Factors Persuading ICTs Use among University Students in Africa and Applicability of the UTAUT Model: A Literature Survey

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Abstract

The preset study was carried out to survey various literatures on the factors influencing the use of Information and Communication Technologies (ICTs) among university students in Africa, and accordingly to investigate the applicability of the Unified Theory of Acceptance and use of Technology (UTAUT) as presented by Venkatesh *et al*. (2003) on the observed factors. The study was highly qualitative and involved a survey of literatures on researches conducted in various universities found in African countries. The countries which research studies were involved were selected at random. In order to arrive at reasonable conclusion, literature from at least one country from each of the five regions of Africa was involved. Findings revealed that the main reasons for ICTs use among university students in Africa are pedagogical and social; however the later are subdivided into various reasons. It was further deduced that university students are finding ways for ICTs to smoothen the progress of their academic and social life. These finding agree with the assertion by the UTAUT's first core determinant variables of technology use, the performance expectancy. The study also revealed that the extent of use of ICTs tools and applications by university students in Africa depends on the availability of those tools/applications, which is unlike the effort expectancy as asserted by the UTAUT model. It was also discovered that male students are using ICTs slightly more than females; the main differentiation is however on social reasons than pedagogical reasons, among other findings. In most cases the study agrees with the UTAUT model on the factors persuading ICTs use among university students in Africa except in few cases as presented in the document.

Keywords: ICTs use, UTAUT model, University students, Africa

1. Introduction

Information and Communication Technologies (ICTs) have impacted almost all spheres of our life. In fact Ellegård and Wihlborg (n.d) pointed out that as days go, ICTs are becoming part and parcel of our daily living. TechTerms (2010) and World Bank (2011) define ICTs as devices, tools, or applications that permit the exchange or collection of data through interaction or transmission. According to the authors ICT is an umbrella term that encompasses radio, television, cellular phones, digital cameras, computers, computer networks, satellite systems, etc. ICTs have been increasingly used by people of different cadres for a variety of reasons hence their world wide use have been reported to increase with years.

Taking into account, for example, the world wide mobile-cellular subscriptions and internet usage, International Telecommunication Union (ITU) (2014) indicates that in the year 2005 the world had about 2 billion mobile-cellular subscriptions but in 2013 the world was having an estimate of 6.8 billion mobile-cellular subscriptions. In other words, in 2013 there were almost as many mobile-cellular subscriptions as people in the world (Figure 1). ITU also reports that in 2013, over 2.7 billion people were using the internet, which corresponds to 39% of the world's population, this is a percentage increase from about 10% of the world's population in 2003 (Figure 2).

Although reports show that Africa is lagging behind in these global ICTs' usage developments, but Africa has also recorded a tremendous increase in the same. In the year 2005, for example, Africa had a total of 87 million and 17 million mobile-cellular subscriptions and internet users respectively but in 2013 the number was increased to an estimate of 545 million mobile-cellular subscriptions and 140 million internet users (ITU, 2014). University students are among potential users of ICTs (Mbah, 2010). The increasing number of ICTs users globally and in Africa particularly entails an increase in number of African university students using ICTs. Research studies reveal a variety of reasons and factors that influence university students to use ICTs and hence increased number of the same. It is generally asserted by Ndangle (n.d) that higher education students use ICTs for pedagogical and social reasons.

The present study attempted to survey various literatures on the factors influencing the use of ICTs among African university students. The study then investigated the applicability of the Unified Theory of Acceptance and use of Technology (UTAUT) as presented by Venkatesh *et al*. (2003) on the observed factors. The main objective of this study was thus to find out the applicability of the UTAUT model on the factors influencing the use of ICTs among university students in Africa. However the study was based only on the UTAUT's direct determinants of the intention of using technology (performance expectancy, effort expectancy

and social influence) and the gender and age as the two associated moderating factors. The two moderators were chosen deliberately because they moderate all the three determinant factors. However Waithaka (2013) found out that most of university students (98.5% of her 264 sample size) are aged between 16 and 35 years. According to Gul *et al*. (2002) the age group from 19 to 34 years old is called young adult, which also constitutes most of university students as per Waithaka (2013). The present study therefore alleged that most of university students are young adults, and therefore the age factor was not investigated. Consequently the specific objectives of the study were:

- To ascertain reasons for day to day use of ICTs among university students.
- To find out common ICT tools and applications used by university students.
- To investigate on how social factor influences university students to use ICTs.

