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**ADDIS ABABA UNIVERISTY**

**SCHOOL OF GRADUATE STUDIES**

**SCHOOL OF INFORMATION SCIENCE**

**ASSESSMENT OF AGRICULTURAL KNOWLEDGE  
MANAMGEMENT SYSTEM (AKMS): THE CASE OF  
ETHIOPIAN AGRICLUTURAL TRANSFORMATION  
AGENCY SYSTEM**

**Temesgen Gebeyehu**

**June 2016**

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A Thesis submitted to the School of Graduates Studies of Addis Ababa  
University in Partial Fulfilment of the Requirements for the Degree of Master of  
Science in Information Science

By Temesgen Gebeyehu

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# Declaration

I declare that the thesis is my original work and has not been presented for degree in any other university.

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Date

This thesis has been submitted for examination with my approval as university advisor.

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Advisor

**Dedicated to:**

**My Dear Wife Dagmawit Asfaw and Precious Daughter  
Nathania Temesgen**

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June, 2016

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## Acronyms

AKC	Agricultural Knowledge Centre
AKM	Agricultural Knowledge Management
AKMS	Agricultural Knowledge Management System
ATA	Ethiopian Agricultural Transformation Agency
BoA	Bureau of Agriculture
DA	Development Agent
EIAR	Ethiopian Institute of Agriculture Research
GoE	Government of Ethiopia
GTP	Growth and Transformation Plan
ICT	Information & Communication Technology
IT	Information Technology
IVR/SMS	Interactive Voice Response /Short Message Service
KQ	Knowledge Quality
KM	Knowledge Management
KMS	Knowledge Management System
MoANR	Ministry of Agriculture and Natural Resources
Q&A	Question and Answer
SQ	System Quality
SU	System Use
SMF	Small Holders Farmers
SNNP	Southern Nations Nationalities and People
SPSS	Statistical Package for the Social Sciences
R&D	Research and Development
US	User Satisfaction
UNDP	United Nations Development Program

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## Abstract

Ethiopia Agricultural Transformation Agency (ATA) together with its partners designed and implemented the 8028 Hotline. It is used to disseminate agricultural knowledge about the best farming practices to smallholder farmers and other stakeholders. Even though more than one million unique callers start using such technology, it is difficult to conclude that the contents which are being disseminated via the system are actually reaching the users and serving their purpose at the other end. The purpose of this research is to assess the performance of 8028 Hotline in disseminating the agronomic knowledge to Ethiopian farmers, and examining the relationships between the factors constituting its success. In order to achieve the research objective, this research adopted the Wu and Wang (2006) Knowledge management system (KMS) success model. Quantitative approach was used to design the methods of the study. The survey's results were interpreted using standard multiple regression analysis, which helped to investigate and interpret the correlations between the dimensions constituting KMS success. The findings in this paper suggest that Knowledge quality has positive influence on both user satisfaction and perceived KMS benefits whereas System quality has positive influence on user satisfaction. In the contrary, the influence of System Quality on Perceived KMS Benefits was not found significant. The most important implication of this research is the importance of the user for KMS success. Other factors influencing the success of a KMS are incentives, management support and the likes (Whitfield, 2008), (Ali, 2012). The findings of this study are also in-line with those reported in previous studies (Wu & Wang, 2006). Therefore, the result of the study also validated the Wu and Wang model in the perspectives of the KMS implemented for the agricultural sector in the low-income countries such as Ethiopia.

**Keywords:** *Wu and Wang Model, 8028 hotline or AKMS, ATA, System Quality, Knowledge Quality, User Satisfaction, Perceived KMS Benefits, System Use*

# CHAPTER ONE

## 1. INTORUDCTION

### 1.1 Background

Ethiopia is Africa's second most populous nation with over 96 million inhabitants, over 80% of them live in rural areas. Agriculture has been the dominant sector of the country's economy, representing nearly 42% of GDP, 77% of employment, and 84% of exports (ATA, 2015). The majorities of farmers in the country have less than 2 ha of land, have limited mobility outside of their Woreda, have low levels of education, and are heavily involved in social networks (Precise, 2013). Ethiopia has the largest agricultural extension system in Sub-Saharan Africa, and third largest in the world after China and India (Swanson and Rajalahti, 2010).

It is known that providing farmers with locally relevant and specific information can be an extremely expensive and time consuming process. Public agricultural extension projects send trained agricultural experts into the field. The public extension model is a powerful means of information sharing, yet there is a limit to the number of farmers a given extension agent can reach (USAID, 2012). Understanding limitation of the public extension service, the Ethiopia government and various agricultural sector' actors in the country have been implementing different initiatives such as WoredaNet, Web portals, Community radio program, Video based approaches and other ICT solutions to leverage various modern technologies for the smooth flow information and/or knowledge among the sector stakeholders (Ermias S, 2006).

### 1.2 Overview of ATA

Ethiopian Agricultural Transformations Agency (ATA) is a government initiative with the primary aim of promoting agricultural sector transformation. The agency works to achieve this objective by supporting existing structures of government, private-sector and other non-governmental partners to address systemic bottlenecks and deliver on a priority national agenda to achieve growth and food security (ATA, 2016). Understanding the strategic importance of Information and Communication Technology (ICT) and its ability to catalyze a wide range of interventions that are core to transform the agricultural sector, ATA setup a

program called 'ICT for Agricultural Service'. This program in consultation with internal and external stakeholders study and isolate the programmatic challenges and design and develop ICT solutions to solve those identified agricultural challenges encountered by government institutions, small holder farmers (SMFs) and other key stakeholders (ATA, 2016).

These solutions either facilitate the dissemination or flow of agronomic advice (best practices or lesson learnt) to the SMFs and other stakeholders so that this agricultural knowledge can help them increase crops production and productivity; or collect, analyze data and provide these data for decision makers and policy makers so that important decisions are made based on facts (ATA, 2016). Although ATA does not have knowledge management program or staffs that are responsible for managing KM activities within its office or across the Ethiopian agricultural sector, it has implemented ICT solutions which support some of the process and practice of the KM in the agriculture sector.

One of the ICT solutions designed and implemented by ATA's ICT for Agricultural Service Program's is the 8028 Hotline which is a mobile-based Interactive Voice Response (IVR) and Short Message Service (SMS) system. This agricultural hotline is used to disseminate agronomic knowledge to smallholder farmers and other stakeholders. In 2014, the ATA, in collaboration with the Ministry of Agriculture (MoA), Ethiopia Institute of Agriculture Research (EIAR) and Ethio Telecom, designed, developed and implemented this system to disseminate year-round agronomic advice to farmers and development agents (DAs) throughout Ethiopia.

The 8028 hotline offers a range of advantages, addressing literacy barriers and character limitations for SMS, while facilitating detailed sharing of information in any of the Ethiopian languages, although it currently focused on three of the main languages which are Amharic, Afan-Oromo and Tigrigna. As of April 2016, the system has received more than 9.5 million calls from 1.3 million registered users (of which approximately 950,000 users identified themselves as farmers). Although it is concentrated in the urban areas, the penetration of mobile phone is 21 % at the end of 2014 (Research & Market, 2015). Comparing to the 1.3 penetration of internet and the literacy barriers of using internet service for accessing knowledge, mobile based application is the most feasible KMS tool for the disseminating or transferring agricultural knowledge.

The information collected during profile registration is used to broadcast additional information via IVR and SMS on topics ranging from crops disease and unseasonal rainfall to improved agronomic practices, equipping farmers and DAs with critical information needed to make informed decisions in a timely manner.

The ATA has also been piloting an IVR based helpdesk system, developed by Awaaz.De, in partnership with Digital Green, across 16 woredas since March 2016. The IVR based helpdesk provides a framework for farmers or other users to post their questions and for experts to answer them. The users can call by using any type of mobile or landline phone to access a wide range of the agronomic advice (ATA, 2016). The system's main objective is to ensure that smallholders have real-time and immediate access to pertinent agronomic information, which will help them to make more informed decisions about their farming practices (ATA, 2015).

Although ATA does not explicitly call its 8028 hotline as Agricultural Knowledge Management System (AKMS), according to the literatures, this system fulfils at least one of the the knowledge management processes. Alavi and Leidner (2001) define a KMS as “an information technology-based system developed to support and enhance the processes of knowledge creation, storage and retrieval, transfer, and application.” For a system to be classified as a KMS, the system must promote one or more of the processes. ATA's 8028 hotline fulfils the requirement by disseminating or transferring agronomic knowledge to Ethiopian farmers or other system users. In this paper, '8028' 'agricultural service hotline', 'IVR/SMS system' and 'AKMS' interchangeably represent this system under the study.

### **1.3 Statement of the Problem**

The recent dramatic advancement of ICT in both capability and affordability is easily recognized for its ability to capture, store, and process, retrieve, and communicate knowledge (Alvai & Leinder, 2011). As a result organizations have started creating knowledge management systems (KMS), which help them manage knowledge activities. In addition to the fact than implementing a new or improved KMS can be challenging for any organization, it has to be adopted by the intended users; it should improve upon past processes and practices, and in the end give a return higher than its cost. However, just like knowledge itself, it is hard to measure the actual benefits of implementing a KMS (Wu & Wang, 2006; Petter, DeLone & Mclean, 2008; Fahey & Prusak, 1998). There is no way to measure a direct effect

on the end result of an organization or a sector (Fahey & Prusak, 1998). The effectiveness and efficiency of a KMS is a hard-to-measure concept, but it is these benefits received from a KMS that determine its success for an organization or any other sector be it public or private.

Although ATA achieved significant result in simplifying the dissemination of agricultural knowledge about the improved farming practices to the SMFs and other agricultural stakeholders, the performance of the 8028 hotline has not been assessed. Without assessing a system, it is impossible to identify system strength and weakness and act upon these results to provide a better service to the system users. In order to assess KMS, the determinants of the KMS success need to be identified and understood. According to Jennex & Olfman, (2005), understanding the determinants of KMS success is crucial to the successful use of information technology to facilitate knowledge management.

Many researchers such as DeLone and McLean (1992; 2003); Wu & Wang (2006); Lumsdan, Bucklund and Ihloff (2010) and so many of other KM and IS researchers identified and adopted different determinants for assessing the success of KMS. System quality, Knowledge quality, Users' satisfaction, Perceived Benefits of the KMS and System use are among the most common determinants which can be used to assess or measure success of the KMS. System quality is about the assessment of the operational characteristics of a particular KMS (Wu & Wang, 2006). It deals with whether there are errors in the system, ease of system usefulness, and etc. KMS which is not user-friendly and optimized for its purpose will most likely result in low adaptation and lower benefits (Ajmal, Helo & Kekäle, 2010; Alavi & Leidner, 2001; Hahn & Wang, 2009). In addition to being determinants by itself for measuring the performance of the KMS, The system quality is directly associated with the user's satisfaction and perceived benefits of the KMS.

If the AKMS users find the knowledge useful and of quality, they obviously consider the KMS more useful, therefore this knowledge quality can be taken as an important dimension in a KMS success model. For supporting the farmers and the experts in the agriculture sector it is important for them to receive useful Knowledge, which can aid in problem solving and decision-making processes, then it in turn improves users' Perceived KMS Benefits and User Satisfaction. So these factors which determine the effectiveness and efficiency of the system and their acceptance level of the system by the users need to be assessed to appreciate the success of the system.

Since the model is using the system users' perspective it helps the system implementers to see what the system users' need in order to maximize the KMS usefulness for its users. Accordingly, the key research question here is what are the influential factors affecting acceptance and success of 8028 AKMS by SMFs and DAs and other stakeholders in Ethiopia and what are the relationship among these influential factors?

The research questions are as follows:

- To what range the AKMS is filling the users' need of knowledge on the improved practices for their farming activities?
- What is the level of AKMS easiness or difficulty while operated by its users?
- What is the extent of users' satisfaction?
- To what extent the 8028 AKMS is being utilized by its users of the system?

#### **1.4 Objective of the Research**

The general objective of this research is to assess the performance of 8028 AKMS in disseminating the agronomic knowledge to Ethiopian farmers, and examine the relationships between the factors constituting KMS's success.

Specific objectives include

- To examine the quality of the agronomic advice disseminated to system users via the 8028 AKMS
- To assess the quality of the 8028 AKMS in terms of its functioning features
- To assess the extent of the utilization of the 8028 AKMS by its users
- To examine the relationships between the factors constituting its success and explore the possible effects of the KM practices.

#### **1.5 Overview of Research Model**

This section briefly explains the theoretical foundations of the KMS success model (see Figure 5 in chapter 2) adopted for this study. The model is introduced in detail in Chapter 2. IT is based on the KMS success model by Wu & Wang (2006), which in turn is based on the DeLone and McLean (1992; 2003) IS success model. Both of these models offer a way to measure the success of AKMS by looking at their influence on the work of the farmers or other system users and identifying the areas which are important to consider when trying implementing a good KMS. Together with the model, this study adopted the factors for

measuring the system and hypothesizes factors which are more critical for knowledge management system success. It is hoped that by properly considering the moderating effect on the factors that influence KMS success, one can explain the success of a KMS using a greatly simplified list of success factors.

### **1.6 Significance of the Study**

The result of this research will reveal the challenges which hinder the effectiveness of the AKMS and which in turn help the implementer to improve the system. The result will also help the decision makers to assess the factors which contribute positively to the effectiveness and efficiency of the 8028 AKMS. Thirdly, the result of the study will improve the quality of the knowledge which will be stored and disseminated in and via the system. Finally, this research may be used as a reference material by future researchers in the agricultural knowledge management field and specifically in assessing those who want to improve the effectiveness of 8028 AKMS and improve the KMS success model in Ethiopia context.

### **1.7 Organization of the Thesis**

This research report result is organized into five chapters. The First Chapter already discussed the background, the problem statement that relate to the research, and brief overview of the model and hypothesis. In the second chapter, literature reviews on the theoretical concepts, KMS models and related works are presented. Chapter Three describes the research methodology that this study has followed while the findings are discussed in the Fourth Chapter. Finally, in Chapter Five discussion, conclusion and recommendations along with the future research directions are forwarded.

## CHAPTER TWO

### 2 LITERATURE REVIEW

#### 2.1 Foundations

In building this research, the basic background concepts, namely, knowledge, knowledge management, knowledge management systems (KMS), and KMS assessment are critical in order to understand agricultural knowledge management systems. Therefore, the following sections will be devoted to discuss these concepts from the extant literatures.

