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Sustainable Solutions for Last Mile Internet Access in Developing Countries: Critical Success Factors

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UNIVERSITY OF JYVÄSKYLÄ

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ABSTRACT

The Internet is a tremendous, undisputed force for economic growth and social change. However, access to this vital technology in Africa is progressing slowly compared to other regions of the world. For instance, the Internet penetration rate at individual level in Africa in 2014 was just 19%. This figure was far less than the world's average penetration rates of 40%. In addition, the 2014 household Internet penetration rate in Africa was about 11%, a figure which was also far less than the world average of about 44%. These statistics demonstrate a major obstacle in terms of Internet use on the continent. Thus, this dissertation's primary objective is to develop frameworks that could increase understanding of key elements of Internet diffusion and adoption in Africa. This will be achieved by identifying critical success factors (CSFs) of sustainable solutions for last mile Internet access on the continent. In order to attain the primary objective, a number of secondary objectives are outlined in the form of research questions that fit the individual needs of the six papers that make up this dissertation. A triangulated research design is employed that consists of a systematic literature review, a case study and a survey method. Three data analysis techniques are used: structural equation modeling, descriptive statistics and open and nonhierarchical coding. The dissertation focuses on Internet Service Providers (ISPs) and users as two important entities in Internet dispensation. The results reveal six critical success factors impeding last mile Internet access in Africa. They include trust, facilitators, accessibility, infrastructure, behavioral intention and awareness. The identified CSFs are further expressed in terms of fourteen dimensions: ISPs' service deliverability, cyberphobia, ISPs' benevolence toward Internet users, ISPs, ICT policy makers, cost, income, Internet Exchange Points, undersea fiber optic connection, adequate electricity, privacy, security, user perception and required local content. The six CSFs and the fourteen dimensions help to develop a generalized Internet diffusion framework (GIDF). In addition, four frameworks are proposed. Cumulatively, the proposed frameworks could be used as tools for ICT policy makers and ISPs in their efforts to enhance Internet diffusion and adoption in developing countries. They can also serve as basis for future researchers in developing more comprehensive Internet adoption and diffusion frameworks.

Keywords: Africa, critical success factors, developing countries, ISPs, Internet users, sustainable solutions, last mile Internet access

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I.   Touray, A. 2013. Internet Abuse Among University Students: a Neglected Theme in Africa. International Journal on Information Technologies and Security, 5(4), 3-12.

II.   Touray, A., Salminen, A. & Mursu, A. 2013. ICT Barriers and Critical Success Factors in Developing Countries. The Electronic Journal of Information Systems in Developing Countries, 56(7), 1-17.

III.   Touray, A., Salminen, A. & Mursu, A. 2013. The Impact of Moderating Factors on Behavioral Intention Towards Internet: a Transnational Perspective. International Journal of Computer and Information Technology, 2(6), 1035-1041.

IV.   Touray, A., Salminen, A. & Mursu, A. 2014. Internet Adoption at the User Level: Empirical Evidence from The Gambia. Information Technology for Development, 21(2), 281-296.

V.   Touray, A., Savolainen, T., Salminen, A., Sutinen, E. & Dai, Y. 2015. The Role of Trust in Enhancing Internet Use in a High-Risk Society. Journal of Systems and Information Technology. DOI: 10.1108/JSIT-09-2014-0066.

VI.   Touray, A. & Hämäläinen, T. 2015. The Effect of Internet Addiction on Internet Use: Adapting the Internet Addiction Test (IAT) Scale. (Submitted to the Journal of Research and Practice in Information Technology for peer review)

Paper VI is submitted to the Journal of Research and Practice in Information Technology for peer review. The author did the majority of the work for all coauthored papers. He formulated the initial research questions and hypotheses for Papers II, III, IV and VI. However, the final version of the questionnaire for each of these papers was developed together with the other coauthors. For Paper V, the questionnaire was developed by the first and second authors, Almamy Touray and Taina Savolainen, while the remaining coauthors contributed to the structure and content of the paper. In all the coauthored papers, the main author was responsible for data collection, analysis, the majority of structuring and writing the paper. Paper I was entirely written by him alone.

1 INTRODUCTION

Many researchers perceive Information and Communication Technology (ICT) as a platform for development (Avgerou 2008; Bankole F., Bankole O., & Brown, 2011; Deliktas & Kok, 2003; Hicks & Streeten, 1979; Sahey & Avgerou, 2002 and Walsham & Sahey, 2006). Others argue that it has turned the world into an information-intensive society and the nerve of growth that can tremendously transform economic, political, cultural, and social conditions in many developing countries (Deliktas & Kok, 2003 and Hicks & Streeten, 1979). It is imperative to acknowledge that the Internet is one of the most important innovations to have transformed the ICT domain.

The importance of the Internet in our daily life cannot be overemphasized. Punnoose (2012) argues that information is vital aspect of modern society where the Internet serves as an integral platform for its dissemination. The Internet is the world's largest knowledge repository (Rena, 2008) that enables communication in order to share ideas, knowledge, experiences and cultures (Devi & Roy, 2012 and Chhachhar, Khushk, Chachar & Qureshi, 2013). It is also one of the technologies required to support information processing in order to execute applications and deliver services (Leahy & Yermis, 2003; Mofleh, Wanous & Strachan, 2008 and Raji, Ayoade & Usoro, 2006).

Among the prominent applications of the Internet are the *Es* and *Ms* which are used in Africa in such areas as health, education, governance and journalism (Kenny, 2006). The term *Es* refers collectively to a set of applications that enable people to use electronic devices like computers and 3G phones to access, store and transfer information such as eCommerce, eBanking and eHealth. The *Ms* perform a similar function for mobility such as mBanking, mPayments, mTransfer and mFinance (adopted from Donner & Tellez, 2008).

Despite the potentials and capabilities of the Internet, the UNICEF State of the World's Children Report (2011) acknowledges that in many developing countries, the poor remain largely excluded from ICT and its benefits. Reports by the International Telecommunications Union (ITU) and the Internet World Statistics have shown the existence of such an exclusion in terms of Internet access (Internet World Statistics Website, 2011 and ITU, 2011).

In view of the aforementioned argument, this dissertation's primary objective is to develop frameworks that could increase understanding of key elements of Africa's Internet diffusion and adoption processes. It is achieved by identifying critical success factors of sustainable solutions for last mile Internet access on the continent. In order to attain the primary objective, a number of secondary objectives are outlined in the form of research questions that fit the individual needs of the six papers that make up this dissertation. The empirical data used in this dissertation are collected from three African countries: The Gambia, Kenya, and Nigeria.

1.1   Definition of key terminologies

For conceptual clarity, some key concepts are defined below. They include Information and Communication Technologies (ICT), developing countries, critical success factors, last mile Internet access and sustainable solutions.

The concept of *ICT* could generally relate to technologies that are used for accessing, gathering, manipulating and presenting or communicating information. Such technologies could include hardware (e.g., computers and other devices), software applications and connectivity (e.g., access to the Internet, local networking infrastructure, videoconferencing, etc.) (Lloyd 2005). According to Mhlanga (2006), ICT combines information technology (i.e. involves the use of computers), telecommunications technology (telephone, fax, radio and television broadcasting often through satellite) and networking technologies (Internet as the most popular among them, mobile phone, Voice over Internet Protocol and satellite communication).

According to the International Statistical Institute ([ISI], 2015), *developing countries* refer to nations with a Gross National Income (GNI) of 11,905 USD or less. The GNI previously known as Gross National Product (GNP) comprises the total value of goods and services produced within a country. In other words, it is simply the Gross Domestic Product (GDP) plus income received from other countries (notably, interest and dividends) minus similar payments made to other countries. It is important to note that a variety of terms are used to refer to types of developing countries such as less developed countries, least developed countries, small island developing states and landlocked developing countries (Library of Congress [LOC], 2008). The UN has stated that there is no universal acceptable definition of developing countries (LOC, 2008). However, in their 2008 Collection Policy Statement, the Library of Congress defines a developing country as follows:

> The majority of population makes less income and has significantly weaker social indicators than the population in high-income countries…it lives on far less money and often lacks basic public services [compared to developed] countries.

This implies that developing countries have lesser income and purchasing power as well as insufficient basic amenities compared to the developed world. According to Nielsen (2011), they are nations found at the lower levels of different development taxonomies. With the exception of South Africa, all other African countries fall within the ISI (2015) classification of developing countries. Africa has 58 countries and is divided into five regions (United Nations [UN], 2014) with a 2013 population estimate of about 936.1 million inhabitants (World Bank, 2015). The continent's different regions are Eastern Africa, Middle or Central Africa, Northern Africa, Southern Africa and Western Africa. With the exception of Northern Africa, the rest of the continent falls within Sub-Saharan Africa.

The concept of *Critical Success Factors* (CSFs) also has a number of different definitions in the ICT literature. However, one of the most frequently used definitions cited in Laosethakul & Boulton (2007) is as follows:

> Critical success factors are the limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance for the organization. They are the few key areas where "things must go right" for the business to flourish. If results in these areas are not adequate, the organization's efforts for the period will be less than desired.

In simple terms, CSFs refer to the areas which are essential for functionality. In this dissertation, the term refers to factors that must be addressed in order to guarantee last mile Internet access in Africa. A number of researchers used the CSFs approach to identify the key drivers of particular phenomena they studied (Laosethakul & Boulton, 2007; Feindt, Jeffcoate and Chappel, 2002 and Brunn, Jensen and Skovgaard, 2002).

Similarly, *last mile Internet access* refers to the connectivity mechanism from service providers to end users (Bull & Garofalo, 2004). Several technologies are used in Africa to achieve Internet connection, namely, dial-up, Integrated Service Digital Network (ISDN), Asymmetric Digital Subscriber Line (ADSL), Symmetric Digital Subscriber Line (SHDSL), Wireless Fidelity (Wi-Fi), World Interoperability for Microwave Access (WiMAX) and Very Small Aperture Terminal (VSAT). Both dial and ISDN allow users to connect to an ISP's analog lines at speeds of 28.8 Kbps and 128 Kbps, respectively. The ADSL and SHDSL both operate on the Digital Subscriber Line Access Multiplexer (DSMLAM) platform. The basic difference between the two access technologies is that ADSL does not provide equal upload and download speed compared to SHDSL. Similarly, Wi-Fi and WiMAX are IEEE standards used in providing wireless Internet access. They are based on IEEE 802.11 and 802.16 standards, respectively. The basic difference between the two relates to speed and coverage with WiMAX having the upper hand in terms of the two metrics. The VSAT is a satellite communication system that also provides Internet access. In this case, a user requires home based equipment that interfaces his/her computer to the outside antenna with a transceiver. Finally, *sustainable solutions* are considered in this dissertation as Internet access technologies that are capable of paying for them-

selves over a long period of time in a manner accessible and affordable to the target consumers.

1.2 Research background

The Internet is a tremendous, undisputed force for economic growth and social change (Dalberg Survey Report, 2013). However, its potential is still largely untapped particularly in Sub-Saharan Africa (Dalberg Survey Report, 2013) and Internet access in Africa is progressing at a limited pace (Alshameri & Bangura, 2014). For instance, the Internet penetration rate at individual level in Africa in 2014 was just 19%. This figure was far less than the world's average penetration rates of 40%. In addition, the 2014 household Internet penetration rate in Africa was about 11%, a figure which was also far less than the world average of about 44%. These statistics demonstrate a major obstacle in terms of Internet use on the continent. Dada (2006) underscores that such a wide disparity in access to technology means that a solution for countries with high connectivity will not necessarily work for those with low levels. It is imperative to highlight that identifying CSFs impeding Internet adoption in Africa, for instance, can enhance Internet use on the continent and subsequently improve the status quo. Considering the importance of ISPs and Internet users in Internet diffusion, the respondents of this dissertation are drawn from these two groups in three African countries, namely, The Gambia, Nigeria and Kenya.

The Gambia is located in West Africa bordering the North Atlantic Ocean and Senegal. It is the smallest mainland country in Africa with a 2013 population of about 1.849 million inhabitants (World Bank, 2015). The 2013 GNI per capita estimate was 500 USD (World Bank, 2015). The Gambia serves as the headquarters of the Africa Coast to Europe (ACE) submarine cable which is one of the most ambitious telecommunication projects in the subregion. The project was launched on December 20th, 2012 and the total design capacity of the submarine cable is 5.12 terabytes. The 17,000 kilometer long submarine cable provides direct connectivity to Equatorial Guinea, Liberia, Mauritania, Guinea, Sao Tome & Principe, Sierra Leone and The Gambia.

Nigeria is also a West African country with a population of about 173.6 million inhabitants and a GNI per capita of about 2,710 USD (World Bank, 2015: 2013 estimates). It borders the Gulf of Guinea between Benin and Cameroon. Nigeria also borders Chad and Niger.

Kenya, on the other hand, is located in East Africa with a 2013 population estimate of about 44.35 million inhabitants and a GNI per capita of about 1,160 USD (World Bank, 2005). The country borders the Indian Ocean between Somalia and Tanzania. It also borders Ethiopia, South Sudan and Uganda.

