# THE EFFECTIVENESS OF MOBILE TELEPHONY SMS IN AGRICULTURE EXTENSION INFORMATION: THE CASE OF SOKO+ SMS SERVICE IN SIPILI OLMORAN WARD IN LAIKIPIA COUNTY.

By

Getrude Esther Lung'ahi

A Research Project Submitted in Partial Fulfillment of the Requirements for the Award of the Degree of Master of Arts in Communication Studies, School of Journalism UNIVERSITY OF NAIROBI

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## DECLARATION

This research project is my original work and has not been presented anywhere to the best of my knowledge. No part of this thesis may be reproduced without the prior permission of the author.

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Signature......Date.....

This research project has been submitted with our approval as the university supervisors

Elias Mokua , PhD (Supervisor)

Date

# DEDICATION

To my parents Samson and Janet Atsyaya

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# ACRONYMS

ALIN	Arid Lands Information Network
ICTs	Information Communication Technologies
TAM	Technology Acceptance Model
SMS	Short Messaging Services
Soko+	Market information portal

#### **ABSTRACT:**

Mobile telephony has become an important Information and Communication Technology (ICT) tool used by farmers to access agriculture extension services in rural areas. With its widespread, SMS services should find more use as they offer easy accessibility. The use of mobile telephony SMS in accessing agriculture extension information is key yet factors that influence uptake by small scale farmers in rural areas is under researched considering the emergence of many innovations on mobile telephony that is geared towards supporting agriculture extension services. This study therefore seeks to find out the effectiveness of mobile telephony SMS in the uptake of agriculture extension information in Sipili Olmoran ward in Laikipia County basing on Soko+ SMS service as the case study. The study reviews factors that influenced uptake and rejection of SMS in delivery of agriculture extension information while also looking at existing agriculture extension information needs and information systems in Sipili Olmoran ward used by small scale farmers. The study is guided by Technology Acceptance Model theory. The study adopts case study research design. Target population was 310 farmers who were trained on Soko+ SMS where a sample of 20 percent of the farmers was involved in the study. The study also included agriculture extension officers and ALIN staffs. Questionnaires and key informant interviews were the main sources of primary data. Purposive sampling technique was used to select participants. Data was analyzed using charts, frequencies, percentages, descriptive statistics and chi squares generated by the use of Statistical Package for Social Sciences (SPSS). The study findings show that access to mobile phone, provision of relevant information, trainings, competition among information providers are critical factors for the uptake of agriculture extension information among small scale farmers. The conclusions could benefit ALIN and other development practitioners working with rural farmers to enhance delivery of such innovations for effective adoption and use. It also provides useful insights on the role of mobile telephony SMS services in agriculture extension information thus may be useful for academicians for further research.

# CHAPTER ONE INTRODUCTION

## **1.1 Background to the study**

Agriculture in Kenya accounts for about a third of the gross domestic product (GDP). 70% of Kenya's export merchandise are agricultural, and 33% of manufacturing sector output is based on agricultural products (Pearson, 1995). Small scale farmers are responsible for more than 80% of the food produced in the country (USAID, 2013). Despite their contribution to food security, the majorities of small scale farmers, however still lack access to basic agricultural extension information.

The term extension refers to advisory and other services that help rural families make the best possible use of the productive resources at their disposal (Katz, 2002). The current extension system has been described as ineffective and is considered among the main cause of poor agricultural performance of the agricultural sector (Republic of Kenya 2004). According to Mattia (2003) extension services if properly designed and implemented improve agricultural productivity. Extension services include dissemination of useful and practical information related to agriculture, including improved seeds, fertilizers, implements, pesticides, improved livestock practices, and market information.

Small scale farmers are characterized by small farms, low levels of education and technology use (Karugu, 2011). Generally the farm sizes are less than ten hectares(<10 ha) (Kamau, 2000). Small scale famers need access to updated extension information on market prices in urban market centres so that they can sell their produce at better prices thereby reducing exploitation by middlemen.

Modern Information Communication and Technologies(ICTs) offer exceptional potential to deliver information to poor rural communities and link them to markets, and thus contribute to alleviating food insecurity, poverty and transforming social and economic conditions(Mukhebi et al 2007). Marcelle (2000) defines ICTs as a complex and heterogeneous set of goods,

applications and services used for producing, distributing, processing and transforming information. Ngenge (2003) perceives them as technologies that enable the handling of information and facilitate different forms of communication between human actors, human beings and electronic systems, and between electronic systems.

Potential beneficial application of ICTs is found in mobile telephony. According to statistics from the Communications Commission of Kenya (CCK, 2013) mobile phones penetration in the country stands at 78 per cent this means that most adults in Kenya own at least a basic mobile handset. Messages transmitted through SMS can therefore reach virtually all of the estimated 3.5 million small scale farmers. This level of cell phone penetration makes mobile phone a potential 'mass media' in Kenya.

A mobile phone is a telephone with access to a cellular radio system so it can be used over a wide area, without a physical connection to a network (Oxford dictionaries.com, 2013). Short Messaging Services (SMS) is a text messaging service component of phone, Web, or mobile communication systems and its limited to 160 characters. The SMS-based services offers farmers timely source of information, as they no longer have to wait for newspapers to publish the information a day after the price is reported (Mungai, 2005). Mobile phones are used widely in people's day-to day lives giving the freedom to communicate anywhere and at anytime. Mobile phones today have become a necessity in human life.

Greater access to information help farmers make informed decisions on prices, diversification of their produce, and access to inputs leading to increased incomes. Despite the high potential to reach most of the small scale farmers through the mobile telephony, Kituyi-Kwake and Adigun (2008) find that only 14.7 % of farmers in rural Kenya use the cellphone for their agricultural information needs. The basic assumption is that mobile phone-based interventions especially SMS can be a poverty alleviation tool that enables producers to improve their returns and/or help urban consumers to buy food at lower prices. Lack of market information represents a significant hindrance to market access especially for smallholder farmers in Kenya (Mukhebi et al 2007). According to World Bank (2011), farmers in Africa obtain pricing information via text

messages, saving time and raising their incomes. The expansion of mobile networks provides a unique and unparalleled opportunity to give rural smallholders access to information that could transform their livelihoods. World Bank Information for Development Report (2012) indicates the most common way of using SMS is on accessing extension services.

Soko+ is an integrated supply chain solution that collects agricultural commodity information from the field, collates it into a regional and national perspective and disseminates packaged products to end users via various media, including SMS, Wireless Access Point (WAP), Email and Web. Farmers can send SMS using a basic phone to query for prices of various commodities in major towns of Kenya and farming tips on crops and livestock. Farmers can also upload products available for sale and the prices on the online platform to seek potential buyers. The platform provides regular timely SMS information on market prices, weather forecast, crops and livestock farming tips, alerts of emerging issues and market linkages (ALIN, 2010). Soko+ SMS is the main focus of this study.

Soko+ SMS service is being implemented by ALIN a regional NGO that facilitate information sharing among farmers in rural communities through use of ICTs. Soko+ has more than 2500 farmers registered on the platform. Even though this is the case, only fifteen percent of the registered farmers are using the system. For example, in Sappily Loran ward alone more than 800 people are registered on the system but only a handful use few of the Soko+ SMS services (ALIN 2013). This is the case despite the fact that more than 300 farmers in Sipili Olmoran ward in Laikipia County have been trained on the use of Soko+ SMS service through various capacity building workshops and open days conducted by ALIN and its partners for three years now.

#### **1.2 Statement of the Problem**

Mobile telephony has become an important Information and Communication Technology (ICT) tool used by farmers to access agriculture extension services in rural areas. There are approximately 28.08 million mobile subscriptions in Kenya; it is assumed that this number represents that of active SIM cards (CCK, April 2012). With the widespread use of mobile phones, SMS services should find more use as they offer easy accessibility. The area of use of

SMS in accessing agriculture extension information is key yet factors that influence uptake by small scale farmers in rural areas is under researched considering the emergence of many innovations on mobile telephony that is geared towards supporting agriculture extension services.

A perusal of available literature revealed that studies focusing on the low uptake of SMS to address gaps in agricultural extension information needs in the small scale agriculture sector in Kenya are inadequate. For example we know little about what factors determine the usage and uptake of SMS and the impact on agricultural extension. There is limited information available on factors that determine uptake of SMS by small scale farmers in accessing information on agricultural extension. Such information would be extremely valuable in identifying major constraints in dissemination and in formulating strategies to overcome them. Investigating issues affecting rural small scale farmers' uptake and appropriation of SMS agricultural information services in rural Kenya became imperative and the main focus of the study.

## **1.3 Justification of the study**

Although mobile telephony Short Messaging Services (SMS) can be critical in accelerating growth in the agricultural extension sector, its use by farmers is still low. The study is important because it seeks to establish factors that influenced the uptake of Soko+ SMS service to access agricultural extension information among small scale farmers in Sipili Olmoran ward of Laikipia County. The study investigates the determinants of use of Soko+ SMS service among small scale farmers in Sipili Olmoran ward of Laikipia County. It seeks to examine factors that influenced the use of SMS by small scale farmers as source of agriculture extension information in Sipili Olmoran ward of Laikipia County. It also investigates the best option for establishment of SMS information system that would help farmers to access agricultural extension information that included market prices and hence increase small scale farmers' decision making process.

## 1.4 Research Objectives of the Study

### 1.4.1 Broad research objective

The main objective of the study is to examine factors that influenced the uptake of Soko+ SMS service to access agricultural extension information by small scale farmers in Sipili Olmoran ward of Laikipia County in Kenya.

## 1.4.2 Specific research objective

The specific objectives of the study were:

- i. To examine factors that influenced the uptake of Soko+ SMS service by small scale farmers in Sipili Olmoran ward in Laikipia County.
- ii. To establish the influence of Soko+ SMS service in provision of agriculture extension information in Sipili Olmoran ward Division in Laikipia County.
- iii. To establish the existing agricultural extension information systems in Sipili Olmoran ward.
- To find out the agriculture extension information needs of small scale farmers in Sipili Olmoran ward.

## **1.5 Research Questions**

## **1.5.1 Broad research question**

What are the factors that influenced the uptake of Soko+ SMS service to access agricultural extension information by small scale farmers in Sipili Olmoran ward of Laikipia County in Kenya?

## **1.5.2 Specific research Questions**

- i. What is the influence of Soko+ SMS service in agriculture extension in Sipili Olmoran ward in Laikipia County?
- ii. What factors influence the acceptance of Soko+ SMS service by small scale farmers in Sipili Olmoran ward?
- iii. What factors influence the rejection of Soko+ SMS service by small scale farmers in Sipili Olmoran ward?
- iv. What are the agriculture extension information needs of small scale farmers in Sipili Olmoran ward?
- v. What agricultural extension information systems are in Sipili Olmoran ward?

## **1.6 Significance of the study**

Effective implementation of SMS in agricultural extension sector requires a better understanding of the farmers' context for the adoption and usage of SMS. These study findings could be used to influence the mode of design, package and delivery of Soko+ SMS service while providing recommendations for further actions by ALIN and other information providers to improve

effectiveness of their intervention. The study also deepened understanding on the potential and limitations of SMSs in enhancing agricultural extension information access and dissemination for poverty alleviation in the small scale farming sector of Kenya for both academics and practitioners alike. Additionally it provides trends that may encourage rethinking of aims for agriculture extension in rural areas as well as providing useful insights into the existing policy framework for agricultural extension services in Kenya. The study could also provide new insights into the role of mobile telephony in agricultural extension services in Kenya.

#### **1.7 Limitations of the Study**

Since Laikipia County does not have all the characteristics of other Counties in the country the information may not be generalized, however it can be applied to regions with same characteristics. Additionally the study focused on farmers who were trained on use of Soko+SMS in Sipili Olmoran ward, Laikipia County only yet there could be other farmers who are using Soko+SMS and not in this group. Another limitation was the possibility that farmers may not be willing to disclose some of the challenges they are going through as a result of using Soko+. Given the length of time that was available for the study, it was not be possible to capture all the factors because the project is still ongoing with several interventions.