In order to come out with best results the study was guided by the following research questions:

- Why university students use ICTs in their everyday life?
- Which ICT tools and applications commonly used by university students? Why?
- To what extent social factor influences university students to use ICTs?

2. The UTAUT Model

The UTAUT model aims to explain user intentions to use of technology and subsequent usage behavior. The theory was developed through a review and consolidation of the constructs of eight models and theories in the field of technology acceptance research that earlier research had employed to explain Information System (IS) usage behavior. The reviewed models and theories were the Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), Motivational Model (MM), Theory of Planned Behavior (TPB), Model Combining the Technology Acceptance Model and Theory of Planned Behavior (C-TAM-TPB), Model of PC Utilization (MPCU), Innovation Diffusion Theory (IDT), and Social Cognitive Theory (SCT). The UTAUT contains four core determinants of technology use behavior, and four moderators of key relationships (Figure 3). The theory posits that performance expectancy, effort expectancy, social influence and facilitating conditions are key constructs that determines the usage intention and behavior, and that gender, age, experience and voluntariness of use have moderating effects on the acceptance of technology (Venkatesh *et al*., 2003).

The core determinant variables of technology use are defined by Venkatesh *et al*. (2003) as shown in Table 1. The core determinants are also explained in this study's context in the same table.

Venkatesh *et al*. (2003) provided empirical evidence to demonstrate that an individual's technology use intention and behavior can be well explained by the UTAUT model, but recommended continued testing and validation of the model.

3. Methodology

This study was highly qualitative and involved a survey of literature to find out the applicability of the UTAUT model on the factors influencing the use of ICTs among university students in Africa. The study reviewed various literatures on different researches conducted in African universities in relation to the present research focus. The countries which researches was involved in this study was selected at random but from each of the five regions of Africa. Algeria was included from Northern Africa, Nigeria from Western Africa and Cameroon from Middle Africa. In East African region the study involved literatures from Tanzania, Kenya and Uganda, and in the South African region the Republic of South Africa was involved. United Nations (n.d) and National Geographic (n.d) shows list of African countries by regions. Internet search was the main data source. Collected data was analysed and then systematically presented as findings.

4. Findings and Discussions

4.1 Do African University Students use ICTs?

Some studies like that of Brown and Czerniewicz (2008) suggest that the first thing to investigate when surveying the use of ICTs in higher education in developing countries should be to find out if ICTs are at all used. According to the authors this is unlike in developed countries where ICTs use in higher education has become an assumption and questions are asked about how often rather than if they are used. The authors went further to site some examples of studies done in developed countries. For instance, a 2007 study of undergraduates in the United States America did not enquire whether ICTs were used in courses, but rather what students' preference for the balance of technology in their courses were (Salaway and Borreson, 2007). Similarly a United Kingdom study of first year students did not quantify the number of courses using technology; instead it focused on use for particular activities and whether the amount of ICT use was what students expected (JISC, 2008).

However Makori, *et al*. (2013) asserts that most of university students in Africa these days use ICTs, whether being tools like computers, tablets, phones, radios and TVs or their related applications like internet services such as emails, chatting, the world wide web, etc. or mobile applications and chat apps like WhatsApp, Viber, Instagram, Instant Messaging, etc. The authors went further to say ICTs facilities such as radio and TV

are provided by the universities in students' common rooms hence they are easily accessible by most of students. Based on the grounds as presented by Makori *et al.* (2013) the present research assumes that university students in Africa use ICTs. The focus was then not to investigate on whether ICTs are used or not but to find out as to why they are used.

4.2 Reasons for the use of ICTs among African University Students

Researches show that there is variety of reasons for university students in Africa to use ICTs. Ngoumandjoka (2012) surveyed 389 full-time third year students at Wits University, South Africa and found that almost 51% of them use ICTs for academic purposes, followed by 34% who use ICTs for recreational activities, 8% for relationships development and maintenance such as keeping in touch with friends and family over tools such as Skype, and 7% of them use ICTs for other purposes such as job seeking etc. Brown and Czerniewicz (2008) reported that the most frequent ICTs-related activities used by higher learning students in South Africa were for searching information on the internet, typing of assignments and submission, by sending or uploading an electronic copy (sometimes by using Learning Management System (LMS)), spreadsheet, presentation package and emails.