1.3   Problem statement

As a World Economic Forum report (2011) claims, "Little is known about the values and attitudes of Internet users around the world. We cannot assume that globalization leads to the homogenization of world cultures which makes it important to acknowledge the multicultural and multidimensional nature of online behavior." Essentially, this statement speaks to the necessity of studying Internet adoption from different perspectives and contexts. The Internet penetration rate at individual level in Africa in 2014 was just 19% which is far less than world average of about 40% (ITU, 2014). Similarly, the penetration rate at household level on the continent for the same year was just 11% which was significantly less than the corresponding world average of about 44%. Figure 1 is a regional comparison of the Internet penetration rates at individual and household levels. In both categories, Africa has the lowest individual and household Internet penetration rates. These statistics demonstrate the main problem statement of this dissertation.
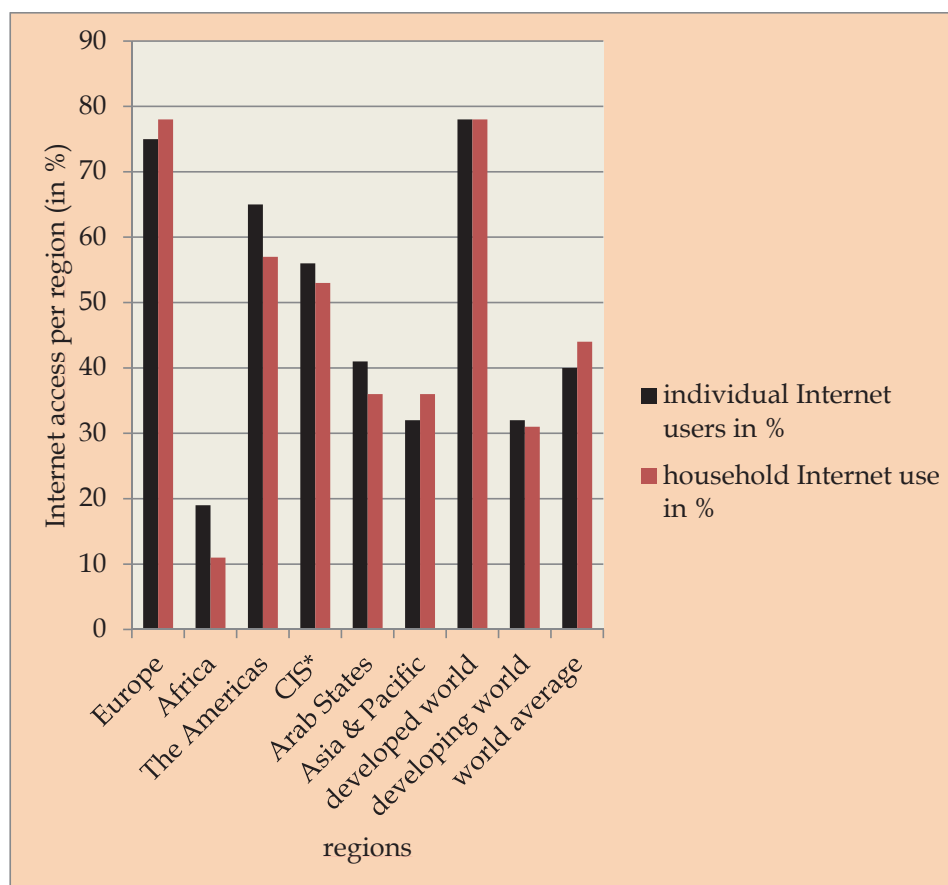
Source: adapted from ITU (2014) Facts and Figures; * Commonwealth of Independent States

FIGURE 1   Regional Internet penetration

1.4   Research objective

Information is a vital aspect of modern society where the Internet serves as an important platform for its dissemination (Punnoose, 2012). However, considering the aforementioned Internet diffusion statistics for Africa, it can be argued that the status quo ought to change if the continent is to be an active player in today's digital society. Thus, the primary objective of this dissertation is to develop frameworks that could serve as tools for Africa's ICT policy makers and Internet Service Providers in their efforts to enhance Internet diffusion on the African continent. Doing so may be achieved by identifying CSFs of sustainable solutions for last mile Internet access in Africa. In order to attain the primary objective, a number of secondary objectives are formulated in the form of research questions (RQs) which fit the individual needs of the six included journal papers.

- RQ 1: What are the Internet use patterns among university students in Africa? (see *Paper I*)
- RQ 2: What are the ICT barriers and critical success factors in developing countries? (see *Paper II*)
- RQ 3: What is the impact of moderating factors on behavioral intention towards Internet? (see *Paper III*)
- RQ 4: How can better Internet diffusion be achieved at the user level in a developing country? (see *Paper IV*)
- RQ 5: What are the key trust antecedents that influence Internet users' trust level toward Internet Service Providers in a developing country? (see *Paper V*)
- RQ 6: What are the major factors in trust building, causes of its violation, potential implications and restoration in terms of Internet adoption in a developing country? (see *Paper V*)
- RQ 7: What is the effect of Internet addiction on Internet use? (see *Paper VI*)

The dissertation's objective is essentially defined and achieved in terms of the aforementioned six papers. The remainder of the dissertation is organized as follows: Chapter 2 reviews the theoretical foundation. It also summarizes the theories used in answering the included papers' various research questions. Chapter 3 explains the methodological approaches employed while Chapter 4 provides an overview of the included journal papers. The key results from each paper and the dissertation as a whole are presented in Chapter 5 while Chapter 6 entails a brief discussion of the included papers' main findings and Internet diffusion as a whole from prior research perspectives. Chapter 7 presents the conclusion, validity and reliability of the dissertation. It also delineates the limitations and future research directions. The original journal papers are included in the Appendix.

2 THEORETICAL FOUNDATION

Researchers (Gallivan, 2001 and Musa, 2006) reported that most information systems (IS) theories do not focus on developing countries. Musa (2006) further asserts that these theories need to be applied in the context of developing countries in order to determine their level of applicability. Similarly, Reijswould (2009) emphasized the importance of theoretical context in his study. For the purpose of this dissertation, theoretical context will be used to help identify critical success factors of sustainable solutions for last mile Internet access in Africa. This will be achieved by adapting four IS theories in conjunction as well as a Systematic Literature Review (SLR) approach. The adapted theories are the Trust Model (Mayer et al., 1995), the Internet Addiction Test (IAT) scale (Young, 1998), the Uses and Gratification Theory (UGT) (Katz et al., 1974 and Rosengren, 1974) and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh, Morris, Davis, G., & Davis, F., 2003).

2.1 Unified Theory of Acceptance and Use of Technology (UTAUT)

The UTAUT is among the most widely used technology adoption theories. Others include the Technology Acceptance Model (TAM), the Theory of Planned Behavior (TPB), the Theory of Diffusion of Innovation (DOI) and the framework of Technology Organization and Environment (TOE) (Bankole et al., 2011; Bwalya, 2009 and Oliveira & Martins, 2011). The approaches of technology diffusion and acceptance are required to empirically identify the particular factors of a social and organizational context that affect ICT adoption (Avgerou, 2010).

This dissertation adapts the UTAUT (Venkatesh et al., 2003) based on its explanatory power. According to Wu et al. (2008), its explanatory power is about 70 percent with regards to technology-using behavior. It is also more effective than any of the previously used models (Wu et al., 2008). The UTAUT was born out of the limitations of the TAM. Specifically, these limitations relate

to the unaccountability of social influence which subsequently resulted in the UTAUT model by Venkatesh et al. (2003). The UTAUT model cites social influence as an important construct that determines usage intention and behavior. This model has been widely applied and adapted by a number of researchers (Bankole et al., 2011; Brown et al., 2009; Bwalya, 2009; Kaba, Diallo, Plaisent, Bernard & N'da, 2006; Venkatesh, Thong, & Xu, 2012 and Wu, Tao & Yang, 2008). The key determinants of the UTAUT model are Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), and Facilitating Conditions (FC). Venkatesh et al. (2003) define the aforementioned UTAUT key constructs as follows:

- Performance Expectancy: "the degree to which an individual believes that using the system will help him or her in job performance."
- Effort Expectancy: "the degree of ease associated with the use of the system."
- Social Influence: "the degree to which an individual perceives that important others believe he or she should use the new system."
- Facilitating Conditions: "the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system."

The UTAUT integrates the PE, EE, SI, and FC into the core determinants. It applies gender, age, experience and voluntary use as control variables (Venkatesh et al., 2003).

2.2 Trust model

Trust is a vital aspect of our everyday life. There is a growing body of literature on the connections between ICTs such as the Internet, trust and human development (Kuriyan, Kitner & Watkins, 2010). Trust involves several theoretical approaches, definitions, factors and models (Rousseau, Sitkin, Burt & Camerer, 1998). One generally accepted definition is "the willingness of a party to be vulnerable to the action of another party based on the expectation that the other will perform a particular action important to the trustor irrespective of the ability to monitor or control that other party" (Mayer, Davis & Schoorman, 1995). This implies that trust can be seen as a person's assessment of one's ability to be trusted. A willingness to be vulnerable is a key aspect of the trust model. Trust is one factor that can enhance Internet use, particularly in a developing region like Africa (Popola, 2013 and Zeffane, 2010). Trust is also important during situations of perceived high-risk (Joubert & Van Belle, 2013) such as that on the African continent (African Development Bank, 2013).

Mayer et al. (1995) propose ability, benevolence and integrity as the key elements of trust.

- *Ability:* the competence level of the trustee (Das & Teng, 2001). Williams (2001) defines competence as "… [a] set of skills…that allows [one] to perform in some area." In other words, trusting another party depends on the trustor's perception that the trustee possesses the ability or competence to be trusted. Researchers further highlight that ability is positively related to one's intention to trust (Gill, Boes, Finegan and McNally, 2005).
- *Benevolence:* the extent to which the trustor perceives that the trustee intends to do good to the trustor in a relationship (Mayer et al., 1995 and Williams, 2001). It essentially entails a responsibility or desire to care for or protect another party.
- *Integrity:* the belief that parties (for instance, a trustor and trustee) will adhere to a set of acceptable standards, principles or values (Mayer et al. 1995). A high degree of integrity is perceived as a positive trait in an individual (Audi and Murphy, 2006) and as a business asset (Koehn, 2005).

Mayer et al. (1995) assert that a trustor's level of trust and perceived risk will affect his or her risk-taking behavior. Risk is a vital element in their model of trust since trust essentially refers to a willingness to assume vulnerability (Mayer et al., 1995). Studies have shown the importance of intention to trust in building actual trust (Davis, 1999; Mayer et al., 19995 and Gill et al., 2005).

2.3   Internet Addiction Test (IAT) scale

The IAT scale was developed by Young in 1998. However, she defined the term Internet addiction in 1996 as "an impulse-control disorder which does not involve an intoxicant." Young (1996) states that this phenomenon can have negative effects on marriages, dating relationships as well as academic and occupational performances. There are other acceptable scales used to study Internet addiction. They include the Generalized Problematic Internet Use (GPIUS) (Caplan, 2002), the revised Generalized Problematic Internet Use (GPIUS2) (Caplan, 2010), the Pathological Internet Use (PIU) (Morahan-Martin & Schumacher, 2000), and the Chinese Internet Addiction Scale-Revision (CIAS-R).

However, the most widely used test scales in the literature are IAT and GPIUS. The main differences between these two test scales is that the former focuses on behavior associated with excessive Internet use while the latter deals with cognitions as well as the behaviors and negative consequences of excessive Internet use. The GPIUS comprises of 29 statements corresponding to seven subscales: mood regulation, perceived social benefits, perceived social control, withdrawal, compulsivity, excessive Internet use and negative outcome.

TABLE 1   Internet addiction related questions

1. How often do you find that you stay online longer than you intended?
2. How often do you neglect house chores to spend more time online?
3. How often do you prefer the excitement of the Internet to intimacy with your partner?
4. How often do you form new relationships with fellow online users?
5. How often do others in your life complain about the amount of time you spend online?
6. How often do your grades or homework suffer because of the amount of time you spend online?
7. How often do you check your email before something else that you need to do?
8. How often does your job performance or productivity suffer because of the Internet?

Source: adapted from Young's Criteria for Internet Addiction (Young, 1998)

The IAT scale, by contrast, consists of 20 questions (refer to Young, 1998 for more information). It has three subscales: withdrawal and social problems, time management and performance, and reality substitute. Questions 3-5, 9, 13, 15 and 18-20 of the IAT scale are associated with withdrawal and social problems, questions 1, 2, 6-8, 11, 16 and 17 with time management and performance and questions 10, 12 and 14 with reality substitute. Young (Young, 1998) categorizes individuals as Internet-dependent if they answer in an affirmative to four or more of the questions listed in Table 1.

This dissertation adapts two of the IAT subscales: withdrawal and social problems (WSP) and time management and performance (TMP). It is important to note that this dissertation does not utilize the reality subscale of the IAT scale. The IAT scale (Young, 1998) is used herein as a theoretical lens because it is the first standardized test scale used in studying Internet addiction.

2.4   Uses and Gratifications Theory (UGT)

The Uses and Gratifications Theory (UGT) explains that media does not do things to people; rather, people do things using the media (Katz et al., 1974 and Rosengren, 1974). This theory seeks to underscore how individuals use mass communication to gratify their needs (Baran & Davis, 2001). Users of mass media actively use whatever the media can offer (Baran, 2002). The Internet is one of the most dominant forms of media which enables access to information that best suits an individual (Baran, 2002). Of course, the Internet may also be used for other reasons. We use this theory as a lens in order to investigate potential Internet abuse patterns among university students in a developing country.