#### **1.8 Definition of terms**

**ICTs** - Heeks (1999) defines Information and Communication Technologies (ICTs) as electronic means of capturing, processing, storing and communicating information.

**Short Messaging Services (SMS)** is a text messaging service component of phone, Web, or mobile communication systems. It is the transmission of short text messages to and from a mobile phone, fax machine and/or IP address. Messages must be no longer than 160 alpha-numeric characters and contain no images or graphics (http://www.webopedia.com/).

**Web 2.0** Web 2.0 is the term given to describe a second generation of the World Wide Web that is focused on the ability for people to collaborate and share information online. Web 2.0 basically refers to the transition from static HTML web pages to a more dynamic web that is more organized and is based on serving Web applications to users. Other improved functionality of Web 2.0 includes open communication with an emphasis on Web-based communities of users, and more open sharing of information. Examples include; Blogs, wikis among others.

**Interactive Voice Services (IVR)** it is a technology that allows a computer to interact with humans through the use of voice.

**Market Information Systems (MIS)** are information systems used in gathering, analyzing and disseminating information about prices and other information relevant to farmers, traders, processors and others involved in handling agricultural products.

**Mobile Apps** it is a term used to describe Internet applications that run on smartphones and other mobile devices (m-Apps) among others. Mobile applications or mobile apps are applications developed for small handheld devices, such as mobile phones, smartphones, PDAs and so on. Mobile apps can come preloaded on the handheld device as well as can be downloaded by users from app stores or the Internet. You can find mobile apps on both feature phones and smartphones. The most popular smartphone platforms that support mobile apps are Windows Mobile, Android, Symbian, Java ME and Palm. (http://mobiledevices.about.com/)

**Wireless Application Protocol** (WAP) it is a technical standard for accessing information over a mobile wireless network. A WAP browser is a web browser for mobile devices such as mobile phones that uses the protocol.

**Short codes** (also known as short numbers) are special telephone numbers, significantly shorter than full telephone numbers, that can be used to address SMS and MMS messages from certain service providers' mobile phones or fixed phones. There are two types of short codes: dialing and messaging

# CHAPTER TWO LITERATURE REVIEW

This chapter reviewed literature related to the study with the aim of identifying and evaluating opinions, knowledge and attitudes of various studies on use of mobile telephony SMS in agricultural extension by rural small scale farmers. Areas reviewed included; communication, mobile telephony, media theory related to the study, agriculture extension and small scale farmers. These are among the key factors that influence adoption of any innovations among communities. The materials that were reviewed in this section give insight into existing research gaps on use of SMS in agricultural extension. Theoretically, this study was based on Technology Acceptance Model (TAM).

## 2.1 Empirical review

#### 2.1.1 Communication in rural development

Wahlstrom (1992) defines communication as the process where one person transmits a message through a channel to another person with some effect. This implies that communication may be designed to change behavior and attitudes, persuade, transfer meaning, imparts knowledge, and disseminates information among other functions. According to Berlo (1960), the sole purpose of communication is to influence people thus new media channels – especially the Internet and the World Wide Web – offer a means of overcoming barriers to the flow of information that arise over time (Baran and Davis, 2009).

Barriers to effective communication can distort the message and intention of the message being conveyed which may result in failure of the communication process or an effect that is undesirable(Russell 2012) .Such barriers include filtering, selective perception, language, communication apprehension, gender differences and political correctness. Thus, failure to understand the background of the person with whom we interact renders communication approaches used ineffective. Effective communication that overcomes these barriers is therefore a tool which can influence change and actions. Effective communication occurs when a desired effect is the result of the intention of the message.

This study considered effective communication as a key factor in improving agriculture extension services to small scale farmers in Sipili Olmoran ward of Laikipia County. This could influence positively farmers' decisions on agricultural practices and marketing of their produce.

#### 2.1.2 Why Soko+

According to Kituyi-Kwake and Adigun (2008) the Arid Lands Information Network, Eastern Africa (ALIN-EA) is the most significant organisation providing ICT platforms on marketing information in Kenya. ALIN-EA collaborates with the digital broadcast pioneer, World Space Foundation (WSF), USA, to provide information to remote parts of Kenya(even where there are no telephone lines or electricity) using digital satellite broadcasting. The organisation has operations in four countries -Kenya, Uganda, Tanzania and Ethiopia.This then implies that, any study, such as the current one, that attempts to understand the operations and performance of a diverse organization and significant ICT platforms provider such as ALIN is not only relevant but also necessary to inform future ICT policy and development initiatives both in Kenya and the East African region.

As defined earlier in chapter one Soko+ is an integrated supply chain solution that collects agricultural commodity information from the field, collates it into a regional and national perspective and disseminates packaged products to end users via various media, including SMS, Wireless Access Point (WAP), Email and Web. The platform provides regular timely SMS information on market prices, weather forecast, crops and livestock farming tips, alerts of emerging issues and market linkages.

Soko+ SMS represent many mobile telephony innovations that are geared to supporting rural small scale farmers in accessing agriculture extension information. This study therefore examined factors that influenced the uptake of Soko+SMS service by small scale rural farmers in accessing agriculture extension information.

#### 2.1.3 Mobile telephony SMS service in Kenya

Demand for mobile phone in rural Kenya has exceeded expectations and as the urban market becomes flooded, the rural customers become the new target groups (Fahamu, 2007). Shah (2007) estimates that every month 100 000 new subscribers enter the cell phone market in

Kenya. According to Vennesa (2006) the cell phone is a realistic option for many people living in rural Kenya because of availability, affordability, simplicity and flexibility. A unique aspect of the ICT phenomenon in Kenya has been the widespread proliferation of mobile money. Starting with the M-PESA system launched by Safaricom in 2007 where users use SMS platform to transact.

SMS allows text-based messages to be sent to and from mobile telephones on a Global System for Mobile Communications (GSM) network. Each message has a maximum length of 160 characters. The SMS system has been more beneficiary for farmers where they can send SMS through mobile and gets instant message reply for decision making (Pankaj 2011).

Initiatives in Kenya that have strived to use SMS platform focusing on market information include Soko+; the Kenya Agricultural Commodities Exchange (KACE); the Regional Agricultural Trade Intelligence Network (RATIN); M-Farm; Mkulima Young, icow, Kilimo (Ministry of Agriculture) National Farmers Information Service (NAFIS); ikilimo; infonet; Sokohewani among others.

Market information services, especially those based on mobile phones such as SMS reduce transaction costs by improving supply chain management. In addition they reduce information disequilibria between traders and producers, enable farmers to purchase inputs, and enhance farmers' ability to fine-tune production strategies to match the accelerating rates of change in consumer demand and marketing channels (World Bank 2012).

In support of this view Dixie and Jayaraman (2011) make reference to a national survey of Indian farmers that found that 50 percent of farmers interviewed said they reduced expenditures on agricultural inputs because of SMS information services. The survey also established that the service is also changing farmers' behavior with 44 percent said that it changed their fertilizer applications and 43 percent said that it changed the timing of spraying which led to yields improvement, more incomes and reduced poverty. The cell phones can be the primary source to access information as Kennedy (2008) states.

Even though SMS has many advantages there are some challenges associated with its use. For example the SMS carries only a limited amount of information and requires a basic level of literacy. Also, SMS does not offer detailed information such as pictorial illustrations useful when communicating with illiterate people as in web solutions. Nevertheless, the SMS remains a useful resource for communication in rural areas and all that is needed is to provide an easy way for the farmers to have access and navigate its different uses (FARA 2009).

This study examined SMS as key medium of disseminating agricultural extension information among small scale farmers in Sipili Olmoran ward of Laikipia County. Challenges highlighted provided relevant insight for this study.

#### 2.1.4 Small scale farmers

There are an estimated 450 million small-scale farms (farms of two hectares or less of land) worldwide (IFAD, 2008). These 450 million farms are thought to support a population of roughly 2.2 billion people (Singh, 2009). As defined in chapter 1, small-scale farmers in Kenya are are characterized by small farms, low levels of education and technology use (Karugu, 2011). Generally the farm sizes are less than ten hectares (<10 ha) (Kamau, 2000). Majority of small scale farmers practice mixed farming (keeping livestock and growing crops). According to the Kenya National Agribusiness Strategy (2012), more than two thirds of Kenya's marketed agricultural commodities are produced on small-scale, subsistence farms averaging 0.2 to 3 hectares in size.

Small-scale farmers are often marginalised by their lack of access to inputs, including good quality land, smart technologies and good quality seeds. Lack of access to capital markets, credit, agronomy information and markets are also areas that marginalise small-scale farmers (Kent &Poulton, 2008). Rural financing for small scale farmers is important in contributing to the broader agricultural sector and economy.

The Food and Agricultural Organization (FAO) indicates that women produce as much as 80 percent of the basic foodstuffs for household consumption and sale in Sub-Saharan Africa (FAO-ILO-IUF 2005). Women are estimated to make up about half (48.6 percent) of the economically

active population in agriculture .They often manage farms on their own or with other household members. Few women own land in Kenya but many cultivate crops on small plots of land under their control or alongside their spouses on larger plots, and manage farms in the absence of their spouses. It is widely acknowledged that women farmers have less access to information and productive resources than men and lack the authority to adopt new practices that could increase productivity and profitability of their farms (FAO, 2011)

Small scale farmers have been exceptionally resilient in the presence of multiple risks and play an important role of feeding the world. There are a lot of success stories about small-scale farmers reaching out and sustaining whole communities. For example, in Kenya the dairy industry milk was provided by small scales for school meal programmes. In Brazil small scales play a huge role in supplying food for vulnerable groups, under a food security policy known as Zero Hunger (IIED 2011).Small scale farmers are the main focus of the study.

### 2.1.5 Agriculture extension

Extension is an informal educational process directed toward the rural population (FAO). This process offers advice and information to help them solve their problems. Extension also aims to increase production and generally increase the standard of living of the farmers. Several developed countries have fully or partially privatised their agricultural extension services.

The new terms like outsourcing extension, cost-recovery for extension services, and contracting out extension are related to the drive for privatisation. Costa Rica has a unique system under which the government provides farmers with extension vouchers, which can be used for getting extension advice from private specialists. In England, the public extension service has evolved over time into a private consulting practice. In Holland, about 60% of the extension budget comes from farmers while the remaining 40% is provided by the government.

The benefits include increased efficiency, improved quality, client-orientation, job satisfaction for staff, and expanded marketing opportunities for farmers. The modality of using both public and non-public institutions for delivering extension services to farming communities, called pluralistic extension system, is gaining popularity. The rationale is the pooling of all available resources in order to reduce redundancy of services, and compensate for low budgets of the ministries of agriculture. In certain developing countries like Mali, one finds many NGOs, private companies and semi-autonomous bodies engaged in delivering extension advice to farmers (FAO2002).

The importance of agricultural extension in relation to the fight against poverty has been underscored in the Strategy to Revitalize Agriculture (SRA) (Republic of Kenya 2004). The declining effectiveness of the public extension service has been identified as one among the factors impeding agricultural growth in Kenya. In this regard, SRA has suggested reform of the extension system to create more effective linkages between research, extension and farmers, who are the ultimate beneficiaries.

Rural people can and do make wise decisions about their problems if they are given full information including possible alternative solutions. By making decisions, people gain self-confidence. Extension, therefore, presents facts, helps people to solve problems and encourages farmers to make decisions. (FAO 1993).

Kenya's small scale farmers have benefited from a range of extension systems from Government, private, Non-Governmental Organisations (NGOs), Faith based and Communitybased organizations .A mix of public and private service operates presents a new challenge with new potential roles and responsibilities for the public sector(Muyanga and Jayne 2006) .Agricultural extension services are therefore critical in the performance of small scale farmers since they provide basis of all factors that are key in the success of any agricultural activities. This study main focus was on examining the influence of Soko+ SMS in dissemination of information on agricultural extension to small scale farmers in Sipili Olmoran ward of Laikipia County.