##### 2.1.1 Knowledge

Knowledge is defined as information in context with understanding to applying that knowledge (Brooking, 1999). It is considered as the fourth production factor after labor, land and capital (AFAAS, 2011) and is particularly critical in the agricultural sector. Making relevant knowledge accessible to the farming community helps improve production, productivity and brings higher returns. If the agricultural practice of smallholders is not backed up by modern agricultural knowledge and information, agricultural households are likely to remain trapped in low productivity, food insecurity and poverty. In the context of Ethiopia, generating new agricultural knowledge and information and making it available for use by smallholder farmers is important in promoting sustainable livelihoods and reducing rural poverty (UNDP, 2012).

Knowledge can be defined as the fact or condition of knowing something with a considerable degree of familiarity acquired through experience, association or contact. Knowledge consists of the attitudes, cumulative experiences, and developed skills that enable a person to consistently, systematically and effectively perform a function (Hahn and Subramani, 2000). It is an integration of explicit and tacit knowledge. Explicit knowledge refers to all aspects of formal, systematic, recorded, communicated and shared knowledge that is made accessible through a variety of information delivery systems. Tacit knowledge on the other hand is highly personal, created by doing, trial, error, reflection and revision (Nonaka and Takeuchi, 1995).

Traditional corporate and development theory generally focus on developing and diffusing explicit knowledge. Knowledge management programs, based on this approach, attempt to manage the process of information exchange between groups of specialists, companies, and research and development (R&D) organizations (Hartwich, and Perez, 2007). However,

during the last decade, a growing body of literature has stressed the development of tacit knowledge and translation between the two different knowledge forms. The disagreement here is that a good part of knowledge cannot be simply transferred but needs to be anticipated by processes of experience and learning by doing (Hartwich,, and Perez, 2007).

Hence, to promote new knowledge among farmers, one would need to nurture open access to people's extensive tacit knowledge and to enable learning and knowledge flow. Additional wisdom is brought into this discussion by considering the mechanisms traditionally used for transferring local, indigenous or ancestral knowledge which is neither generated nor communicated through the international and national science and technology institutions but communicated among farmers, linking newer generations with their ancestors (Howes and Chambers 1980, Warren 1989).

### **2.1.2 Knowledge Management**

Knowledge management encompasses processes and practices concerned with the creation, acquisition, sharing and use of knowledge, skills and expertise and follow a circular flow and a nonstop process that continuously updates itself (see figure 1). Knowledge management deals with the process of capturing, sharing and using of knowledge and techniques. For the circular flow of knowledge management to take place both knowledge, that is sufficiently better than the existing knowledge, and means for transmitting it must be both available. In addition, the consumers of knowledge must be willing and able to use the better knowledge that is now available (UNDP, 2012).

Most knowledge management programs have been studied in the corporate sector. The underlying motivations of such programs therefore relate to ideas of the knowledge economy, organizational efficiency, structural and cultural change, learning organizations, and financial profit (Hovland 2003). Consequently, recommendations focus on organizational practices such as information technology, communities of practice, expert systems, intranets and other networking tools and communication technologies as well as investment in R&D and the building of partnerships between research institutes and companies (Liebowitz 1999).

Knowledge management in developing country agriculture, however, has a distinct connotation (Hartwich, and Perez, 2007). For example, small farmers do not need to look for cutting edge technology. Rather, they need to get access to the often abundantly available knowledge that can improve their livelihoods. Extension and development agencies try to

assist farmers to access this type of knowledge but they are often biased to a certain trajectory of development, e.g. new plant varieties or processing technologies, where they have comparative advantages and can leverage funding. Poor farmers, however, would not feel comfortable to absorb one type of knowledge promoted by a certain technology provider if they have not cross-checked its usefulness with other farmers, community members and authorities, other development agents and even with product buyers. The issue here is that farmers try to reduce risk by contacting multiple sources of information in order to trust in a certain type of technology (Hartwich,, and Perez, 2007).

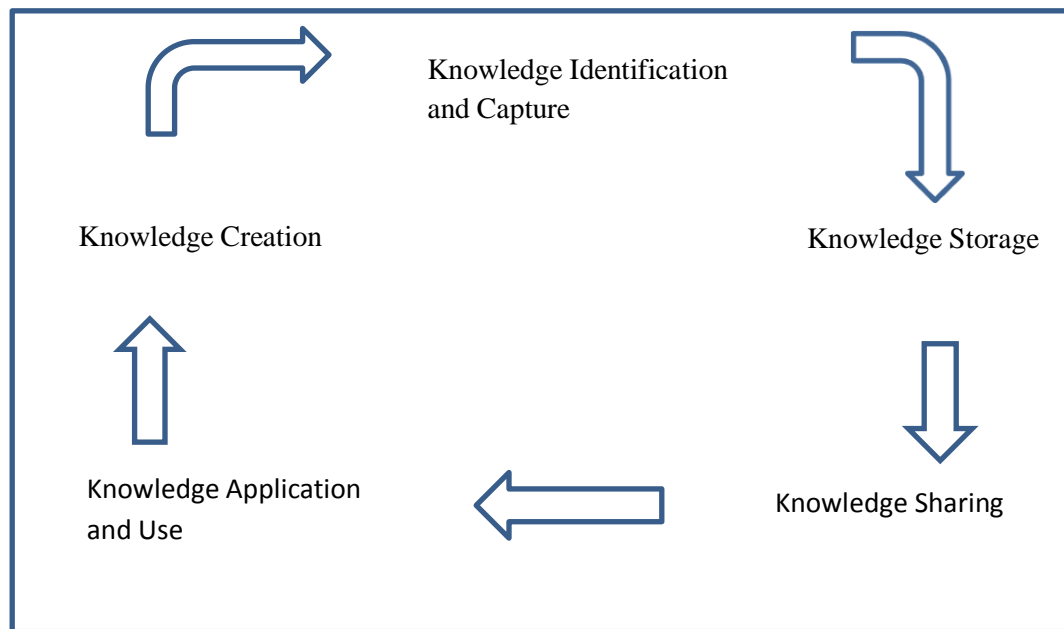


Figure 1: Knowledge Flow Source: Adopted from Cong et al. (2007)

### 2.1.3 Knowledge Management Processes

Knowledge management is largely regarded as a process involving various activities. In most of the KM literatures, a KM process includes basic processes of knowledge creation, storing/retrieving, sharing/transferring, and application as discussed in the following section.

Knowledge creation related to developing new knowledge or replaces existing knowledge in terms of tacit and explicit knowledge (Alavi & Leidner, 2001). Agricultural knowledge is created from modern and indigenous sources. The modern knowledge is created through scientific research (and therefore it is explicit knowledge) by universities and research institutes. Indigenous knowledge or tacit knowledge, on the other hand, refers to traditional

knowledge, innovations and practices of local communities and is developed outside the formal education system (UNDP, 2012).

Knowledge identification and capture comprises activities associated with the entry of new knowledge into a system, and includes knowledge development, discovery and capture (Newman and Conrad, 1999). With the Ethiopia agricultural extension service, Agricultural knowledge created from different sources are identified and captured in various forms before it is stored and disseminated for use. Study tours, and field days are age old tools of KM. They are both for knowledge capturing and sharing. These tools enable participants to learn about new technologies, practices, and get inspiration from others experiences by giving them opportunities to evaluate their own journey, challenge their thinking, create new ideas, and benefit from such reflections. It also provides opportunities to network with like-minded individuals who are also engaged in endeavors they are trying to adapt. Farmer Training Centers (FTC) and Agricultural Knowledge Centers (AKC) are other means used to capture knowledge (IPMS, 2012).

Knowledge storage/ Retrieval include activities such as knowledge residing in various component forms, knowledge structure, codifying the knowledge and store of knowledge to organizational memory (Alavi and Leidner, 2001). The main repositories of such knowledge include publications, audio visuals, websites databases and knowledge centers.

Knowledge sharing/ transfer exist between individual, individual to groups, groups to groups, groups in organizations and across (Alavi & Leidner, 2001). The stored knowledge and information is then disseminated to users, such as rural farmers, through intermediaries notably during trainings, field visits, exhibitions, publications, and using traditional forms of ICT (TV and radio), modern forms of ICT (internet, mobile phone, etc), and others (UNDP, 2012).

Knowledge application is an integration of knowledge to organization process or activities such as directives, organizational routines, and self-contained task teams (Alavi & Leidner, 2001). Effective knowledge management in the agriculture sector is achieved when the right knowledge and information is delivered to the right person at the right time in a user friendly and accessible manner that helps the recipients to perform their jobs efficiently (Islam, 2010). The outcome of effective knowledge management facilitates the dissemination

and sharing of agricultural knowledge which assist the farmers for improving their crops production and productivity and performance of the agricultural sector in general.

#### **2.1.4 The Expected role of KM in the Ethiopian Agriculture Sector**

Knowledge management can play an important role in enhancing agricultural productivity and addressing the problem of food insecurity. If properly managed, it enables appropriate knowledge and information to reach knowledge intermediaries and smallholder farmers in a timely manner (UNDP, 2012). The uncertainties of the smallholder farmers' products from production to marketing of will be minimized with the timely communication of knowledge and information. According to the study conducted by Precise consult on behalf of ATA, in order to effectively engage in agricultural knowledge management, adequate mechanisms are needed for producing, capturing, and disseminating knowledge and information through the use of effective processes and institutional arrangements (Precise, 2013). Bureau

Based on several literatures, the sources of agricultural knowledge include scientific research and indigenous knowledge (Shimeles, 2013, Fraol, 2009, Ahmed 2010, UNDP 2012). After the creation, sourcing or accumulation of knowledge, the knowledge has to be disseminated to users to support the innovation process. Information and communication technology (ICT) can play a critical role in facilitating rapid, efficient, and cost effective knowledge management (Shimeles, 2013). However, ICT application in Ethiopia remains low in comparison with several African countries. For instance, in a number of Sub-Saharan African countries, smallholder farmers get technology-related advice as well as location-specific market information on inputs and outputs through ICT kiosks. Furthermore, mobile telephone service is being used to deliver agricultural information to users (UNDP, 2012).

It is safe to say that research outputs and agricultural development models proven effective in Ethiopia and elsewhere often never reach most of the farmers who can benefit from them (Shimeles, 2013). Partly as a result of this disconnect; most farmers and pastoralists produce using methods and means of production that haven't changed much in ages. Access to information on prevailing market conditions is hard to come by for most of our farmers. Even at market days, most producers don't have a good indication of the going rate for their produce at bigger markets not far from them. On top of this, globalization is intensifying competition in all commodities – affecting markets for both domestic and export commodities. The prospect is that this phenomenon will only get more intense, making those

unprepared to face it more and more disadvantaged. In short, knowledge on agricultural production and marketing is important to the sustained development of the sector (Ermias, 2006).

On the other hand, Ethiopia has diverse agro-ecological conditions suitable for a broad spectrum of agricultural development endeavors. It has unexploited indigenous knowledge and other resources with attractive potential returns in domestic and international markets. Often, there is also expertise and knowledge that can help solve many of the challenges facing the country. However, these potential resources are seldom harnessed effectively and thus meaningful and sustained transformation of the Ethiopian agriculture sector is a dream that is “so close and yet so far” (Ermias, 2006). Developing and implementing and properly using knowledge management system assist Ethiopian institutions, farmers and pastoralists to leverage the technologies; overcome the challenges; and take advantage of opportunities facing the agriculture sector of the economy.

### **2.1.5 Knowledge Management Systems (KMS)**

KMS are a special class of information systems designed to facilitate KM, the leveraging of organizational knowledge through knowledge creation, knowledge storage/retrieval, knowledge transfer, and knowledge application (Alavi and Leidner, 2001). KMS are also defined as information systems that are developed to boost the effectiveness of the organization’s knowledge management (Ali Al-Busaidi and Co, 2010). Information Technology (IT) works best with knowledge that is primarily in the explicit dimension. Knowledge that is primarily in the tacit dimension requires more contexts that can be captured with the knowledge where context is the information used to explain what the knowledge means and how it is used (Jennex, 2010). Managing tacit knowledge is more difficult to support using IT solutions. After conducting country wide study and the best practices of other developing countries, ATA identified telephone based agricultural knowledge dissemination mechanism as one of the best way for sharing knowledge among the small holders farmers and other stakeholders (Precise, 2013).

According to Gray (2000), two common characteristics of a KMS are knowledge repositories and knowledge maps. The first are databases of useful documents with the system that provides functions for capturing, organizing, storing, searching, and retrieving the knowledge and information. Thus a KMS serves as a repository of knowledge for the firm

regardless of time and geographic barriers, improving the capability for the combination and exchange of intellectual capital (Wasko, 1999). The second are searchable indexes or catalogues of expertise held by individual employees. However, because it is impossible to capture and store knowledge itself, the best way to use it is to map it in an organized way (Spiegler, 2000).

The KMS can then help team members find individuals with particular knowledge to help analyze complex problems, thereby improving the diversity of knowledge in analyzing problems. Based on the knowledge repositories, a KMS is also an “integrated, user-machine system for providing Knowledge to support operations, management, analysis and decision-making (Wu and Wang, 2006).” It is thus similar to early MIS ideas as defined by Davis and Olson (Davis, 1985). But, through knowledge maps, the KMS provides a mechanism to manage the tacit or implicit knowledge carried in an individual’s mind and not present in the company databases. This characteristic is the main difference between a KMS and an MIS (Ragowsky, 1996). In addition, one major KMS benefit comes from knowledge creation and sharing on the basis of “pull” by users and not the “push” of information to them. Thus, the characteristics of a KMS are different from those of an MIS.

## **2.2 Knowledge Management Systems Assessment**

Unless KMS is assessed it is not possible to know whether the KMS is relevant to the problem domain or not and also impossible to determine where improvements are needed. Assessing the system would assist the implementers and decision makers to understand whether costs of KM efforts are justified; and helps identify the gap in KM efforts (Becerra-Fernandez, 2010). Assessment of the KMS ‘involves evaluating the extent to which knowledge discovery, capture, sharing, and application processes are utilized, and how well they are supported by KM technologies and systems’ (Becerra-Fernandez, 2010). This section is employed to explore the evolution of KMS assessment models from their predecessor Information System (IS) models and uses one of these models to develop and measure the study target system.

