. Explain the extent to which information provision is utilized in promoting dissemination of agricultural information. .	Survey	Researcher found potential in harnessing ICT's for disseminating agricultural information which will allow small scale farmers to share knowledge and experience through utilizing social media, tele centers and other ICT driven communication devices.	The researcher should have streamlined the research to either ICT or ICT Tool. There seem to two research in one. On centered on ICT Mediums such as radio, television and podcast and another on information services available to rural areas in Zimbabwe. Research should have been narrowed.

No.	Year	Study Site	Author	Title	Objectives	Methodology/ Methods	Conclusion	Comments/ Critique
5	2016	Kenya	Litondo, et al.,	ICT and Marketing decision amongst small scale farmers in Kenya.	Examine how ICTs are being used to facilitate decision making in agricultural sector amongst small scale farmers in Kenya.	Literature reviews on ICT and Marketing decisions of farmers.	ITC to address multiple constraints to provide or integrate ICT Services with other support activities.	After having concluded Litondo, et al 2016 seem to suggest the need to come up ICT service with other support activities. In my view he is saying that there is need for an integrated support system where these farmers could get their information.
6	2016	Switzerland	Bhattacharjee Suchiradipta and Saravanan Raj	Social Media: Shaping the future of agricultural extension and advisory services.	Use of Social Media in agricultural extension and advisory	Structure Survey Questionnaire	The research found that there was lack of authenticity share online despite Face book was found to be the most popular social media Platform.	This researched looked at a number of Social media platform and not just one. Again this cited social media in general and not one of the platforms.

No.	Year	Study Site	Author	Title	Objectives	Methodology/ Methods	Conclusion	Comments/ Critique
7	2012	Ethopia	Kwadwa Asenso-Okyere and Daniel A. Mekonnen	The importance of ICTs in the Provision of Information for Improving Agricultural Productivity and Rural Incomes in Africa	Examine evidence on the role of emerging ICTS in the agricultural sector in Africa with lessons from Asia with respect to farmers' access to information and other services that help improve agricultural productive, practices and farmer livelihoods.	Working Paper	Despite evidence that rural incomes have been increasing with the use of ICTs to access knowledge and information, there was still a challenge in making ICT available to a large number of rural population who are engaged in agriculture.	The study was too general as it spoke about ICT without being specific as to which tool in question.
8	2013	Nigeria	Nnenna A Ezeh	Access and application of information and communication technology(ICT) among Farming households of South East Nigeria.	Analyze the access and application of information and technology (ICT) among farmers of South East Farmers, Nigeria.	Questionnaire	Found that the level of ICTs applications to farming operations of the farmers was low, and need for efforts to create awareness	The study was general as not specific as to which tool farmers can use. Hence you one cannot pin point as to which tool can farmers use for their information communication.

No.	Year	Study Site	Author	Title	Objectives	Methodology /Methods	Conclusion	Comments/Critique
9	2013	Kenya	Mwombe,et al.,	Evaluation of Information and Communication Technology Utilization by Small Holder Banana Farmers in Gatanga District, Kenya.	Determine factors influencing intensity of use of ICT tools and assess whether use of ICT has a significant influence on adoption of tissue culture bananas by small scale farmers in Gatanga District Kenya.	Questionnaire	The study concluded that there was need to demystify ICT training at all level of education.	Again the study looked at different ICT tools being used by farmers. The study was generally on different tools.
10	2017	India	Darshan N.P and Meena B.S.	Constraints in Using Internet and Social Media as Perceived by Farmers in Karnal District of Haryana, India.	Analyze constraints faced by farmers in using social media in Karnal district of Haryana State, India.	Semi-structured interview	Farmers felt high cost of stat was the main constraint, followed by network and speed and also difficult to find relevant information due to large number of source.	This study looked at the constraints that farmers face when using internet and social media when accessing information. I believe it could have been stream lines again by looking at either the constraints faced when using social media or when using internet.
11	2005	Botswana	Kalusopa Trywell	The challenges of utilizing information communication technologies (ICTs) for the small-scale farmers in Zambia.	To discuss some key challenges that Zambia faces in the application of information communication technologies (ICTs) for the small-scale farmers. .	Survey		Study cited need clear national policy framework on use of ICTs for the small-scale farmers to enhance national development Researcher did not indicate areas to include in policy.

Appendix C: Questionnaire

This is a questionnaire for an academic study on sharing Information and knowledge by small farmers in Lusaka Province of Zambia using social media. The information provided will be used for this study only and will be held with the utmost confidentiality.