A study by Ojeniyi and Adetimirin (2013) which involved 223 undergraduate students from Lead City University (LCU) and University of Ibadan (UI), Nigeria shows that students of both universities used ICTs for supporting their course work (93.1% in LCU and 97.2% in UI), independent learning (93.1% in LCU and 94.2% in UI) and project report (95.1% in LCU and 95.7% in UI). Others included examination, assignment, and leisure and entertainment purposes. Ibegwam (2004) as reported by Ojeniyi and Adetimirin (2013) agreed that University of Lagos Medical students used ICTs for meeting their various academic needs. Mahmood (2009) pointed out that 85% of students in a study conducted agreed that they use ICTs for educational related purpose which includes conducting researches, class assignment and others. Nwezeh (2010) in his survey of 297 university students in Nigeria indicated that most of university students use internet resources such as email (84%), World Wide Web (www) 58%), search engines (30%) and to a low extent File Transfer Protocol (FTP) and Discussion groups 9% and 7% respectively.

A study by Mbah (2010) at the University of Buea, Cameroon revealed that 83% of university students participated in that study daily use ICTs to support their studies. Ndangle (n.d) adds that higher education students in Cameroon use ICTs for two reasons; pedagogical and social. In pedagogical reason they use ICTs to do research, do assignments, type assignments and dissertations, present their work, present dissertations and share learning resources. Emails, chatting and social networking was the author's identified social reasons for using ICTs among higher education students.

Shembilu (2013) in his study on importance of social networking for student participation in education in Tanzania gave 67 students of the University of Dar es Salaam opportunity to indicate the purpose of their use for Internet. Results found that email use was 96% and connecting with friends via social networks was 95%. For the news purpose was 52% and 54% was for chatting. The use of internet for academic purposes was 62% that shows it to be not a widely used platform for education. When investigating further about specific academic use of internet Shembilu (ibid) found that 94% of respondents indicated it as a discussion space for academic matters and ideas, 63% tutorial space, 61% sharing course materials, and 34% uploading assignments and exercises. In addition, students revealed that they sometimes use discussion groups via Google or Facebook based on their courses and interests. They further pointed out that there are portals and learning management systems for academic purposes.

60 Masters students in Makerere University's School of Education, Uganda indicates that email, web surfing and word processing are the leading ICTs services used by those students (Bakkabulindi *et al.*, 2010). The study further reported spreadsheet, database management systems, graphics and data analysis software, discussion forums and electronic journals are also used but in a little extent.

As presented in these findings, almost all literatures indicated two main reasons for ICTs use among university students. These are pedagogical and social. Therefore it can be easily deduced that the main reason for ICTs use by university students in Africa are academic and social, however the later are subdivided into various reasons. It can further be reasoned that university students are finding ways for ICTs to smooth the progress of their academic and social life. These findings therefore agree with the assertion by Venkatesh *et al.* (2003) on his UTAUT's first core determinant variables of technology use, the performance expectancy.

4.3 Commonly used ICTs tools and Applications

It is quite clear that, as said by TechTerms (2010) and World Bank (2011), ICTs tools and applications are many. These are such as computers, computer networks, Social Medias, radio, television, cellular phones, satellite systems, etc. Identifying ICTs tools or applications that are commonly used by university students in Africa was thus another specific intention of this research. This would help to know if students prefer using certain ICT tool or application over others and the reason for their preferences.

When surveying of ICTs accessibility at the at the University of Buea, Cameroon, Mbah (2010) found mobile phone to be the most used ICT facility where by 59% of respondents said they were using it. Moreover, 44% of respondents indicated to use internet, 35% cable TV, 31% computer, 28% radio and 19% other resources like CD/DVD. 264 students of the University of Nairobi, Kenya were asked by Waithaka (2013) to identify which technological devices they used to access the internet. 106 (40.2%) of them indicated that they accessed the internet using desktop computers, 83 (30.1%) used laptops, 65 (24.6%) used mobile phones and 10 (3.8%) used iPads.

Ojeniyi and Adetimirin (2013) found the following ICT tools to be often used by university students in Lead City University (LCU) and University of Ibadan (UI), Nigeria; computers system (59.1% in LCU and 32.9% in UI), photocopiers (65.5% in LCU and 20.0% in UI), telephone (51.4 % in LCU and 20.0% in UI), multimedia projector (37.0% in LCU and 8.6% in UI), printers (53.2% in LCU and 15.7% in UI), scanners (51.4% in LCU and 12.8% in UI), CD-ROM (39.2% in LCU and 12.9% in UI) and electronic bulletin board (36.1% in LCU and 5.8% in UI), among others.