### **2.2.1 DeLone and McLean’s IS Success Model**

Because IS success is a multi-dimensional concept that can be assessed at various levels and, the measure for Information System (IS) success has neither been totally clear nor exactly defined (Wu & Wang, 2006). Some benefits from a KMS, such as improved

knowledge flow and innovativeness are hard to measure (Fahey & Prusak, 1998). Despite this issue research has been rather limited on models measuring the success of a KMS (Ravindrani & Freeze, 2006). Since KMS is a kind of IS (Alavi & Leidner, 2001) a model that can measure the success of an IS might also be proper for measuring a KMS's success (Wu & Wang, 2006; Petter, DeLone & McLean, 2008). However, DeLone and McLean in 1992 made a major breakthrough. They conducted a comprehensive review of IS success literature and proposed a model of IS success shown in Fig. 2. After reviewing conceptual and empirical studies regarding IS's success DeLone & McLean (1992) came up with six dimensions that reflect IS success. These are system quality, information quality, use, user satisfaction, individual impact and organizational impact. This model also provided a scheme for classifying the multitude of IS success measures and suggested the temporal and causal interdependencies between the six dimensions.

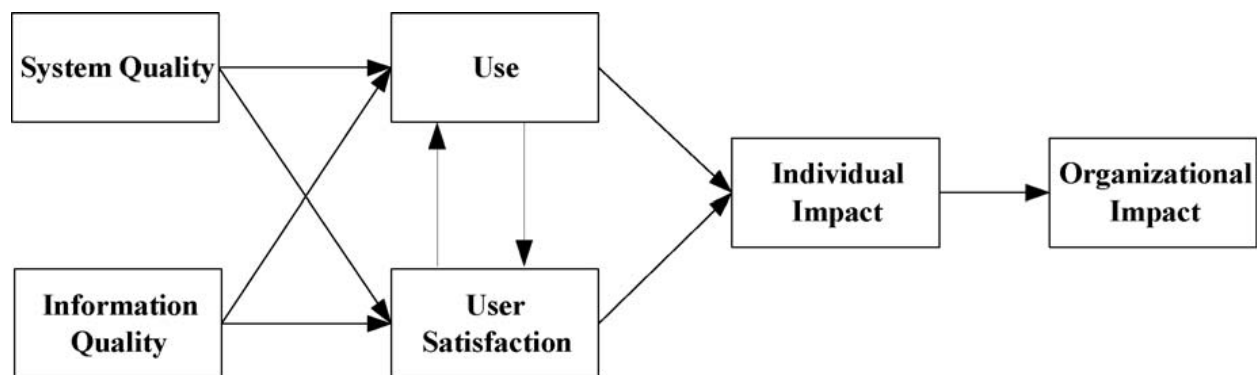


Figure 2: DeLone and McLean's IS success model (1992).

DeLone and McLean's IS success model (1992) was based on communications research by Shannon and Weaver (1949) and the *information influence theory* of Mason (1978). Shannon and Weaver (1949) identified three levels in communications: a technical level, a semantic level and an effectiveness level (Lumsden, 2010). The technical level represented the communication system's accuracy and efficiency, which produces information, the semantic level describes how efficient the communication system is at transmitting the meaning of a message, and the effectiveness level proved the effect of the message on the recipient (Shannon & Weaver, 1949). Each of these levels is represented in the D&M (DeLone & McLean, 2003), and measuring how an IS succeeds at each of these levels is the basis for its overall success. Semantic success was measured through information

quality, and use, user satisfaction, individual impacts and organizational impacts are used to measure the success of the effectiveness level.

As can be seen in their model, the dimensions were interrelated and therefore close consideration was necessary, when defining the dependent variable and trying to measure an IS's success (DeLone & McLean, 1992). DeLone and McLean (1992, p.88) suggested the model 'needs further development and validation before it could serve as a basis for the selection of appropriate IS measures.' After 10 years they re-evaluated their model (DeLone & McLean, 2003) in order to adopt it to the findings regarding this model and address critics. This is shown in Fig 3.

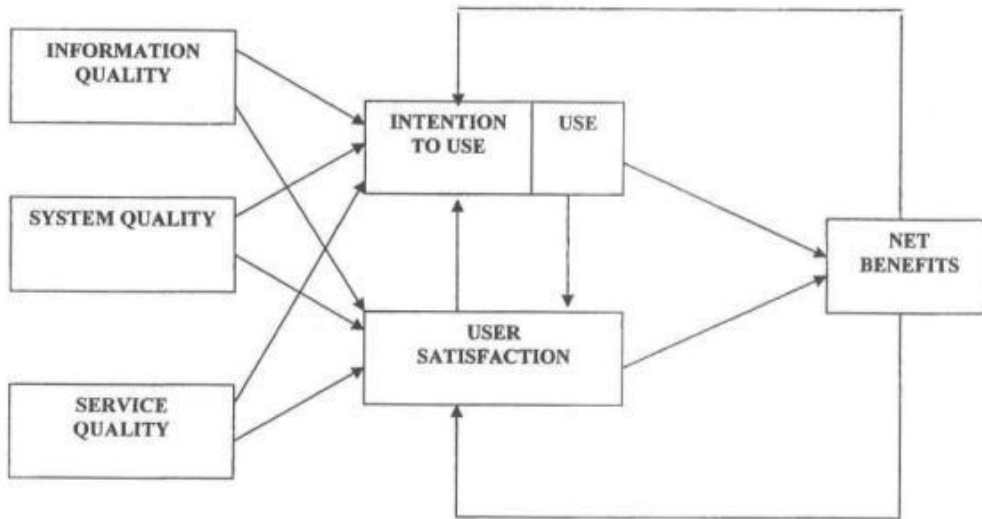


Figure 3: DeLone and McLean's updated IS success model (2003).

In the research following the proposal of the model in 1992 the links between system use and individual impacts, system quality and individual impacts, information quality and individual impacts had the strongest empirical support. DeLone & McLean (2003) model's significant and important determinants for measuring each dimension extracted from the studies are as follows: **System Use:** frequency of use, time of use, number of accesses, usage pattern, dependency; **System Quality:** ease-of-use, functionality, reliability, flexibility, data quality, portability, integration, importance; **Information Quality:** accuracy, timeliness, completeness, relevance, consistency; and **Individual Impacts:** job performance, decision-making performance, quality of work environment, quality of work. All other links between

the IS success dimensions were confirmed by the studies as well, and thus give the model a significant empirical support (DeLone & McLean, 2003).

There was also criticism of the model, DeLone & McLean (2003) addressed the most important ones and adapted their model accordingly or defended it against the critic. The main critique was the use of causal as well as process model in one descriptive model (Seddon, 1997). He argued that this can cause confusion as to what arrows in the model mean, since they can refer to a process or influence (Seddon, 1997). DeLone & McLean (2003) admit that it could lead to confusion, but in order to understand IS success as a construct of the different dimension the use of both models is helpful.

The process model only consists of three parts: the creation, the use, and the consequences of a system. Every one of these parts 'is a necessary, but not sufficient, condition for the resultant outcome'. (DeLone & McLean, 2003, p.16). As an example you can look at system quality and information quality, without the two nobody would use the system, and nobody would know if or not they are satisfied, since the system does not exist. Moreover, as a logical conclusion without any system that can be used, there is no individual impact, and consequently no organizational impact, therefore it makes sense to include a process model. DeLone & McLean (1992) also wanted to show the relevance each of their dimensions had for IS success, that is why a causal model was useful as well, since it can show how the dimensions impact IS success.

There has also been an intense debate about whether system use is a good measure of IS success. Although some authors (Seddon, 1997) have suggested that it is better to remove system use as an IS success variable, DeLone and McLean argued that system use was an appropriate measure. They asserted that the source of the problem was a too simplistic definition of system use, and that researchers must consider the extent, nature, quality, and appropriateness of it. Simply measuring the amount of time a system is in use is not enough: informed and effective use is an important indication of IS success.

The primary differences between the original and updated D&M models included (Wu & Wang, 2006): (1) The addition of service quality to reflect the importance of service and support in successful ecommerce systems; (2) The addition of intention to use to measure user attitude, and (3) The collapsing of individual impact and organizational impact into a more parsimonious net benefits construct.

The categories of the updated taxonomy were system, information, and service quality, intention to use, use, user satisfaction, and net benefits (DeLone & McLean, 2004). Although DeLone and McLean proposed an updated conceptual IS success model, it clearly needed further validation before it could serve as a basis for the selection of appropriate IS measures (Wu & Wang, 2006). In addition, researchers had to choose several appropriate success measures based on the objectives and the phenomena under investigation, as well as consider possible relationships among the success dimensions when constructing the research model.

### 2.2.2 The Wu and Wang Model

Although the DeLone & McLean (2003) model needs to be slightly adjusted in order to apply it for a KMS, it is a good start to analyze and measure the success of an IS. This section takes a closer look at a KMS success model by Wu & Wang (2006) and Lumsdan, Bucklund and Ihloff, (2010), with slightly adjusted dimensions accounting for the differences between IS and KMS.

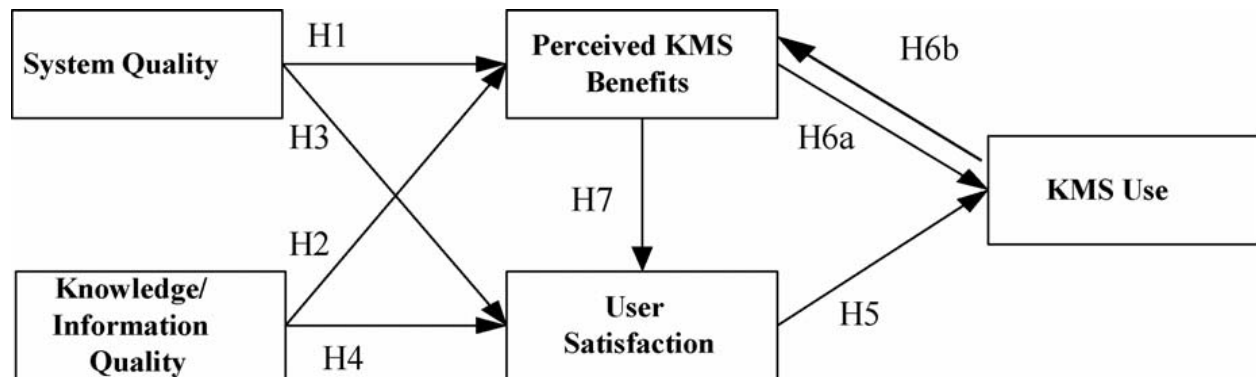


Figure 4: Wu & Wang (2006) KMS success model

One difference from DeLone & McLean’s model is the changed dependent variable used to judging success; Wu & Wang (2006) and Lumsdan, Bucklund and Ihloff, (2010) use Perceived KMS Benefits for this. They additionally exclude the influence of a direct connection between System Use and the two quality dimensions of the system. Wu & Wang (2006) argue that user satisfaction is not caused by using a system, but rather by the quality of the system and its perceived benefits. This distances their model from the process model, where use is a requirement for satisfaction to occur (DeLone & McLean, 2003). Another change is the removal of the service quality dimension, which Wu & Wang (2006) deemed

necessary, seeing how Service Quality is not a part of a KMS, but rather an external factor. In short, service quality is a necessity for a good KMS to succeed, but it will not be able to improve a bad KMS.

Wu & Wang (2006) ( also adopted by Lumsdan, Bucklund and Ihloff, (2010) decided to drop the Intention to Use dimension as well, since it is only relevant in a setting where the access to the KMS is non-permissible. Under normal circumstances its impact on other factors should be linear with the one of System Use; it is therefore implicitly included in the dimension System Use. A further change was the revision of Net Benefits into Perceived KMS Benefits, which stems from the fact that Net Benefits can be hard to define (Wu & Wang, 2006) and as mentioned by DeLone & McLean (2003) dimensions need to be adjusted for specific research contexts. In this case the context is a KMS and most benefits from it, cannot easily be measured with numerical values, but the 'soft' benefits described by Perceived KMS Benefits are a way to assess the success of a KMS (Fahey & Prusak, 1998).

The model with its adjustments for KMS success can be used to measure the success of the technological dimensions of a KMS from the users' perspective. In the model System Quality and Information Quality represent the technological dimension, which is the direct overall quality of the KMS. A human dimension is represented through User Satisfaction, Perceived KMS Benefits, and System Use, which represent the effect of the KMS on the users (Wu & Wang, 2006). This approach makes the model very suitable for this research's purpose and it is also used to measure the ATA's 8028 hotline for its success which is currently being used by the farmers at the agriculture sector. In order to make suggestions about the correlations between the different dimensions of KMS success, it is important to look at the dimensions of Wu & Wang's (2006) KMS success model and propose possible correlations based on a theoretical approach, which can then be tested for through a survey.

### **2.2.3 The Research Model and Hypotheses**

This section explains the theoretical foundations of the KMS success model see Figure 5. The model is based on the Wu & Wang (2006) KMS success model, which in turn re-specified the DeLone and McLean (1992; 2003) IS success model. Both of these models offer a way to measure the success of AKMS by looking at their influence on the work of the farmers or other system users and identifying the areas which are important to consider when

trying implementing a good KMS. Together with the model, this study adopted the factors for measuring the system and hypothesizes factors which are more critical for knowledge management system success. It is hoped that by properly considering the moderating effect on the factors that influence KMS success, one can explain the success of a KMS using a greatly simplified list of success factors. Below these factors and the associated hypotheses will be explained.

### **2.2.3.1 System Quality**

‘System quality depends on the intended operational characteristics. It is concerned with whether there are errors in the system, its ease of use, response time, flexibility, and stability. System quality measures the reliability and predictability of the system independent of the knowledge it contains’ (Wu & Wang, 2006, p.731). Although ICT tools play a huge role in sharing agricultural knowledge, the availability and usability of the system are also equally important for its success (Fraol, 2009). This measure is very significant for a KMS’s success, as studies have proven that a KMS, which is not user-friendly and optimized for its purpose will most likely result in low adaptation and lower benefits (Ajmal, Helo & Kekäle, 2010; Alavi & Leidner, 2001; Hahn & Wang, 2009; McDermott, 1999; DeLone & McLean, 2003; Rhodes, Hung, Lok, Lien & Wu, 2008; Peel & Rowley, 2010; Xu & Quaddus, 2005; Staples, Wong & Seddon, 2002). As a result it is a dimension crucial to the efficacy of a KMS and therefore a necessary part of any framework aiming to measure a KMS’s overall success (Lumsdan, Bucklund and Ihloff, (2010)). Therefore it is hypnotized in this research that System Quality has a considerable influence on the Perceived KMS Benefits and User Satisfaction of the 8028 information hotline.