2.5   Summary of the theoretical foundation

Theoretical application is imperative in scientific research (Reijswould, 2009). Earlier researchers (Gallivan, 2001 and Musa, 2006) assert that most technology adoption theories do not focus on developing countries. It is therefore important to apply these theories to regions like Africa in order to determine a potential need for modification (Musa, 2006). However, in this dissertation, theoretical context is used as a lens in order to develop appropriate research frameworks for the included papers of this dissertation that can help us identify key factors for better Internet diffusion in Africa. The broader aim of the theoretical foundation herein is to determine CSFs of sustainable solutions for last mile Internet access in a developing region like Africa. The adapted theories are the Trust Model (Mayer et al., 1995), the Internet Addiction Test (IAT) scale (Young, 1998), the Uses and Gratifications Theory (UGT) (Katz, Blumler & Gurevitch, 1974 and Rosengren, 1974) and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003).

The Trust Model is used in *Paper V* while the IAT scale is used in *Paper VI*. The UTAUT is adapted in *Papers III* and IV while the UGT is used in *Paper I*. The essential relationship among the aforementioned theoretical frameworks is that they entail aspects of an individual's intention to use or trust in technology adoption. For instance, the UTAUT focuses on behavioral intention that can influence use behavior while the Trust Model essentially focuses on elements that influence one's trusting behavior. Similarly, the UGT explains how individuals use mass media like the Internet to satisfy their own needs. A broader relationship between the UTAUT, the Trust Model, the UGT and the IAT scale, is that they are all used in Internet adoption related studies.

3   RESEARCH DESIGN AND METHODOLOGIES

Research design helps in planning, structuring and executing research in order to maximize the validity of its findings (Mouton, 1996). It may also be considered as a chain of acceptable procedures for getting point A to point B where point A is the initial set of questions and point B is a set of answers and conclusions (Yin, 2003). Essentially, the research design phase helps in conducting the various research themes that make up this dissertation. A number of research methodologies can be used in conducting scientific investigation. Runeson & Höst (2009) distinguish between four purpose types in research as shown in Table 2.

- *Descriptive:* the portrayal of a situation or phenomenon.
- *Improving:* increased efficiency of a certain aspect of the studied phenomenon.
- *Exploratory:* determination of what is happening, a quest for new insights and generation of ideas and hypotheses for new research.
- *Explanatory:* an explanation of a situation or a problem; in most cases, not necessarily in the form of a causal relationship.

Case studies are, by definition, carried out in a real-life situation. Therefore, they exhibit a great degree of realism which compromises the corresponding degree of control. In conducting such research, a trade-off between the level or control and the degree of realism becomes imperative. According to Runeson & Höst (2009), the realistic situation is often complex and nondeterministic which hinders the comprehension of the studied phenomenon, particularly for explanatory purposes. Runeson & Höst state that increasing the level of control decreases the corresponding degree of realism. This approach sometimes leads to actual influential factors being placed outside the scope of the study. Three main research methodologies are used in this dissertation: a systematic literature review (Amberg, Fischl & Wiener, 2005; Biolchini, Mian, Natalia and Travassos, 2005; Kitchenham, 2004 and Kitchenham, Breretom, Budgen, Turner, Bailey and Linkman, 2009), a case study (Yin, 1984; 2003) and a survey (Pinnsonneault & Kraemer, 1993 and Glasow, 2005).

TABLE 2   Characteristics of common research methodologies

methodology	primary objective	primary data	design
survey	descriptive	quantitative	fixed
case study	exploratory	qualitative	flexible
experiment	explanatory	quantitative	fixed
action research	improving	qualitative	flexible

Source: Runeson & Höst (2009)

TABLE 3   Review pool

journal source	acronym
Information Technology for Development	IT4D
Electronic Journal of Information Systems in Developing Countries	EJISDC
Information Technologies & International Development	ITID
Asian Journal of Communication	AJC
African Journal of Information & Communication	AJIC

3.1   Systematic Literature Review (SLR) methodology

The SLR is particularly phenomenal at identifying critical success factors (Amberg at al. 2005). "It is a specific research methodology developed in order to gather and evaluate the available evidence pertaining to a focus topic" (Biolchini et al., 2005). An SLR is also viewed as a means of identifying, evaluating and interpreting all available relevant research pertaining to a particular research question (Kitchenham, 2004). This methodology is employed in *Paper II* and adheres to the strict procedures outlined by Kitchenham et al. (2009). These include research questions, a research process, inclusion and exclusion criteria, quality assessment, data collection, data analysis, results, discussion and conclusion.

3.1.1   Inclusion and Exclusion Criteria (IExC)

Two levels of inclusion and exclusion criteria are employed in the SLR study of *Paper II*, namely, IExC for journal selection and IExC for study selection. The scope of *Paper II* focuses only on the top five ICT4D journals based on Heeks' (2010) journal citation ranking as shown in Table 3.

Based on the adopted IExC, research papers published from 2000 to 2011 that are relevant to the research objective are included (see Kitchenham, 2004 for more information). The following publication types are excluded: practitioner reports, commentaries, special issues in the form of an introduction, editorial introductions, discussion papers and concept notes. The decision to in-

clude or exclude a study was based on four criteria, namely, study title, abstract, results or findings and conclusion. This strategy was vital in reducing the entire review process considering the huge amount of studies in the aforementioned journals.

3.1.2 Review process

In order to maintain a clear level of consistency during the review process, a three-step recursive approach is adopted:

1. Accessing the online archive of each of the included journals
2. Accessing the studies in their respective publication order from 2000 to 2011
3. Considering the title of each paper. If it seemed directly related to the research objective or question, it was then considered to be an included study and was marked *selected*. If not, the abstract, results/findings and conclusion were scanned especially in search of the following key words: barriers, challenges, obstacles, impediments, constraints and difficulties. Based on the scanning, a decision was made to determine whether or not the study met selection criteria.

These steps were repeated until the studies from the aforementioned journals were exhausted.

3.2 Case study methodology

A case study is defined as an empirical method aimed at investigating a contemporary phenomenon in its natural context (Robson, 2002; Yin, 2003 and Benbasat, Goldstein & Mead, 1987). However, these researchers further differ in opinions on a case study in terms of research methodology. Robson calls it a research strategy and stresses the use of multiple sources of evidence while Yin denotes it as an inquiry and remarks that the boundary between the phenomenon and its contexts may be unclear. Benbasat et al. define it somewhat more in detail by mentioning information gathering from a few entities (people, groups or organizations). According to Runeson & Höst (2009), a case study is similar to four other research methodologies: survey, experiment, action research and ethnography.

- *Survey:* the gathering of information from a specific population or a sample of it.
- *Experiment:* a controlled research that investigates the effect(s) of manipulating variables.
- *Action research:* focus on and involvement in the process of change. It differs from case study research in that it requires the researcher's deep

association with the phenomenon being investigated.

- *Ethnography:* a specialized type of case study which focuses on cultural practices (Easterbrook, Singer, Storey & Damian, 2008) or studies that are long in duration with a large amount of data (Klein & Myers 1999).

A case study is a valuable method of research with distinctive characteristics that make it ideal for many types of investigation (Yin, 1984). Tellis (1997) considers it as a triangulated research strategy which may be used for a single or multiple cases.

3.3 Survey methodology

A survey methodology is used in *Papers two*, *three,* and *five* in order to collect quantitative data from a sample of potential respondents of the studied populations. It must be acknowledged that other methods could be used to gather similar data. However, survey methodology is preferred in this dissertation. This methodology has precise procedures which, when followed closely, yield valid and easily interpretable data. It also generates reliable research findings that provide possible explanations and generalizations (Pinnsonneault & Kraemer, 1993). According to Glasow (2005), survey design has three distinct characteristics. Firstly, the phenomena to be studied should examine the relationships between variables. Secondly, the data should be collected from people. Finally, survey research should represent a selected portion of the population. It also requires a predicate model that depicts the expected relationships between variables (Glasow, 2005). The aforementioned characteristics of survey research make it an appropriate choice for the papers which employed it. It is vital to note that all possible efforts are employed in order to adhere to Glasow's (2005) guidelines in designing and implementing the survey method.

3.4 Data collection

The majority of the data used in this dissertation are collected from three countries, namely, The Gambia, Kenya and Nigeria. The selection of these countries is vital in two ways: first, the primary language of formal government and business transactions in all three is English. Second, these countries' education systems use English as the primary language of instruction. Therefore there is no need to modify the original questionnaires or translate them into country-specific dialects. These factors increase the general auditability of the various research findings. In addition, the target populations in each country are university students and Internet Service Providers (ISPs).

sample selection

unbiased sample

sufficiently large sample

Simple Random Sampling

$n = [NZ^2 \times 0.25] / [d^2 \times [N\text{-}1]] + [Z^2 \times 0.25]$

Where n = required sample size; N = total population (known/estimated); d = precision level (0.05 or 0.10); Z = number of standard deviation units of sampling distribution corresponding to the desired confidence interval

Source: adapted from "Air University Sampling and Surveying Handbook" (2002)

FIGURE 2   Sampling approach

A purposeful sampling strategy was employed in choosing the case countries. During the data collection phases, two important strategies were implemented to determine the sample size that truly reflected the target population of each study (see Figure 2). The first was an unbiased sample and the second was a sufficiently large sample. For instance, a simple random sampling approach was used for the first strategy while a statistical formula in Figure 2 was used to achieve the second strategy.

According to the Air University Sampling and Surveying Handbook (2002), the risk related to sample size determination is specified by two interrelated factors. They are the confidence level and the precision (or reliability) range. The use of qualitative data helps in deepening the understanding of each studied phenomenon. It makes the results richer and allows a deeper interpretation than a mere quantitative approach would provide (Creswell, 2003). The qualitative and quantitative results complement each other in achieving better results. It has been stated that "Not everything that can be counted counts, and not everything that counts can be counted" (Albert Einstein as quoted in Linder & Santiso, 2003). In other words, the qualitative method helps to answer the what, why and how questions of the studied themes. It is important to note that the majority of the data for all of the aforementioned papers were collected from university students. There are two reasons behind this approach.

Firstly, three quarters of the African population is illiterate (Obijiofor, 2009). It therefore makes sense to select respondents from a sample that will ultimately minimize the problem of unreturned questionnaires due to high illiteracy rates; if not, such an outcome could ultimately undermine the entire research purpose. With that in mind, the best way to draw an appropriate sample with maximum, valid and reliable returns from such a population is by focus-

ing on university students. Oyelaran-Oyeyinka & Adeya (2004) assert that universities are the gatekeepers of advanced technologies as well as the first Internet users in most countries.

Secondly, the younger generation which most commonly represents the student body is among the most enthusiastic and well-informed Internet users (Pan, Yan, Jing and Zheng, 2011). This population is therefore likely to provide extremely fruitful data while also minimizing the issue of unreturned questionnaires. The selection of this particular target group also likely ensures the validity of the research findings since students are knowledgeable about Internet use and treat it with value. Research has shown that university students account for a large body of Internet users (Ismail, 2011).

It is worth mentioning that this sampling approach toward a highly illiterate population has been employed by a number of researchers (Brown, 2002; Ismail, 2011; Wahid, 2007; Salman & Hasim, 2011 and Thapa, 2011).

3.5 Data analysis

The data analyses techniques used in this dissertation follow a mixed-method approach consisting of analyses of both quantitative and qualitative data. The former employs structural equation modeling (SEM) using Statistical Package for Social Science (SPSS) Amos. In order to justify the use of this tool to analyze the quantitative data, the sampling adequacy is determined using the Kaiser-Meyer-Olkin (KMO) test. For factor analysis to work, some relationships are needed between variables (Field, 2005). This was examined using Bartlett's Test of Sphericity (BTS). The internal reliability of the measurement constructs was also verified by computing Cronbach's Alpha value. A Confirmatory Factor Analysis was conducted in order to test for an absolute model fit and other acceptable fit indices. Five fit indices were considered to test for the overall model fit including the Chi-square (χ^2), Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), Bollen's Incremental Fit Index (IFI or BL89), Normed Fit Index (NFI) and Tucker-Lewis Coefficient (TLI). The factor analysis method was used to check for construct validity (Kerlinger, 1986). Content validity (Nunnally, 1978) is supported by the literature review and helps in developing an appropriate research framework for all six dissertation papers. According to Nunnally (1978), content validity is a matter of judgment. For the qualitative data, two data analysis techniques are used: content analysis (Strauss, 1987 and Eriksson & Kovalainen, 2008) and open and nonhierarchical axial coding (Strauss & Corbin, 1990). Table 4 highlights the various data analysis techniques used in each of the six included papers.

