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# Acceptance of WoredaNet E-Government Services in Ethiopia: Applying the UTAUT Model

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## ABSTRACT

WoredaNet is a Wide Area Network intended to link all woreda<sup>1</sup> administrative units in Ethiopia. The technology presents unique opportunities to facilitate the application of e-Government packages in the country. This study is a work in progress that utilizes the Unified Theory of Acceptance and Use of Technology (UTAUT) for the understanding of acceptance and adoption of Information Technology in Ethiopian context. The study tries to further validate the model and assess acceptance of the e-Government services put in place in the WoredaNet infrastructure in the country. The government of Ethiopia, while utilizing the technology, is still in the process of extending it throughout the country. The study, thus, contributes to the success of Services implementation in the WoredaNet by examining acceptance and utilization issues amongst the users since users' acceptance of the technology is crucial for its ultimate success.

## Keywords

WoredaNet, Technology Acceptance, Technology Adoption, Technology Utilization, Technology Acceptance Model (TAM), Unified Theory of Acceptance and Use of Technology (UTAUT)

## INTRODUCTION

Information and Communications Technologies (ICTs) have become the core of business operation in many sectors (Negash, 2004). Recognizing its critical role in major aspects of the nation, government of Ethiopia is investing a lot to strengthen the ICT infrastructure for different sectors of the economy. WoredaNet is one of these initiatives that is aimed at linking all Woredas through out the country so that different eGovernment packages can be effectively and efficiently implemented all over the nation.

In spite of the overall budget limitation, the percentage of GDP allocation for ICTs by economically developing countries is higher than that of industrialized nations in many cases (Negash, 2006). In line with this, the government of Ethiopia has shown strong dedication to invest a lot of money on WoredaNet technology. It is obvious that the country should get the

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<sup>1</sup> "Woreda" is an administrative division in Ethiopia, equivalent to a district with an average population of 100,000. Woredas are composed of a number of *Kebele*, or neighborhood associations, which are the smallest unit of local government in Ethiopia. The Name WoredaNet comes from "Woreda".

return from this huge investment. The expected benefit can be attained if the technology is effectively utilized. Among the very important prerequisites for effective use of technology is users' acceptance of the technology itself.

According to an official in Ethiopian Information Communication Technology Agency (EICTDA), WoredaNet is an e-government network linking nearly 600 local administrations ("Woreda") with 11 regional government offices and the federal government headquarters in the nation's capital, Addis Ababa and it provides services such as e-mail, Internet Access, file-sharing, and videoconferencing and the like. It is the e-government communication backbone developed by the Ethiopian Telecommunication Corporation and is a promise and a major enabler for rapid ICT development in the country. Already the public sector and the education sector have begun to benefit from this network, and the health and agriculture sectors have been lined up for the next phase.

Unified Theory of Acceptance and Use of Technology (UTAUT) model proposed by Vankatesh et al. (2003) provides great promise to enhance our understanding of user acceptance. However, the initial UTAUT study focused on large organizations. Also, because of its design, WoredaNet present a unique set of circumstances. This research, thus, is mainly aimed at exploring the extent of technology acceptance (adoption) by different groups of users that are using WoredaNet so that factors that determine the adoption of WoredaNet by different user groups can be identified.

In particular, the research tries to answer the following questions:

Does UTAUT apply in the context of WoredaNet in Ethiopia?

What factors determine the adoption of WoredaNet by its users?

In line with this, this research piece tries to practically test the new unified model of technology acceptance in the Ethiopian WoredaNet context.

## **WOREDANET PROJECT**

The WoredaNet is an E-Government project in Ethiopia conducted under the Ministry of Capacity Building and implemented by the ICT Development Agency. The project aims to build terrestrial and satellite-based network connecting lowest levels of government. It is an example of a Government-to-Government (G2G) model in an African country (Kitaw, 2005).

The country is divided into 9 ethnically-based administrative regions (kililoch, sing. kilil) which function as autonomous entities. They are subdivided into 68 zones and two chartered cities (astedader). It is further subdivided into 700+ woredas and six special woredas. Woreda2 (also spelled woreda) is an administrative sub-division, or local government, of Ethiopia, equivalent to a district. Beginning the year 2002, more authority was passed to woredas, in the form of staff and budgets transferred from the Regional governments (Kitaw, 2005). The objective of the WoredaNet ICT network is to deliver IP based services through the use of broadband terrestrial and VSAT infrastructure. This part of a broader ICT initiative to promote sustainable development through a massive program of ICT application is aimed at empowering citizens. The long term objectives include the provision of accurate and timely information to all levels of government; building organizational capacity at all levels of the government; providing knowledge and information to citizens; and bridging the digital divide between urban and rural communities.