H1: The extent of System Quality in AKMS is positively associated with User Perceived AKMS Benefits.

H2: The extent of System Quality in AKMS is positively associated with User Satisfaction.

This survey used four questions in order to measure the system quality of the 8028 hotline. These questions were forwarded to the responders of the survey.

- 8028 hotline is easy to use
- 8028 hotline is user friendly

- 8028 hotline is stable
- The response time of 8028 hotline is acceptable.

### **2.2.3.2 Knowledge Quality**

‘Knowledge quality has been used as a success measure for traditional IS. In the KMS context, the distinction between knowledge and information depends on context and the user’ (Wu & Wang, 2006, p.731)’. Although many extension documents are produced by national agriculture research and public extension systems to inform growers about the latest recommendations concerning different agricultural practices, these documents are not disseminated, updated or managed to respond to the needs of farmers, extension workers, and advisers’ (Ahmed R, 2010). At the same time this Knowledge which would be uploaded to the KMS and supplied to its user needs to be of quality in order to be useful (Rao & Osei Bryson, 2006; DeLone & McLean, 2003; Staples, Wong & Seddon, 2002). If the AKMS users find the knowledge useful and of quality, they obviously consider the KMS more useful, therefore this knowledge quality can be taken as an important dimension in a KMS success model. For supporting the farmers and the experts in the agriculture sector it is important for them to receive useful Knowledge, which can aid in problem solving and decision-making processes, then it in turn improves users’ Perceived KMS Benefits and User Satisfaction.

H3: The extent of Knowledge Quality is positively associated with user Perceived AKMS Benefits.

H4: The extent of Knowledge Quality is positively associated User Satisfaction.

This survey used seven questions in order to measure the knowledge quality of the 8028 hotline. These questions were forwarded to the responders of the survey.

- 8028 hotline makes it easy for me to create knowledge
- The words and phrases in contents provided by 8028 hotline are consistent
- The contents representation provided by 8028 hotline is logical and fit
- The knowledge provided by 8028 hotline is available at a time suitable for its use
- The knowledge provided by 8028 hotline is important and helpful for my work
- The knowledge provided by 8028 hotline is meaningful, understandable and practicable

- The knowledge classification or categorization is 8028 hotline is clear and unambiguous

### **2.2.3.3 User Satisfaction**

‘User satisfaction is one of the most frequently measured aspects of IS success. In addition, it is hard to deny the success of a system which users say they like; thus, user satisfaction is also a good measurement for KMS success’ (Wu & Wang, 2006, p.731). As KMS is a system, which intends to improve the management of knowledge in an organization or any sector, it relies on its users (Lumsdan, Bucklund and Ihloff, 2010). If users do not like the system and are very dissatisfied they will stop using the system or only reluctantly engage it for knowledge related processes (Ajmal, Helo & Kekäle, 2010; DeLone & McLean, 2003; Peel & Rowley, 2010; Xu & Quaddus, 2005; Staples, Wong & Seddon, 2002). This makes User Satisfaction an important factor for a KMS’s success, because only when users of the KMS are satisfied with it, will they be willing to use the KMS and engage in knowledge sharing.

H5: The extent of User Satisfaction is positively associated with System Use.

This survey used four questions in order to measure the user satisfaction of the 8028 hotline. These questions were forwarded to the responders of the survey.

- I am satisfied that 8028 hotline meet my knowledge processing needs
- I am satisfied with 8028 hotline efficiency
- I am satisfied with 8028 hotline effectiveness
- Overall, I am satisfied with 8028 hotline

### **2.2.3.4 System Use**

System use is a necessity for getting net benefits from a KMS (DeLone & McLean, 2003). The right part of Wu & Wang’s (2006) model would become obsolete without System Use. Just like Perceived KMS Benefits and User Satisfaction it is a requirement for a KMS to be used, if one of these components ceases to exist then users would stop utilizing the KMS (Lumsdan, Bucklund and Ihloff, 2010). Making the use of the KMS mandatory could however lead to a diminished usefulness of measuring ‘System Use’ as part of KMS success (Seddon, 1997). That is why ‘System Use’ needs to be engaged correctly, and in Wu & Wang’s (2006)

model focuses on ‘the nature, extent, quality, and appropriateness of the system use’ (DeLone & McLean, 2003, p.16) rather than only the time spent with it. This qualitative definition of System Use makes it an appropriate dimension for measuring KMS success. Wu & Wang (2006) argued that as the quality of system use increases, so should Perceived KMS Benefits, since only when a system is used to its full potential can a user realize the system’s full benefits. However, this cannot be tested during this research, as it requires structural equation modeling to investigate non-recursive models.

This survey used five questions in order to measure the system use of the 8028 hotline. These questions were forwarded to the responders of the survey.

- I use 8028 hotline to help me decisions
- I use 8028 hotline to help me record my knowledge
- I use 8028 hotline to communicate knowledge with colleagues
- I use 8028 hotline to share my specific knowledge
- I use 8028 hotline to share my general knowledge

#### **2.2.3.5 Perceived KMS Benefits**

‘Perceived system benefit is the degree to which a user believes that use of the system results in benefits to the user or the organization, often assuming that this results in an increase in job performance and productivity.’ (Wu & Wang, 2006, p.731) System benefits are the result of other factors influencing the success of a KMS, such as effectiveness (Wu & Wang, 2006). They can therefore be considered a dependent variable, and are consequently used as the main measure for KMS success in Wu & Wang’s (2006) model. Their model represents the gains users perceive to achieve through the KMS. There should also be a correlation to System Use and User Satisfaction (Lumsdan, Bucklund and Ihloff, 2010). It is only logical that users will try to use a system more, which is beneficial, and that they are more satisfied with a KMS, which helps them a great deal.

H6: The extent of Perceived AKMS Benefits is positively associated with User Satisfaction.

H7: The extent of Perceived AKMS Benefits is positively associated with System Use.

This survey used five questions in order to measure the Perceived Benefits of the 8028 hotline. These questions were forwarded to the responders of the survey.

- 8028 hotline helps me acquire new knowledge and innovative ideas
- 8028 hotline helps me effectively manage and store knowledge that I need
- 8028 hotline enable me to accomplish tasks more effectively
- My performance on the job is enhanced by 8028 hotline
- 8028 hotline improves the quality of my work life

Finally, here is the model of this research developed based on the above hypotheses.

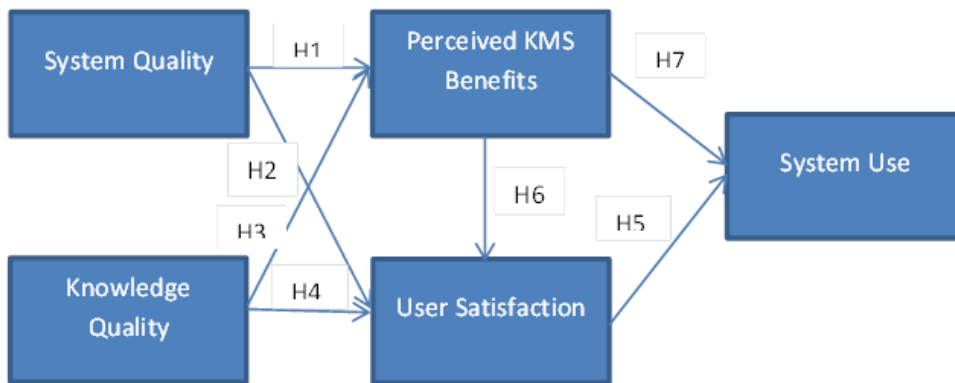


Figure 5: AKMS Success Model

### 2.3 Related Works

As the importance of knowledge management within different sectors including the agricultural sector growing, researchers have tried to access the application of agricultural knowledge management and agricultural KM Systems. In related to this, some researchers' work were reviewed as presented below. The summarized works are presented started from the world view to the local view. In the end, the researcher made his reflection on how these research works affect this research's gap.

Thomas (2006) conducted a great work which studies 'the effect of KM strategy emphasized by an organization on the blend of success factors that determines KMS success.' According to Thomas the managements' growing interest in in KM and KMS is the view that 'organizational knowledge is one of the last remaining sources of long-term sustainable competitive advantage.' He mentioned that 'organizations that have implemented KMS have encountered mixed results.' This research opposes that existing KM studies fail to give

adequate consideration to the importance of KM strategies in determining critical KMS success factors.

The rationale behind his research is that by properly considering the moderating effect of KM strategy on the factors that influence KMS success one can explain the success of a KMS (or lack thereof) using a greatly simplified list of success factors. His research draws on existing IS and KM frameworks, models, and literature and selects four organizational factors that are believed to be critical for the success of a KMS; his study hypothesizes which of these factors are more critical for a knowledge exploration strategy (KRS) and which of these factors are more critical for a knowledge exploitation strategy (KIS). A web-based survey utilizing existing scales, some with slight adaptations, and a newly created strategy scale was administered to test the model; 204 complete responses were collected. The results contribute to the literature by empirically confirming the hypothesized positive relationships between the identified success factors and KMS success. The researcher mentioned that his research can serve as a foundation for future studies, which can help identify additional factors critical for KMS success (Thomas, 2006).

The purpose of Whitfield (2008) master's study is to identify factors that could have a clear influence on the development and implementation of KMSs. The study presents the empirical examination of a theoretical model of KMS success for predicting system use by law enforcement officers. The research findings were accomplished through a validated questionnaire that surveyed 10 law enforcement officers from various agencies. These results contribute to the literature by empirically supporting the hypothesized relationships between identified success factors and KMS success.

The small sample size used for the research can be taken as a huge limitation, but the researcher still recommends that the research can serve as a foundation for future studies, which can help identify other factors critical for KMS success. The comprehensive model can be used to undertake further research and thus add value to knowledge management system based literature. In addition to its theoretical contributions, this study also presents important practical implications through the identification of specific infrastructural capabilities leading to KMS success.

Christoffer Lumsden and et al (2010) conducted a research with the title of "A KMS Success Model: Investigation A Swedish Consulting Company's Knowledge Management System and Influence of Personalization and Codification". The purpose of their paper is to investigate the success of a consulting agency's KMS, examine the relationships between the

factors constituting to its success, and explore possible effects of the knowledge management strategies codification and personalization on these correlations. Their paper is a case study researching a Swedish consulting company's KMS success using a KMS success model by Wu & Wang (2006). The survey's results were interpreted using standard multiple regression analysis, which helped to investigate and interpret the correlations between the dimensions constituting KMS success.

The findings in their paper suggest that personalization and codification have an influence on the quality of the correlations between the KMS success dimensions leaving the overall structure intact. Additionally the influence of System Quality on Perceived KMS Benefits and User Satisfaction on System Use were not found significant. Their study's main limitation is a sample size and the case study approach, which limit the generalizability of the results to other contexts. The most important implication of this research is the importance of the user for KMS success. A company needs to focus on improving the benefits a user receives from a KMS, which can mainly be achieved by improving the knowledge made available through the KMS, and by providing a proper basis for the KMS, in order to ensure a minimum level of System Quality. Other factors influencing the success of a KMS are incentives, which can help to increase system use and the quality of system use.

Their paper shows that when researching KMS success one should take the structure of the company's knowledge management strategy into consideration. It further proves the applicability of the model in different contexts and its validity for accurately measuring KMS success.

Coming to the local work in related to agriculture KM and KMS, the researcher could not get the research of KMS and AKMS assessed with the KMS success models. But different researches which are conducted in the Agricultural KM and KMS are reviewed. The first research work reviewed in this paper from local is Fraol's (2009) work on the role of ICT on Ethiopian agriculture sector. Fraol (2009) in his Study analyzed the perspective that information technology can play a central role in knowledge management processes and its challenges and opportunities in the context of Ethiopian infrastructure in the cases under study.

The study was undertaken in four regions of Ethiopia taking one Woreda Knowledge Centre (WKC) from each region based on purposive sampling method. The study was aimed

to assess the role of ICT in IPMSs' projects of ICT-based Woreda Knowledge Centers (WKC) to investigate if such centers can exploit the opportunity of the ICT-based WKC for the purpose of enhancing effectiveness of the users. The study indicated that the role of ICT in the WKCS is moderate. Due to lack of computer basic skills, shortage of ICT tools and others, there are many challenges that have to be given solutions. The study recommended the way these challenges can be solved. The study also revealed that, the inefficiency of Ethiopian Telecommunication is becoming the obstacle for the process of Knowledge Management (KM) by hindering that there is very poor network connection in all regions so that it is difficult to get and/or disseminate the agricultural information and knowledge by the agricultural service providers (Fraol, 2009).

On the other research work reviewed in this paper, Shimelis (2013) tried to address the creation and sharing of knowledge in Ethiopian Agricultural Research institutes. According to this work, Knowledge management in the agriculture sector is about the systematic connection of all stakeholders to the best practices, knowledge and expertise they need to create value by supporting creation, acquisition, transfer and utilization of knowledge. In Ethiopia, various research institutes both national and international play significant roles in the generation and transfer of agricultural knowledge, but in the country the sector is one of the lowest levels of productivity in the world which suggests there are inadequate linkages between the Research Institutes and the practitioners. The main aim of this study was to investigate the knowledge generation and transfer practices that some Agricultural Research Institutes in Ethiopia have in place and assess the affecting factors involved in these processes.

The finding of this study indicates that in Ethiopia not all agricultural researchers and institutes fully perform end user demand analysis before generating and transferring agricultural knowledge. It was also found that most of the research institutes generate knowledge based on the government priorities and centrally identified problems. This study confirmed that researchers and their institutes did not fully carry out assessment on their research output's impact. The study also revealed that the majority of relationship(56.9%) established between researchers and their stakeholders was not usually based on formal partnership but most of them (44.1%) meet with the stakeholders regularly mainly when stakeholders need new technology.

The result of this study established that most researchers believe that the existing forms of cooperation and partnership between researchers/research institute and the stakeholders are inappropriate to boost knowledge transfer activities. Most of the researchers (58.8%) unwelcome that the research output should reach the end users indirectly through the stakeholders while majority of stakeholders (76.5%) appreciate that the agricultural research output should reach end user directly. The study finding suggests that most research institutes do not provide special incentives and rewards to researchers for transferring knowledge. Most stakeholders do not think that the transferred knowledge is utilized effectively by the end users due to lack of support from researchers, the generated knowledge is not based on the demands of the users and poor linkage of research and extension (Shimelis, 2013).