TABLE 4   Data analysis techniques

No.:	paper title	data analysis technique(s)
Paper I	Internet Abuse Among University Students: a Neglected Theme in Africa	descriptive statistics
Paper II	ICT Barriers and Critical Success Factors in Developing Countries	descriptive statistics
		open and nonhierarchical axial coding
Paper III	The Impact of Moderating Factors on Behavioral Intention Towards Internet: a Transnational Perspective	descriptive statistics
Paper IV	Internet Adoption at the User Level: Empirical Evidence from The Gambia	descriptive statistics
Paper V	The Role of Trust in Enhancing Internet Use in a High-Risk Society	descriptive statistics
		structural equation modeling
Paper VI	The Effect of Internet Addiction on Internet Use: Adapting the Internet Addiction Test (IAT) Scale	structural equation modeling

3.6 Summary of research methodologies

This dissertation employs three main research methodologies tailored to the needs of each included paper. They are SLR, case study and survey. An SLR is used in *Paper II* while a case study methodology is used in all the papers to an extent. A survey methodology is used in *Papers III* and *VI*. Finally, a mixed-method methodology is used in *Paper V*. In selecting the respondents for each paper, we apply two important strategies, namely, taking an unbiased approach and drawing from a sufficiently large sample. The first strategy is attained using a simple random sampling technique while the second is achieved using the statistical formula presented in Figure 2. For the data analysis, both quantitative and qualitative approaches are used. The former uses a structural equation modeling using SPSS while the latter focuses on techniques like content analysis, manual transcription and open and nonhierarchical axial coding.

For each of the included papers in Chapter 4, a strict research process is followed in terms of applying each of the chosen research methodology. For instance, a suitable research problem is formulated for each paper. This is followed by developing the research questions needed to address each research problem. An appropriate case context is further identified for each paper using a purposeful sampling method. The best possible way to collect data from each

selected case context is then chosen. Since it is not possible to collect data from the entire population of the selected case countries, an appropriate research population is identified for each paper using purposeful sampling strategy. The research participants are then recruited for each chosen population. In doing so, two strategies are adopted, namely, unbiased sample and a sufficiently large sample as illustrated in Figure 2. The first strategy enables each potential research participants have an equal opportunity while the second strategy ensures the selection of a sample of the target population which is statistically significant. After identifying the research participants from whom to collect the required data, each one of them is given a questionnaire to complete within a given time frame. The next stage of the research process for each paper continues to the data analysis and reporting phases. Table 4 illustrates the dissertation's various data analysis techniques.

4 OVERVIEW OF THE INCLUDED PAPERS

This dissertation consists of six interrelated journal papers aimed to identify CSFs of sustainable solutions for last mile Internet access. Each paper is tailored to the need of a particular research problem. For instance, *Paper I* investigates a potential Internet addiction pattern among university students at the University of The Gambia. The primary aim of this paper is to serve as a basis for *Paper VI* which studies the broader implications of Internet addiction on Internet use from an African perspective. In *Paper II*, the authors focus on investigating the limited number of areas in developing countries where things must go right in order to achieve better ICT diffusion. In *Paper III*, the authors investigate the moderating factors that influence individuals' behavior to adopt the Internet while *Paper IV* focuses on the relevant elements for better Internet use. Finally, *Paper V* examines the factors that influence Internet users' trust level toward ISPs in a high-risk society like the African continent while *Paper VI* essentially investigates the broader implications of Internet addiction on Internet use. The subsequent sections present a more detailed overview of each of the six included papers.

4.1 *Paper I*: Internet Abuse Among University Students: a Neglected Theme in Africa

Previous studies conducted in Africa on students' use of the Internet seem to neglect the issue of Internet abuse. Therefore, *Paper I* aims to identify Internet use patterns that could reveal potential Internet abuse and employs a case study methodology. It serves as the basis for *Paper VI* that investigates the effect of Internet addiction, an attribute of Internet abuse, on Internet use. The Uses and Gratifications Theory (UGT) (Katz et al., 1974 and Rosengren, 1974) is applied as a theoretical lens in order to attain *Paper I's* objective. The relevance of this paper is strengthened by the findings of Caldwell & Cunningham (2010) who stressed the need to ask questions about Internet use as it exhibits warning

signs of Internet addiction. Internet addiction is one form of Internet abuse in addition to online gambling, trafficking of pornographic materials, cybersex and cyberbullying (Patchin & Hinduja, 2006 and Young, 2004). It is a relatively new disorder that was first described by psychologist Kimberly Young (Young, 1996). The data for this paper is collected from respondents at the University of The Gambia.

4.2 *Paper II*: ICT Barriers and Critical Success Factors in Developing Countries

The main aim of *Paper II* is to identify ICT barriers and critical success factors in developing countries. It employs a systematic literature review (SLR) and a case study approach to collect data. The SLR enables the synthesis of ICT barriers based on 1107 studies published from 2000-2011 in the top five ranked ICT for development (ICT4D) journals based on Heeks' (2010) journal citations ranking. The empirical data that were collected in 2012 from The Gambia help us to identify the overlooked ICT barriers. The barriers from both studies are then categorized into critical success factors (Amberg et al., 2005; Biolchini et al., 2005 and Kitchenham, 2004) and their degrees of severity are compared.

4.3 *Paper III*: The Impact of Moderating Factors on Behavioral Intention Towards Internet: a Transnational Perspective

The Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003) and its extended version (UTAUT2) (Venkatesh, Thong & Xu, 2012) are used extensively to study technology use. Abubakarr & Ahmad (2013) define moderating variable as an interacting term used to strengthen a relationship between independent and dependent variables. The objective of *Paper III* is to examine the impact of moderating factors on individuals' behaviors toward the Internet. Moderating factors are vital constructs in both UTAUT and UTAUT2 frameworks used mainly to stabilize the relationship between core determinants (e.g., performance expectancy, effort expectancies, social influence, etc.) and behavioral intention. *Paper III* adopts a novel approach by neglecting the effect of UTAUT core determinants on behavioral intention as in previous studies (Birch & Irvine, 2009; Al-Shafi & Weerakkody, 2009; Alkhunaizan & Love, 2012 and Yahya, Nadzar, Masrek & Rahman, 2011). Instead, it applies a survey method to explicitly examine the direct impact of six moderating factors on behavioral intention toward Internet. *Paper III* employs multiple case studies and the data are collected from The Gambia and Nigeria.

4.4 *Paper IV*: Internet Adoption at the User Level: Empirical Evidence from The Gambia

Information Technology (IT) adoption in developing countries is often investigated without keeping the user in mind (Kaba et al., 2006). Mere exposure to a technology does not necessarily translate into its usage (Oyelaran-Oyeyinka & Adeya, 2004). Therefore, studies related to Internet diffusion should also account for its adoption at the user level. A number of information system (IS) theories have been widely used to investigate user behavior toward technology. Musa (2006) stresses the need for a wider application of IS theories in developing countries in order to identify the need for potential modification. In *Paper IV*, the authors employ a case study method and use the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003) as its theoretical guide in order to determine key elements of Internet adoption at the user level. Its aim is to propose a framework that will help increase understanding of the relevant elements of better Internet diffusion in a developing country. The data for this paper is collected from Internet users in The Gambia.

4.5 *Paper V*: The Role of Trust in Enhancing Internet Use in a High-Risk Society

A report by the World Economic Forum (2011) indicates that trust has the potential to overcome privacy concerns because people are most often guarded about their privacy when they lack trust in others. Other researchers (Joubert & Van Belle, 2013) highlight its significance during situations of perceived high-risk such as that on the African continent (African Development Bank, 2013). A mixed-method approach is used in *Paper V* which aims to increase understanding of the role of trust in Internet use in high-risk societies where Internet use might offer socioeconomic opportunities. It is achieved by examining trust antecedents that were identified by prior researchers (Mayer et al., 1995; Popoola, 2013; Cho et al., 2007 and Thaw et al., 2009). Furthermore, *Paper V* explores the trust building process, major causes of trust violation, their potential implications and restoration in the Kenyan context. The participants for this paper are Internet users and Internet Service Providers. Essentially, *Paper V* integrates questionnaire and interview forms of data collection. The former is used for ISPs while the latter is used for Internet users.

4.6 *Paper VI*: The Effect of Internet Addiction on Internet Use: Adapting the Internet Addiction Test (IAT) Scale

The Internet is an integral platform for accessing and disseminating information in today's digital world (Punnoose, 2012). It serves as a vital and indispensable resource for students (Sahin, Balta & Ercan, 2010) and education systems at large (Safdar, Mahmood & Qutab, 2010). Despite the huge potential of the Internet, its inappropriate use has negative consequences such as Internet addiction (Siomos, Dafoulie, Braimiotis & Mouzas, 2008; Recabarren, Nussbaum & Leiva, 2008; Castiglione, 2007 and Tahiroglu, Celik, Uzel, Ozcan & Avci, 2008). According to Scherer (1997), Internet use is said to be inappropriate when it undermines one's ability to fulfill his or her responsibilities. Africa has seen a significant amount of research focusing on Internet use (Fatoki, 2004; Luambano & Nawe, 2004; Nwagwu, Adekannbi & Bello, 2009; Ani, 2010; Udende, 2010; Osang, 2012 and Touray, Salminen & Mursu, 2013). However, these earlier research studies focusing on the African continent barely examined the theme of Internet addiction and above all, its potential impact on Internet use. The objective of *Paper VI* is to investigate the relationship between Internet addiction and Internet use. It adapts the time management & performance (TMP) and withdrawal & social problems (WSP) subscales of the Internet Addiction Test (IAT) scale (Young, 1998) as a theoretical lens. This paper uses a survey method to collect data from respondents at Kenyatta University in Kenya.

4.7 Summary of included papers

This dissertation comprises of six journal papers. The first paper looks at the issue of Internet abuse while the second paper focuses on ICT barriers and CSFs in developing countries. The third paper investigates the factors that determine individuals' behaviors toward Internet use. The key factors that influence Internet use are studied in the fourth paper while the fifth paper examines the role of trust in enhancing Internet use in a high-risk society. The last paper uses the first paper as a basis in order to determine the impact of Internet addiction on Internet use. It is imperative to highlight that the aim of each of the aforementioned papers is to identify CSFs of sustainable solutions for last mile Internet access in a developing countries. The next chapter discusses the key results from each paper and the dissertation as a whole.

5 KEY RESULTS

The key results of this dissertation can be understood in terms of the cumulative contribution of its six papers. For instance, in *Paper I*, the author finds a potential Internet abuse pattern among University students at the University of The Gambia. This particular finding serves as the basis for *Paper VI* that investigates the effect of Internet addiction (one attribute of Internet abuse) on Internet use. In *Paper II*, they synthesize ICT barriers and critical success factors in developing countries while in *Paper III*, they focus their attention on the impact of moderating factors on one's behavior to adopt the Internet. In *Paper IV*, relevant entities are investigated for better Internet adoption at the user level. *Paper V* focuses on trust between Internet users and ISPs in a developing country context. A more detailed description of each of the six papers is presented in the subsequent subsections.

5.1 *Paper I*: Internet Abuse Among University Students: a Neglected Theme in Africa

The objective of *Paper I* is to identify potential Internet addiction patterns among Internet users in a developing country. It is aimed to provide a basis for *Paper VI* in order to examine the relationship between Internet addiction and Internet use. The main research question for *Paper I* relates to the time Internet users spend online per session on each Internet related activity. The paper identifies six dimensions of Internet use, namely, academic, work, social communication, entertainment, shopping, downloading movies and unspecified activities. The last dimension accounts for about 18% of the study's respondents. The unspecified activities related to Internet use demonstrate attributes that could reveal potential Internet abuse among users. Figure 3 depicts the percentage response rate for each of the paper's six identified Internet use dimensions.

Total respondents = 181 (11 of whom did not indicate their Internet use pattern)
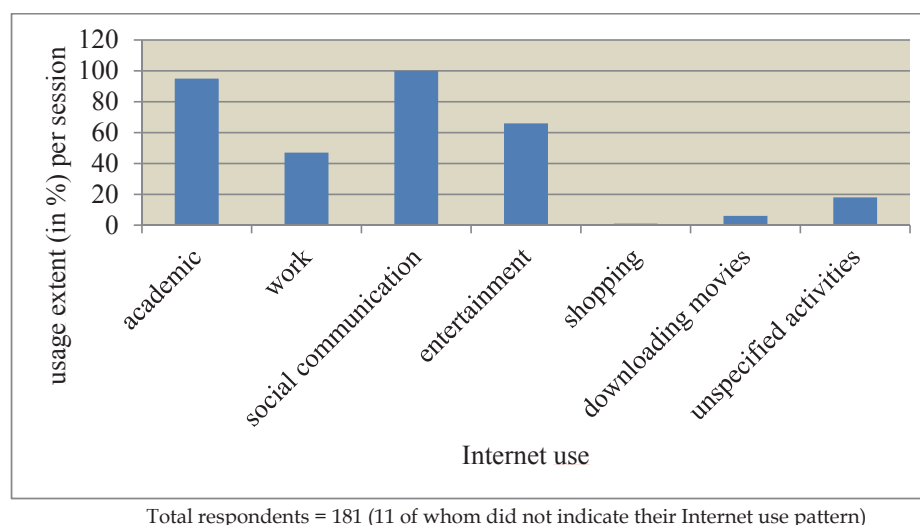
FIGURE 3   Internet usage pattern

5.2 *Paper II*: ICT Barriers and Critical Success Factors in Developing Countries

Paper II addresses three issues. Firstly, it identifies ICT barriers in the literature from 2000 to 2011. Secondly, it identifies ICT barriers through empirical findings and thirdly, it categorizes these barriers into critical success factors. A total of 43 ICT barriers were identified from studies conducted in 68 developing countries. Forty of the barriers are common to both the SLR and case study approach while the remaining three barriers were revealed in the case study as shown in Table 5. They include a lack of Internet exchange points, micromanaging and invisible hands.