SECTION A: DEMOGRAPHICS

1. What is your gender?

a) Male [ ]

b) Female [ ]

2. What is your age category?

18-22 [ ]

23-27 [ ]

28-32 [ ]

33-37 [ ]

37 and above [ ]

3. What is your highest level of Education?

Primary Level [ ] Certificate Level [ ]

Secondary Level [ ] Certificate Level [ ]

Diploma Level [ ] Degree Level [ ]

Masters Level [ ] PhD Level [ ]

4. What type of farming are you engaged in?

Piggery [ ]

Vegetable [ ]

Poultry [ ]

Goat rearing [ ]

Dairy [ ]

Fish Farming [ ]

Others (please specify)

…….

SECTION B: PLATFORMS AVAILABLE FOR INFORMATION AND KNOWLEDGE SHARING FOR SMALL SCALE FARMERS. (RESEARCH QUESTION 1)

1. Do **you SEARCH** for information and knowledge on different platforms?

   a) Yes [ ]

   b) No [ ]

2. Is the information you look for readily available?

   a) Yes [ ]

   b) No [ ]

   c) Sometimes [ ]

3. Do **you SHARE** information on any platform?

   a) Yes [ ]

   b) No [ ]

If **"Yes"** to No.3 above please select the different platforms where you share your information from the list below here if **"No"** go to No. 4

a) SMS [ ]

b) The Internet [ ]

c) Social media [ ]

d) Cooperatives [ ]

e) Extension Services [ ]

f) Television [ ]

g) Radio [ ]

h) Newspapers [ ]

i) Magazines [ ]

j) Other Farmers [ ]

h) Market places [ ]

i) Livestock Services [ ]

j) Others (pleased specify)

……

……

……

Where do **you GET** your agricultural information from? Tick where appropriate (can be more then one source).

a) SMS [ ]

b) The Internet [ ]

c) Social media [ ]

d) Cooperatives [ ]

e) Extension Services [ ]

f) Television [ ]

g) Radio [ ]

h) Newspapers [ ]

i) Magazines [ ]

j) Other Farmers [ ]

k) Market places [ ]

l) Livestock Services [ ]

m) Others (pleased specify)

……

……

4. Which Social media do you **FIRST** go to for search of information and knowledge? Kindly indicate the priority on the scale of 1-5. Where, 5 being the first place you go to search for information.

5= Frequently, 4= Fairly Often, 3= Sometimes, 2= Once in a While,

1= Not At All,

	1	2	3	4	5
Face Book					
Whatsapp					
Twitter					
You Tube					
Google Plus					
Linkedin					

Others (please specify)

……

……..……

SECTION C: TYPE OF INFORMATIONAND KNOWLEDGE SHARED AMONGST SMALL SCALE FARMERS (RESEARCH QUESTION 2)

1. Below is a range of possible information being shared on social media. Kindly indicate the type of information **you search for frequently** depending on your needs on the scale of 1-5, where.

   5= Frequently, 4= Fairly Often, 3= Sometimes, 2= Once in a While,

   1= Not At All,

	1	2	3	4	5
Advice from other small scale farmers					
Educational and training information					
Business and trade information					
Government agricultural policies					
Weather condition and Environmental information					
Variety of seeds					
Agrochemicals					
Credit facilities, source, terms and conditions					
Market trend, price, and stock available					

2. What is your opinion on the information that you search for on social media. Kindly

indicate your level of agreement with each item as it applies to you.

Use a scale of 1-5 where:

5= strongly agree , 4= agree, 3= moderately agree, 2= disagree and 1= strongly disagree,

	1	2	3	4	5
I compare information from different sources					
Selecting a source is important					
I need assistance from an agriculturist					
It takes a lot of effort to search information					
I feel confused by too much information available					
It is hard to decide which information to trust					
I feel it takes time to search for information					
I find the information I search for beneficial					
I get as much information as possible before making final decision					
Encounter challenges when trying to access information from Social media					

SECTION D: CHALLENGES EXPERIENCE IN ACCESSESSING AGRICULTURE INFORAMTION ON SOCIAL MEDIA (RESEARCH QUESTION 3).