## 2.2 Theoretical review

The study was based on Technology Acceptance Model (TAM) to examine factors that influence uptake of Soko+SMS service in Sipili Olmoran Ward of Laikipia County.

#### 2.2.1 Technology Acceptance Model

The essence of any innovation is to provide a platform for which intended target users can use it effectively to enhance their work. Technology Acceptance Model (TAM) was initially proposed by Davis (1989). It is an information systems theory that models how users come to accept and use a technology. The model suggests that when users are presented with a new technology, a number of factors influence their decision about how and when they will use it, notably: Perceived Usefulness (PU) which is the degree to which a person believes that using a particular system would enhance his or her job performance for example through working more quickly, increased productivity, effectiveness and making the job easier.

Perceived Ease-Of-Use (PEOU) is the degree to which a person believes that using a particular system would be free from effort for example easy to learn, clear and understandable and easy to remember. The attitude toward adoption will decide about the adopter's positive or negative behavior in the future concerning new technology. People who perceive technology as useful and easy to use will accept it more readily than those who do not, with usefulness more important than ease of use.

#### Technology Acceptance Model



Source: Davis, F. D., Bagozzi, R. P., and Warshaw, P. R. "User Acceptance of Computer Technology: A Comparison of Two Theoretical Models," Management Science, 35, 1989, 982-1003.

In the above diagram Both (U) and (E) are specific perceptions and are anchored to specific beliefs users hold about the system. According to TAM, they have a significant impact on a user's attitude toward using the system (A), defined as feelings of favorableness or unfavorable toward the system. Behavioral intentions to use the system (BI) are modeled as a function of A and U. BI then determines actual use. Research has consistently shown that BI is the strongest predictor of actual use (Davis et al 1989).

Understanding the factors that influence user acceptance of information technology is key to any technology developers or organization that is championing the innovation. User acceptance is defined as the demonstrable willingness within a user group to employ information technology for the tasks it is designed to support. For example the case of Soko+ SMS service, rural farmers being able to use SMS service to access agriculture extension information and finding the information useful is key in adoption of the innovation.

Lack of user acceptance is a significant impediment to the success of new information systems .In fact, users are often unwilling to use information systems which, if used, would result in impressive performance gains (Henderson, 1988). Therefore, user acceptance has been viewed as the pivotal factor in determining the success or failure of any information system project (Davis, 1993).

Although Several researchers have replicated Davis's original study (Davis 1989) to provide empirical evidence on the relationships that exist between usefulness, ease of use and system use (Adams, Nelson & Todd 1992;Hendrickson, Massey & Cronan 1993; Segars & Grover 1993; Subramanian 1994; Szajna 1994),TAM has been widely criticised, despite its frequent use, leading the original proposers to attempt to redefine it several times. Criticisms of TAM as a "theory" include its questionable heuristic value, limited explanatory and predictive power, triviality, and lack of any practical value. (Chuttur 2009).

Emerging information technology cannot deliver improved organizational effectiveness if it is not accepted and used by target users .The need to know why people resist innovations, predicting how users will respond is vital for any successful roll out of a technology. New technologies such as use of mobile telephony can be complex especially to farmers who are illiterate with a lot of uncertainty to usage and adoption.

TAM attempts not only for prediction but also for explanation to help researchers and practitioners identify why a particular system may be unacceptable and pursue appropriate steps. Purpose of TAM is to assess the user acceptance of emerging information technology. This study examined the influence of Soko+ SMS service in provision of agriculture extension information among small scale farmers in Sipili Olmoran ward thus this model was very useful in determining factors that led to the acceptance or rejection of the innovation.

#### 2.2.2 Research Gap

Critique of the existing literature relevant to the study

Evanjeline Eriksson (2008) in a study of cell phone use by people in rural Kenya shows that people in rural Kenya use SMS as most effective way of communication. The author cited cases where SMS has been used effectively like on Kazi 560(Job Searching), M-Pesa and health care services used by mobile phone. The author further noted factors that have influenced the use like availability, affordability, accessibility among others. However the study did not focus on use of SMS on agriculture extension, thus very little information is known about the impact of SMS on agriculture although it shows the potential of SMS in communication which is useful in this study.

Adrian Mukhebi et al (2007) in their paper; reaching the poor in rural Kenya with market information; highlighted a case study of a market system developed by the Kenya Agricultural

Commodity Exchange (KACE) for collecting, processing, and disseminating relevant and timely market information to small holder farmers using ICTs. KACE uses rural based market information points, market information centres, mobile phone short messaging services, interactive voice response service; internet based regional commodity trade and information system and a website. There is evidence that the system is yielding benefits to client users for example in Bungoma County in western Kenya, farmers who sold maize via the market information service achieved a higher average price compared to those who did not. The main challenge facing KACE is to ensure widespread of use of the technology, the unreliable mobile network availability in rural areas which limits access to market information services and interactive voice response services and development of SMS service with other mobile service providers in the country.

This study did not specifically focus on the use of SMS and factors that influence its adoption but rather looked at all the services offered by KACE in general thus we know very little the direct influence of SMS on access to information among small scale farmers. However the study mentions the limitation of mobile telephony which could be useful in this study.

According to Nyaga (2012) in her study on ICT in agriculture extension feasibility in enhancing market of agriculture produce in Kenya the case of Kiambu shows the potential of use of ICTs by farmers and extensions and probable scenarios. Research findings from farmers in Kiambu on medium that influence identification of new market showed that no farmer used any existing ICTs thus farmers are not using ICTs in extension services. The study does not provide any direct findings or focus on use of SMS on agriculture extension but shows potential use of ICTs by farmers and extension in improving agriculture sector.

Other existing literature have focused on other mobile telephony services for instance; M apps and, m-ARD apps by Christine Zhenwei Qiang et al (2011) in their paper mobile applications for agriculture and rural development findings show that mobile applications (m-app) and mobile applications for agricultural and rural development (m-ARD apps) provide access to information on markets, finance and governance to millions of people. According to Eduardo Nakasone (2013) study on the role of price information on agricultural markets in rural Peru, farmers who were provided with mobile phones through which they received detailed price information for the most relevant crops in 6 regional markets received higher prices for their products .Eduardo support the notion that when small scale farmers adopt use of SMS there are observable results as seen in their income level in the case of rural Peru.This study provides relevant findings that can be used in this study and ideas that Soko+ can learn from their approach with farmers.

In 2011, CIMMYT conducted a survey with 1,200 farmers in the Indo-Gangetic Plains; the survey revealed the farmers needed information on how to address pest attacks and what varieties better adapt to changing climatic conditions. Instead, they received standard prescriptions on input use and general seed varietal recommendations. To provide the information farmers really need, dynamic databases with farmers' land size, cropping pattern, soil type, geographical location, types of inputs used, variety of seed used, and irrigation must be developed. This study shows limitation of use of SMS by farmers which provides possible challenge relevant to this study

It is important to understand how farmers are using emerging platforms to ensure that the new development initiatives are properly addressing farmers concerns and have utility for farmers. Examples that Soko+ may borrow from other interventions is an interactive voice response system, using free SMS, a hotline number for farmers to call and listen to archived information ,announcement, or participate in question-answer forum provision of live market feeds ,real time alerts on market prices automatically delivered to subscribers among many others. However this might not be the case of farmers in Sipili Olmoran ward since audience may be influenced by a number of factors thus need to carry out the study.

Since there is limited information on use of SMS on agricultural extension, this study was important in providing a detailed analysis of what factors influenced the uptake of SMS by rural small scale farmers and offer recommendations on the most effective way of packaging SMS to have desirable impact. This research therefore investigated the variables that influence the use of SMS in agricultural extension information. Again much attention has focused on the general

effect of ICTs and other existing market information systems but comparatively little consideration has been given to the factors that shape small scale farmers use of this medium. Such factors include age, gender and education level. In general, there has been little, if any, systematic study of the determinants of SMS use for accessing agricultural extension information in Kenya.

# CHAPTER THREE RESEARCH AND METHODOLODY

This section dealt with the procedure followed in conducting the study. It included research design, area of study, target population, data collection methods and techniques, data analysis and presentation respectively. Mugenda and Mugenda (2003) define research as an ever going process of thirst for new knowledge with a view to taking proper and meaningful cognisance of phenomena. Cooper and Schindler (2006) define research as any systematic examination of a subject matter intended to come up with solutions for decision making that would lead to better performance of an organization. Walingo and Ngaira (2008) define research as an investigation that seeks to find solutions to an existing problem using scientific approaches that allow replication of results.

According to Churchman (2001), research is an organized investigative procedure used to increase or revise current knowledge by discovering new facts. According to Walingo and Ngaira (2008) research is aimed at getting the solution to a problem. It attempts to answer a question or determine the relationship between two or more variables. Research is therefore systematic as it follows a particular sequence.

## **3.1 Research Design**

Kothari (2004) states that a research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure. Further, Chandran (2004) notes that the choice of a research design is determined by a number of considerations such as; the research purpose, categories of data needed, data sources and the cost factor.

This study adopts case study design. This is an in-depth investigation of an individual, group, institution or phenomenon. It is the best research design when a researcher intends to determine factors and relations among factors that have resulted in the behaviour under study (Mugenda, O. &Mugenda, A., 2003).

## 3.2 Area of study

Laikipia County is one of the 47 Counties of Kenya, located on the Equator in the former Rift Valley Province of the country. Economic activity in the county consists mainly of agriculture chiefly grain crops, ranching and greenhouse horticulture. The County has a cool, temperate climate with both rainy and dry seasons. One of the main problems of small-scale farming in the arid and semi-arid lands (ASAL) of west Laikipia is that of low household incomes. Sipili Olmoran ward is located in Laikipia west it has a population of about 23,000 people with 1500 households who are mainly small scale farmers and agro pastoralists. It is composed of two locations namely Wangwaci and Sipili.

A major contributor to income in this area is from livestock production and crop farming thus access to relevant information is a necessity. Sipili Olmoran ward This study focused on small scale farmers of Sipili Olmoran ward of Laikipia County which sought to understand factors that influence adoption of SMS in accessing agricultural extension information.

## **3.3 Research Population**

Mugenda, O. &Mugenda, A (2003) define population as an entire group of individuals, events or objects, having common observable characteristics. Target population as defined by Kothari (2005) is a universal set of the study of all members of real or hypothetical set of people, events or objects to which an investigator wishes to generalize the result. The population under study was 310 farmers in Sipili Olmoran division who received training on the use of Soko+ during the pilot phase of the innovation.

#### 3.4 Sample Size and sampling procedure

Kothari (2004) describes a sampling design as a specific roadmap for acquiring a sample from a selected population. The roadmap consists of procedures, plans, and techniques that will be utilised to obtain the sample. It is predetermined. It is also known as the sampling strategy (Kumar, 2005). Mugenda and Mugenda (2003) define a sample simply as a sub-sect of the total population. Kumar (2005) defines sampling as the process of taking a few units from a bigger group and using it as a basis to generalise the findings. The sample size was drawn from the population under study; Sipili location in Sipili Olmoran ward and in this case twenty percent of 310 farmers who were trained by ALIN on Soko+. Table 3.1 summarises the sampling.

Category of respondent	population	sample size	Sample
Farmers without phones	50	20%	10
Farmers with phones but don't use Soko+	135	20%	27
Farmers with phones and use Soko+	125	20%	25
Agricultural extension officers	2	100%	2
ALIN staff	18	20%	4
Total	310		62

 Table 3. 1 Sampling procedure

Purposive sampling was employed to identify the farmers who participated in the survey. Purposive sampling is a type of non-probability sampling in which decisions concerning the individuals to be included in the sample are taken by the researcher, based upon a variety of criteria which may include specialist knowledge of the research issue, or capacity and willingness to participate in the research.