As indicated in a project document by EICTDA (2003), WoredaNet aims at delivering the following core services at the federal, regional and woreda level of government. These are Video Conferencing which is a service that allows meeting and broadcast of recorded sessions and programs to remote woredas; Web Services that is a series of web servers and pages that provide civil servants with access to government restricted information, but also access to content available on the internet on education, health agriculture and governance; Voice over IP (IP telephony) which is a service that permits common and singular voice exchange over IP communication infrastructure between federal, regional and woreda sites; and Messaging that is an electronic messaging environment for a free flow of messages through a secure and organized IT framework reflecting the government hierarchical structure.

There are several applications already put in place (and planned to be used) through the Woreda Information Systems (WIS). Some are intended for the use of citizens (e.g. electronic forms through the Internet). A highly visible and effectively used application is the Video Conferencing service for officials at werada, regional and federal level. The Government Video

Conferencing solution works over a nation wide IP based video conferencing within Ethiopia between the Federal Government and all 11 regional States and also different regional states and their woredas/districts. More specifically, the Video-Conferencing application for woredas in Ethiopia contributes in increasing the efficiency of the government at the woreda, regional and federal level as it allows effective and frequent communication and collaboration between woreda administrators, region heads and the federal government; improved use of executive time (speed up decision making); provision of timely information to the lowest government institution through the web services (static web pages and archived video sessions); and reduced travel and administrative costs for sharing information (Kitaw, 2006).

## LITERATURE REVIEW

Computer systems cannot improve organizational performance (Davis, et al., 1989; Venkatesh, 2000) if they aren't used. Unfortunately, resistance to end-user systems by managers and professionals is a widespread problem. To better predict, explain, and increase user acceptance, we need to better understand why people accept or reject computers (Davis, et al., 1989). Another work worth mentioning here is by (Markus, 1983; Baroudi, et al. 1986) about the importance of "User involvement" in information system development for improving system quality and ensuring successful system implementation. When information technologies (IT) have a central role in organizational change programs, understanding how organization members make sense of technology is critical to influencing their actions and to achieving planned outcomes (Orlikowski, 1994; Davidson, 2006). Previous studies also indicate that interpretations of technology are central to understanding technological development, use and change in organizations (Orlikowski, 1994).

As indicated by (Davis, 1989; Thompson, 1991; Venkatesh, 1996; Venkatesh, 2000; Schaper, 2007), research on access, adoption, acceptance and use of ICT is gaining increasing importance with advances in information systems. In line with this, lot of researches have been conducted since early 1990's on technology acceptance by different scholars both in the theoretical as well as the practical aspect of accepting (adopting) new technology.

Technology adoption is studied using different technology acceptance theories such as Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB), Technology Acceptance Model (TAM), Combined TAM and TPB (C-TAM-TPB), Innovation Diffusion Theory (IDT), Social Cognitive Theory (SCT), Motivational Model (MM), Model of PC Utilization (MPCU) and The Unified Theory of Acceptance and Use of Technology (UTAUT). Seyal and Rahman (2007), for example, investigated determinants of adoption of technology features such as the Internet use using TAM and found that perceived ease of use, facilitated by computer attitude, as main determinant. By using the TAM as a conceptual model, Castañeda, Friás and Rodríguez (2008) also tried to elucidate both actual and future behavior of tourists in using the Internet. And they conducted their survey using structured questionnaire, and reached at a result which shows that, by considering direct effects, perceived usefulness is main determinant of actual and future use of the Internet technology.

The technology acceptance model (TAM) is an established model in explaining IS adoption behavior (Hong, 2002; Liu, et al., 2005). According to TAM, adoption behavior is determined by the intention to use a particular system, which in turn is determined ease of use of the system. One key benefit of using TAM to understand system usage behavior is that it provides a framework to investigate the effects of external variables on system usage and when compared to other theoretical models aimed at understanding IS adoption behavior, TAM has been found to have similar or better explanatory power than more sophisticated models. TAM has come to be one of the most widely used models in IS, in part because of its understandability and simplicity. However, it is imperfect, and all TAM relationships are not borne out in all studies; there is wide variation in the predicted effects in various studies with different types of users and systems (King and He, 2006). As briefly discussed by King and He (2006), most of the prior studies have investigated relatively simple IT, such as personal computer, e-mail system, and word processing and spreadsheet software (Hong, 2002).