The 43 ICT barriers in developing countries are further separated into the following categories: economic (EC), sociocultural (SC), infrastructural (IF), political and leadership (PL), legal and regulatory (LR), educational and skills (ES), technical (TN) and security and safety (SS). These categories are termed herein as critical success factors (CSFs) with varying degrees of severity. The lack of Internet Exchange Points is singled out in this case study as the factor responsible for the high cost of Internet access in developing countries. One respondent stated the following:

> [The] high cost of Internet in Africa as a whole depend[s] on the lack of continental, regional, cross-border and local IXPs. In Europe, America [as well as in] other [developed] countries, every state, city and town has an IXP. This is missing in Africa and until this happens, the cost of Internet will never be affordable (anonymous Chief Executive Officer).

TABLE 5   ICT barriers

common ICT barriers		
lacking or inadequate fixed telephone lines	insufficient use or non-existing universal service fund	high cost
corruption	lack of research and development	low returns on investment
lack of investment	political instability	high risk for investment
insecurity	lack of language skills	unnecessary bureaucracy
low income	lack of relevant local content	resistance to change
lack of software and hardware	complex technology	inappropriate technologies
lack of political will	lack of access	poor regulation
monopoly	limited sustainability of networks	lack of regional initiatives
lack of cultural knowledge or limitations	low Internet bandwidth	lack of ICT skills
obsolete technologies	unreliable Internet connection	fear of technology
lack of proper planning and coordination	lack of electricity supply	high taxes
lack of incentives	perceived lack of privacy	lack of proper legal framework
poor network reception	lack of maintenance culture	high illiteracy
scarcity of technical personnel		
overlooked ICT barriers		
lack of Internet Exchange Points	invisible hands	micromanaging

The aforementioned quotation strengthens the findings by Kende & Hurpy (2012) about the importance of IXPs in Africa's Internet ecosystem. The case study participants argued that their Internet traffic is never local even for communications at a national level, i.e., from one Internet Service Provider to the other. Another key finding of this paper relates to "*invisible hands*," meaning governments/investors who fund development projects in developing countries with hidden motives. A respondent refers to *micromanaging* as "giving an individual a responsibility without a corresponding authority to implement it."

5.3 *Paper III*: The Impact of Moderating Factors on Behavioral Intention Towards Internet: a Transnational Perspective

Moderating factors are interacting terms used when the relationship between a dependent and independent variable is weak, inconsistent or nonexistent. They form an integral part of both the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003) as well as its extended version (UTAUT2) (Venkatesh et al., 2012). This paper examines the direct impact of six moderating factors (age, gender, income, experience, complexity and education) on behavioral intention toward Internet. The results suggest that only experience and complexity influence behavioral intention toward Internet in both case countries, The Gambia and Nigeria (see Tables 6 and 7). The impacts of age, gender, income and education, however, vary significantly between these two countries. For instance, the respondents' support of hypotheses pertaining to gender, income and education influence their behavior toward Internet in The Gambia more strongly than in Nigeria. On the contrary, respondents' support of hypothesis pertaining to age is stronger in Nigeria.

The responses in Tables 6 and 7 are then categorized into three distinct regions (see Table 8):

1. *Region of positive certainty:* responses which correspond to strongly agree (1) and agree (2) scales.
2. *Region of uncertainty:* responses which correspond to somewhat agree (3), not applicable (4) and somewhat disagree (5) scales.
3. *Region of negative certainty:* responses which correspond to disagree (6) and strongly disagree (7) scales.

TABLE 6   Distribution of respondents' support of hypotheses for study 1

Study 1: The Gambia								
	response based on the seven-point Likert scale							total number of re-spondents
	frequency count (FC)							
hypothesis	*1*	*2*	*3*	*4*	*5*	*6*	*7*	
H1: age	20	40	51	8	7	33	18	177
H2: gender	85	43	27	5	4	9	5	179
H3: experience	55	59	44	6	3	7	2	176
H4: income	104	46	18	6	2	1	2	179
H5: complexity	84	49	25	1	6	7	5	177
H6: education	79	45	13	10	8	6	17	178

1 = strongly agree; 2 = agree; 3 = somewhat agree; 4 = not applicable; 5 = somewhat disagree; 6 = disagree;
7 = strongly disagree

TABLE 7   Distribution of respondents' support of hypotheses for study 2

Study 2: Nigeria								
hypothesis	response based on the seven-point Likert scale							total number of re-spondents
	frequency count (FC)							
	1	*2*	*3*	*4*	*5*	*6*	*7*	
H1: age	90	66	19	1	5	0	3	184
H2: gender	16	28	30	16	10	40	41	181
H3: experience	54	68	38	3	10	6	1	180
H4: income	10	30	25	44	24	35	10	178
H5: complexity	79	63	18	3	6	8	5	182

1 = strongly agree; 2 = agree; 3 = somewhat agree; 4 = not applicable; 5 = somewhat disagree; 6 = disagree;
7 = strongly disagree

TABLE 8   Distribution of responses

response categories											
	positive region of certainty				*region of uncertainty*				*negative region of certainty*			
	The Gambia		*Nigeria*		*The Gambia*		*Nigeria*		*The Gambia*		*Nigeria*	
H	*C*	*% C*	*C*	*% C*	*C*	*% C*	*C*	*% C*	*C*	*% C*	*C*	*% C*
H1	60	33	156	85	66	37	25	14	51	29	3	2
H2	128	72	44	24	36	20	56	31	14	8	81	45
H3	114	65	122	68	53	30	51	28	9	5	7	4
H4	150	84	40	22	26	15	93	52	3	2	45	25
H5	133	75	142	78	32	18	27	15	12	7	13	7
H6	124	67	83	46	31	17	63	35	23	13	35	19

C = FC; H = hypothesis

The frequency count (FC) of the responses was determined for each aforementioned region. We then calculated their respective percentage (% FC). The aforementioned statistics suggest that sociodemographic variables like age, gender, income and education influence behavioral intention towards Internet. However, the extent to which this is true varies significantly across national boundaries.

5.4   *Paper IV*: Internet Adoption at the User Level: Empirical Evidence from The Gambia

The Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003) is used to investigate technology adoption. *Paper IV* introduces six new moderating factors for UTAUT core determinants and two other direct determinants of Internet adoption. The objective of this approach is to identify

relevant elements of Internet adoption at the user level. The results suggest that Internet adoption at the user level has three vital elements: moderating factors, indirect determinants and direct determinants (see Figure 4). The moderating factors consist of age, gender, experience, voluntary use, friends' influence, Internet Service Providers and regulators. The direct determinants are performance expectancy, effort expectancy, social influence and facilitating conditions while the direct determinants include education, behavioral intention and income. It can be seen in Figure 4 that three factors directly influence Internet adoption at the user level. They include individuals' level of education, their behavior toward Internet and purchasing power. Similarly, individuals' behavioral intention is influenced by four derivatives, namely, expected performance, effort, societal impact and facilitating conditions. Each aforementioned derivative is equally influenced by other factor(s) as depicted in Figure 4.
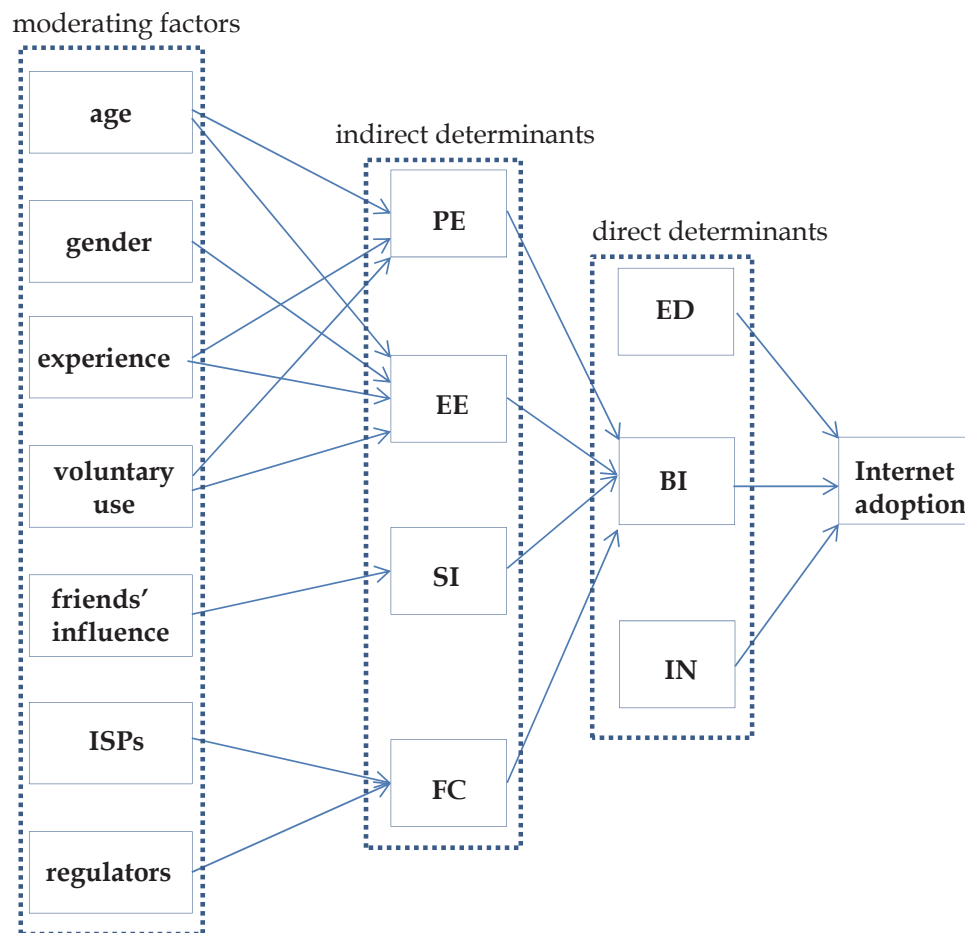
FIGURE 4   User level Internet adoption framework

5.5 *Paper V*: The Role of Trust in Enhancing Internet Use in a High-Risk Society

The goal of *Paper V* is to increase the understanding of the role of trust in Internet use in high-risk societies where Internet use might offer socio-economic opportunities. It aims to determine the key trust antecedents that influence Internet users' trust level towards ISPs by adapting the Trust Model proposed by Mayer et al. (1995). It also investigates the parameters of an effective trust building process, major causes of trust violation, their potential implications and trust restoration. The results show that Internet users' perceptions of ISPs' ability to be trusted depend more on the ISPs' level of competence (*ability*) and desire to protect users (*benevolence*) than upholding acceptable standards (*integrity*). Based on this finding, a revised trust framework has been proposed (see Figure 5). It shows that Internet users' trust level toward ISPs depends on ISPs' ability and benevolence which are moderated by service deliverability and user protection. The framework also establishes a direct relationship between trust and Internet use. In other words, it indicates that trust influences Internet users' decision to use the Internet.

Similarly, the result also indicates a lack of trust manifested in poor communication and greed for profit among ISPs as major causes of trust violation. The lack of trust was evident in this study. As one respondent stated, "In a normal society, we share the same road [to] a common destination but in Kenya, we build our own road to a common destination. This explains the extent of distrust we have in [our] society." It indicates that things are done differently in Kenya in that making their own boundaries implies a lesser degree of trust. In addition to building their own boundaries, Kenya's Internet dispensation is also impeded by greed; one respondent states the following:

> Greed by Internet Service Providers to maximize profit is a major cause of distrust between them and Internet users. However, the [ISPs] will barely acknowledge this phenomenon… the extent of trust users have for ISPs can potentially increase the use of mobile and electronic applications (anonymous respondent).
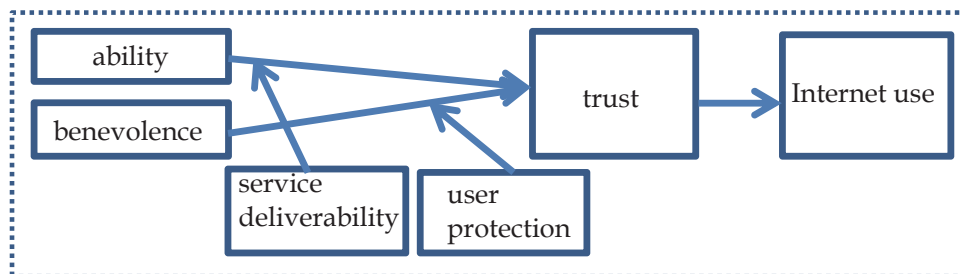
FIGURE 5   Revised trust framework

The aforementioned quotation implies that ISPs' behavior in wanting a huge return on their investment is one major cause of distrust in Africa's Internet dispensation. Considering the importance of trust in Internet diffusion, this paper also proposes a risk mitigation framework that can address distrust and potentially enhance Internet use in a high-risk society. It comprises of four key dimensions: trust building (TB), trust violation (TV), trust restoration (TR) and distrust (DT) (see Figure 6).