Researcher selected individual participants who were most likely to contribute appropriate data, both in terms of relevance and depth. For example, the researcher identified farmers who are using the system to determine factors that influence acceptance; farmers who are not using the system yet they own mobile phones to determine factors that influence rejection; farmers who would wish to use the systems but don't own a mobile phone. This was useful in determining other factors that hinder usage.

#### 3.5 Research method Instruments.

The study used questionnaires and key informant interviews to generate primary data. Kumar (2005) describes a questionnaire as a written list of questions whose answers are provided by the respondents. Questionnaires can either be self-administered (where the respondent reads for themselves the questionnaire and then answers the questions); or researcher administered questionnaire (where the researcher assists the respondents understand the questions before answering) (Mugenda & Mugenda, 2003; Kumar, 2005). There are different types of questions that can be used in questionnaires. Some of these include open-ended questions, close-ended

questions, and matrix questions, among others (Mugenda & Mugenda, 2003). Questionaires with both open –ended and close –ended questions were administered to farmers.

Data was also gathered through conducting in-depth interviews with four ALIN staff and two government agriculture extension workers in Sipili Olmoran ward. This was useful in understanding context of the innovators and real issues that affect agriculture extension information from government extension workers in area of study. The data was qualitative.

#### **3.6 Pilot Study**

The interview guide and questionnaires were pre tested prior to the main study by use of 5 farmers from Sipili Olmoran ward, Laikipia County not registered on Soko+. The purpose of pilot study was to check the reliability of instruments by testing and retesting and validity of questions. It also checked if the questions were clear, if they covered the problem under investigation, if the instruments were well constructed to give consistent results and removed ambiguity, detected adjustments necessary in order to work out the unforeseen pitfalls before the main study. Pre testing also assessed time, accuracy and soundness of instruments. In addition the researcher had the opportunity to familiarize with the area of study. It also made it possible for a similar study to be reciprocated with consistent outcomes. The subjects used during pretesting were not included in the main study.

## 3.7 Validity

Validity is the degree to which a test measures what its suppose to measure on the phenomenon under investigation(Orodho,2004). In this study validity of instruments was arrived at ensuring all aspects of research problems were captured, questionnaire that seem to be ambiguous or too lengthy were corrected. The research instruments were developed and corrected under professional guidance.

#### **3.8 Reliability**

Reliability is the extent to which a test gives consistent results. Orodho (2009) says test retest technique involves administering the same instruments twice to same group of subject. The instruments were first administered to respondents and their scores recorded. The same questions were administered again to the same respondents after two weeks and scores recorded.

Benchmark was based on Cronbach's alpha to find the correlation coefficient between the first and the second scores that determined reliability and provide recommendation for the study.

Reliability of an instrument is the measure of the degree to which a research instrument yields consistent results or data after repeated trials (Mugenda and Mugenda, 2003). To ensure reliability of the instrument, the researcher used the split half reliability. This involved randomly splitting the instrument responses into two halves, one containing odd numbers and the other even numbers. The scores were computed and correlated by use of Statistical Package for Social Scientists (SPSS) computer program Version 17.0. The reliability analysis yielded Cronbach's alpha coefficient of 0.79 for the farmers without phones, 0.76 for farmers with phones not using Soko+, 0.81 for farmers with phones using Soko+. Orodho, (2010) suggests a coefficient of greater than 0.75 as adequate, thus confirming that the instruments were reliable.

#### **3.9 Ethical consideration**

Confidentiality given by the respondents was upheld. All information given was used for academic purpose and all respondents were told to keep anonymity on the questionnaire and interview schedules.

## 3.10 Data Analysis and presentation

The data obtained from the field was edited, coded and interpreted according to themes which emanated from the research objectives and questions. Mugenda and Mugenda (2003) say that such data must be cleansed, coded, key punched into a computer and analyzed. Both qualitative and quantitative approaches of data analysis were used for the study.

Quantitative approach of data analysis was first done by organizing data into themes corresponding to study objectives which were analyzed using Statistics Package for Social Sciences (SPSS) which was used to generate frequencies, percentages, descriptive statistics and chi squares that were used to answer the research questions. Qualitative data was sorted and transcribed to identify the themes using the research questions.

## **CHAPTER FOUR**

## DATA ANALYSIS, INTERPRETATION AND DISCUSSIONS

This chapter presents data analysis, interpretation and discussions. It begins with instrument return rate, demographic data of the respondents, and then followed by an examination of the factors that influence the uptake of Soko+ SMS service to access agricultural extension information by small scale farmers in Sipili Olmoran ward of Laikipia County in Kenya.

## 4.1 Instrument return rate

Questionnaires were used to collect data among farmers, agricultural extension officers and ALIN members of staff. Their response rates were as summarized in Table 4.1

Category of respondent	Sample size	Responses	<b>Response rate</b>
Farmers without phones	10	10	100%
Farmers with phones but don't use Soko+	27	27	100%
Farmers with phones and use Soko+	25	25	100%
Agricultural extension officers	2	2	100%
ALIN staff	4	4	100%
Total	68	68	100%

#### Table 4. 1 Instrument return rate

A total of 68 questionnaires were issued and returned giving a response rate of 100 percent which was deemed sufficient for data analysis. The respondents were quite cooperative and the data collected was taken to be a true representation of the respondents' views due to the independence of the questionnaire method of data collection.

## 4.2 Demographic information of respondents

The study sought to find out the demographic information of the respondents in respect to their gender, age, academic qualifications and farming activities. The purpose of this information was to establish the general characteristics of the farmers, agricultural extension officers and ALIN staff and their understanding of Soko+ in respect to the farming operations.
#### **4.2.1** Distribution of respondents by gender

To determine the distribution, the respondents were asked to indicate their gender. Their responses were as shown in Table 4.2.

	Fa	Farmers		sion officers	ALIN staff		
	Freq	Percent	Freq	Percent	Freq	Percent	
Male	34	55	2	100	3	75	
Female	28	45	-	-	1	25	
Total	62	100	2	100	4	100	

Table 4. 2 Distribution of respondents by gender

According to Table 4.2, both genders in Sipili Olmoran ward of Laikipia County, Kenya are engaged as small scale farmers. The majority (55%) of the farmers were male while the females represented 45% of the farmers. This could be attributed to the fact that in the African culture, the man is seen as the head of household and therefore seen as the spokesperson for the family. Whenever information is sought about households, it is usually the man's opinion that is sought except when he has delegated or is not within the home. Table 4.2 further shows that the agricultural extension officers in the area were mostly male probably due the fact that the agricultural extension officers' occupation is seen as a man's role in that society. The ALIN staff presented both genders. This finding implied that the responses sought from the respondents accommodated views from both genders giving the research more validity for generalization.

Information was sought from the farmers in terms of their mobile phone technology usage. The purpose of this information was to establish how many famers had access to phones and the Soko+ SMS product that is based on the mobile messaging technology. Their distribution was as summarized in Figure 4.1.



Figure 4. 1 Distributions of farmers by phone and Soko+ usage

Findings show that the majority of the farmers had access to mobile phones. Only 16% of them confirmed that they didn't own or have access to a mobile phone. It was also observed from figure 4.1 that 44 percent of the respondents did not have access to Soko+ SMS even though they had access to a mobile phone. This finding implied that the uptake of the Soko+ SMS was at 40% of the farmers' population in the area. The distribution of male farmers in terms of the mobile phone technology usage is as summarized in figure 4.2



Figure 4. 2 Distributions of male farmers by phone and Soko+ usage

As seen from Figure 4.2, the majority of the male farmers had access to mobile phones. Only 15% of them didn't own or have access to a mobile phone. This finding implied that the uptake of the Soko+ SMS amongst the male farmers in the area was 47 percent.

The distribution of female farmers in terms of the mobile phone technology usage is as summarized in Figure 4.3



Figure 4. 3 Distributions of female farmers by phone and Soko+ usage

As seen from Figure 4.3, 18 percent of the female farmers did not have access to mobile phones. Whereas majority of the women had access to the phones, 50% of them had not enrolled for Soko+ SMS. This finding implied that the uptake of the Soko+ SMS amongst the female farmers in the area was 32 percent. This could be attributed to lack of ownership, low literacy level among women and technophobia.

#### **4.2.2** Distribution of respondents by age

Information on age was sought from the respondents. The purpose of this information was to establish the age pattern of the farmers within the ward. A cross tabulation was also conducted to establish the pattern of Soko+ uptake by age. The results were as shown in Table 4.3

Gender			Fa	rmers	Extension officers ALIN staff					
	No phone		With phone No Soko+		With phone With Soko+					
	Freq	Percent	Freq	Percent	Freq	Percent	Freq	Percent	Freq	Percent
Between 18 - 24		·	2	7.4	1	4.0	-	-	-	-
25 - 29			1	3.7	1	4.0	-	-	2	50
30 - 34	1	10.0	1	3.7	3	12.0	-	-	1	25
34 - 39	1	10.0	2	7.4	1	4.0	-	-	1	25
40 - 45	2	20.0	8	29.6	10	40.0	2	100.0	-	-
Above 45	6	60.0	13	48.1	9	36.0	-	-	-	-
Total	10	100	27	100.0	25	100.0	2	100	4	100

Table 4. 3 Distribution of respondents by age

Findings in Table 4.3 show that 60 percent of the farmers who didn't have phones and 48% of those who didn't use Soko+ even though they had mobile phones were above 45 years of age. Similarly, 36 percent of the farmers who used Soko+ were over 45 years of age. A significant proportion of farmers in each of the three categories were aged between 40 and 45. This finding implied that most of the farmers in the area settled for farming as an occupation at an advanced age (in this case 40 years and above), this finding suggested that they engage in farming having retired from other occupations. This could impact on their usage of technology, especially given the fact that technology changes fast and is very popular amongst the younger generations especially the youth (those aged between 18 and 35 years of age). The fact that most of the farmers in the area are advanced in aged could be a hindrance to the uptake of Soko+ SMS. This could be contrasted with the ALIN staff, majority (75%) of who were less than 35 years of age confirming that the technology was more popular with the youth.

Adrian Mukhebi et al (2007) in their paper; reaching the poor in rural Kenya with market information; showed the usefulness of integrating various ways of reaching farmers that included rural based market information points, market information centres, mobile phone short

messaging services, interactive voice response service; internet based regional commodity trade and information system and a website to reach more farmers. Since barriers to use of mobile telephony among rural farmers still exists.

## 4.2.3 Distribution of respondents by academic qualification

Information on the education level was also sought from the farmers. The purpose of this information was to establish the educational exposure of those who engaged in farming activities within the ward. A cross tabulation was also conducted to establish the pattern of Soko+ uptake by age. The results were as shown in Table 4.4.

Gender	Farmers							Extension officers ALIN staff			
	Without		Wit	h phone	With phone						
	p	hone	No	Soko+	Wit	n Soko+					
	Freq	Percent	Freq	Percent	Freq	Percent	Freq	Percent	Freq	Percent	
O-Level	4	40	13	48.1	9	36	-	-	-	-	
A - Level	1	10	3	11.1	9	36	-	-	-	-	
University	-	-	3	11.1	1	4	2	100	3	75	
Diploma	1	10	3	11.1	2	8	-	-	1	25	
Less than O-level	4	40	5	18.5	4	16	-	-	-	-	
Total	10	100	27	100	25	100	2	100	4	100	

Table 4. 4 Distribution of respondents by education level

Findings in Table 4.4 show that 40 percent of the farmers who didn't have phones had less than 0 level of education which could be a hindrance to their uptake of Soko+ SMS since it required some form of basic education. However it was observed that 16 percent of those who used Soko+ SMS had little education suggesting that there are strategies of incorporating farmers of little education into the Soko+ SMS service. The majority of those who had phones had varied education at between O-level and university degree. The pattern between those who had enrolled for Soko+ SMS and those who hadn't was so similar that it was concluded that education was

not a hindrance to the uptake of Soko+ SMS. The education of the extension officers was degree level suggesting that they had the requisite training to offer the service to the farmers in the area. ALIN staffs were also highly trained with the majority holding a degree education also suggesting that they had the requisite training to offer and support the Soko+ SMS the service they were promoting to the farmers.