When Shembilu (2013) tried to find out about internet access points for students at the University of Dar es Salaam, Tanzania he observed that internet accessibility at the university has been identified as the main access point, followed by mobile phones and access from home. Very few did access internet via Internet cafés. The reason given was that, Dar es Salaam University provides various computer labs with internet access and yet there are various wireless (WIFI) hotspots for connectivity. About social networking sites in use, the author found that Facebook was leading with 96% (64) of respondents' preference, followed by blogs 92% (62) and Twitter 88% (59). Other scored 55% (37), LinkedIn and MySpace both scored 42% (28) and 26% (17) respectively.

The focus of the study by Sarfo and Ansong-Gyimah (2011) was to explore access and ICTs use among higher education students in Ghana. Sample size for the study was 120 students. Results showed that 40% of participants use mobile phones, 30% use computers and 3% use internet. 14% of the participants use computers and mobile phones; 1% use computers and internet and 10% use computers, internet and mobile phones.

These findings reveal that some ICTs tools and applications are commonly used by students across African universities. The use of mobile phones, computers and internet has been mentioned by almost all surveyed literatures. However the extent of their use varies significantly from one institution to another. For example the use of mobile phones have been indicated by Sarfo and Ansong-Gyimah (2011) to be 40%, Waithaka (2013) indicated it to be 24.6%, Mbah (2010) found it to be 59%, and Ojeniyi and Adetimirin (2013) found telephone use by students in LCU and UI to be 51.4 % and 20.0% respectively. Concerning computer uses, Mbah (2010) found that 31% of respondents use computers, Waithaka (2013) identified that 40.2% out of respondents used desktop computers and 30.1% used laptops and Ojeniyi and Adetimirin (2013) found that 59.1% and 32.9% of all respondents in LCU and UI respectively use of computer systems, and Shembilu (2013) generalized that most of University of Dar es Salaam students use computers in computer labs.

Shembilu (2013) pointed out that the extent of use of ICTs tools depends on their availability. We are inclined to agree with the author due to the varying extent of use on the same ICT tool across institutions. The UTAUT's second core determinant variable of technology use asserts that the extent of use of technology is determined by degree of ease associated with its use (effort expectancy), which is not in line with this study's finding.

4.4 Observed Influences for ICTs usages
Gender
A study by Odell *et al*. (2000) as cited by Ngoumandjoka (2012) analysed in detail gender differences in internet usage among 843 college students. 385 respondents were males and 458 were females. The study found that there is no persisting gender gap in internet usage among students. The study also revealed that female students use the internet by a smaller weekly average than their male counterparts. Ndangle (n.d) in his study found that both boys and girls use ICTs for pedagogical reasons, but for social reasons the author realized that girls do not use ICTs to chat like boys. This finding is similar to that of Odell *et al*. (2000) who pointed out that although male students were found to be using the internet for more other purposes than female students; those other reasons were not as major as students' use of the internet for e-mail and academic research. For instance, the study revealed that 43.6% of males against 26.6% of females were more likely to use the internet for playing games.

Mbah (2010) on other side found that male students were using ICTs more than female students. The author reported that 95% of male students in his study use ICTs to facilitate leaning while female students were 72%. As such, according to him, gender has an impact on the use of ICTs. This is supported by Morahan-Martin and Schumacher (2000) who found that women college students get internet access less often, spend less time online and don't surf for different purposes as often as men. Nsibirano (2009) added that women often have complex relationships with technology and machines as a result of being socialized over time to believe that machines and

technology are a man's domain and not for women and girls, thus generating a gender bias in attitudes towards studying or using information technology.

Presented findings suggest a slight difference in ICT use between male and female students, males are indicated to be more users of ICTs than females. Literatures agree therefore with the UTAUT's model that social influence determines behavioral intention for technology use, and gender as a moderating factor. However, most literatures surveyed in this study suggest that the main difference of ICTs use is on social reasons than pedagogical reasons.

Academic Disciplines

Although few literatures tried to compare academic discipline and ICTs usage but Ngoumandjoka (2012) observed that Science students overall consume more Internet bandwidth than students from other disciplines as reported for Formal Languages, Architecture and Networks and Remote Sensing. This tells that academic discipline makes students more users or less users of internet. This study also confirms findings from Anderson (2001) that students majoring in hard sciences use the Internet far more than students from other academic disciplines such as arts. This finding also agrees with the UTAUT's social influence being a determinant for technology use intention.