When I start from the last research work, Shimelis mainly suggested in his work that the Ethiopia agricultural research institutes and other knowledge centers should avail the quality Knowledge to the farmers and other agricultural stakeholders in order to these knowledge utilized effectively by the target users. Fraol also mentioned the importance of the ICT for the knowledge management. When we come to Thomas and Lumsden and his colleagues' works the KM and KMS should be assessed for their performance. They developed and adopted different KMS success model by reviewing the contemporary literature and empirically testing those models.

Summarizing all of the above works the users of the KMS should get quality knowledge and we need to make sure that the medium of the knowledge transfer should be assessed just like the knowledge itself. So, this research takes these two mentioned measurements or independent variables (system quality and Knowledge quality) with the rust dependent variables (users' satisfaction, perceived KMS benefits, and system use) into consideration in order to ensure the effectiveness and efficiency of the KMS. As of the investigation of this research conductor, there is no research which adopted the KMS success model. It is better for the Ethiopian researcher to investigate the models and properly adapt to the country, sector and organization context.

## CHAPTER THREE

### 3 Methodology

#### 3.1 Research Approach & Study Design

One of the two research approaches involved when gathering data, is the deductive approach. According to Saunders, Lewis, & Thornhill (2007) deductive approach develops a theory from a hypothesis which then is tested in contrast to the inductive approach which aims to create a theory of its own once the data has been analyzed,. This study uses a deductive approach at first proposing seven hypotheses, which were created following a thorough KM literature review; with particular focus on Wu and Wang's (2006) re-specification of the Delone and McLean's (1992) IS success model. These hypotheses are tested using Wu & Wang's (2006) model's dimensions on data gathered with a survey on the users of 8028 AKMS. As a result the paper follows a quantitative research design in form of a case study. The quantitative method using a questionnaire allowed the research to use formal measurements.

##### 3.1.1 Data Source

Both primary and secondary data were used in this study. The source of the primary data was collected from the users of 8028 hotline or AKMS gathered via the questionnaire. Through projects implementation documents' of the system and review of the literature, the researcher was able to understand how the system was implemented to disseminate agricultural knowledge. Here the primary data can be checked against the secondary data and vice versa in addition to bringing forward new and supplementing information.

##### 3.1.2 Sampling Techniques

As it was impossible to include each and every user of the 8028 hotline or AKMS in the study, a representative sample is drawn. This research utilized multistage sampling with both random and purpose sampling techniques. As the objective of the study is assessing the performance of the AKMS, the users who are living in the place where the system stayed for long time and with additional feature will be in the best position to satisfy this purpose. As a multistage sampling process; the first step was purposefully selecting the overlapping group of woredas between those 21 which were a pilot when the system was implemented two and half years ago for the first time and those another group of 16 woredas which are currently

being piloted for the interactive helpdesk subcomponent. This subcomponent was started to be piloted since March, 2016. So the overlapping woredas are six.

The second step was randomly selected one woreda from the above overlapped six woredas. It is Meskan Woreda, which is found in Guraghe Zone of South Nations and Nationalities and People Region (SNNPR). The third step was purposefully selecting the users who are fully registered to the system called more than four times to access the agricultural knowledge about the crops. In general, when users call to the system, they are requested to provide their profile information. Although the users can quit the registration and go to the content at any stage of the process, the profile registration basically takes two steps to complete. Users are requested about their woreda at the second step of the registration. After querying the database, 459 of the users are found complete their registration and 105 of them called to the system at least four times. This study took these system users as its target since they are believed to know the system well and are in a good position to assess it.

### **3.2 Data Collection Instrument**

As the quantitative approach was utilized for this study, the data collection instrument used was questionnaires. A questionnaire is a very effective method to collect data, when the variables and the area of interest are already known and defined by the researcher (Sekaran, 2003). As questionnaire was the best way to collect data, the Wu & Wang (2006) questionnaire was adapted for this research, which made a survey imperative in order to create a comparable study. Data was collected through a questionnaire from the 8028 hotline users registered under Meskan Woreda; the questionnaire was filled in paper (hard copy or by filling out an electronic MS-word format copy). The questionnaire contained the constructs which are used to measure for quantitative analysis, along with 5 demographic questions (e.g., gender, age, education level, and Agriculture related work experience, AKMS or 8028 hotline experience).

The instrument was also reworded to more accurately address the hypotheses being used translated to Amharic to be used by the SHFs. After the researcher himself translated the questionnaire content to Amharic from English, in addition to the language expert, the PhD candidate in the Information science commented on the proper translation of the original English questionnaire content to Amharic. So in the translation process both the English-

Amharic language expert and the IS expert provided their input for better translation. However, because of the shortage of time the pilot test was not conducted to check the questionnaire before conducting the actual survey.

The Scales utilize a similar (5-point, Likert type) answer format (where the left-most answer choice for a question was coded as “1” and the right-most answer choice was coded as a “5”). The questionnaire has a cover letter to explain the purpose of the survey to the responders. The questions are divided in to six main parts the first part of the questionnaire which has 5 questions was used to acquire general background information about the respondents. The second section of the questionnaire’s five questions assessed the system quality; the quality of Knowledge was assessed by the seven questions of the third section. Users’ satisfaction was measured by four questions of the fourth section; and users’ perceived KMS’s benefit was measured by 5 questions of the fifth section of the survey questionnaire. To assess system use, the sixth section used 5 questions.

### **3.3 Data Collection procedure**

#### **3.3.1 Data Collection Methods**

Using the telephone numbers which were retrieved from the database (with the consent of ATA management), the researcher called to these system users to check their willingness for participating in the survey. From 105 system users, 18 declined the calls (three trials) and 9 told to the investigator that they do not remember calling to the system. Then the researcher communicated one development agent (DAs) from each of the 23 kebeles of Meskan Woreda to collect data through them. These DAs distributed questionnaires to the users of the 8028 hotline living in their Kebeles and collected data from 74 of them based on the list of telephone numbers provided by the researcher. Since 4 of the system users leave out of Meskan Woreda, the researcher collected data from these users via email by sending electronic MS word copy of the questionnaire. Out of the 74 responses collected from the users, 6 had to be dropped because of missing values, which left final responses of 68 out of a 105 system users who complete their registration and called to the system at least four times.

#### **3.3.2 Data Prepressing method**

The questionnaire data has been fully captured into the pre-formatted template by the researcher in order to minimize error and ensure completeness. Furthermore, the data has been

cleaned and edited for its information completeness and logical coherences. To this end, the researcher managed to make complete some questionnaire requiring few clarifications from respondents end. Nevertheless, Out of the 74 responses collected from the users, 6 had to be dropped because of missing values, which left final responses

### 3.4 Data Analysis

Data analyses included reliability and internal validity analyses, correlation analysis, and multiple regressions. Data analysis was performed using Statistical Package for the Social Sciences (SPSS) version 23 for Windows. Descriptive statistics were used to describe the samples. Multiple regression analysis was used to test the hypotheses from the research models. p values <0.05 were regarded as statistically significant.

#### 3.4.1 Reliability and Internal Validity of the Survey Instrument

When the actual survey was collected, reliability was assessed for each construct using Cronbach's  $\alpha$  to test the discriminant validity and reliability of constructs and scales as recommended by Hair, Anderson, Tatham, & Black (1998). The greater Cronbach  $\alpha$  value, the greater correlation between the question items within the scale and the higher internal consistency. Nunnally (1978) defined acceptable reliability as 0.7 and above in general basic research. In this research all the measures are above 0.7.

Measures	No. of Items	No of Observations	Cronbach's Alpha
System Quality (SQ)	4	68	.82
Knowledge Quality (KQ)	7	68	.86
Perceived System Benefits (PB)	4	68	.82
User Satisfaction (US)	5	68	.88
System Use (SU)	5	68	.79

Table 1: Scale Cronbach's Alpha Reliability Coefficients

In addition to the validity assessments, a collinearity test was conducted. In regression models, multicollinearity exists when there is a strong correlation between two or more independent variables (Field, 2005a). The multicollinearity for all the variables was examined with the Variance Inflation Factor (VIF). The VIF indicates whether independent variable has a strong linear relationship with other independent variables (Field, 2005a). As an indicator that multicollinearity is controlled in a measurement model, Neter and Kutner (1990) suggest

that the VIF values should be less than 10. Obtained values of VIF for the constructs in this study ranged from 1.701 to 1.899 (see Table 2). Therefore, the measurement model exhibited evidence of convergent validity, further suggesting that additional analysis using the research model was appropriate for the purposes of this study.

<b>Dependent Variable</b>	<b>Independent Variables</b>	<b>Independent Variable VIF Value</b>
Perceived System Benefit (PB)	System Quality	1.869
	Knowledge Quality	
User Satisfaction	System Quality	1.889
	Knowledge Quality	
System Use	Perceived System Benefit (PB)	1.701
	User Satisfaction	

**Table 2: Variance Inflation Factor (VIF) Value**

## **CHAPTER FOUR**

### **4 RESULTS AND DISCUSSION**

#### **4.1 Results**

The general aim of this research has been clearly defined from the outset which is assessing the performance of 8028 hotline in disseminating the agronomic knowledge to Ethiopian farmers, and examines the relationships between the factors constituting KMS's success. The first part of this chapter focuses on describing the background information and each dimension of the study factors. Descriptive statistics were used to analyze the respondents' background information and calculate the responses percentages of each dimensions of the model. Then, multiple regression analysis was used to test the hypotheses from the research models. P values <0.05 were regarded as statistically significant. The next sections of this chapter describe the various stages of the data analysis.

##### **4.1.1 Description of the Respondents**

68 valid questionnaires were returned from 105 distributed questionnaires, with 64 coming from the Meskan Woreda and 4 from the system users who are not living in Meskan Woreda but selected the woreda while registering to the system. The response rate is 65%. 82% of the respondents are Male and 18% of them are female. 41% of the respondents have not completed high school; 15% of the respondents have completed high school; Diploma holders are 25% and 19% of them are degree and above degree. 53% responders are farmers; 18 of them are development agents; 23% are agricultural experts; whereas 6% are categorized as others. 38% of the respondents have less than 5 years of experience; 34% of the respondents have 5 to 15 years of experience; 12% of the respondents have 16-25 years; whereas 16% of the responders have more than 26 years. When we come to the last variable of the demographic information; 73% of the respondents know the 8028 hotline for less than 6 months; 23% of the respondents know the system for the past 6 months to one year of time; 2% of the respondents know the system from the last of 13 months to 18 months, and another 2% of the respondents know the system for more than 19 months. Table 3 shows the detail description of the respondents

Demographic Questions		No of Respondents	Percentage
<b>Gender</b>	Male	56	82%
	Female	12	18%
<b>Education Level</b>	Less than High Scholl	28	41%
	High School	10	15%
	Deploma	17	25%
	Degree or Above	13	19%
<b>Occupation</b>	Farmer	36	53%
	Development Agent	12	18%
	Agricultural Expert	16	23%
	Others	4	6%
<b>Experience in Agriculture Sector</b>	Less than 5 Years	26	38%
	5-15 Years	23	34%
	16-25 years	8	12%
	More than 25 Years	11	16%
<b>Experience of 8028 hotline</b>	Less than 6 months	50	73%
	6-12 months	16	23%
	13-18 months	1	2%
	More than 19 months	1	2%

**Table 3: Respondents Demographic Data**

#### **4.1.2 Description of the Dimensions**

Question one to four the section two of the survey (SQ1-SQ4) deal with System Quality, which is as earlier, mentioned a very important measure for a KMS success. The questions concern ease of use, user-friendliness, stability and response time of the KMS, thus representing overall System Quality. A system that is not user-friendly and/or adapted to its purpose will lead to low adaptation and sub optimal usefulness. This makes the System Quality dimension important for measuring KMS success. More than 90 % of the responders agreed and strongly agreed with the quality of the system. The frequency and percentage of the individual responses for question one to four are summarized in figure 6. All questions received responses higher or equal to two, with three different respondents rating the easy usefulness, user-friendliness, and response time of the system and two responders rating stability as low as 1.

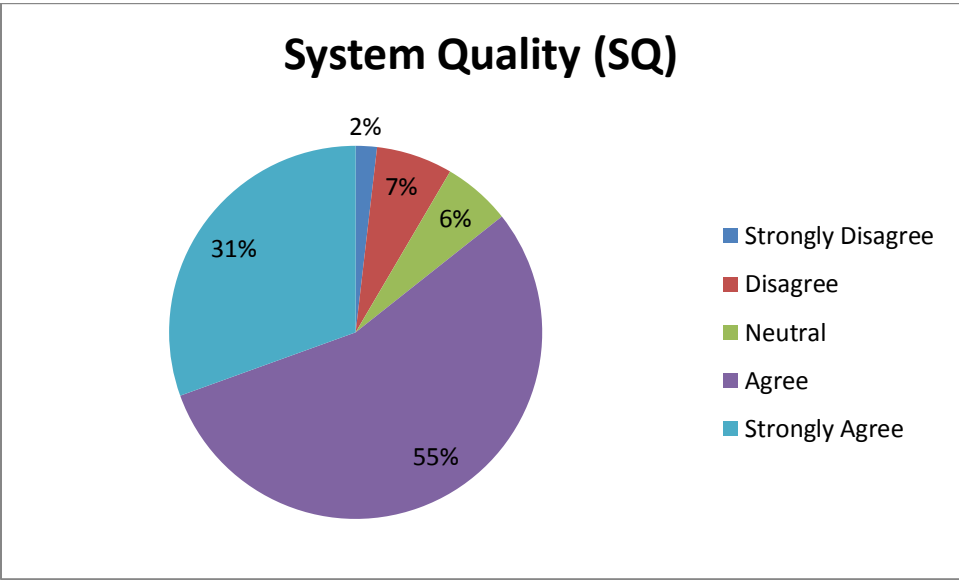


Figure 6: Percentage of users' responses for System Quality

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
8028 hotline is easy to use	1	2	2	40	23
8028 hotline is user friendly	1	0	4	39	24
8028 hotline is stable	2	8	7	34	17
The response time of 8028 hotline is acceptable	1	8	3	37	19

Table 4: Count of Users responses for System Quality

The Knowledge Quality dimension is handled by Question 5 to 12 of the section two of the survey. These questions look at the quality of the available material in the KMS. The quality issue is very important, since a higher quality and more useful information/knowledge improve the usefulness of the KMS. This dimension is therefore a cornerstone of the KMS success model. 88% of the respondents agreed and strongly agreed with the quality of the knowledge disseminated via the AKMS as seen in figure 7. The results suggest a reasonably high system users' satisfaction of the knowledge quality of the KMS than the quality of the system.