Similar to the way Hong (2002) stated in his study, WoredaNet is different from the IS that have been examined in prior TAM studies in several ways. It is much broader in nature. It includes not only the enabling technology, but also the content, services, architecture, distributed environments, and even institutions. The intended target user group of a WoredaNet is usually a community involving a large number of users, who have more diversified education and socioeconomic background. Due to the uniqueness of WoredaNet, it is imperative to examine the acceptance of this complex new technology by its varied community in its special environmental context. Considering both the effectiveness and simplicity of TAM, and its wide applicability to different kinds of IT, TAM will be used as a theoretical framework to examine the factors that can affect users' adoption of WoredaNet in Ethiopia.

Recently, new technology acceptance model, called the Unified Theory of Acceptance and Use of Technology (UTAUT), was formulated by Vankatesh, Morris, Davis, & Davis (2003). Yang and Lee (2007) in their study of comparison of ICT adoption pattern in different countries used the UTAUT model and the result of their study illustrated that the critical factors of adoption differ from country to country. In their study, for example, performance expectancy and social influence are

critical factors of adoption of ICT in Korea and these factors are not critical factors in another country, US. Another study conducted by Grandon, Alshare and Kwun (2005) showed that factors such as convenience and perceived ease of use are determinant factors of intention to adopt online classes by American students where as those factors are not the critical factors by the Korean students. From these results we can deduce that technology adoption researches using certain models should be done in different countries so as to determine the key determinant factors of adoption in different contexts as the factors are correlated to different cultures and norms of nations.

UTAUT contains four core determinants of intention and usage—performance expectancy, effort expectancy, social influence and facilitating conditions. The variables of gender, age, experience and voluntariness of use moderate the key relationships in the model (Schaper, 2007). As shown in Figure 2 below, these determinants and moderators have all been adapted for use in the proposed research model.