## 4.3 Factors that influence uptake of Soko+ SMS service

The first objective of the study was to examine factors that influence uptake of Soko+ SMS service by small scale farmers in Sipili Olmoran ward in Laikipia County. To establish this, the farmers were required to respond to a set of questions on farm ownership, mobile phone technology and on the Soko+ SMS product. Further, a cross tabulation was done between land ownership and Soko+ uptake. The results were a shown in Table 4.5.

	·	• • •		Farmer categor	у	
		-	Without	With phone no	Use Soko+	_
			phone	Soko+		Chi square
Do you have a farm?	Yes	Freq.	32	24	25	
		Percent	100.0%	92.3%	100.0%	X <sup>2</sup> =2.549a
	No	Freq.	0	2	0	- df = 1
		Percent	.0%	7.7%	.0%	$\operatorname{Sig} = .110$

### Table 4. 5 Farmers' land tenure ship.

Findings in Table 4.5 show that the majority of the farmers owned the land they cultivated. Only 7.7 percent of them did not own the land and were probably leasing the land for their farming activities. To test whether there was any significant differences between land ownership and the uptake of Soko+ SMS, a chi square test was conducted. The result ( $X^2=2.549a$ , df = 1, Sig = .110) confirmed that there was no statistical and significant difference between the farm ownership and the uptake of Soko+ SMS.

#### **4.3.1** Access to mobile phone

One of the factors influencing the uptake of Soko+ SMS was phone ownership because a phone is a basic requirement for the access to the service. The farmers without phones were therefore required to indicate the reasons why they could access one. The results were as shown in Table 4.6.

Reason	Frequency	Percent
Cost is high	5	50.0
Lack of know how to use	5	50.0
Total	10	100.0

Table 4. 6 Farmers impediments to owning a mobile phone

Findings show that half of the farmers who didn't own mobile phones didn't know how to use them. This finding could be attributed to the fact that the majority of the farmers were more than 45 years of age suggesting that they were not in tandem with the digital technology as it evolved. The other half complained that the cost of a mobile phone was quite high for them suggesting that they viewed mobile phones as luxurious and very expensive gadgets for one to own. This finding implied that ALIN staffs need to adopt strategies aimed at training famers of low education on how to use a mobile phone and eventually Soko+ SMS if they were to increase the uptake of the service amongst the farmers in the area. Additionally, strategies need to be put in place for phone ownership including free mobile handsets, cost shared handsets, loan schemes, and information centres in order to increase the uptake.

Eduardo Nakasone (2013) study in Peru shows that farmers who were provided with mobile phone to receive information on agriculture increased their income.

#### 4.3.2 Farmer awareness on Soko+ SMS

Another factor influencing the uptake of Soko+ SMS is the awareness of the existence of the service. The farmers who were not enrolled for Soko+ SMS were therefore required to indicate their awareness on Soko+ SMS. The results were as shown in Table 4.7

	Witho	out	With phone No Soko+		
Awareness of Soko+ SMS	phor	ie			
	Frequency	Percent	Frequency	Percent	
Yes	6	60.0	23	85.2	
No	4	40.0	4	14.8	
Total	10	100	27	100	

#### Table 4. 7 Farmers awareness of Soko+ SMS

Whereas the majority of the farmers were aware of the product, Findings show that 40% of the farmers who didn't own mobile phones didn't know of the existence of Soko+ SMS. Additionally, 14.8 percent of the farmers having mobile phones were not aware of the Soko+ SMS. This finding implied that awareness creation was still necessary in the area if additional uptake of the product was to be realized. Interviews with the agricultural officers confirmed their awareness of the existence of Soko+ service in the division. To them, Soko+ complemented their work and made communication with farmers easier. Interviews with ALIN staff confirmed that hands on training sessions have been conducted on the availability and use of Soko+.

Further to awareness, the farmers were required to indicate the usefulness of Soko+ SMS. Their responses were as summarized in Table 4.8.

Responses on the usage of Soko+ SMS	With pho	out ne	With phone No Soko+		
	Frequency	Percent	Frequency	Percent	
Provide market information	3	50.0	15	65.2	
Provide market linkage	2	30.0	4	17.4	
Educates farmers about prices of various farm produce	1	20.0	4	17.4	
Total	6	100	23	100	

## Table 4. 8 Farmers' responses on the usage of Soko+ SMS

According to in Figure 4.8 the farmers aware of the Soko+ SMS correctly indicated its contribution to their farming activities as to: provide market information, Provide market linkage and to educates farmers about prices of various farm produce. This finding implied that there was a segment of farmers (60% without phones and 85.2% with phones) who were aware of the features of Soko+ SMS but were not enrolled for it. This could probably suggest that barriers existed on accessing the products portfolio provided under Soko+ SMS due to language barriers, inadequate messaging space, and poor network coverage or even that the products were not vibrant enough to attract them into the service.

This findings are similar to Evanjeline Eriksson (2008) in a study of cell phone use by people in rural Kenya shows that people in rural Kenya use SMS as most effective way of communication. The author cited cases where SMS has been used effectively like on Kazi 560(Job Searching), M-Pesa and health care services used by mobile phone. The author further noted factors that have influenced the use like availability, affordability, accessibility among others.

## **4.3.3 Participation in Soko+ events**

Participation in Soko+ events was another factor that influenced the uptake of the product. To establish the patterns of the farmers in the area. The farmers without phones were asked if they ever attended a meeting or training or any event on Soko+. The results were as shown in Table 4.9

<b>Response on participation in Soko+ events</b>	Frequency	Percent
Yes	7	70.0
No	3	30.0
Total	10	100

Table 4. 9 Farmers participation in Soko+ events

Findings show that 70 percent of those who didn't have phone had attended at least one Soko+ event suggesting that they were aware about the benefits of Soko+. However 30 percent of them had never attended any events suggesting that there was still a segment of farmers within the area

that required product demonstration and information on Soko+ SMS. The extension officers confirmed having attended and participated in events organized on Soko+.

# farm input suppliers 50% farm input prices 50% farm produce prices country wide 40% weather information 30% fruits and vegetable prices 30% buyers 30% agrovet suppliers 20% agrovet prices 20% farmingtips 20% 0% 10% 20% 30% 40% 50% 60%

## 4.3.4 Products portfolio on Soko+ SMS

When the farmers were asked about the services they wished to see on the Soko+, their responses were as shown in Figure 4.4



The most important features that farmers in the area wished to access from Soko+ SMS were farm input suppliers and farm input prices. These were demanded by half of all the farmers polled. Other features on demanded include farm produce prices countrywide, weather information, fruits and vegetable prices, farm produce buyers, agrovet suppliers, agrovet prices and farming tips. This finding implied that if the product portfolio on Soko+ SMS was broadened, then its uptake could increase amongst the farmers.

This study shows similar findings to a study conducted by CIMMYT (2011) survey on 1,200 farmers in the Indo-Gangetic Plains; which revealed that farmers needed more information relevant to their information needs other than What they were being provided for. The study recommended for dynamic information databases with farmers' land size, cropping pattern, soil type, geographical location, types of inputs used, variety of seed used, and irrigation must be developed.

#### 4.3.5 Training on Soko+ use

The farmers were asked to indicate their need for training, the result were as shown in Table 4.10

	Farmers with	Chi square			
Training needed	Frequency	Percent	Frequency	Percent	
Yes	9	90.0	11	44.0	X2 = 8.264a
No	1	10.0	14	56.0	df=14
Total	10	100.0	25	100.0	sig. = .004

Table 4. 10 Farmers need for training on Soko+

The majority (90%) of the farmers without phones and 44 percent of the farmers who had phones indicated a need for training on the features and use of Soko+ SMS. The chi square was (X2 = 8.264a, df=14, sig. = .004) confirming that there was a statistically significant difference in the training needs between the two segments of farmers. This finding implied that training was necessary and very critical if the uptake of the Soko+ SMS was to be sustained. On accessing the service 80 percent of the farmers who didn't own a phone desired to be provided with one, while 40 percent desired to be provided with airtime.

Information was therefore sought on the critical areas of training on Soko+ and the results were as summarized in Figure 4.5





Further information was sought from the farmers who had phones on why they never used the Soko+ service. Their responses were as shown in Table 4.11

Reason	Response	Frequency	Percent
Interactivity	Yes	2	7.4
	Non response	25	92.6
	Total	27	100.0
Simplicity	Yes	5	18.5
	Non response	22	81.5
	Total	27	100.0
Language barrier	Yes	7	25.9
	Non response	20	74.1
	Total	27	100.0
Affordability	Yes	2	7.4
	Non response	25	92.6
	Total	27	100.0
Insufficient information	Yes	10	37.0
	Non response	17	63.0
	Total	27	100.0

# Table 4. 11 Reasons for not using Soko+ SMS

From Table 4.11, majority of the farmers opted not to respond to the reasons proposed by the study. However, a significant proportion of the farmers single out insufficient information (37%), language barriers (25.9%) and simplicity as the key reasons why they never used the Soko+ service. As earlier established, the farmers demanded more information than was provided through Soko+. Again, language barriers could exist as a result of low education. Interviews with the agricultural extension officers confirmed that Soko+ messages were delivered in English while a significant proportion of the farmers in the division did not have a good command of English. Similarly, the features provided by Soko+ should be simplified for these farmers if the uptake was expected to increase.

## 4.4 Influence of Soko+ SMS service in provision of agriculture extension information

The second objective of the study was to establish the influence of Soko+ SMS service in provision of agriculture extension information in the Division. To achieve this, the farmers were required to respond to a set of questions on agricultural extension, mobile phone technology and on the Soko+ product. The farmers were first required to indicate whether they had access to agricultural extension information. The results were as shown in Figure 4.6.



Figure 4. 6 Farmers access to agricultural extension information

Findings show that 67 percent of the farmers in the area had access to agricultural extension services. Details on the frequency of accessing the agricultural extension information were as shown in Table 4.12.

	•	Daily	Weekly	Monthly	Seasonally	Don't access	Total	Chi square
without phone	Freq.	0	2	3	4	1	10	
without phone	Percent	.0%	20.%	30%	40%	10%	100%	
with phone no	Freq.	1	2	5	10	4	22	X2 = 5.62/a
Soko+	Percent	5%	9%	23%	46%	18%	100%	$u_{-0}$
wa Saka	Freq.	3	4	8	8	1	24	51 <b>G</b> . 1009
use Soko+	Percent	13%	16.%	33%	33%	4%	100%	

Table 4. 12 Frequency of farmers' access to agricultural extension information

According to table 4.12, 70 percent of the farmers without phones accessed agricultural extension information on either monthly or seasonal basis. Similarly, 69 percent of the farmers with phones but hadn't enrolled for Soko+ and 66 percent of those who used Soko+ indicated accessing the information on either monthly or seasonal basis. The chi square was (X2 = 5.627a, df=8, sig. =.689) confirming that there was no statistical significant differences between the farmer segments. This finding implied that demand for agricultural extension information in the division was seasonal probably around the planning, top dressing and harvesting seasons.

## 4.5 Existing agricultural extension information systems in the division

The third objective of the study was to establish the existing agricultural extension information systems in the division. To achieve this, the farmers were required to indicate their source of agricultural extension services. Their responses were as summarized in Figure 4.7.



Figure 4. 7 Farmers source of agricultural extension information

Findings show that the farmers without phones heavily relied on their neighbours (58%), and radio (50%). Only 26% of them indicated getting the services from the agricultural extension officers. This finding implied that the farmers who didn't have phones heavily relied on unverified secondary sources of information whose reliability was not tested for credibility. Majority of the farmers with phones but do not use Soko+ indicated their information sources as radio (50%), chief barazas(44%), self help groups (33%), and agricultural extension officers (29%). These sources seemed to be dominated by the "government voice" in the sense that the chief baraza and the agricultural extension officers were government systems. Most of the self

help groups received recognition from the chief and advice from the agricultural extension officers. Majority of the farmers using Soko+ indicated their information sources as mobile phone (75%), Soko+(63%), newspaper(53%), radio(50%), social media (50%) self help groups(61%) and agricultural extension officers(45%). This finding suggested that the farmers who used Soko+ cross checked their information from several other sources before making their planting, harvesting and marketing decisions.