In particular KQ5 are rated very positively, this means system users find the information provided helpful, which is a crucial purpose of any KMS. All of the respondents either agree

or strongly agree on the fifth question of the knowledge quality “the Knowledge provided by 8028 is important and helpful for my work.”

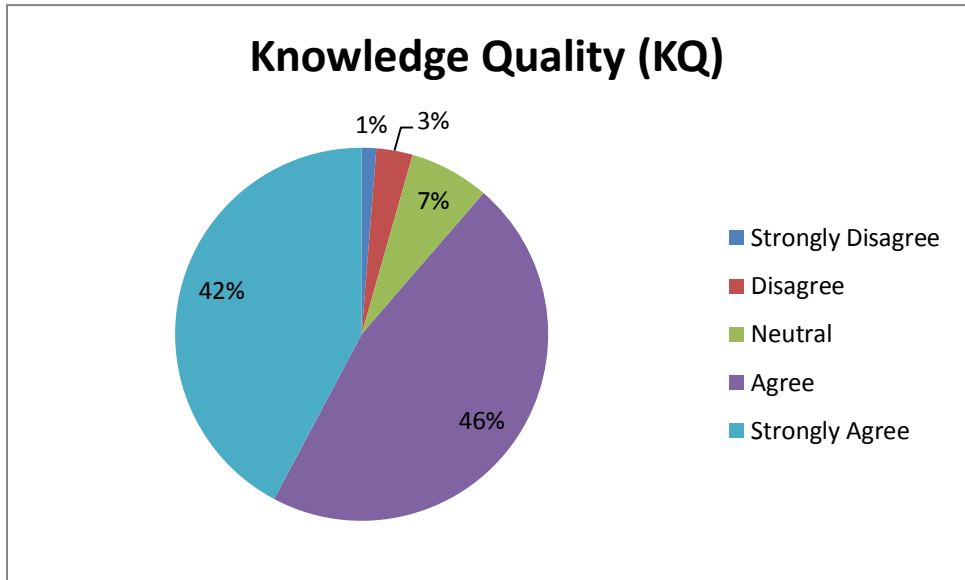


Figure 7: Percentages of Users’ response for Knowledge Quality

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
8028 hotline makes it easy for me to create knowledge	1	1	5	39	22
The words and phrases in contents provided by 8028 hotline are consistent	2	4	9	27	26
The contents representation provided by 8028 hotline is logical and fit	1	4	7	28	28
The knowledge provided by 8028 hotline is available at a time suitable for its use	1	0	4	32	31
The knowledge provided by 8028 hotline is important and helpful for my work	0	0	0	35	33
The knowledge provided by 8028 hotline is meaningful, understandable and practicable	1	2	2	33	30
The knowledge classification or categorization is 8028 hotline is clear and unambiguous	0	4	6	27	31

Table 5: Count of Users responses for Knowledge Quality

User Satisfaction of a KMS has a significant influence on the overall success of a KMS. User Satisfaction has been previously used as a measure for KMS success, and shows how well a KMS is received by its users. Question 13 to 17 of the section two in the survey measure this dimension, and ask about how well the KMS is fulfilling its purpose, satisfaction with the KMS’s efficiency and effectiveness, as well as overall satisfaction with the KMS.

The respondents expressed a strong user satisfaction of the KMS. 58 % of the respondents strongly satisfied and 32 % of the respondents are satisfied with the performance of the system as it can be seen in figure 8. Additionally only one respondent rated item in User Satisfaction with one on the efficiency of the system, all other answers were equal to or above two, leading us to believe that the overall satisfaction with the 8028 agricultural hotline is very good.

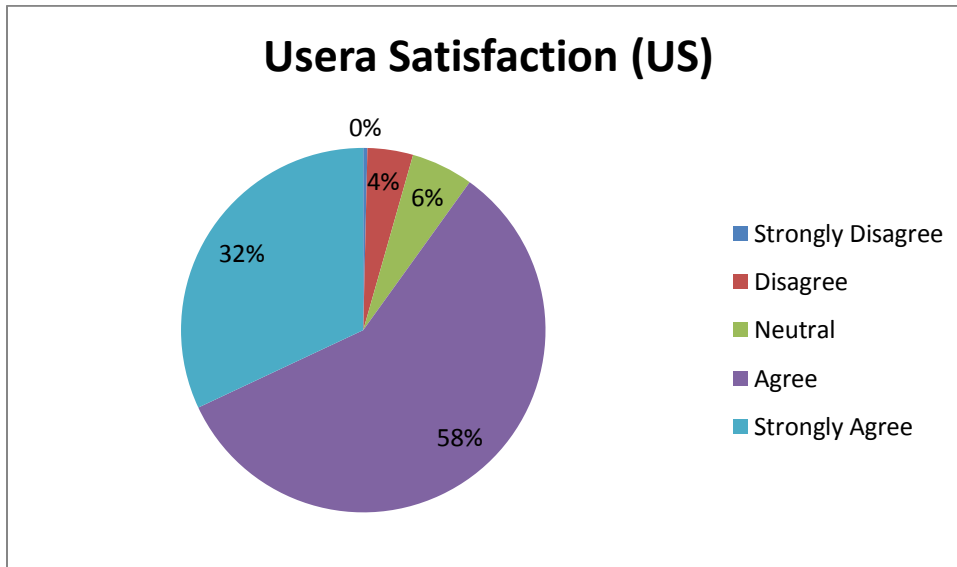


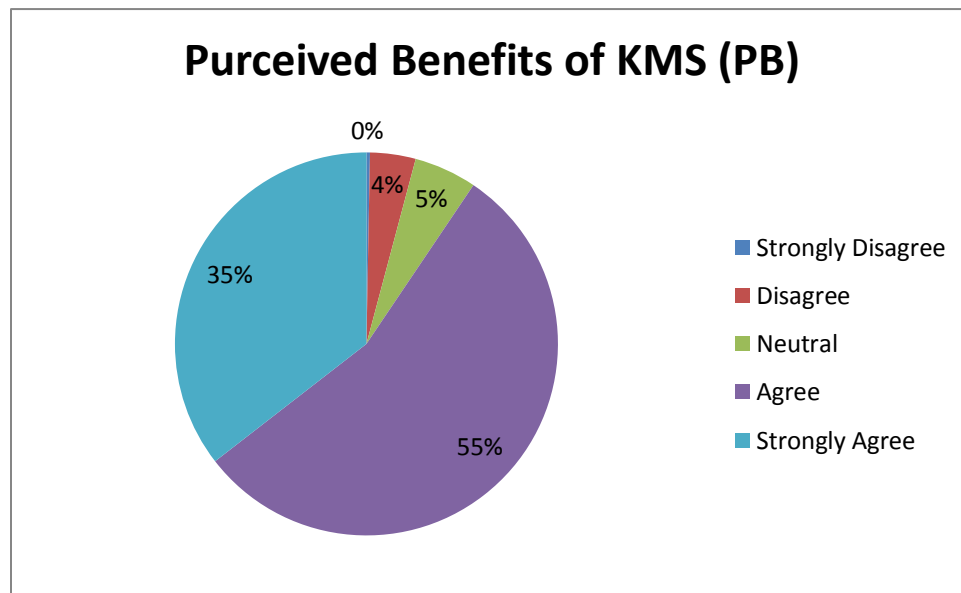
Figure 8: Percentages of Users' response for User Satisfaction

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I am satisfied that 8028 hotline meet my knowledge processing needs	0	2	2	43	21
I am satisfied with 8028 hotline efficiency	1	2	4	43	18
I am satisfied with 8028 hotline effectiveness	0	4	6	36	22
Overall, I am satisfied with 8028 hotline	0	3	3	36	26

Table 6: Count of Users responses for User satisfaction

Question 20 to 24 look at benefits of the KMS, which users think they receive from it. The dimension is important since it covers both individual benefits, but also the improved job satisfaction and productivity assumed to be caused by it. The respondents continue to show a positive perception of the benefits received from the system with a percentage of 90% for

‘strongly agree’ and ‘agree’ as it can be seen in figure 9. This time also only one respondent strongly disagree on the system ability to enable him conduct his task more efficiently.



**Figure 9: Percentages of Users’ response for Perceived KMS Benefits**

	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Agree</b>	<b>Strongly Agree</b>
8028 hotline helps me acquire new knowledge and innovative ideas	0	2	3	36	27
8028 hotline helps me effectively manage and store knowledge that I need	0	3	0	40	23
8028 hotline enable me to accomplish tasks more effectively	1	2	0	38	27
My performance on the job is enhanced by 8028 hotline	0	3	7	37	21
8028 hotline improves the quality of my work life	0	3	8	35	22

**Table 7: Count of Users responses for Perceived KMS Benefits**

The System Use dimension includes measurements that are needed in order to see how the KMS is being used qualitatively. The questions concern the purpose of the usage in order to get an accurate measure of the system use, as discussed in the theoretical framework. 83 % of the responders of which 49% strongly agreed and 34% agreed on the assistance of the AKMS for accomplishing their work. The percentage value of the responses with ‘agree’ and ‘strongly agree’ value for the responses to the questions concerning system use of the KMS was lower than all except the dimension of the quality of the system. The results show a percentage of 83% which is slightly higher than the percentages of the system quality as can

be seen in the figure 10 below. In general the 83 % responses for the two higher values shows that the system is being used meaningfully and it is serving its purpose although it has place for improvement especially for the last questions which rated lower than the other four questions. Comparing to other questions, the system is not as such helping users to share their specific knowledge.

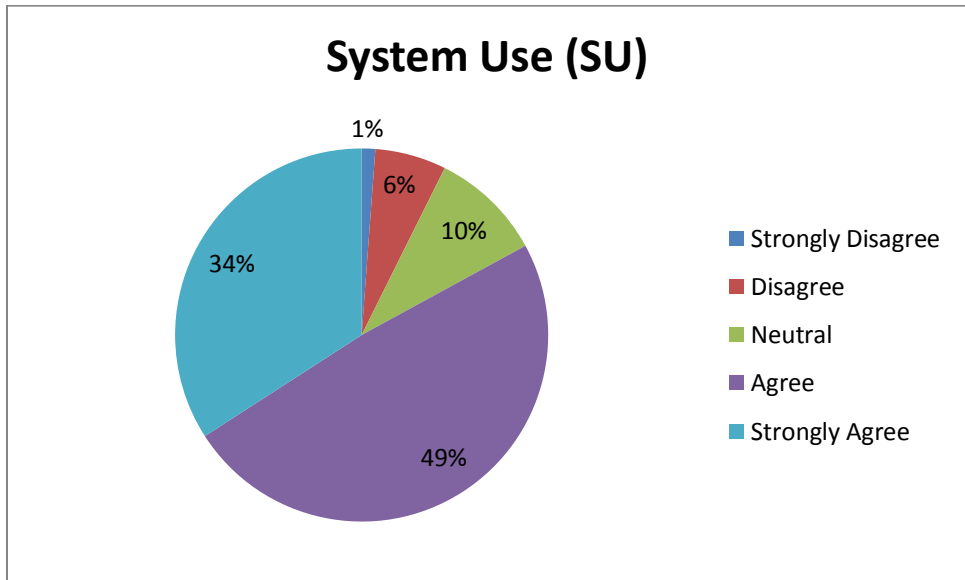


Figure 10: Percentage of Users' responses for System Use

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I use 8028 hotline to help me decisions	1	0	4	38	25
I use 8028 hotline to help me record my knowledge	2	0	9	34	23
I use 8028 hotline to communicate knowledge with colleagues	0	6	6	30	26
I use 8028 hotline to share my specific knowledge	0	7	2	35	24
I use 8028 hotline to share my general knowledge	1	8	12	29	18

Table 8: Count of Users responses for System Use

#### 4.1.3 Standard Multiple Regression

The investigation of the correlations between the five dimensions of the KMS success model was conducted using three standards multiple regressions with the SPSS. This revealed the standardized coefficients ( $\beta$ ) among the dimensions. The results can be seen in figure 11. Furthermore using the results from the analyses it was possible to add other correlation

measures, for examining the correlations between the dimensions. The three multiple regressions conducted are the following:

	Dependent Variable	Independent Variable(s)
1	Perceived KMS Benefits	System Quality & Knowledge Quality
2	User Satisfaction	System Quality & Knowledge Quality
3	System Use	Perceived KMS Benefits & User Satisfaction

**Table 9: Correlations of the Dimensions**

#### **4.1.4 Hypothesis Testing and Analysis**

Multiple regression analysis was then used for the specific hypothesis testing, again using SPSS for Windows for data analysis. Multiple regression analysis is a statistical technique for finding the best relationship between a dependent variable and selected independent variables (Field, 2005a). The total effect of a particular independent variable on the dependent variable is the result of the direct relationship between the independent and dependent variables, and the indirect impacts of any intervening variables Lumsdan, Bucklund and Ihloff, (2010).

After checking multicollinearity and the level of association between the variables the next steps will be analyzing the multiple regressions' result to evaluate the model, since the calculations of the model were done through three multiple regressions, the full model is divided into three parts. This means the evaluation will actually show how well parts of the model are describing the data, this is particularly interesting since Wu & Wang (2006, p.731) argued for their model containing a technological (left part of the model) as well as human side (right part of the model).

The first measure is Adjusted R Square, which shows how much of the variance in the dependent variable is explained by the model and it corrects R square, for small sample sizes, to 'provide a better estimate of the true population value' (Pallant, 2001, p.158), a higher value approaching 1 indicates a better model. That means adjusted R square can be used as an indicator for the variance caused by the independent variables uniquely and shared (Pallant,

2001). As a result the shared contribution of the independent variables can be particularly high if the correlation between them is high. On other hand the statistical significance of the results is already tested by checking ‘Sig.’ in the ANOVA table provided as part of SPSS output, this value has to be lower than 0.01 to reach statistical significance.