TRUST BUILDING (TB)

- create visibility
- feedback
- communication
- transparency
- common tariff
- accountability
- neutral regulator
- open access network

DISTRUST (DT)

- weak institutions
- slow Internet penetration
- less investment
- fewer ISPs
- high costs for users
- monopoly
- loosing customers
- time wasting on consolidation

TV implications

- lack of communication
- greed to maximize profit
- intention to acquire market
- neglecting privacy
- compromising security issues
- lack of promised QoS

TRUST VIOLATION (TV)

- creating visibility
- communication
- consultation
- action/implementation
- legal/abitration process
- face-to-face communication
- compensation
- strict penalty for offenders
- restoring QoS

TRUST RESTORATION (TR)

FIGURE 6   Risk mitigation framework

Creating awareness about potential implications of distrust is an important dimension of the aforementioned proposed risk mitigation framework. This is because it can lead to a broader discussion about trust in high-risk societies. One interview respondent stated the following:

> The significan[ce] of trust can only be appreciated once we are aware of the consequences of distrust… Trust is one entity that can minimize our perception [of] issues like privacy and security concerns (anonymous respondent).

This underscores that knowing the broader implications of trust violation is necessary in acquiring a better understanding of trust in Internet diffusion. The proposed risk mitigation framework can be used as a checklist for ISPs in enhancing their operational relationship with Internet users. It can also be a vital tool for ICT policy makers in Africa and other high-risk societies on how to enhance Internet use.

5.6 *Paper VI*: The Effect of Internet Addiction on Internet Use: Adapting the Internet Addiction Test (IAT) Scale

Internet addiction can negatively affect family relationships, academic success and occupational performance. This paper extends beyond the usual Internet use pattern studies that are widely researched in Africa (e.g., Fatoki, 2004; Luambano & Nawec, 2004; Nwagwu et al., 2009; Ani, 2010; Udende, 2010; Osang, 2012 and Touray, 2013). It achieves three predefined objectives. Firstly, it demonstrates a high prevalence of Internet addiction among respondents at Kenyatta University. Similarly, the result indicates that an average of about 49% of our res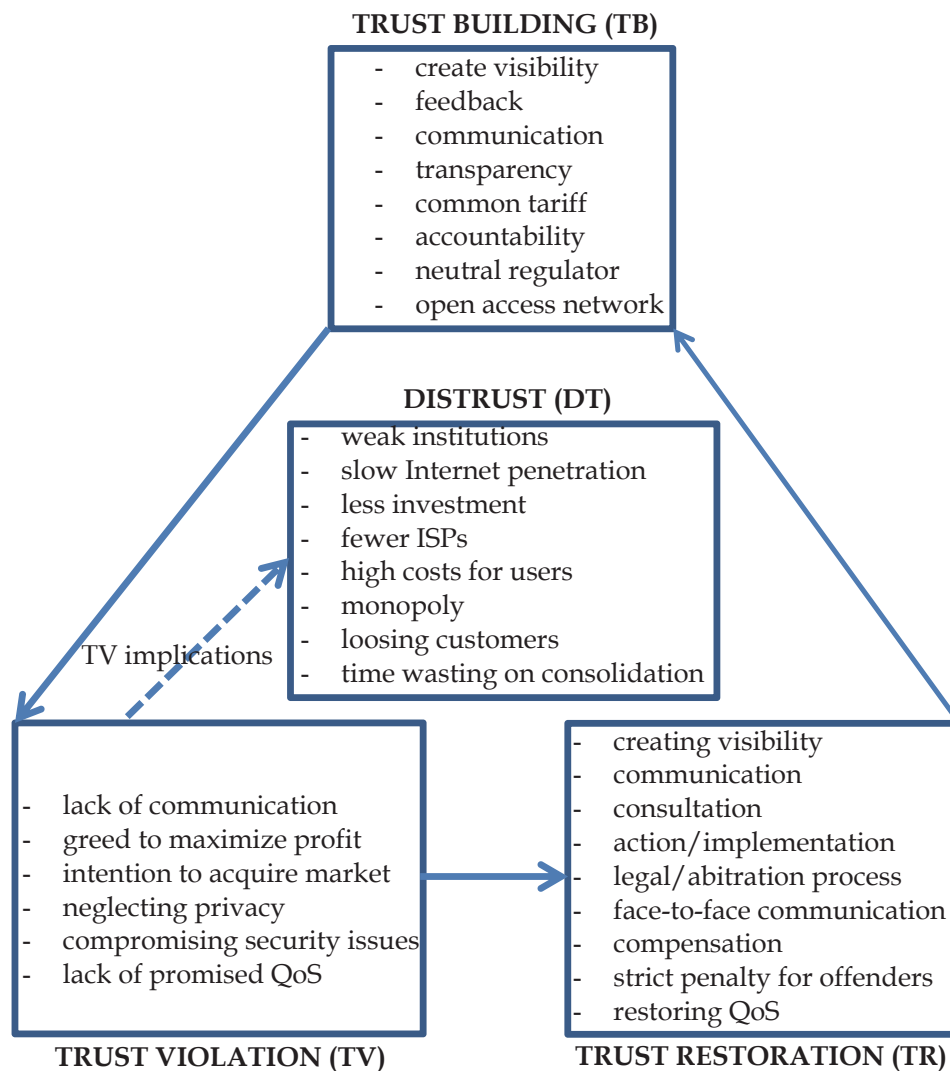pondents fit the description of Internet addicts. This is based on four competing Internet use thresholds that determine "normal" and "addicted" Internet use (see Table 9). This approach is selected because it prevents the authors from being entangled in the controversy surrounding the use of the terms "normal" and "addicted" Internet usage. Secondly, the factor analysis and structural equation modeling (SEM) results underscore a positive relationship between Internet addiction and Internet use. Furthermore, the statistics depicted by Table 10 highlight acceptable fit indices for the studied phenomenon. Cumulatively, the results from SEM demonstrate that the Internet addiction questions proposed by Young (1998) (see Table 1) are appropriate to investigate the relationship between Internet addiction attributes and Internet use. Thirdly, about 78% of the survey respondents indicate that Internet addiction can negatively affect Internet use and the way the technology is perceived.

TABLE 9   Competing Internet use thresholds

weekly time spent online (in hours)	response rate	researcher(s)	usage category (in %)	
			normal	addicted
≤ 8.5	75	Morahan-Martin & Schu-macher (1997)	37.5	62.5
> 8.5	125			
≤ 11	78	Benner (1997)	39	61
> 11	122			
≤ 19	104	Holmes (1997)	52	48
> 19	96			
≤ 38	138	Young (1998)	75	25
> 38	62			

Note that two of the 202 respondents did not provide the amount of time they spend online.

TABLE 10   Measurement model's fit indices

χ^2/df	NFI	IFI	TLI	CFI	RMSEA
1.520	0.88	0.95	0.91	0.95	0.05

χ^2 = Chi-squared; df = degree of freedom; NFI = Normed Fit Index; IFI = Incremental Fit Index; TLI = Tucker-Lewis Coefficient; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approxima-tion

The SEM result reveals a positive association between the two Internet addiction subscales (withdrawal & social problems (WSP) and time management & performance (TMP)) and Internet use. The effect of WSP on Internet use weighs about 0.32 while that of TMP is 0.59. Furthermore, there is a negative correlation (-0.02) between WSP and TMP (see Paper III). The Chi-squared (χ^2) p-value is approximately 0.04. This is less than the recommended threshold of 0.05 (Hooper & Mullen, 2008). The results from the structural equation modeling (see Table 10) indicate acceptable fit indices for our research model (Weston & Gore, 2006; Hooper & Mullen, 2008 and Browne & Cudeck, 1993).

Based on the findings of *Paper VI*, a framework is proposed that shows the relationship between IAT subscales (TMP & WSP) and Internet use. It indicates that Internet addiction attributes can negatively affect Internet use. The impact of the two adapted IAT subscales (TMP and WSP) on Internet use are influenced by four moderating factors (see Figure 7). These findings are significant in the sense that there is a positive association between attitude toward a technology and intention to use (Venkatesh et al., 2012). The findings also highlight a serious concern since a negative belief about a technology like the Internet can undermine a decision to embrace or use it (Parasuraman, 2000). More importantly, nothing should get in the way of Internet diffusion on a continent whose Internet penetration rate is a mere 19% (ITU, 2014).
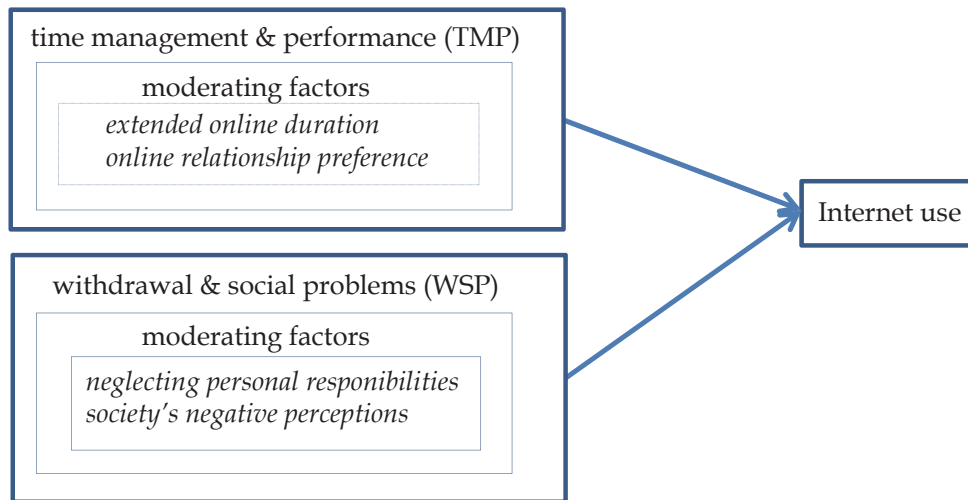
FIGURE 7   Enhanced Internet adoption framework

5.7 Summary of key results

This dissertation addresses seven research questions tailored to the needs of the six individual papers. The aim is to identify CSFs of sustainable solutions for last mile Internet access in developing countries. The following research questions (RQs) are addressed in this dissertation:

- RQ 1: What are the Internet use patterns among university students in Africa? (see *Paper I*)
- RQ 2: What are the ICT barriers and critical success factors in developing countries? (see *Paper II*)
- RQ 3: What is the impact of moderating factors on behavioral intention toward Internet? (see *Paper III*)
- RQ 4: How can better Internet diffusion be achieved at the user level in a developing country? (see *Paper IV*)
- RQ 5: What are the key trust antecedents that influence Internet users' trust level toward Internet Service Providers in a developing country? (see *Paper V*)
- RQ 6: What are the major factors in trust building, causes of its violation, potential implications and restoration in terms of Internet adoption in a developing country? (*see Paper V*)
- RQ 7: What is the effect of Internet addiction on Internet use? (see *Paper VI*)

In answering the aforementioned RQs, a number of CSFs of sustainable solutions for last mile Internet access are identified. They are presented in terms of

five proposed frameworks, namely, a user level Internet adoption, an Internet adoption, a risk mitigation, enhanced Internet adoption and a generalized Internet diffusion.

The *first framework* indicates that Internet adoption at the user level comprises of moderating factors, indirect and direct determinants. Essentially, the moderating factors and the indirect determinants influence users' behavior toward the Internet. The framework further indicates direct determinant for Internet use, namely, education, income and behavioral intention.

The *second framework* shows that Internet users' trust level toward ISPs depend on ISPs' ability and benevolence which are moderated by service deliverability and user protection. The framework also establishes a direct relationship between trust and Internet use. In other words, it indicates that trust influences Internet users' decision to use the Internet.

The *third framework* underlines a number of things that can enhance trust building in high-risk environments such as Africa. They include creating visibility, feedback, communication, transparency, a common tariff, accountability, a neutral regulator and an open access network. The framework identifies major causes of trust violation, namely, a lack of communication, greed for maximized profit, an intention to acquire the market, neglecting privacy, compromising security and a lack of promised quality of service (QoS). On the other hand, the framework provides a possible means of restoring trust when violated/breached which includes creating visibility, communication (including face-to-face communication), consultation, action/implementation, a legal/arbitrary process, compensation, strict penalties for offenders and restoring the QoS. The framework also highlights potential implications of trust violation (distrust), namely, weak institutions, slow Internet penetration, less investment, fewer ISPs, high user costs, monopolies, losing customers and considerable time wasted on consolidation.

The *fourth framework* indicates a relationship between Internet addiction and Internet use. In other words, the two adapted subscales of IAT scale (TMP & WSP) negatively affect Internet use. This result is significant in the sense that it broadens the discussion on Internet addiction beyond its traditional impact on users. From a theoretical perspective, the proposed framework indicates that the IAT scale can be used to identify factors that affect Internet diffusion.

Finally, the *fifth framework* integrates the main findings from all six dissertation papers (see Figure 8). It highlights the CSFs for enhanced Internet adoption and diffusion in Africa. These factors are trust, facilitators, accessibility, infrastructure, behavioral intention and awareness. The identified CSFs are further expressed in terms of the fourteen dimensions. For instance, trust is expressed in terms of ISPs' service deliverability, cyberphobia and ISPs' benevolence toward users. Facilitators are ISPs and ICT policy makers while accessibility refers to cost and income. Infrastructure covers Internet Exchange Points, undersea fiber optic connections and adequate electricity. Similarly, behavioral intention is expressed in terms of required local content and user perception. Finally, awareness entails security and privacy issues.