When the farmers were asked on the most reliable sources, their responses were as shown in Figure 4.8



#### Figure 4.8 most reliable sources of agricultural extension information

The farmers ranked Soko+, government extension workers and chief barazas as the most reliable sources of agricultural extension information. This could probably be due to the fact that the three sources gave the specific information that the farmer in the area sought. Soko+ was ranked the highest probably because of its availability to everyone and could be accessed easily on mobile phones. In as much as the agricultural officers were ranked as reliable sources, their access to farmers was not very frequent probably the reason they were ranked lower than Soko+. This could be supported by the fact that there were only 2 extension officers assigned to support farmers in the whole division as of the time of study. Additionally, the chief barazas were only occasional when the chief wanted to convey a certain message specific to farming. Again, these

barazas would incorporate the extension officers as the key speakers, probably the reason as to why the farmers ranked the barazas lower than the agricultural extension officers.

## 4.6 Influence of Soko+ SMS service in provision of agriculture extension information

The fourth objective of the study was to find out the agriculture extension information needs of small scale farmers in Sipili Olmoran ward. To achieve this, the farmers were required to indicate the type of agricultural extension information they wished to access. The results were as summarized in Table 4.13

		fa	rmer category		
Information demanded	-	without	with phone	use	
		phone	no Soko+	Soko+	Total
Market information	Frequency	8	8	20	36
	Percent	22.2%	22.2%	55.6%	100%
Farming tips (seeds, Fertilizers,	Frequency	9	14	20	43
inputs, post harvest	Percent	20.9%	32.6%	46.5%	100%
Weather (forecast)	Frequency	8	6	17	31
	Percent	25.8%	19.4%	54.8%	100%
Traders/buyers	Frequency	5	1	14	20
	Percent	25.0%	5.0%	70.0%	100%
Extension workers contacts	Frequency	4	-	1	5
	Percent	80.0%	-	20.0%	100%
Input suppliers contacts	Frequency	3	11	5	19
	Percent	15.8%	57.9%	26.3%	100%

Table 4. 13 Agriculture extension information needs of farmers in the division

Information in Table 4.13 reveals that the farmers without phones mostly demanded the contacts of the agricultural extension officers. This could be due to the fact that majority of them were not literate and were more comfortable engaging the extension officers on all their queries. In contrast none of the farmers with phones were interested in this contact. The farmers with phones

but not enrolled for Soko+ wished to access the contacts of farm inputs suppliers. Significant proportions of this segment of farmers also wished to access farming tips, market information and the weather forecast. The majority (70%) of the farmers using Soko+ wished to access information on the traders and buyers of farm produce. They also wished to access the market information, weather forecast, farming tips, inputs supplier contacts and the extension workers contacts.

Interviews with the ALIN staff established that Soko+ at the time of study offered market information, farming tips and weather forecast. This information was dispatched to the farmers on a bi-weekly basis. This information implied that ALIN had correctly identified some of the key needs of the farmers in the area. However, the fact that the information is still in high demand amongst the farmers suggests that there were areas that required improvements to which investigations were necessary. ALIN therefore needed to look into the relevance, accuracy timeliness, productiveness, frequency, effectiveness and efficiency of the information relayed to the farmers. Their rating of market information was very good, farming tips was good, weather forecast was good, and market linkages were "average". This confirmed that there were areas that needed to be improved in each of the product categories.

Interviews with the agricultural officers confirmed that the main challenge they faced with the rolling out of Soko+ in the area was getting simplified and relevant farming information to the farmers. As found out earlier, most of the farmers were over 45 years of age with low education. The agricultural officers confirmed that the factors that influenced the uptake of Soko+ were literacy levels, market trends and weather forecast which could be the key areas that farmers in the division are keen on. The extension officers further confirmed that information on high value crops, and adaptation to the changing weather patterns was very relevant in the division. They further observed that many farmers did not understand English and Provision of the information in a simpler language like Swahili would benefit more farmers.

#### 4.8 Findings based on TAM

This study is based on Technology Acceptance Model (TAM). Based on the findings it is evident that users will adopt the usage of a new technology when they perceive the usefulness and

perceived ease of use. For instance farmers who were using Soko+ SMS services found it useful in their work. Majority indicated it was their primary source of market information which increased their awareness of product prices and where to sell thus able to make informed decision.

On the other hand, a user will easily use a technology that he/she finds it user friendly, clear, understandable and easy to remember. In the case of Soko+ SMS service ,farmers who rejected use of Soko+ SMS services indicated that they needed training on the features and use of Soko+ SMS since they found it complex and not interactive. Although Several researchers have criticised Davis's original study (Davis 1989) ,the researcher found it very useful based on the findings and concludes that TAM was critical in providing insights on possible factors that led to the acceptance or rejection of Soko+ SMS service.

## 4.9 Summary of Findings

## 4.9.1 Summary of the study

The main objective of this study is to examine factors that influence the uptake of Soko+ SMS service to access agricultural extension information by small scale farmers in Sipili Olmoran ward of Laikipia County in Kenya. The researcher developed four research objectives from which the four research questions were drawn. The objectives were; to examine factors that influence uptake of Soko+ SMS service by small scale farmers, to establish the influence of Soko+ SMS service in provision of agriculture extension information, to establish the existing agricultural extension information systems, and to find out the agriculture extension information needs of small scale farmers in the ward. Related literature to the use of technology on dissemination of agriculture extension information was reviewed. The theoretical framework was based on the Technology Acceptance Model.

The study targeted the all the 310 farmers covered by the Soko+ project area. A sample of 20% was employed to get 62 respondents. Questionnaire tools were used to collect the required information. The return rate was 100%. Data was analyzed using charts, frequencies,

percentages, descriptive statistics and chi squares generated by the use of Statistical Package for Social Sciences (SPSS).

#### 4.9.2 Summary of key findings

The uptake of the Soko+ SMS by farmers in Sipili Olmoran ward in Laikipia County was 40%. Access to mobile phone, Farmer awareness on Soko+ SMS, Participation in Soko+ events, Products portfolio on Soko+ SMS, and Training on Soko+ use influenced uptake of Soko+ SMS service amongst the farmers greatly influenced their uptake of the product. Language, inadequate messaging space, and poor network coverage are some key barriers to its uptake. The products on Soko+ SMS were not vibrant enough. Farmers demanded inclusion of farm produce prices countrywide, weather information, fruits and vegetable prices, farm produce buyers, agrovet suppliers, agrovet prices and farming tips. Most of the Soko+ messages were delivered in English while a significant proportion of the farmers in the division did not have a good command of English. Consequently, the features provided by Soko+ were somehow complicated for them.

Demand for agricultural extension information was seasonal mostly around the planning, top dressing and harvesting seasons. While 67 percent of the farmers in the area had access to agricultural extension services, only 40 percent relied on Soko+ SMS. Of the existing agricultural extension information systems in the division, Soko+ was ranked the highest because of its availability to everyone and could be accessed easily on mobile phones. However there was need to look into the relevance, accuracy timeliness, productiveness, frequency, effectiveness and efficiency of the information relayed to the farmers, since the main challenge for Soko+ users was getting simplified and relevant farming information.

## 4.9.3 Demography

The majority (55%) of the farmers were male while the females represented 45% of the farmers. This could be attributed to the fact that in the African culture, the man is seen as the head of household and therefore seen as the spokesperson for the family. Whenever information is

sought about households, it is usually the man's opinion that is sought except when he has delegated or is not within the home. Whereas the majority of the farmers (84%) had access to mobile phones, the uptake of the Soko+ SMS was only 40% of the farmers' population in the area. The majority (63%) had O- level of education and below. Most of the farmers (77%) were above 45 years of age, and only 36 percent of them used Soko+. The uptake of the Soko+ SMS amongst the male farmers was 47 percent while that of females was 32 percent.

#### **4.9.4** Factors that influence uptake of Soko+ SMS service

On the first objective of the study which was to examine factors that influence uptake of Soko+ SMS service by small scale farmers in Sipili Olmoran ward in Laikipia County. It was that; Access to mobile phone, Farmer awareness on Soko+ SMS, Participation in Soko+ events, and Products portfolio on Soko+ SMS, and Training on Soko+ use influenced uptake of Soko+ SMS service amongst the farmers. It was also established that; there was no significant difference between the farm tenureship and the uptake of Soko+ SMS, that the majority of the farmers were more than 45 years of age and they were not in tandem with the digital technology as it evolved, and that there existed a general awareness of Soko+ service in the division. Barriers existed on accessing the products portfolio provided under Soko+ SMS. They took the form of language barriers, inadequate messaging space, poor network coverage and that the products were not vibrant enough. features demanded by farmers include farm produce prices countrywide, weather information, fruits and vegetable prices, farm produce buyers, agrovet suppliers, agrovet prices and farming tips. A significant proportion of the farmers indicated a need for training on the features and use of Soko+ SMS. Most of the Soko+ messages were delivered in English while a significant proportion of the farmers in the division did not have a good command of English. Similarly, the features provided by Soko+ were somehow complicated for them.

#### 4.9.5 Influence of Soko+ SMS service in provision of agriculture extension information

On the second objective of the study which was to establish the influence of Soko+ SMS service in provision of agriculture extension information in the Division. It was established that demand for agricultural extension information in the division was seasonal mostly around the planning, top dressing and harvesting seasons, that 67 percent of the farmers in the area had access to agricultural extension services. And that 40 percent of the farmers had enrolled for Soko+ SMS.

#### 4.9.6 Existing agricultural extension information systems in the division

On the third objective of the study was to establish the existing agricultural extension information systems in the division. It was established that only 26% of the farmers who didn't have phones got the services from the agricultural extension officers. The others relied on unverified secondary sources of information such as radio and neighbours whose sources were not tested for credibility. Majority of the farmers with phones but do not use Soko+ indicated their information sources as radio (50%), chief barazas (44%), self help groups (33%), and agricultural extension officers (29%). Majority of the farmers using Soko+ indicated their information sources as mobile phone (75%), Soko+ (63%), newspaper (53%), radio(50%), social media (50%) self help groups(61%) and agricultural extension officers (45%). It was also established that the farmers who used Soko+ cross checked their information from several other sources before making their planting, harvesting and marketing decisions. Soko+, government extension information because they provided specific information that the farmer in the area sought. Soko+ was ranked the highest because of its availability to everyone and could be accessed easily on mobile phones.

# 4.9.7 Influence of Soko+ SMS service in provision of agriculture extension information

On the fourth objective of the study was to find out the agriculture extension information needs of small scale farmers in Sipili Olmoran ward, it was established that the farmers in the division wished to access; contacts of farm inputs suppliers, access farming tips, market information, weather forecast, information on the traders and buyers of farm produce, and the extension workers contacts.

However there was need to look into the relevance, accuracy timeliness, productiveness, frequency, effectiveness and efficiency of the information relayed to the farmers. Because the rating of the products was as follows: market information was "very good", farming tips was "good", weather forecast was "good", and market linkages was "average". Improvements are

therefore necessary in each of the product categories. The main challenge on Soko+ in the area was getting simplified and relevant farming information to the farmers. Due to the low levels of literacy, seasonality of the demand for extension services and the high rating of Soko+ as the key source of this agricultural extension services.

#### **CHAPTER FIVE**

## **CONCLUSIONS AND RECOMMENDATIONS**

This chapter deals with the conclusions and recommendations of the study. The Influence of Soko+ SMS service in the uptake of agriculture extension information in Sipili Olmoran ward in Laikipia County.