1. Do you face challenges with accessing Agriculture information on Social media?

   a) Yes [ ]
   b) No [ ]
   If **'Yes'** go to No. 2, if **'No'** go to No. 3

2. Challenges faced when accessing agriculture information

	Tick
Too many sources on one topic	
Lack of authenticity on the information being provided	
No credible source on market information on social medial.	
Lack of expert advice	
No digital extension advise	
Lack of government policy on ICTS in Agriculture	

Others:……..…….
……

3. Do you have any recommendation to improve the information and knowledge sharing amongst small scale farmers.
   ……
   ……
   ……

SECTION E: INTERGRATED INFORMATION AND KNOWLEDGE SUPPORT PLATFORM (RESEARCH QUESTION 4).

1. Is there need for an integrated information and knowledge sharing support system?

   a) Y e s [ ]

   a) No [ ]

2. If your answer is **'Yes'** in No. 1 above, what type of information would you like to see on the Integrated platform? Please select by ticking, you can select more than one option.

	Tick
Advice from other small scale farmers	
Educational and training information	
Advice from agriculture experts	
Business and trade information	
Government agricultural policies	
Weather condition and Environmental information	
Variety of seeds	
Agrochemicals	
Credit facilities, source, terms and conditions	
Market trend,	
Price and stock available	
Animal Disease alerts	
Agriculture research	
Donor Partnership	

Any other additional information to add to No. 2.....

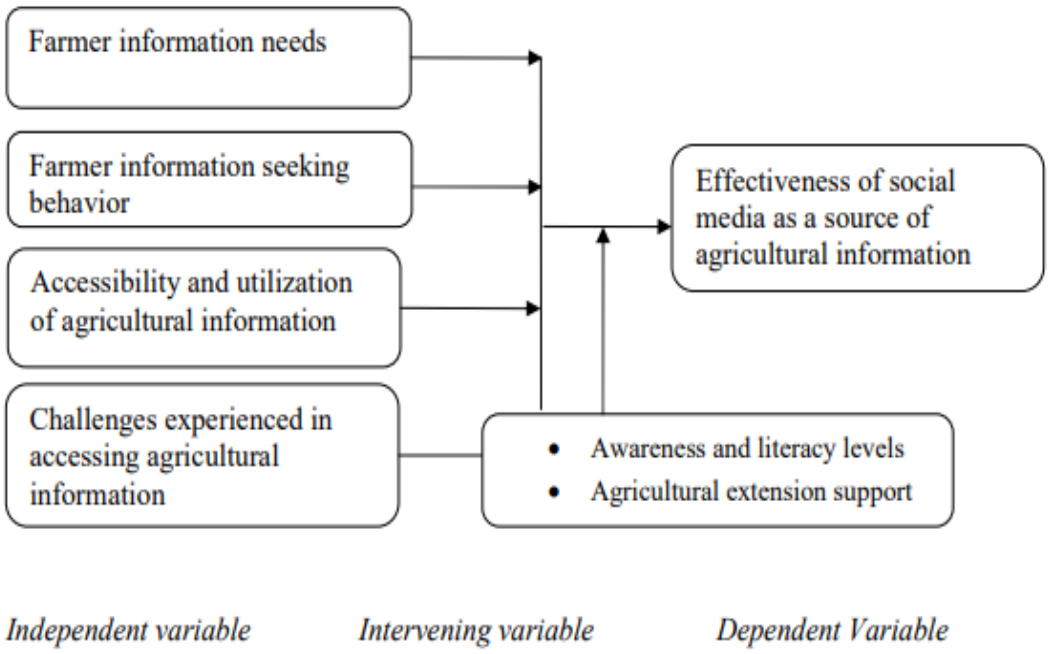
THANK YOU FOR YOUR TIME

Appendix D: Interview Schedule

1. Do small scale farmers actively seek for information?
2. What kind of information do small holder farmers look for?
3. What type of information does your office offer to small scale farmers?
4. What medium is used by your office to offer small scale farmers information?
5. Does lack of information hinder agricultural development for small scale formers?
6. Do you think the media has an alternative for providing agricultural information?
7. In your opinion can farmers fully rely on the social media for reliable information?
8. What kind of information are farmers seeking from social media?
9. What is your opinion on the use of social media as a source of information?
10. What challenges are face by small scale farmers when they are trying to obtain information?
11. What challenges do you think smallholder farmers encounter when obtaining information from social media platforms?

Appendix E:

Conceptual Framework for A Case study of Lower Kabete, Kiambu County Use of Social Media as a Source of Agricultural Information by Small Holders Farmers



Source: A Case study of Lower Kabete, Kiambu County on Use of Social Media as a Source of Agricultural Information by Small Holders Farmers