The third step in the multiple regression analysis concerns the  $\beta$  values for the independent variables. These are found under ‘Standardized Coefficients’ in the SPSS output. Only when using the standardized coefficients can the  $\beta$  values for the different independent variables compared, since they are then converted to the same scale (Pallant, 2001). The  $\beta$  value basically shows how much each independent variable contributes to the change in the dependent variable (Pallant, 2001). It is important to check the Sig. value for each  $\beta$  value as well, to see if ‘the variable is making a statistically significant unique contribution to the equation’ (Pallant, 2001, p. 159). A value of less than 0.05 indicates it did not make a unique contribution, which could be caused by an overlap with other independent variables (Pallant, 2001), this is useful especially when the correlation between the independent variables was found to be high. Another important measure to look at the influence of the independent variables on the dependent variable is the ‘Part correlation coefficient’ (Pallant, 2001). When the part correlation coefficient is squared it shows how much of dependent variable’s variance is caused by an independent one (Pallant, 2001).

#### 4.1.4.1 Perceived KMS Benefits

Independent Variables	Correlation (Ind.+ Dep.)	Correlation (Ind.+ Ind.)	VIF	Adj. R <sup>2</sup>	Sig.	$\beta$ Value	Sig.	Part Correlation
System Quality (SQ)	.463	.682	1.869	.557	.000	-0.093	.405	-0.068
Knowledge Quality (KQ)	.752					0.815	.000	0.596

Table 10: Perceived KMS Benefits Result

As the results in table 10 shows, the correlations between System Quality & Knowledge Quality and Perceived KMS Benefits are both higher than 0.3 indicating a relation between the independent variables and the dependent variable. The System Quality and Knowledge Quality are also moderately interrelated, with a correlation a little bit less than 0.7 which is .682, however the VIF is 1.869 which much lower than the ceiling 10. With an

adjusted  $R^2$  of 0.557 a large part of the variance in Perceived KMS Benefits is explained by the Knowledge variables, and with a  $\beta$  value of 0.815 and sig. of 0.00 Knowledge Quality is the main unique contributor to Perceived KMS Benefits. In fact System quality has a negative contribution to the dependent variable with  $\beta$  value of -0.093 and high sig. of 0.405 which is above 0.05.

The part correlation coefficient squared shows, that it explains 59.6% in the variance of the dependent variable. **System Quality however fails to reach a statistically significant contribution to Perceived KMS Benefits, as can be seen by negative  $\beta$  Value of -0.093,** and a part correlation is also squared of negative values.

**H1: The extent of System Quality in KMS is positively associated with User Perceived KMS Benefits.**

Hypothesis has to be rejected as it has not significant influence on the Perceived System Benefits. A system with high quality does not mean that users perceive that they will be benefited from it.

**H3: The extent of Knowledge Quality is positively associated with user Perceived KMS Benefits.**

Hypothesis 3 is accepted, as Knowledge Quality has a unique statistically significant influence on Perceived KMS Benefits.

**4.1.4.2 User Satisfaction**

Independent Variables	Correlation (Ind.+ Dep.)	Correlation (Ind.+ Ind.)	VIF	Adj. $R^2$	Sig.	$\beta$ Value	Sig.	Part Correlation
System Quality (SQ)	.706	.682	1.869	.568	.000	0.438	.000	0.320
Knowledge Quality (KQ)	.692					0.393	.001	0.287

**Table 11: User Satisfaction Result**

For User Satisfaction both independent variables have a high correlation of 0.706 and 0.692 respectively, but they are highly interrelated as well, with a correlation of 0.682, which is almost 0.7, and raises concerns of multicollinearity. Despite this high bivariate correlation the VIF stays much lower than 10 which is 1.869. The problem of this high interrelation

between the independent variables becomes apparent when looking at a relatively high adjusted  $R^2$  of 0.568, followed by no statistically unique contribution to the variance in User Satisfaction by either independent variable. In this case the  $\beta$  Value are high at 0.4 for System Quality and 0.38 for Knowledge Quality, and the direct influence of both independent variables on User Satisfaction is certainly there, but they are too interrelated to really make sense of the correlations between them and User Satisfaction. Additionally, both values have almost the same influence on User Satisfaction, with System Quality taking a marginally higher influence as indicated by the slightly larger  $\beta$  and the square part correlation coefficient.

**H2: The extent of System Quality in KMS is positively associated with User Satisfaction.**

**H4: The extent of Knowledge Quality is positively associated User Satisfaction.**

Both hypotheses are accepted.

#### 4.1.4.3 System Use

Independent Variables	Correlation (Ind.+ Dep.)	Correlation (Ind.+ Ind.)	VIF	Adj. $R^2$	Sig.	$\beta$ Value	Sig.	Part Correlation
Perceived System Benefit	.667	.642	1.711	.569	.000	.358	.001	.275
User Satisfaction	.711					.482	.000	.369

Table 12: System Use Result

The correlations between User Satisfaction & Perceived KMS Benefits are both relevant at 0.711 and 0.667 respectively, and both independent variables are not too interrelated at 0.642. The VIF of 1.711 is very good value as well, showing no obvious problems with multicollinearity. The adjusted  $R^2$  is high with 0.569, but the bigger influence on System Use is clearly caused by user satisfaction, with a  $\beta$  value of 0.482 and a squared part correlation of 0.369. Although Perceived System Benefit's contribution is less than User Satisfaction with a  $\beta$  value of 0.358 and a squared part correlation of 0.275, it reach a statistically significant unique contribution to the variance in System Use with sig of .001.

**H5: The extent of User Satisfaction is positively associated with System Use.**

This hypothesis is accepted based on the above result.

**H6: The extent of Perceived KMS Benefits is positively associated with User Satisfaction.**

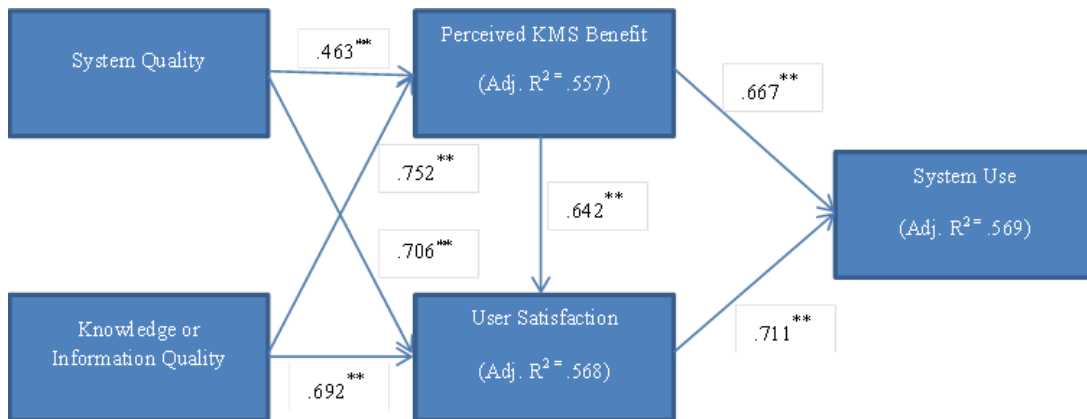
Even though the  $\beta$  value is not calculate for H6 hypothesis, as shown by the correlation between the two independent variables have a correlation higher than 0.642, indicating a definite relationship between the two dimensions, therefore H6 is accepted.

**H7: The extent of Perceived KMS Benefits is positively associated with System Use.**

This hypothesis is still accepted.

## 4.2 Discussion

Figure 11 represents the final model with the standardized path coefficients, their significance, and the coefficients of determinant ( $R^2$ ) for each endogenous construct. The asterisks on the paths indicate the significance level and the variance explained are presented below the dependent variables.



\*\*Correlation is significant at the 0.01 level (1-tailed)

Figure 11: Research Model and Observed Correlations

### 4.2.1 System Quality

As the percentages of the dimensions show, the users' assessment of the system quality is positive by itself. The system quality affected perceived usefulness negatively and the user satisfaction positively. And in general, it was a weaker predictor than knowledge content quality. Thus, low system quality (in terms of ease of use, stability etc.) might make the users feel less satisfied, but the users may still perceive the system as useful for as long as the quality of the knowledge it provides is high. Through only user satisfaction, KMS system quality affected the system use. But its effect is considerably weaker than the correspondent

effects of knowledge content quality. These findings are consistent with the results from many previous studies that examined the effect of the quality of the system on the usefulness of the system in both IS success (DeLone & McLean, 1992; 2003; 2004) and KMS success contexts. The relatively weak effect of the KMS system quality observed in this study may be explained, in part, by the simplicity of the mobile usage by the farmers and other system users. Since this AKMS needs only the basic operation of mobile, it might not be difficult even for the farmers to use and retrieve Knowledge from its backend content repository. Generally, the results suggest that system quality matters, but not as much as knowledge quality.

#### **4.2.2 Knowledge Quality**

Knowledge content quality was the strongest predictor of both users' perceived benefits of KMS and user satisfaction. Through users' perceived benefits of KMS and user satisfaction, knowledge content quality indirectly affected system use. These findings are consistent with Lumsdan, Bucklund and Ihloff, (2010), and Wu and Wang (2006), who suggested that user perception of quality of knowledge influences user perceptions of the usefulness of KMS and, therefore, encourages them to use KMS. The high quality of knowledge content that is provided by repositories or experts may increase individuals' willingness to access the knowledge. This is consistent with prior literature (Kankanhalli et al., 2005b) reporting the positive effect of output quality on the use of KMS by knowledge seekers. Generally, the results suggest that the quality of knowledge affects the overall success of KMS.

#### **4.2.3 Perceived Usefulness**

Perceived benefits of KMS affected system use. The effect of perceived benefits on system use was strong; it was the strongest effect in the model. These findings are consistent with prior studies using TAM and the DeLone and McLean IS success model (Baroudi, 1986; Davis, 1989; Fang et al., 2006; Seddon, 1997), including the study by Wu and Wang (2006) conducted with a knowledge management system. Generally, the effect of perceived usefulness on system use is well established in the literature, and it was not surprising that it was also found in this study.

#### **4.2.4 User Satisfaction**

User satisfaction was found to affect system use though its effect on system use is almost less than the effect of perceived benefit of the KMS. Generally, these findings can be seen as consistent with prior studies that found that user satisfaction affected KMS use (Wu & Wang, 2006) and was a determinant of KMS success (Hwang et al., 2008). The results suggested that perceived usefulness of KMS is more important for KMS success than user satisfaction. It does not matter so much whether the system meets user expectations, as long as the users perceive the system to be useful.

#### **4.2.5 The connections among user satisfaction, user perceived benefits, and system use**

The empirical result of this research showed that that perceived KMS benefits had a positive influence on user satisfaction and that perceived KMS benefits and user satisfaction had a direct positive effect on system use which is actually in consistent with both Wu and Wang, (2006) and Lumsdan, Bucklund and Ihloff, (2010). If users conclude that the benefits will outweigh the costs or effort of using a KMS, they will effectively use it, but if it cannot provide benefits to users and help them, it will not contribute to user performance.

## CHAPTER FIVE

### 5 Conclusion, Limitations and Recommendations

#### 5.1 Conclusion

The objective of this research was to assess the performance of 8028 AKMS in disseminating the agronomic Knowledge of best farming practices to Ethiopian farmers, and examine the correlations between the five dimensions of the model in the context of the 8028 hotline. In order to achieve this purpose quantitative approach was chosen, and questionnaires were distributed to 8028 agricultural hotline users found in a Meskan district or woreda. Meskan woreda is found in Guraghe Zone, SNNP Region, in Ethiopia. A theoretical framework was shaped to explore the current field rotating around KMS success. During this process the KMS success model of Wu & Wang (2006) was adopted as the theoretical basis for this paper.

After the model was determined, survey was conducted using the same approach as Wu & Wang (2006), and distributed the questionnaires to the farmers, development agents, agricultural experts, and other users of the 8028 hotline by filtering their demographic information from the database. The results of the survey were analyzed using standard multiple regression analysis, which lead to the discovery of the correlations between the KMS success model's dimensions.

The five dimensions were: System Quality, Knowledge Quality, Perceived KMS Benefits, User Satisfaction and System Use. The percentages of those who agreed and strongly agreed with all of the five dimensions are above 80%. On other hand, users rated each dimensions individually positively. Positive correlations were also found between Knowledge Quality and Perceived KMS Benefits & User Satisfaction, System Quality and User Satisfaction, as well as between Perceived KMS Benefits & User Satisfaction and System Use. There was however no positive significant correlation between System Quality and Perceived KMS Benefits. Therefore this study confirms the validity of Wu & Wang's (2006) KMS success model in agricultural context and in low-income country like Ethiopia as the Wu and Wang Model was previously tested in Taiwan with Business Companies.

Another result from the research is that the KMS at the agriculture sector was received positively by the farmers and other stakeholders, but need to be improved the quality of knowledge and adding to the perceived benefits. ATA needs to improve the content of the

crops which are uploaded to the system periodically. Although the contents are reviewed once in a year users are complaining that the contents are general and it does not consider the local context such as soil, agro-ecology and others factors.

The users are also to some extent complaining for the quality of system. Users were not pleased by the long prompt they need to make to access the content. As it becomes long time and steps to access the content it will become difficult to especially farmers to use it considering that their limited knowledge they have for the technology. The busy signals of the telephone system and call drops are also other challenges of the system to be used by the users. The short code is not accessible from some rural parts of the country.

It is evident from this study that the use of knowledge management systems, such as the 8028 agricultural hotline, can have a significant role on the effective dissemination of the agricultural Knowledge of the best farming practice. The participants in this study strongly voiced their valuation of the importance of the 8028 agricultural hotline. Based on the limited findings of this study, the AKMS was generally perceived as a useful and valuable asset for the effective dissemination of agricultural Knowledge. These results also indicate that the 8028 AKMS is playing its part in leading the smallholder farmers to increased productivity and production of their crops by reducing the amount of effort spent for the relevant agricultural Knowledge.

As testing the relationships between the dimensions which were put as hypotheses were also an objective of this paper, the result of their correlations showed a clear relationship between the dimensions of KMS success. Except for System Use and Perceived KMS Benefits which was not actually assessed in this study, the results found between the dimensions are in accordance with Wu & Wang's (2006) KMS success model. In general, the system should be of quality and have relevant content which can improve the farming practices. The quality content would satisfy the users and increase the usability of the system by the SMFs and other users of the system. The quality system and relevant content will also improve the users' perception of the AKMS benefit which would also improve the system use. The 8028 hotline was found to be rather successful and helping farmers and other users to access the agricultural Knowledge and apply to their farming activities.