In summary, Figure 8 indicates that proper ICT policies are needed in deploying Internet Exchange Points and undersea fiber optic connections in order to achieve affordable Internet access in low income regions like Africa. This has to be coupled with the presence of competent and benevolent Internet Service Providers (ISPs) as well as the ramifications of Internet addiction on the continent. Achieving this can improve trust between ISPs and Internet users to potentially overcome security and privacy concerns. Doing so would also eventually boost Internet use. Behavioral intention toward the Internet in terms of required local content and the way users perceive the Internet is vital in embracing and adopting the Internet.

It is vital to state that the GIDF framework has the potential to provide a better understanding of how to improve last mile Internet access in Africa. This is because it integrates both the CSFs and the key dimensions for each one of them. This approach will easily enable ICT policy makers and ISPs to commit more attention and resources to the limited number of factors that are crucial to successful Internet diffusion and adoption. From a theoretical perspective, the five proposed frameworks (see Figures 4, 5, 6, 7 and 8) could be adapted by other researchers to study and develop more content dependent Internet diffusion frameworks for the African continent and beyond.
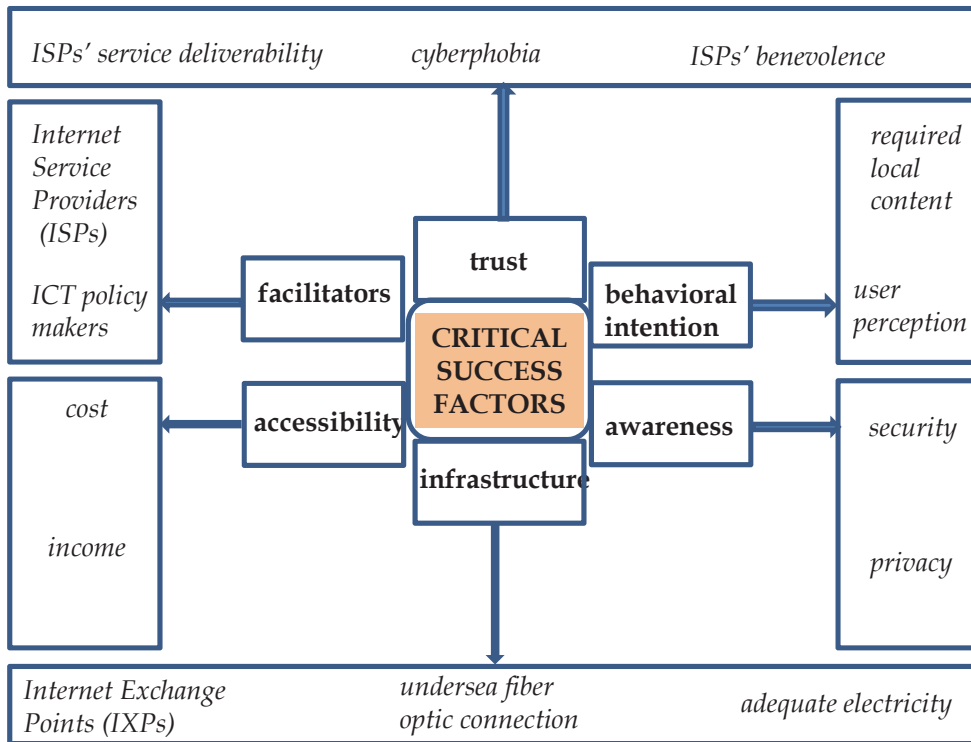

FIGURE 8   Generalized Internet diffusion framework (GIDF)

6 DISCUSSION

The Internet is a basic requirement for the use of web-based applications like eLearning, eHealth, eScience, eCommerce, eBanking, eGovernment, etc. There has been tremendous global achievement in terms of worldwide Internet access. However, Internet dispensation in Africa is still a daunting work in progress. Among other factors, the slow Internet penetration rate led to the creation of the Broadband Commission of Digital Development that was launched in May 2010 by the International Telecommunications Union (ITU) and the United Nations Educational, Scientific and Cultural Organization (UNESCO). The existence of such an organization signifies the global concern for better Internet access. It must be said that addressing this issue in Africa as a developing region is significant for three main reasons. They are as follows:

1. A developed market in Africa can lead to new growth opportunities for the region and the developed world.
2. The developed world could come closer to achieving the MDGs (Millennium Development Goals) set by the United Nations.
3. It would likely improve the living standard of Africans and could subsequently lead to greater political stability.

In order to achieve the aforementioned objectives through Internet access, the CSFs of sustainable solutions for last mile Internet access should be used as a guiding tool for Internet Service Providers (ISPs) and ICT policy makers, particularly in Africa. Achieving last mile Internet access is an important element in attaining national development. There is a growing discussion on the relationship the Internet and the economic well-being of the poor. The cost of accessing ICTs like the Internet is one obstacle facing wider Internet adoption in many developing countries. For instance, in Africa, ISPs and ICT policy makers relate the high costs of Internet access on the continent to the use of satellite for backbone connectivity in the region. They have been advocating for undersea fiber optic connections across the continent thinking that it would lead to cheaper Internet access. Their quest to achieve such an infrastructural boost has now been realized. For example, a good number of African countries are now

connected to the Africa Cable to Europe (ACE) undersea fiber optic connection (see Figure 9). Despite this huge infrastructural achievement, the cost of Internet access in Africa is still beyond the earning capacity of average citizens. For instance, in 2004, a monthly E1 (European Standard 1) connection in Ghana cost between 4,000 and 6,000 USD via satellite while the same connection via SAT3 undersea fiber optic cable cost 12,000 USD (Oskiakwan, 2007). These statistics suggest that the high cost of Internet access in Africa does not depend entirely on availability or a lack of undersea fiber optic connections as a type of backbone infrastructure.

Anderson & Billou (2007) proposed a 4A (availability, affordability, acceptability and awareness) framework. It is meant to provide services like the Internet to low-income consumers or those earning less than 1,500 USD per annum like those in Africa. Similarly, Rogers (1995) identifies five attributes of innovation (relative advantage, compatibility, complexity, trialability and observability) that can result in its successful diffusion. Rogers (1995) and Anderson & Billou (2007) explain how innovations like the Internet can be successfully adopted.

Source: PURA (2011)

FIGURE 9   Current ACE configuration

On the contrary, the proposed GIDF is more context-dependent since it accounts for both CSFs and the prioritized dimensions necessary to achieve enhanced Internet diffusion in Africa (see Figure 8). It accounts for specific sociocultural attributes like trust, Internet addiction and behavioral intention that were not explicitly captured in previous frameworks (Anderson & Billou, 2007 and Rogers, 1995). This approach is significant for three main reasons.

1. Potential consumers would be unlikely to use the Internet if they lack trust in those providing the service
2. They would not likely use the Internet if they perceive it as a harmful tool
3. Potential consumers would be unlikely to adopt the Internet if there is a lack of required local content

The high cost of Internet access in Africa mainly due to insufficient Internet Exchange Points (IXPs) is a major obstacle impeding Internet adoption on the continent. For instance, ISPs' in The Gambia suggest that more than 75 percent of their operating costs stem from connection fees to the United States Internet backbone via an International circuit. This relates to the use of international transit lines as a means of transporting the continent's user data even at national levels. Furthermore, this argument is supported by Silvius findings (2011) that a high international bandwidth cost is the main financial burden for African Internet Service Providers.

An IXP has the potential to alleviate the use of an international transit line, thereby reducing costs for both ISPs and users. It does so by keeping the local Internet traffic local. Another important capability of an IXP is its ability to reduce Round Trip Time (RTT) or latency. For instance, currently, most African Internet traffic is routed through Europe or North America even if the destination is in Africa (Silvius, 2011). Some of the traffic is even routed through Europe and North America. This is due to insufficient IXPs on the African continent. African countries need high quality and affordable Internet service (Bon, 2007). A high connectivity cost for users is a real problem that impedes Internet use in Africa (Rena, 2008 and Pejovic et al., 2012).

In Africa, service deliverability based on service level agreements (SLAs) between Internet users and ISPs barely exists. Even in situations where it does exist, implementation is never a priority except for corporate users like banks, parastatals, embassies, ministries, etc. Furthermore, protections for Internet users' interests are nonexistent in many African countries. These factors have severe ramifications on Internet use across the continent. Quite simply, they undermine the trust level between Internet users and ISPs. In this dissertation, we proposed a risk mitigation framework that can help improve the operational relationship between Internet users and ISPs as well as between ISPs and ICT policy makers. Achieving increased trust is essential in Internet adoption and its diffusion.

Similarly, our revised trust framework can also serve as a basis for future researchers in developing a more comprehensive trust framework that suits developing countries. This is necessary from a research perspective as Fulmer & Gelfand (2012) highlight cultural context as another level of analysis in trust research. They also assert that samples of trust research have mainly been Western. The proposed revised framework includes very relevant and applicable concepts that can potentially enhance Internet adoption in Africa and other developing countries.

Kyobe (2011) highlights the capacity to adopt and use technologies as important concepts in determining ICT adoption in South Africa. However, we argue that potential Internet users might not adopt the technology if they do not trust those providing the services even if Internet users have the capacity to adopt and use the Internet. This signifies the importance of trust in terms of Internet adoption. We can claim that our proposed generalized Internet diffusion framework includes very relevant constructs that are needed to enhance the Internet adoption and diffusion status quo in Africa and other developing countries.

It is imperative to note that achieving improved Internet access for Africa, for example, is a complex endeavor. It consists of several interrelated factors that must be understood by ISPs and African ICT policy makers. The hope is that the proposed frameworks presented in this dissertation will help clarify the parameters of sustainable solutions' critical success factors for last mile Internet access in Africa.

7 CONCLUSION

Information is the nerve of modern society and the Internet is a vital platform for its dissemination (Punnoose, 2012). In order to be part of the digital world, Internet Service Providers (ISPs) in Africa have deployed a number of Internet access technologies on the continent. They include ADSL, SHDSL, dial-up, ISDN, mobile cellular, WiFi, WiMAX and VSAT. However, the Internet's full potential in Africa is still largely untapped and access to the Internet is progressing very slowly (Dalberg Survey Report, 2013 and Alshameri & Bangura, 2014). For instance, Africa's total Internet users in 2013 amounted to only six percent (ITU, 2013). This figure is far less than the world average of about 46 percent from the same year. In addition, the number of households with Internet on the continent is just seven percent (ITU, 2013), a figure which is estimated to increase in 2014 by just four percent (ITU, 2014). Furthermore, Africa's Internet penetration rate in 2014 was 19 percent which is also far less than the corresponding world average of about 49 percent (ITU, 2014). This dissertation identifies a number of CSFs of sustainable solutions for last mile Internet access in developing countries. The CSFs are presented in a form of five frameworks, namely, a user level Internet adoption, a revised trust, risk mitigation, addictive effect of the Internet and generalized Internet diffusion. The last framework (GIDF) integrates key findings from all of the included papers.

7.1 Validity and reliability of the dissertation

It is vital at this stage to briefly discuss the issue of validity and reliability of this dissertation. Runeson & Höst (2009) define validity as the trustworthiness of the results, to what extent they are true and not influenced by a researcher's subjective view. Quite simply, it refers to the repeatability of the study's findings. The problem of validity in qualitative research relates to unnecessary emphasis on results rather than documenting a comprehensive research process (Miles & Huberman, 1994). In other words, qualitative researchers are more

result oriented. Runeson & Höst (2009) argue that validity must be addressed throughout the entire research process in a case study. Yin (2003) highlights four different domains of validity, namely, construct validity, internal validity, external validity and reliability. We will briefly discuss how each of these themes is addressed in this dissertation.

- Construct validity - This aspect of validity essentially reflects the extent to which the operational measures that are investigated really represent what the research has in mind. Other researchers measure construct validity based on whether there is sufficient evidence in applying a particular theory (Kirk & Miller, 1986). It is also includes investigation according to the research questions (Runeson & Höst, 2009). In this dissertation, construct validity is attained by adapting well established theories as a research framework for each of the included papers with the exception of *Papers one* and *two*. These two papers use an SLR and UGT, respectively that do not present concrete theoretical frameworks as other technology adoption theories like the trust model, the UTAUT, the technology acceptance model, etc. Another way we achieve this type of validity in our qualitative studies is by getting feedback from research respondents.
- Internal validity – This aspect of validity is of concern when causal relations are examined. There is a threat to internal validity when a researcher is not aware of a dependent relationship between factors, for example (Runeson & Höst, 2009). Internal validity is achieved in this research by having a clear understanding and level of dependency between the constructs of each of the adapted theories used to collect data.
- External validity – This aspect of validity relates to the extent to which the findings of research are generalizable beyond the investigated scope. With a clear and strict research process undertaken in each of the included papers, we can claim that external validity is achieved to a certain degree.
- Reliability – This aspect of validity is concerned with the auditability of research findings. Reliability is achieved in this dissertation by following a strict research process in each of the included papers. Furthermore, all interviews were tape-recorded and field notes were also taken. We have also used random samples wherever possible, utilized appropriate sample size, avoided bias and our results are not influenced by funding or the desire to seek certain results. We strive as much as possible to adhere to Guba's four criteria for trustworthiness, namely, credibility, transferability, dependability and confirmability (Guba, 1981). We achieve the first criterion by adapting appropriate and well recognized research methods, sampling our participants randomly, performing triangulation and examining previous studies to frame our results. Transferability is attained by providing background data to establish the study context and a detailed description of the phenomenon investigated in each paper. We ensure dependability through in-depth methodological descrip-

tion of each of the included papers. Finally, confirmability is achieved through triangulation and recognizing the demerits in each paper's method and their potential effects. There is also comprehensive documentation detailing how the data are collected and analyzed for each included paper.