## **5.1 Conclusions**

Following discussions based on the findings four key conclusions were drawn and recommendations provided as below;

#### 5.1.1 Access to Mobile phone

Access to knowledge and technologies is vital if farmers are to increase agricultural production in a sustainable way. Therefore, creating awareness through provision of mobile phones is an essential component for development in time they could reduce the digital and knowledge divide. Mobile phones SMS service is the most reliable and fastest means of disseminating information and are being used to facilitate agriculture extension information among small scale farmers. Pankaj (2011) also support this notion by highlighting that SMS system has been more beneficiary to farmers where they can send message and gets instant reply for decision making.

It has been observed that having access to the right information can address major problems that hinder rural community development and it can also improve livelihoods. Several researchers such as Alex Pox (2003) has reported that an increase income because farmer's cooperatives which are well informed are able to respond appropriately to changes in the market. When the rural farmers lack access to knowledge and information that would help them achieve maximum agricultural yield, they are driven to the urban centres in search of formal employment, as the only option for survival (Munyua, 2000).

In a similar study Eduardo Nakasone (2013) on the role of price information on agricultural markets in rural Peru, farmers who were provided with mobile phones through which they received detailed price information for the most relevant crops in 6 regional markets received higher prices for their products .Eduardo support the notion that when small scale farmers have access to mobile phone, uptake and adoption of the services is inevitable. Additionally Evanjeline Eriksson (2008) in a study of cell phone use by people in rural Kenya shows that

people in rural Kenya use SMS as most effective way of communication in Kazi 560(Job Searching) and M-PESA noting that factors that influenced the use included availability, affordability, accessibility among others.Nyerere (1967) stated that, "while other countries in the world aim to reach the moon, we must aim for the time being at any rate to reach the villages by providing them with necessary information".

The cost of communication in Kenya remains high a fact that would hinder many Kenyans from participating in mobile telephony communication. The need to provide agriculture information has led to emergence of numerous mobile telephony based solutions to support farmers. It is generally agreed by a number of scholars such as Mchombu (1993), Corriera et al (1997), Okiy, (2005) and others that, rural communities in Africa have invariably lagged behind interms of any meaningful development. Lack of access to adequate and right information at the right time to the rural communities undermines the efforts at improving the living conditions of the rural people.

The introduction of pre-paid technology and acquiring mobile phones on contracts has significantly increased affordability of mobiles however this is not enough in this digital era. Mobile phone is a necessity tool to farmers in rural areas, such gadgets should be subsidised by the government or development practitioners so that farmers are able to afford and use them to access agriculture extension information relevant to increase their farm productivity improving their income levels and living conditions. Additionally government should consider equipping every village with Iinformation centers with up to date information and communication gadgets, such as mobile phones, computers with internet access, radio and television sets and multimedia that provides relevant information on agriculture extension.

#### 5.1.2 Relevant information

Farmers don't require just any kind of information, the information has to be relevant, reliable, timely, and in the language preferred by the farmers. It's always a challenge to know all the information needs of farmers especially in an information dependent sector like agriculture where there are new and rather complex problems facing farmers every day. Agriculture extension information needs vary from village to village and farmer to farmer. Saravan R. et al

(2008) study on information pattern and information need of the tribal farmers in Arunachal Pradesh indicate that most of the farmers need information on various topics such as pest management while Tologbonse D, et al. (2008) found out that rice farmers community in Niger state needed information about the crop production.

Knowledge brokers who facilitate the transfer and exchange of information to support small scale farmers in decision making processes in many cases provide information that do not match their needs even further in a format that is not friendly to them. This leads to barriers in usage of such information that could be useful elsewhere. Similarly, a study conducted by CIMMYT (2011) in the Indo-Gangetic Plains; revealed the farmers needed information on how to address pest attacks and what varieties better adapt to changing climatic conditions. Instead, they received standard prescriptions on input use and general seed varietal recommendations. To provide the information farmers really need, dynamic databases with farmers' land size, cropping pattern, soil type, geographical location, types of inputs used, variety of seed used, and irrigation must be developed.

According to TAM theory, for any technology to gain acceptance by users, perceived usefulness and perceived ease-of-use determines attitude toward adoption, rejection and acceptance. People who perceive technology as useful and easy to use will accept it more readily than those who do not. Farmers should not only be provided by relevant information but also in simple formats that are easy to use for them to apply in their farm. When farmers are provided with relevant information, evidence show that they improve their production and income levels. In a study conducted by Dixie and Jayaraman (2011) showed that 50 percent of Indian farmers reduced expenditures on agricultural inputs because of SMS information services. The survey also established that the service is also changing farmers' behavior with 44 percent farmers acknowledging that it changed their fertilizer applications and 43 percent said that it changed the timing of spraying which led to increased income.

Information is essential for development. The success of any agriculture extension approach depends on how it enhances the information flow along the agriculture value chain, and whether this is done sustainably and effectively. Sustainability and effectiveness are determined by the

type of information provided, how and to whom the information is provided, the strength of feedback in each link, and the capacity of the approach to provide relevant information to meet farmers' needs. Due to changing agricultural conditions including climate change, farmers require access to timely, reliable, and relevant information that can support the complexity within which their farm enterprises operate.

There is need to do periodic needs assessment by agriculture extension information providers in order for them to provide timely and relevant information to smallscale farmers for improved production. The department of agriculture extension should put a mechanism of ensuring that agriculture extension information provided by any entity should be useful in the right format and language that can support farming productivity. Information sources to farmers should explore multilingual sources to ensure all small scale farmers benefit from information provided.

## 5.1.3 Training

The existence of skills shortages hinders the utilization of emerging new ICTs that support smallscale farmers' access information on agriculture extension. Marginalised small scale farmers lack skills to use these communication tools and even implementing the new model of farming systems. Capacity building is required at various levels to promote access to relevant agriculture extension information for increased agricultural productivity and sustainable farming. The general lack of awareness among small scale farmers can be attributed to their high level of illiteracy, technophobia, culture and gender. This contributes to the low level of utilization of communication tools that support access to information.

Results of Pemsl et .al (2005) paper on the concept of Farmer Field Schools in Senegal show that when it is very important to train farmers when introducing a new concept on knowledge dissemination. Development practitioners who provide these innovative communication tools that disseminate information on agriculture extension should train farmers on how they can use the tools. However, agricultural productivity will not increase if the capacity of farmers and other actors in the agricultural value chain remains low.

Farmers should be provided by experiential learning trainings to facilitate acceptance and use of tools such as mobile phones. By putting farmers and other operators in the agriculture value

chain at the center, development practitioners need to provide training modules at every stage to develop the capability to operate efficiently and effectively in the knowledge society. This will support adoption, replication and sustainability since farmers will be self-reliant.

## 5.1.4 Competition

Many small scale farmers use various sources to access agriculture extension information so that they can compare the accuracy of information or just have additional information that has been provided by a different source. For example most farmers rely on government extension workers, chief administration gatherings ,social groups, media especially radio and newspapers, friends, internet among many others to access information that enable them make informed decision.

Information overload is becoming an issue with increasing access to mass communications that is as a result of globalization and liberalization. However, in terms of relevant, timely, welladapted and adequately delivered information for agricultural and rural development, there is certainly a big gap in most developing countries. The controversy, however, lies in the uncertainty of fair and equal conditions for all innovators of tools for communication, irrespective of the advantages, disadvantages, potentials and risks. Small scale farmers therefore, must be educated and prepared to modify their information seeking behavior within the context of globalization and liberalization which has encouraged open competition.

Bertolini, (2004) argued that innovative ways of combining ICT-based information sources (such as agricultural information systems) with traditional ones (such as radio broadcasting) should be considered when looking at the costs and benefits of ICT development. In their study, Adrian Muchiri et al (2007) shows that KACE uses rural based market information points, market information centres, mobile phone short messaging services, interactive voice response service; internet based regional commodity trade and information system and a website to disseminate market information to farmers, this shows the usefulness of using multi channels to reach farmers effectively.

Uses and gratification theory for example, assume that the user has alternative choices to satisfy their need. Blumler and Katz's (1974), suggest that media users play an active role in choosing and using the media. A media user seeks out a media source that best fulfills the needs of the user. The more dependent an individual is on the media for having his or her needs fulfilled, the

more important the media will be to that person. This shows that farmers as users of agriculture extension information use multiple channels as sources for information depending on usefulness of the information, affordability, availability, effectiveness and reliability of the information.

The main issue is how the powers of the emerging advanced information technologies can be harnessed for the benefit of both extension agents and farmers without compromising the importance of unique local factors such as indigenous communication patterns, and also without considering information technology as replacement for the extension agents, which remains a much-needed and –appreciated human element. Under FAO project in the Philippines, the Internet and interactive e-mail facilities have been established at municipality level for supporting decentralized extension staff. Expert systems are also being developed to compensate, to some extent, for the too-rare visits of subject-matter specialists to farmers' fields. The use of cellular phones is by now a routine practice and the equipment is used for rural development projects in Bangladesh. Over 30% of extension staff in Estonia use the Internet where one can find programmes like "virtual gardens" and "virtual farms" Rivera et al (2005).

It is necessary to monitor emerging technologies. The responsibility lies on both the national and county agricultural extension systems to moderate these entities so that farmers access usable information in friendly formats. They should provide checks and balances to regulate the emergence of these innovations that could end up confusing farmers and encourage partnerships to provide better services to the small scale farmers as opposed to unhealthy competition since most innovations are very similar to each other.

## **5.2 Recommendations**

Mobile phones are essential to farmers in rural areas, such gadgets should be subsidised by the government or development practitioners so that farmers are able to afford and use them to access agriculture extension information to increase their farm productivity and income levels. Providers of agriculture extension information should conduct periodic needs assessment in order for them to provide timely and relevant information in the right format and language to small scale farmers. Additionally, farmers should be provided by experiential learning trainings

at every stage to facilitate acceptance and use of communication tools such as mobile phones this will support adoption, replication and sustainability since farmers will be self-reliant.

The national and county agricultural extension systems or a regulatory unit in charge of extension agriculture should monitor and moderate entities that provide agriculture extension information to small scale farmers to ensure farmers access usable information .The regulatory unit should encourage partnerships among information providers to avoid unnecessary duplication and unhealthy competition to avoid information overload to farmers. Based on the findings, further research should be conducted to investigate the role of other sources of extension agriculture information to find out the market share and the influence they have.

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# APPENDIX I RESEARCH QUESTIONNAIRE FARMERS USING SOKO+

The purpose of this interview is to collect data for purely academic purposes. The study seeks to find out the Influence of Soko+ SMS service in the uptake of agriculture extension information in Sipili Division in Laikipia County.

Please answer the questions by putting a tick in the appropriate box or by writing in the space provided.

# SECTION A: GENERAL INFORMATION

1.	Gender: (Please tick where applicable)	
	Male	{ } Female { }
2.	Age:	
	Between 18	8-24 { } 25-29 { } 30-34 { } 35-39 { } 40-45 { } Above 45 { }
3.	Highest Level of Education	
	O-level	{ }
	A-level	{ }
	University	{ }
	Other	
	None	{ }
4.	Current Oc	cupation
	Public Serv	vant   { } Farmer { } Retired { } other(specify)
5.	List the farmer group you belong to	
6.	Do you have a farm? Yes{ } No{ }	
	If yes what type of farming activities do you do?	
		Cereals/grains
		Rearing of livestock and
		poultry
		Vegetables and fruits
		Cash/subsistence farming
		Other(specify)
1 a) Do you know how to use SMS? Yes { } No { } 2 a) Have you ever heard about Soko+ SMS 20245? Yes  $No\{ \}$ { } b) If Yes how did you learn about Soko+? Launch { } road show { } farmer { } Radio { } ALIN / Maarifa staff { } neighbor/friend { } meeting/training { } c) Have you ever been trained or attended a meeting/event on Soko+? Yes{ } No{ } d) If yes what do you know about it? e) How useful was it to you? f) Do you use Soko+ Yes{ } No{ } g) For how long have you used Soko+? One month { } 6 months { } 1year { } 2 years { } I don't know { } h) What type of information have you used on Soko+? Market prices { } Farming tips { } weather { } buyers/market { } i) Overally how do you rate Soko + SMS? High { } Average { } Low { } None { } Explain.....