## **5.2 Limitation of the Thesis**

This study had some limitations. First this study was limited only to the users of AKMS who are accessing the contents via mobile call. Second, the study was investigated with a specific KMS in one sector and in one country. The benefit of focusing on one organization and one KMS was control. Of course, this limited its generalization.

Although the contents in the system can be accessible in three languages and across the country, this research targets only one Woreda who access the contents only in Amharic not forgetting to mention that the system is working in Meskan woreda since the piloting time of the system. Although one of the assumption taken for this was most of Ethiopia woreda reflect the whole other woredas, it would be still difficult to fully generalize the research to the whole country.

This research is conducted based on the model developed by Wu & Wang (2006). According to the researcher knowledge, this model has not been used in assessing the KMS in Ethiopia context. Although this model has been peer reviewed and used with KMS assessment in different industries and in another countries context (Whitfield, 2008), (Lumsdan, Bucklund and Ihloff, 2010), (Ali, 2012), generally it can be said that no KMS success model was reviewed much by the Ethiopian research community. Thus it is necessary to contextualize and agree on a KMS success model which derived from the IS success model. This model could then be improved, instead of creating new KMS success models.

## **5.3 Recommendations**

- The most important result which becomes obvious through all research is the importance of the user for the effectiveness of the KMS. This aspect has however not been researched enough, the way farmers or development agents interact with the KMS can be a crucial factor in its success, these needs to be reflected better in a KMS success model. During the review of articles in this research, the psychological aspect of a KMS in regard to social interactions, and other indirect benefits from human relationships through a KMS have been neglected. The main focus is still mainly on technological aspects (Kulkarni et al, 2006; McDermott, 1999), this is in part the result of the success of DeLone & McLean's (1992, 2003) success model, which is the basis for other KMS success models (Seddon, 1997; Wu & Wang, 2006, Halawi et al, 2007/2008; Kulkarni et al, 2006). This is what

future research should focus on, in order to truly improve a KMS for the user, which ultimately is the judge of its success or failure.

- In order to improve the acceptance of the system by the users' and improve the usability of the contents which are being availed by the system, the implementers of the system should work on the content and system quality. As the empirical result of this research and different researched literature show the content of the system should be updated and be useful for improving the farming activities of the system users. The content should be contextualized to the location, soil types, and agro-ecologies. It should also tie the weather information to the contents.
- The quality of the system should not be constraint for users to access the content on time. The problems noticed during the study were the long prompt the users need to go through to access the content and that would discourage them to access the content. The implementer should also devise a way to avoid the busy signal and other related telephone signal related problems. One of the solutions may be having the location information from Ethio telecom and it will reduce three of the prompts (Region, zone and Woreda) of which the users need to provide to the system.
- As the contents in the system increase and their quality improves, there is a tendency that accessing the system will be complex. The implementer should pay attention to the easiness of the system while improving and adding the content. As the main users of the system are farmers the system should be as easy as possible to make its information accessible.
- As noticed by the researcher during the study, the sustainability of the initiative is one of the issues which need to be considered. The Ethio Telecom is subsidizing the air time of the users calls. ATA is also a time-bounded organization. What would happen when Ethio Telecom stops its subsidy? ATA, Ethio Telecom and MoANR should find a way to make it sustainable while maintaining the affordability of the system to the farmers to make a call to the system and access information easily. Unless the system is available nobody can use the system.
- Finally, as mentioned in the background of the 8028 hotline, there is one system component which is being piloted across 16 districts in four regions of the country.

It is IVR based helpdesk component. The agricultural experts who are responsible to provide the answer for the farmers' unique question via their mobile are externalizing their knowledge. Their responses together with the farmers' questions will be recorded in the backend databases. So we can see here creation and storing practice of the knowledge management. They are doing this mostly voluntarily. As this is one of the important components of knowledge management practice, researchers should further be able to assess it in the future with additional variables. These variables can be managerial factors (e.g. attitudes of top management), facilitating conditions (e.g. reward), environmental factors (e.g. trust, organizational culture), and resource availability may have an influence on KMS success.

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## **Appendix A. Data Collection instrument with Construct definition and Measures**

### **A. Questionnaire English Version**

#### **Cover letter**

Dear Sir/Madam,

I am a graduate student at Addis Ababa University MSc Program. Currently, I am doing my final thesis project on “**Assessment of Agricultural Knowledge Management System (AKMS): The Case of Ethiopian Agricultural Transformation Agency**”. As part of my project, I am conducting a survey through this questionnaire to assess the agricultural Knowledge management system. It is the 8028 mobile based extension service which is Interactive Voice response (IVR) and Short Message Service (SMS) system. Thus, I kindly request you to cooperate with me to fill up questionnaire. I assure you that the information gathered will be for academic purpose only and individual responses confidential.

Please help me with considerate and in time response

**I. Background Information**

- You can make bold or italic for your response from the choices**

- Your gender? Male Female
- Your Occupation?
  - Farmer Development Agent (DA) Agricultural Expert Other
- Your highest Educational Level?
  - High School Less Completed High School  Diploma Degree or above
- Years of experience in the agriculture sector?
  - Less than 5 years 5-15 Years  16-25 Years More than 25 Years
- How long have been using the mobile based 8028 Agricultural Knowledge Management System?
  - Less than 6 months 7-12 months  13 – 8 More than 18 months

**II. Assessment of the System Quality (Q) of the 8028 AKMS (5 level Likert Scale):**

Please indicate how good the KMS is in terms of its operational characteristics

- You can put number or some kind of sign in the box of these questions**

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. 8028 is easy to use					
2. 8028 is user friendly					
3. 8028 is stable					
4. The response time of 8028 is acceptable.					

### III. Assessment of the Knowledge Quality of the 8028 AKMS (5 level Likert Scale)

How good the 8028 AKMS is in terms of its output content quality

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. 8028 AKMS makes it easy for me to create knowledge					
2. The words and phrases in contents provided by 8028 are consistent					
3. The content representation provided by 8028 is logical and fit.					
4. The Knowledge provided by 8028 is available at a time suitable for its use					
5. The Knowledge provided by 8028 is important and helpful for my work.					
6. The Knowledge provided by 8028A is meaningful, understandable, and practicable.					
7. The knowledge classification or categorization in 8028 is clear and unambiguous.					

**IV. Assessment of the User Satisfaction of the 8028 AKMS (5 level Likert Scale):** The sum of one's feelings of pleasure or displeasure regarding 8028 AKMS

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I am satisfied that 8028 meet my Knowledge processing needs.					
2. I am satisfied with 8028 AKMS efficiency					
3. I am satisfied with 8028 effectiveness.					
4. Overall, I am satisfied with 8028.					

**V. Assessment of the Perceived KMS Benefits of the 8028 AKMS (5 level Likert Scale):** The valuation of the benefits of the 8028 AKMS by users

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. 8028 helps me acquire new knowledge and innovative ideas.					
2. 8028 helps me effectively manage and store knowledge that I need.					
3. 8028 enable me to accomplish tasks more efficiently					
4. My performance on the job is enhanced by AKMS.					
5. 8028 improves the quality of my work life.					

**VI. Assessment of the System Use of the 8028 AKMS (5 level Likert Scale):** The extent of the 8028 KMS being used

	<u>Strongly Disagree</u>	<u>Disagree</u>	<u>Neutral</u>	<u>Agree</u>	<u>Strongly Agree</u>
1. I use 8028 to help me make decisions.					
2. I use 8028 to help me record my knowledge.					
3. I use 8028 to communicate knowledge and information with colleagues.					
4. I use 8028 to share my general knowledge.					
5. I use 8028 to share my specific knowledge.					

Thank you!

B. Questionnaire Amharic Version

የ8028 ሥርዓት መገምገሚያ ጥናት መጠይቅ

የሽፋን ደብዳቤ

ይህ መጠይቅ የተዘጋጀው የግብርና ዕውቀት ማጠናቀሪያ ሲስተምን (ሥርዓትን) በተለይም 8028 የተባለውን የድምፅ ቅብብሎሽ ምላሽ /አይ ቪ ኦር/፣ የአጭር መልእክት አገልግሎት /ኤስ ኤም ኤስ/ የግብርና ኤክስቴንሽን አገልግሎትን ለመገምገም ነው። የዚህ ጥናት ወጤት 8028 የግብርና ኤክስቴንሽን ሥርዓት ስኬታማነትና በሥርዓቱ ዙሪያ ያሉ ክፍተቶችን በመገምገም መወሰድ የሚገባውን የማሻሻያ እርምጃ ያሳያል። በመሆኑም የእርስዎ ትብብር ጠቀሜታው የጎላ ስለሆነ መጠይቁን በመሙላት እንዲተባበሩኝ በአክብሮት እንጠይቃለሁ።

ከእርስዎ የማገኘውን ምላሽ ለትምህርታዊ ጉዳይ ብቻ እንደምንጠቀመው በማረጋገጥ ምስጢራዊነቱ የተጠበቀ ይሆናል።

እናመሰግናለን

**I. ለስርዓቱ ተጠቃሚዎች የቀረቡ አጠቃላይ ጥያቄዎች**

1. የታ  ወንድ  ሴት
2. ስራዎ ምንድነው?  
 ግብርና  የልማት ስራተኛ  የግብርና ባለሙያ  ሌላ
3. የትምህርት ደረጃዎ?  
 ከሁለተኛ ደረጃ በታች  ሁለተኛ ደረጃ አጠናቅቂያለሁ  ዲፕሎማ  ድግሪና ከድግሪ በላይ
4. በግብርናው ዘርፍ ላይ ያለዎት የሥራ ልምድ/የቆየበት ጊዜ  
 ከ5 ዓመት በታች  ከ5-15 ዓመት  ከ16 — 25 ዓመት  ከ25 ዓመት በላይ
5. ለምን ያህል ጊዜ 8028 የተባለውን የግብርና ዕውቀት አገልግሎት ተጠቅመዋል:  
 ከ6 ወር በታች  ከ7-12 ለሚሆኑ ጊዜያት  ከ13-18 ለሚሆኑ ወራቶች  ከ18 ወራቶች በላይ

**II. የሲስተሙ (የስርዓቱ ጥራት) መገምገም**

	በጣም አልስማማም	አልስማማም	ገለልተኛ ነኝ።	እስማማለሁ	በጣም እስማማለሁ
1. 8028 ለመጠቀም ቀላል ነው።					
2. 8028 ለአጠቃቀም አመቺ ነው።					
3. 8028 አገልግሎቱ አይቋረጥም።					
4. ከ8028 መልስ ለማግኘት ብዙ ጊዜ አይወስድም።					

III. የዕውቀት ወይም የመረጃው ጥራት ጥራት

	በጣም አልስማማም	አልስማማም	ገለልተኛ ነኝ።	እስማማለሁ	በጣም እስማማለሁ
1. አዲስ የግብርና ዕውቀትን ለመፍጠር 8028 ሁኔታዎችን አቅሎልኛል።					
2. በ8028 በቀረቡ ይዘቶች ውስጥ የሚገኙ ቃላቶችና ሃረጎች ወጥ ናቸው።					
3. የ8028 ዕውቀት ውክልና ምክንያታዊ እና አግባብነት ያለው ነው።					
4. በ8028 የሚሰጡ ዕውቀቶች ወይም መረጃዎች በማንኛውም ጊዜ የሚገኙ ሲሆን ለአጠቃቀምም አመቺ ናቸው።					
5. በ8028 የሚሰጠው ዕውቀት ወይም መረጃ ለእኔ ስራ አስፈላጊና ጠቃሚ ነው።					
6. በ8028 የሚሰጠው ዕውቀት ወይም መረጃ ትርጉም ያለው፣ ለመረዳት የማያስቸግርና ተግባራዊ መሆን የሚችል ነው።					
7. በ8028 ውስጥ ያለው ዕውቀት ምደባ ግልፅና የማያሻማ ነው።					

**IV. የተጠቃሚ እርካታን ለመገምገም**

	በጣም አልስማማም	አልስማማም	Neutral ገለልተኛ ነኝ።	Agree እስማማለሁ	Strongly Agree በጣም እስማማለሁ
1. በ8028 የእውቀት ወይም መረጃ ፍላጎቴን ስለሚያሟላልኝ እረክቼበታለሁ።					
2. በ8028 ብቃት እረክቼበታለሁ።					
3. በ8028 ወጤታማነት እረክቼበታለሁ።					
4. በአጠቃላይ በ8028 አገልግሎት እረክቼበታለሁ።					

**V. ተጠቃሚው ያስተዋለው የሲስተሙ ጥቅም**

	በጣም አልስማማም	አልስማማም	ገለልተኛ ነኝ።	እስማማለሁ	በጣም እስማማለሁ
5. 8028 አዳዲስ ዕውቀትና የፈጠራ ሃሳቦችን እንዳገኝ ይረዳኛል።					
6. 8028 የምራልገው ዕውቀት በብቃት አንደይዝ ወይም እንድጨብጥ ይረዳኛል።					
7. 8028 ስራዬን ይበልጥ በብቃት እንዳከናውን ይረዳኛል።					
8. የስራ አፈፃፀሜ በ8028 አማካኝነት ከፍ ብሏል።					
9. 8028 የስራዬን ጥራት አሻሽሏል።					

**VI. አጠቃላይ የሲስተሙ ጥቅም**

	<u>በጣም</u> <u>አልስማማም</u>	<u>አልስማማም</u>	<u>ገለልተኛ</u> <u>ነኝ።</u>	<u>እስማማለሁ</u>	<u>በጣም</u> <u>እስማማለሁ</u>
1. 8028ን በስራዬ ጠቃሚ ውሳኔ ለመወሰን እጠቀማለሁኝ።					
2. 8028ን እውቀቴን ለመመዘገብ ወይም ለማጠራቀም እጠቀማለሁኝ።					
3. ከባልደረቦቼ ጋር እውቀት እና መረጃ ለመለዋወጥ 8028ን እጠቀማለሁኝ።					
4. ያለኝን አጠቃላይ እውቀት ለማካፈል 8028 እጠቀማለሁኝ።					
5. እኔ ብቻ የማውቀውን እውቀት ለሌሎች ለማካፈል 8028 እጠቀማለሁኝ።					

**እናመሰግናለን!!**