Students' Residence

Mbah (2010) tried to compare internet access between students residing on campus and those residing off campus. His research revealed that very few students (36%) prefer to have internet access on campus at the university IT centre, while a vast majority of students (64%) have internet access off campus, particularly at cyber cafés (62%). This finding is contrary to what Ngoumandjoka (2012) observed in his study. According to Ngoumandjoka a student staying on campus uses the internet more than a student living off campus. This is understandable because students living on campus have 24/7 access to the internet. If we consider students' residence as one of the social factors then this finding slightly agree with UTAUT's model that social influence determines behavioral intention for technology use.

5. Conclusion and Recommendations

The study tried to analyze various factors persuading the use of ICTs among university students in Africa. Literature shows that there are two main reasons for the use of ICTs among university students, social and pedagogical reasons; however the later are subdivided into various other reasons. The study deduced that the main use of ICTs for social and pedagogical reasons is to find ways for university students to smoothen the progress of their academic and social life. These agree with the assertion by the UTAUT's first core determinant variable of technology use that performance expectancy is one of the reasons triggering the use of technology. Unlike the UTAUT's assertion on its second core determinant variable of technology use that the extent of use of technology is determined by degree of ease associated with its use (effort expectancy), the study revealed that the extent of use of ICTs tools among African university students depends on the availability of those tools. It was also observed that gender, academic discipline and students' residence as social influence had some impacts on students' attitudes towards the use of ICTs. Literatures generally agree with the UTAUT's model that social influence determines behavioral intention for technology use. Gender was also observed as moderating factor as suggested by the UTAUT's model.

As we have concluded, effort expectancy is not the same in all cases. It is generally affected by users' settings. Thus, we recommend that the model should state explicitly that effort expectancy is an independent variable that relies on the environment in which technology is used.

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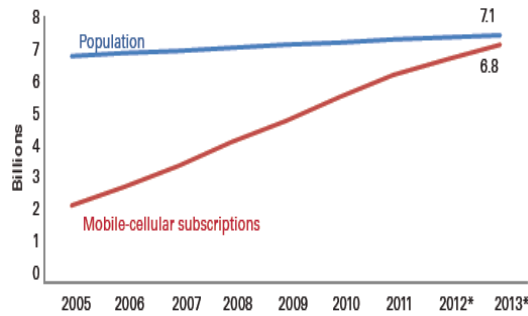
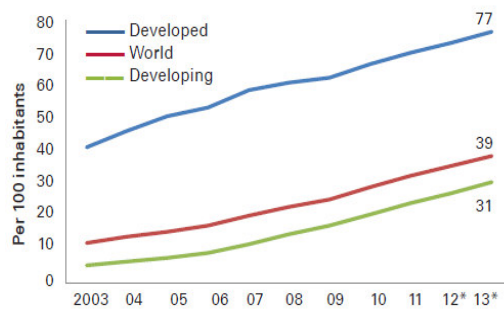Figure 1: Global mobile-cellular subscriptions   Figure 2: Global internet penetrations
Source: ITU World Telecommunication/ICT Indicators database. Note: * Means Estimate
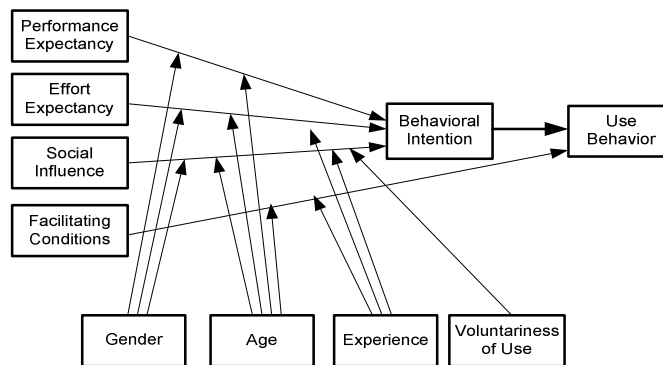

Figure 3: The UTAUT Model. Source: Venkatesh, *et al*. (2003)

Table 1: Description of core determinant variables of technology use

Core determinant variables of technology use	Venkatesh *et al.* (2003) definition	Present study's context Definition
Performance Expectancy (PE)	The degree to which an individual believes that using a system will help him or her to attain gains in job performance	The degree to which students expect ICTs to smooth the progress of their academic and social life
Effort Expectancy (EE)	The degree of ease associated with the use of the system	The reason motivating university students to prefer using certain ICT tool or application out of others
Social Influence (SI)	The degree to which an individual perceives that important others believe he or she should use the new system	Pressure regarding to the use of ICTs a student gets from peer group
Facilitating Conditions (FC)	The degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system	Not applicable

Source: Venkatesh *et al.* (2003) and Researcher's construct