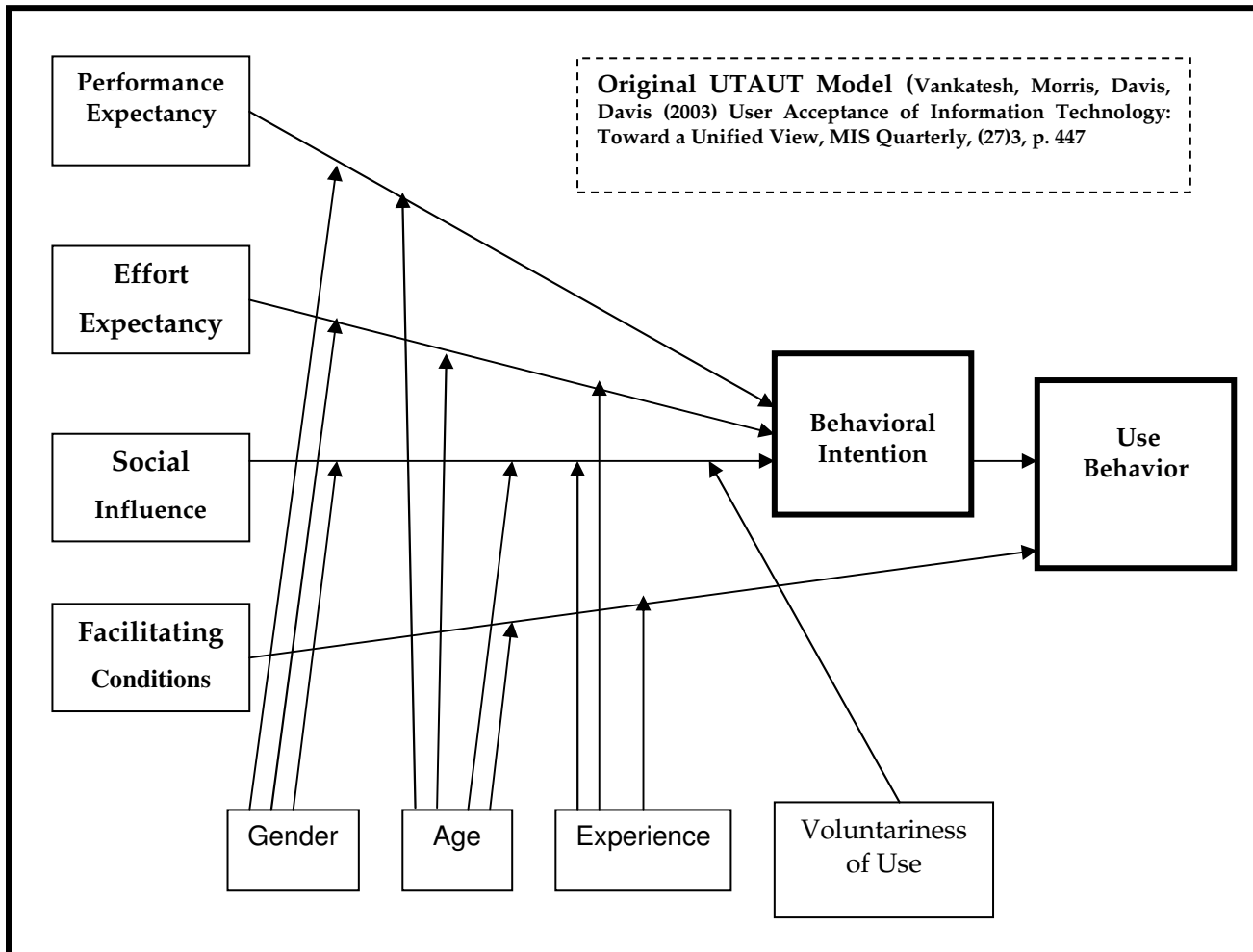


Figure 1: Original UTAUT Model (Vankatesh, Morris, Davis, Davis (2003) User Acceptance of Information Technology: Toward a Unified View, MIS Quarterly, (27)3, p. 447

**RESEARCH MODEL**

The research model in this study is primarily based on the UTAUT model. As stated above, the unified theory of acceptance and use of technology (UTAUT) was formulated by leading technology acceptance researchers and published in the September 2003 edition of MIS Quarterly (Venkatesh, et al, 2003). The model was formulated based on conceptual and empirical similarities across eight prominent competing technology acceptance models: Davis’ technology acceptance model (TAM); Roger’s innovation diffusion theory (IDT); the theory of reasoned action (TRA); the motivation model (MM); the theory of planned behavior (TPB); the combined TAM and TPB; the model of PC utilization (MPCU); and social cognitive theory (Schaper, 2007).

UTAUT was empirically validated amongst four businesses in various industries and cross-validated using data from another two. UTAUT was able to explain 70% of technology acceptance behavior, a considerable improvement on previous models which routinely explain over 40% of acceptance (Schaper, 2007). The UTAUT model, thus, was adapted for this research due to the comprehensiveness and its high explanatory power. Figure 2 indicates the Modified UTAUT for WoredaNet. Because one of the intentions of this study is to validate this newly formulated Model in Ethiopian context, the model is used as it is in this research by modifying the constructs to fit to WoredaNet context and accordingly the hypotheses to be tested.

### **Original UTAUT Variables**

#### *Performance Expectancy*

Performance expectancy is defined as the degree to which an individual believes that using the system will help him or her to attain gains in job performance (Venkatesh, et al, 2003; Schaper, 2007). In a WoredaNet context, performance expectancy is important to technology acceptance decision-making and may influence behavioral intention directly.

H1: The influence of performance expectancy on behavioral intention of WoredaNet users will be moderated by gender and age, such that the effect will be stronger for men and particularly for younger men.

#### *Effort Expectancy*

Effort expectancy is defined as the degree of ease associated with the use of the system (Venkatesh, et al, 2003). Basically, it can be argued that technologies that are perceived to be uncomplicated or easy to use would have positive influences on behavioral intention, due to the limited time a WoredaNet user would need to invest in learning how to use the technology.

H2: The influence of effort expectancy on behavioral intention of WoredaNet users will be moderated by gender, age, and experience, such that the effect will be stronger for women, particularly younger women, and particularly at early stages of experience.

#### *Social Influence*

Social influence is defined as the degree to which an individual perceives that important others believe he or she should use the new system (Venkatesh, et al, 2003; Schaper, 2007). Since the actual users of WoredaNet technology are civil servants working government departments, the belief of their supervisors and colleagues may have impact on their behavioral intention to use the technology.

H3: The influence of social influence on behavioral intention of WoredaNet users will be moderated by gender, age, voluntariness, and experience, such that the effect will be stronger for women, particularly older women, particularly in mandatory settings in the early stages of experience.