.....

-----

j) Does Soko+ has benefit for you? Yes { } No{ } If yes List

k) During that period would you say Soko+ has improved access to agriculture extension information?

Yes { } No { }

1) Do you find Soko+ a reliable source of agriculture extension information?

Yes{ } No{ }

m) How would you rate Soko+ interms of the following.(Please use E-Effective,A-average P-poor)

Language	
Reliability	
Affordability	
Accessibility	
Credibility	
interactivity	
Simplicity	

- n) Have you ever introduced other farmers to SOKO+ Yes { } No { }
- k) Is Soko+ responding to your information needs? Yes { } No { }
- 1) What challenges do you face in using Soko+ SMS?

Language barrier { } insufficient information { } Not relevant information { }

Poor network signal { } Frequency { } Costs { } Lengthy process { }

m) Please list activities you think Soko+ can do to improve its services?

Local mark	et prices				
Linkages	with	service	providers	like	

inputs/finance	
Get buyers	
Periodic trainings	
Use local language/swahili	
Incorporate voice	
Engage users/follow up	
I don't know	

n)What would you want to see in *Soko*+ SMS?------

o) If you would like to use more services Soko+ do you need training to access? Yes { } No{ }

If yes what type of training do you need?

Use of SMS service	
Accessing Soko+ website	
Uploading products	
Sending inquiries	
I don't know	

3 a) What is your source of agriculture extension information? (Please tick)

Government agriculture extension	
workers	
Soko+	
Chiefs/administration barazas	
Neighbour	
Groups e.g self help group	
Social centres	
Internet/social media	
Media(specify)	
Mobile phone	

Newspaper	
Others(list)	
I don't know	

b) How often do you access agriculture extension information?

Daily { } weekly { } monthly { } seasonally { } don't access

(c)What type of agriculture extension information do you access?

Market information	
Farming	
tips(seeds,fertilisers,inputs,post	
harvest)	
Weather (Forecast)	
Others(list)	
I don't know	

4 a).Please list your most reliable sources of agriculture extension information

Government extension workers	
Soko+	
Chiefs/administration barazas	
Neighbour	
Groups	
Radio	
Others(list)	
I do not have	
I don't know	

b) What type of agriculture extension information would you like to access?

Market information	
Farming tips(seeds,fertilisers,inputs,post	
harvest)	
Weather (Forecast)	

Traders/buyers	
Extension workers contacts	
Input suppliers contacts	
Others(list)	
I don't know	

5. Do you know anyone who uses Soko+ around you? Yes{ } No{ }

If yes how often do they use?

# APPENDIX II RESEARCH QUESTIONNAIRE FOR FARMERS WITH MOBILE PHONE AND DON'T USE SOKO+

The purpose of this interview is to collect data for purely academic purposes. The study seeks to find out the Influence of Soko+ SMS service in the uptake of agriculture extension information in Sipili Division in Laikipia County.

Please answer the questions by putting a tick in the appropriate box or by writing in the space provided.

# SECTION A: GENERAL INFORMATION

7.	'. Gender: (Please tick where applicable)			
	Male { } Female { }			
8.	Age:			
	Between 18-24 { } 25-29 { } 30-34{ } 35-39{ } 40-45{ } Above 45 { }			
9.	Highest Level of Education			
	O-level { }			
	A-level { }			
	University { }			
	Other			
	None { }			
10.	Current Occupation			
	Public Servant   { }   Farmer { }   Retired { }   other(specify)			
11.	List the farmer group you belong to			
12. Do you have a farm? Yes{ } No{ }				
If yes what type of farming activities do you do?				
	Cereals/grains			
	Rearing of livestock and			
	poultry			
	Vegetables and fruits			
	Cash/subsistence farming			

Other(specify)

#### **SECTION B**

1a) Do you know how to use SMS? Yes { } { } No 2 a) Have you ever heard about Soko+ SMS 20245? Yes { } No { } b) If Yes ,how did you learn about Soko+? Launch { } road show { } farmer { } Radio { } ALIN / Maarifa staff { } neighbor/friend { } meeting/training { } c) Have you ever been trained or attended a meeting/event on Soko+? Yes{ } No{ } d) If yes what do you know about it?

e) How useful was it to you?

3 Why don't you use Soko + service to access agriculture extension information?

Please tick where applicable

Interactivity	
Simplicity	
Language barrier	
Affordability	
Insufficient information	
Other(state)	
I don't know	

4. What would you like to see improved on SOKO+ so that you can use it?

5 a) Do you have access to agricultural extension information?

Yes { } No { }

b) How often do you access agriculture extension information?

Daily { } weekly { } monthly { } seasonally { } don't access c) What is your source of agriculture extension information? (Please tick)

Government agricultur	e
extension workers	
Soko+	
Chiefs/administration barazas	
Neighbour	
Groupse.g self help group	
Social centres	
Internet/social media	
Media(Specify)	
Mobile phone	
Newspaper	
Others(list)	
I don't know	

(d)What type of agriculture extension information do you access?

Market information	
Farming	
time (and the familie and in most a most	
tips(seeds,fertilisers,inputs,post	
harvest)	
harvest)	
Weather (Forecast)	
Others(list)	

I don't know	
--------------	--

6. Do you know anyone who uses Soko+ around you? Yes{ } No{ }

If yes how often do they use?

# APPENDIX III QUESTIONNAIRE FOR FARMERS WITHOUT PHONES

The purpose of this interview is to collect data for purely academic purposes. The study seeks to find out the Influence of Soko+ SMS service in the uptake of agriculture extension information in Sipili Division in Laikipia County.

Please answer the questions by putting a tick in the appropriate box or by writing in the space provided.

# SECTION A: GENERAL INFORMATION

13. Gender: (Please tick where applicable)
Male { } Female { }
14. Age:
Between 18-24 { } 25-29 { } 30-34{ } 35-39{ } 40-45{ } Above 55 { }
15. Highest Level of Education
O-level { }
A-level { }
University { }
Other
None { }
16. Current Occupation
Public Servant   { }   Farmer { }   Retired { }   other(specify)
17. List the farmer group you belong to
18. Do you have a farm? Yes{ } No{ }
If yes what type of farming activities do you do?
Cereals/grains
Rearing of livestock and
poultry
Vegetables and fruits
Cash/subsistence farming
Other(specify)

#### **SECTION B**

1. Why don't you have a mobile phone?

Cost is high { } Lack of know how to use { } not priority { } I don't know { } 2a) Have you ever heard about *Soko*+ SMS 20245 ?

Yes { } No { }

b) Have you ever been trained or attended a meeting/event on Soko+? Yes{ } No{ }

c) If yes what do you know about it?

d) How useful was it to you?

d) Would you like to use Soko+?

Yes { } No { }

If No Briefly explain why (skip to qn.3)

If Yes ,what information would you like to find on Soko+?

e) What would you like Soko+ to provide so that you can use its facility?

Mobile phone	
Airtime	

Others	
I don't know	

f) If you would like to use Soko+ do you need training to access? Yes  $\{ \}$  No  $\{ \}$ 

If yes what type of training do you need?

Use of SMS service	
Accessing Soko+ website	
Uploading products	
Sending inquiries	
I don't know	

3 a) What is your source of agriculture extension information? (Please tick)

Government agricul	ture
extension workers	
Chiefs/administration barazas	
Neighbour	
Groups e.g. self-help group	
Social centres	
Internet/social media	
Media(specify)	
Mobile phone	
Newspaper	
Others(list)	
I don't know	

b) How often do you access agriculture extension information?

Daily { } weekly { } monthly { } seasonally { } don't access

(d)What type of agriculture extension information do you access?

Market information	
Farming	
Tips(seeds,fertilisers,inputs,post	
harvest)	
Weather (Forecast)	
Others(list)	
I don't know	

4. a)Please list your most reliable sources of agriculture extension information

Government extension workers	
Soko+	
Chiefs/administration barazas	
Neighbour	
Groups	
Media(specify)	
Others(list)	
I do not have	
I don't know	

b) What type of agriculture extension information would you like to access?

Market information	
Farming	
Tips(seeds,fertilisers,inputs,post	
harvest)	
Weather (Forecast)	
Traders/buyers	

Extension workers contacts	
Input suppliers contacts	
Others(list)	
I don't know	

5. Do you know anyone who uses Soko+ around you? Yes{ } No{ }

If yes how often do they use?

# APPENDIX IV INTERVIEW GUIDE FOR ALIN STAFF

The purpose of this interview is to collect data for purely academic purposes. The study seeks to find out the Influence of Soko+ SMS service in the uptake of agriculture extension information in Sipili Division in Laikipia County.

Please answer the questions by putting a tick in the appropriate box or by writing in the space provided.

#### SECTION A: GENERAL INFORMATION

1. Gender: (Please tick where applicable) Male { } Female { } 2. Age: Between 18-24 { } 25-29 { } 30-34 { } 35-39 { } 40-45 { } Above 45 { } 3. Highest Level of Education O-level { } A-level } { University { } Other None { } 4. Current Occupation Public Servant { } Farmer { } Retired { } other (specify)\_\_\_\_\_ 5. For how many years have you worked on SOKO+?-----\_\_\_\_\_

# **SECTION B**

6. What factors influenced your innovation choice for disseminating agriculture extension information?

```
Mobile phone penetration { }
Accessibility { }
Reliability { }
```

Other -----

7. Did you conduct any training on the use of SOKO+ to farmers?

Yes { } No{ }

If yes what type of training?

#### 8. a)What is the frequency of SMS dispatch

Weekly{ } Bi-weekly { } Monthly { } Quarterly { }

b)What kind of information do you share on SOKO+ SMS?

Market information	
Farming	
tips(seeds,fertilisers,inputs,post	
harvest)	
Weather (Forecast)	
Others(list)	

9. Are you aware of any other ICTs extension services exists and are used by farmers?

Yes { } No { }

How unique is SOKO+ compared to others

10. How would you rate SOKO+ services performance

(VG-Very Good, A-Good, A-Average P-Poor)

Market information	
Farming	
tips(seeds,fertilisers,inputs,post	
harvest)	
Weather (Forecast)	
Linking buyers with producers	
Others(list)	

11. Are there any challenges you have faced in rolling out the project?

12. In your opinion do you think SOKO+ has achieved intended outcome? Yes { } No { }

\_\_\_\_\_

Explain

13. What do you intend to put in place to improve SOKO+?

# APPENDIX V INTERVIEW GUIDE FOR AGRICULTURAL EXTENSION WORKERS

The purpose of this interview is to collect data for purely academic purposes. The study seeks to find out the Influence of Soko+ SMS service in the uptake of agriculture extension information in Sipili Division in Laikipia County.

. All information will be treated with strict confidence.

# PART I: DEMOGRAPHIC DATA

- 1. What is your position?
- 2. For how many years have you worked on agriculture extension sector ?

# PART II: USE OF ICTS

vi. What ICTs extension services exists and are used by farmers that you are aware of in Sipili?

Mfarm	
Mkulima Young	
I cow	
Kilimo	
KACE	
Soko+	
radio	
Olx	
Other	

vii. What factors influence uptake of any ICT tool by small scale farmers in Sipili Division?

viii.	What	are	the	challenges	faced	by	farmers	in	accessing	information	on	agriculture
	extension in Sipili Division?											

ix. In your opinion do you think ICT tools support extension services?

Yes { }	No {	}			

# APPENDIX VI FOCUS GROUP INTERVIEW QUESTIONS FOR FARMERS

- 1. What is your opinion about Soko+?
- 2. Is Soko+ meeting your information gaps?
- 3. Does Soko+?+ help in provision of extension information?
- 4. How can Soko+? improve its performance?