#### *Facilitating Conditions*

Facilitating conditions are defined as the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system. This incorporates objective factors in the implementation context such as management support, training and the provision of computer support (Venkatesh, et al, 2003).

The WoredaNet is result of the government's initiative to promote e-governance throughout the country focusing mainly on the civil service sector. Implicitly, the government forces government offices to use the WoredaNet to facilitate some of their activities. In other words, WoredaNet is a kind of technology mainly pushed to the users rather than pulled by the users themselves. There fore, the facilitating conditions availed to the users may have impact on usage of the technology.

H4a: Facilitating conditions will not have a significant influence on behavioral intention of WoredaNet users.

H4b: The influence of facilitating conditions on usage will be moderated by age and experience, such that the effect will be stronger for older workers, particularly with increasing experience.

As supported by UTAUT, computer self-efficacy and computer anxiety are expected to have no direct effect on behavioral intention and a direct effect on effort expectancy (Venkatesh, et al, 2003).

H5a: Computer self-efficacy will not have a significant influence on behavioral intention of WoredaNet users.

H5b: Compute anxiety will not have a significant influence on behavioral intention of WoredaNet users.

H5c: Attitude toward using technology will not have a significant Influence on behavioral intention of WoredaNet users.

Behavioral Intention

The authors of UTAUT believe that behavioral intention will have a significant positive influence on technology usage (Venkatesh, et al, 2003; Schaper, 2007).

H6: Behavioral intention of WoredaNet users will have a significant positive influence on usage of WoredaNet.

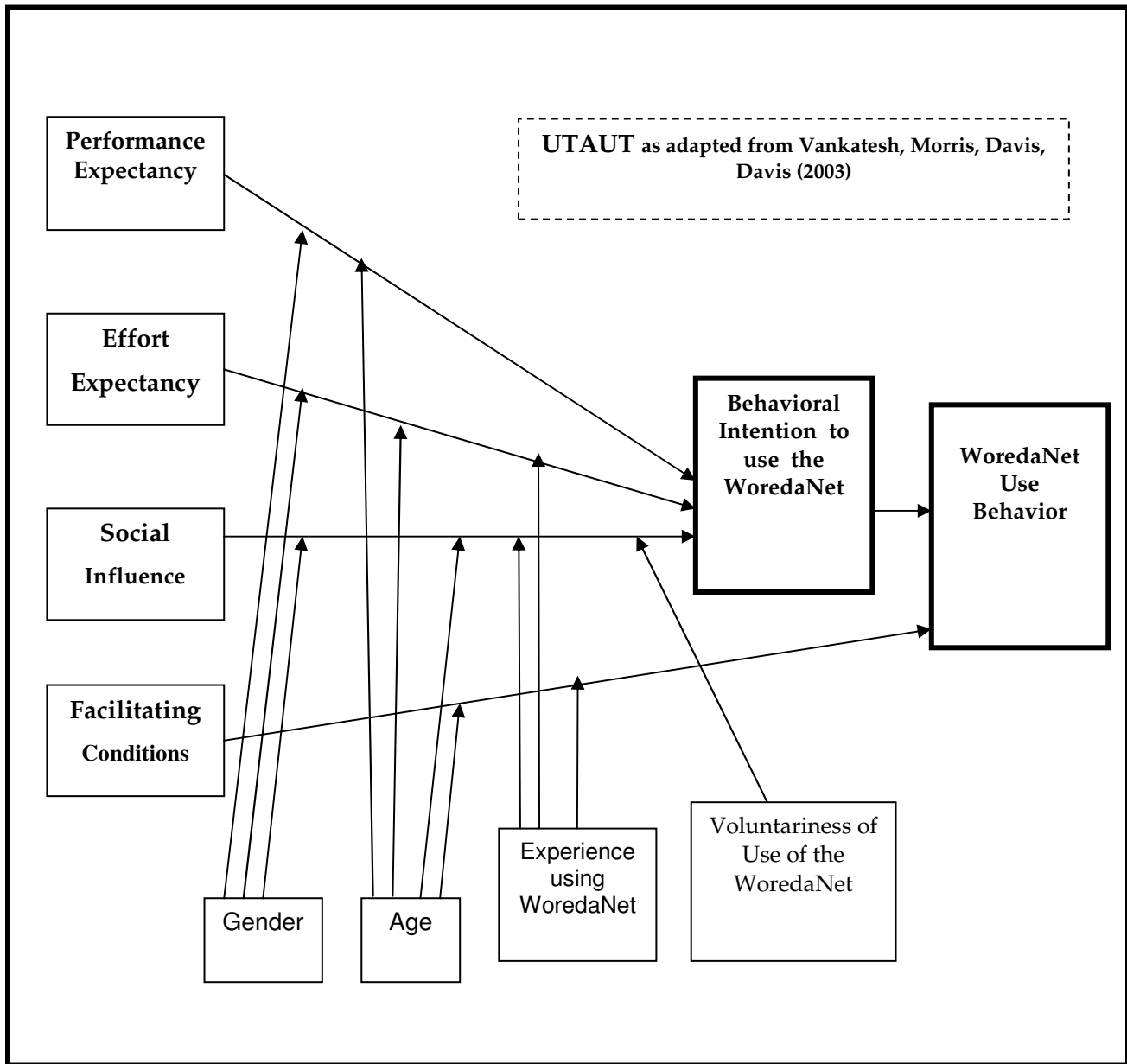


Figure 2: Research Model design based on the original UTAUT Model (Vankatesh, Morris, Davis, Davis (2003) User Acceptance of Information Technology: Toward a Unified View, MIS Quarterly, (27)3, p. 447

Hypothesis Number	Dependent Variables	Independent Variables	Moderators	Explanation
H1	Behavioral intention	Performance expectancy	Gender, Age	Effect stronger for men and younger workers
H2	Behavioral intention	Effort expectancy	Gender, Age, Experience	Effect stronger for women, older workers, and those with limited experience
H3	Behavioral intention	Social influence	Gender, Age, Voluntariness, Experience	Effect stronger for women, older workers, under conditions of mandatory use, and with limited experience
H4a	Behavioral intention	Facilitating conditions	None	Nonsignificant due to the effect being captured by effort expectancy
H4b	Usage	Facilitating conditions	Age, Experience	Effect stronger for older workers with increasing experience
H5a	Behavioral intention	Computer self-efficacy	None	Nonsignificant due to the effect being captured by effort expectancy
H5b	Behavioral intention	Computer anxiety	None	Nonsignificant due to the effect being captured by effort expectancy
H5c	Behavioral intention	Attitude toward using tech.	None	Nonsignificant to the effect being captured by process expectancy and effort expectancy
H6	Usage	Behavioral intention	None	Direct effect

**Table 1: Summary of the Hypotheses indicating Dependent Variables, Independent Variables and Moderators**

**RESEARCH METHODOLOGY**

**Study Design**

Case study research will be conducted focusing on use and level of acceptance of WoredaNet in selected Woredas in which the technology is available. The study will be cross sectional survey.

**Sample Organization and Data Collection Procedure**

Ten WoredaNet destinations will be selected for the study. Target respondents will be civil servants in those administrative units in which WoredaNet is deployed. The address for each WoredaNet destination will be obtained from the National Data Center under Ethiopian Information & Communication Technology Development Agency (EICTDA). Total of 600 users (60 *Proceedings of the Seventeenth Americas Conference on Information Systems, Detroit, Michigan August 4<sup>th</sup>-7<sup>th</sup> 2011*



users from each WoredaNet site) who have been using WoredaNet will be randomly selected as study subject. To assure that the beliefs measured are formed based on direct behavior experience with the object, only responses from those who had previously used the WoredaNet will be included. To that end, each civil service government offices will be approached to identify those staff that has made to use WoredaNet to facilitate office duty. Then, questionnaire will be prepared and distributed to each of the respondents with brief instruction as to how to fill the questionnaire and closer administration to maximize the return rate of the distributed questionnaires.

### **Measures / Indicators**

Questionnaire content will include 35 items (see Appendix A) designed to measure the constructs and relationships contained in the research model. Previously developed and validated items by Venkatesh et al. (2003) in their development of UTAUT for Performance expectancy, effort expectancy, organizational facilitating conditions, self-efficacy and anxiety will be used in this research. Slight changes in wording were necessary to appropriately reflect the WoredaNet context. Items will be measured using a seven-point Likert-type scale, with 1 = strongly disagree and 7 = strongly agree for all questions except for the items measuring computer self-efficacy. The anchors of the items measuring computer self-efficacy ranged from “not at all confident” to “totally confident”.

### **Data Analysis**

Because one of the goals of the study is to verify UTAUT, the researcher will follow as closely as possible the measurements and analyses of Venkatesh et al. (2003) in terms of reliability, validity, means, standard deviations, and correlations. Descriptive statistics will be adopted for presenting and analyzing the quantitative data in this study; the researcher will summarize patterns in the responses from the sample by the use of frequency tables and percentages. To that end, SPSS statistical package will be used to analyze the collected data from descriptive statistics perspectives.

### **LIMITATIONS**

The findings of this research may be limited because the research is based on only a sample of 10 WoredaNet destinations out of the total of 600. Due to differences in culture, facilitating conditions, experience in using the technology and the like, it may be very difficult to generalize this study’s results to all other WoredaNet destinations throughout the country. Thus, future research can build upon the findings of this study and examine additional WoredaNet destinations in the country to better generalize the findings of such study.

### **CONTRIBUTIONS OF THE STUDY**

Technology acceptance model (TAM) is an established model in explaining IS adoption behavior. Recently, new technology acceptance model, called the Unified Theory of Acceptance and Use of Technology (UTAUT), was formulated by Venkatesh, Morris, Davis, & Davis (2003) based on previously designed technology acceptance models.

WoredaNet is an e-government network linking nearly 600 local administrations (“Woreda”) with 11 regional government offices and the federal government headquarters in the nation’s capital, Addis Ababa and it provides services such as e-mail, Internet Access, file-sharing, and videoconferencing and the like.

The research is mainly aimed at exploring the extent of technology acceptance (adoption) by different groups of users that are using WoredaNet so that factors that determine the adoption of WoredaNet by different user groups can be identified. Because the technology is considered as a promise and a major enabler for rapid ICT development in the country, the output of this research can be used as important input to policy makers and concerned government bodies in the effort to make the existing services of WoredaNet more efficient and effective. In addition, it can be used as valuable input to devise the way how future expansion effort and promotion of services of WoredaNet can be approached.

In line with this, this research piece tries also to practically test the new unified model of technology acceptance in the Ethiopian WoredaNet context and in so doing it may validate the model in a new setup or it may come up with new observations on the model.

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Appendix A:

Items to test research constructs

***Behavioral intention to use WoredaNet technology***

1. I intend to use **WoredaNet** in the next 6 months.
2. I predict I would use **WoredaNet** in the next 6 months.
3. I plan to use **WoredaNet** in the next 6 months.

***Performance expectancy***

1. I would find WoredaNet useful in my job.
2. Using WoredaNet enables me to accomplish tasks more quickly.
3. Using WoredaNet increases my productivity.
4. If I use WoredaNet, I will increase my chances of getting a raise.

***Effort expectancy***

1. My interaction with WoredaNet would be clear and understandable.
2. It would be easy for me to become skillful at using WoredaNet.
3. I would find WoredaNet easy to use.
4. Learning to operate WoredaNet is easy for me.

***Social influence***

1. People who influence my behavior think that I should use WoredaNet.
2. People who are important to me think I should use WoredaNet.
3. The senior management of this business has been helpful in the use of WoredaNet.
4. In general, the organization has supported the use of WoredaNet.

***Facilitating conditions***

1. I have the resource necessary to use WoredaNet.
2. I have the knowledge necessary to use WoredaNet.
3. The system is not compatible with other Network technologies I use.
4. A specific person (or group) is available for assistance with system difficulties.

***Voluntariness of use***

1. Although it might be helpful, using a **WoredaNet** is certainly not compulsory in my job.
2. My boss does not require me to use a **WoredaNet**.
3. My superiors expect me to use a **WoredaNet**.

***Attitude toward using technology***

1. Using WoredaNet is a bad/good idea.
2. The WoredaNet system makes work more interesting.
3. Working with the WoredaNet system is fun.
4. I like working with the WoredaNet system.

***Self-efficacy***

1. I could complete a job or task using the WoredaNet system.
2. If there was no one around to tell me what to do as I go.
3. If I could call someone for help if I got stuck.
4. If I had just the built-in help facility for assistance.

***Anxiety***

1. I feel apprehensive about using the WoredaNet system.
2. It scares me to think that I could lose a lot of information using the system by hitting
3. the wrong key.
4. I hesitate to use the WoredaNet system for fear of making mistakes I cannot correct.
5. The WoredaNet system is somewhat intimidating to me.

**Table 2. Items Used in Estimating UTAUT (Source: Adapted from Venkatesh et al., 2003)**