Similarly, content validity is ensured in this dissertation by using statistical formulae in determining our respondents. We used two strategies, namely, simple random sampling and the concept of a sufficiently large sample (see Figure 1 for more information). Another key element used to improve the validity and reliability of this dissertation is the use of triangulation as opined by Patton (2001) cited by Golafshani (2003).

7.2 Limitations of the dissertation and future research directions

There are several limitations of this study. Firstly, most of the data were collected from students in only three countries in Africa which were not randomly selected. Secondly, a 0.10 precision value is used instead of 0.05 in determining his sample size in all three countries. This provides a weaker argument in terms of generalizing the results and applying them to the entire African continent. Thirdly, a limited number of ISPs participated in the research. The data collection approaches could have had more ISPs participate in the study so as to represent a broader perspective. Fourthly, respondents in the three case countries (The Gambia, Kenya and Nigeria) are very sensitive to issues relating to the role of government in Internet diffusion. This has to do with their individual perceptions that any negative statement they say about government is tantamount to sabotage. Such a situation is completely different in developed countries. The particular attributes of fear and reservation were evident during the data collection in all three case countries. These factors might have several effects on respondents' true perceptions during data collection. Finally, another difficulty in collecting data in the three countries relates to limited awareness regarding the importance of research. A Chief Executive Officer (CEO) of a renowned Internet ISP in Kenya stated the following:

> I have to tell you the fact…we don't see the importance of collecting data from us in order to help improve Internet use in Kenya. This is just a waste of time and we are not obliged to participate…I am sorry but that is the reality (anonymous CEO).

This quotation implies that research is not positively embraced in Africa compared to developed countries, for example. The aforementioned statement by a CEO of a telecommunication company substantiates this claim. It further underlines the need for urgent sensitization on the African continent regarding the role of research in Internet diffusion. Notwithstanding, it must be stressed that the aforementioned limitations are beyond the authors' control given the nature

of the research context and associated difficulty in collecting data in Africa compared to Europe or the United States.

For future studies on Internet diffusion in developing countries, for instance, Africa should consider a number of research spectrums. Firstly, there should be a greater focus on sociocultural attributes impeding Internet adoption. Secondly, there is a need to develop a comprehensive regional Internet diffusion framework that will increase understanding about the trust relationship between Internet Service Providers and users in Africa. Thirdly, there is a need to extensively apply existing information system theories to studies focusing on Africa in order to identify the potential need for their modification and expansion. Fourthly, future Internet adoption and diffusion studies focusing on Africa should apply our proposed frameworks in order to develop a more comprehensive GIDF for the African continent. A number of IS theories have long been used as guiding tools for ICT policy makers on the continent even though some might not particularly suit the African context or differences between its individual countries.

YHTEENVETO (FINNISH SUMMARY)

Internetillä on valtava ja kiistämätön vaikutus talouskasvuun ja sosiaaliseen muutokseen. Afrikassa mahdollisuudet käyttää tätä keskeistä teknologiaa ovat kuitenkin kehittyneet hitaasti muuhun maailmaan verrattuna. Esimerkiksi vuonna 2014 Internetin levinneisyysaste yksilötasolla oli Afrikassa vain 19 prosenttia. Kyseinen lukema on huomattavasti vähemmän verrattuna maailman keskiarvoon, 40 prosenttiin. Lisäksi, vuonna 2014 Internetin levinneisyysaste kotitaloustasolla oli Afrikassa noin 11 prosenttia, kun vastaava luku koko maailmassa oli noin 44 prosenttia. Nämä tilastot havainnollistavat, että Afrikassa Internetin käyttöön on merkittäviä esteitä. Tämän väitöskirjan ensisijaisena tavoitteena onkin kehittää viitekehyksiä, jotka voivat edistää Internetin leviämisen ja omaksumisen keskeisten elementtien ymmärtämistä. Tämä on mahdollista saavuttaa tunnistamalla kriittisiä menestystekijöitä kestäviin ratkaisuihin, jotka mahdollistavat Internetin paremman saatavuuden Afrikassa. Ensisijaiseen tavoitteeseen pääsemiseksi väitöskirjassa eritellään myös toissijaisia tavoitteita tutkimuskysymysten muodossa. Nämä tutkimuskysymykset ovat linjassa kuuteen artikkeliin, joista tämä väitöskirja koostuu. Väitöskirjassa käytetään triangulaatioon perustuvaa tutkimusasetelmaa, joka koostuu systemaattisesta kirjallisuuskatsauksesta, tapaustutkimuksesta sekä kyselystä. Tutkimuksessa hyödynnetään kolmea aineiston analyysin tekniikkaa: rakenneyhtälömallinnusta, kuvailevaa tilastointia sekä avointa ja epähierarkkista koodausta. Väitöskirja keskittyy kahteen Internetjakelun tärkeään kokonaisuuteen: Internet-palveluntarjoajiin ja käyttäjiin. Tulosten mukaan kuusi kriittistä menestystekijää estää Internetiin pääsyä Afrikassa. Näitä ovat luottamus, fasilitaattorit, saatavuus, infrastruktuuri, käyttäytymisaikomus sekä tietoisuus. Tunnistetut kriittiset menestystekijät kuvataan neljäntoista ulottuvuuden muodossa: Internet-palveluntarjoajien toimituskyky, kyberfobia, Internet-palveluntarjoajien hyväntahtoisuus käyttäjiä kohtaan, Internetpalveluntarjoajat, teknologiapäättäjät, kustannukset, tulot, Internetin solmukohdat, vedenalaiset optiset kuituyhteydet, riittävät sähköt, yksityisyys, turvallisuus, käyttäjän näkemys ja vaadittava paikallinen sisältö. Kuusi kriittistä menestystekijää ja sen neljätoista ulottuvuutta auttavat yleisen, Internetin leviämistä selittävän viitekehyksen kehittämisessä. Lisäksi, väitöskirjassa esitellään neljä viitekehystä. Yhdistettynä, viitekehyksiä voidaan hyödyntää teknologiapäättäjien sekä Internet-palveluntarjoajien työkaluina Internetin leviämisen ja omaksumisen kohentamisessa kehitysmaissa. Ne voivat toimia myös pohjana tutkijoille, jotka kehittävät kokonaisvaltaisempia Internetin leviämisen ja omaksumisen viitekehyksiä tulevaisuudessa.

REFERENCES

Abubakar, F. M. & Ahmad, H. B. 2013. The moderating effect of technology awareness on the relationship between UTAUT constructs andbehavioral intention to use technology: a conceptual paper. Australian Journal of Business and Management Research, 3, 14-23.

African Development Bank 2013, Final report on needs assessment for risk mitigation in Africa: Demands and solutions, Initiative for Risk Management in Africa (IRMA).

Air University Sampling and Surveying Handbook (2002). Guidelines for planning, organizing and conducting surveys, revised (PDF) edition, available at http://www.au.af.mil/au/awc/awcgate/edref/smpl-srv.pdf (accessed 22 July 2014).

Alkhunaizan, A. & Love, S. 2012. What drives mobile commerce? An empirical evaluation of the revised UTAUT model. International Journal of Management and Marketing Academy, 2(1), 82-99.

Al-Shafi, S. & Weerakkody, V. 2009. Factors affecting E-Government adoption in the state of Qatar. European and Mediterranean Conference on Information Systems, Abu Dhabi, UAE

Alshameri, F. & Banjura, A. K. 2014. Creating a metadata to study and teach about African issues. Information Technology & People, 27(3), 341-365.

Amberg, M., Fischl, F. & Wiener, M. 2005. Background of critical success factors research, working paper No.2/2005. Friedrich-Alexander-University Erlangen-Nuremberg, Germany.

Anderson, J. & Billou, N. 2007. Serving the world's poor: innovation at the base of the economic pyramid. Journal of Business Strategy, 28(2), 14-21.

Ani, O. E. 2010. Internet access and use: a study of undergraduate students in three Nigerian universities. The Electronic Library, 28(4), 555-567.

Audi, R. & Murphy, P. E. 2006. The many faces of integrity. Business Ethics Quarterly, 16 (1), 3-21.

Avgerou, C. 2008. Information systems in developing countries: a critical research review. Journal of Information Technology, 23(3), 133-146.

Avgerou, C. 2010. Discourses on ICT and development. Information Technologies and International Development, 6(3), 1-18.

Bankole, F. O., Bankole, O. O. & Brown, I. 2011. Mobile banking adoption in Nigeria. The Electronic Journal of Information Systems in Developing Countries, 47(2), 1-23.

Baran, J. S. 2002. Introduction to mass communication: media literacy and culture. Boston: McGraw-Hills Books.

Baran, J. S. & Davis, D. K. 2001. Mass communication theory: foundations, Ferment and Future, 3rd. edition, Belmont, CA: Thomson

Benhasat, I., Goldstein, D. K. & Mead, M. 1987. The case study research strategy in studies of information systems. MISQ, 11(3), 369-386.

Biolchini, J., Mian, P. G., Natalia, A. C. C. & Travassos, G. H. 2005. Systematic review in software engineering. Technical Report, RT-ES 679/05.

Birch, A. & Irvine, V. 2009. Preservice teachers' acceptance of ICT integration in the classroom: applying the UTAUT model. Educational Media International, 46(4), 295-315.

Bon, A. 2007. Can the Internet in tertiary education in Africa contribute to social and economic development? International Journal of Educationand Development using Information and Communication Technology (IJEDICT), 3(3), 122-131.

Brown, I., T., J. 2002. Individual and technological factors affecting perceived ease of use of web-based learning technologies in a developing country. The Electronic Journal of Information Systems in Developing Countries, 9(5), 1-15.

Brown, M. W. & Cudeck, R. 1993. Alternative ways of assessing model fit. In: Testing structural equation models. K. A. Bollen and J. S. Long, eds. New bury Park, CA: Sage Publications, 136-162.

Brown, I., Letsididi, B. & Nazeer, M. 2009. Internet access in South African homes: a preliminary study on factors influencing consumer choice. The Electronic Journal of Information Systems in Developing Countries, 38(2), 1-13.

Brunn, P., Jensen, M. & Skovgaard, J. 2002. E-Marketplaces: crafting a winning strategy. European Management Journal, 20(3), 286-298.

Bull, C. & Garofalo, J. 2004. Internet access: the last mile. Learning & Leading with Technologies, 32(1), 16-21.

Bwalya, K. J. (2009). Factors affecting adoption of e-Government in Zambia. The Electronic Journal of Information Systems in Developing Countries, 38(4), 1-13.

Caldwell, C. D. & Cunningham, T. J. 2010. Internet addiction and students: implications for school counselors. Available at http://counselingoutfitters.com/vistas/vistas10/Article_61.pdf

Caplan, S. E. 2010. Theory and measurement of generalized problematic Internet use: a two-step approach. Computers in Human Behavior, 26, 1089-1097.

Caplan, S. E. 2002. Problematic Internet use and psychosocial well-being: development of a theory-based cognitive-behavioral measurement instrument. Computers in Human Behavior, 18, 553-575.

Castiglione, J. 2007. Internet abuse and possible addiction among undergraduates: a developing concern for library and university administraors. Library Review, 57(5), 358-371.

Chhachhar, A. R., Khushk, G. M., Chachar, A. A. & Qureshi, B. 2013. Internet usage among university students in Pakistan. Journal of Basic and Applied Scientific Research, 3(9), 31-35.

Creswell, J. W. 2003. Research design: qualitative, quantitative and mixed methods approach. London: Sage.

Dada, D. 2006. The failure of e-Government in developing countries: a literature review. The Electronic Journal on Information Systems in Developing Countries, 26(7), 1-10.

Dalberg Survey Report 2013. Impact of the Internet in Africa: establishing conditions for success and catalyzing inclusive growth in Ghana, Kenya, Nigeria and Senegal. Available online at

http://www.impactoftheinternet.com (accessed 22 July 2014).

Das, T. K. & Teng, B. S. 2001. Trust, control and risk in strategic alliances: an integrated framework. Organizational Studies, 22(2), 251-283.

Davis, G. M. 1999. A test of an interpersonal trust model (integrity, benevolence). Univ Microfilms International.

Deliktas, E. & Kok, R. 2003. Efficiency convergence in transition economies: 1991-2002: a non-parametric frontier approach. Department of Economics, Ege University.

Devi, C. B. & Roy, N. R. 2012. Internet use among university students: a case study of Assam University Silchar. Pratidhwani the ECHO, 1(2), 183-202.

Donner, J. & Tellez, C. A. 2008. Mobile banking and economic development: linking adoption, impact, and use. Asian Journal of Communication, 18(4), 318-332.

Easterbrook, S., Singer, J., Storey, M-A. & Damian, D. 2008. Selecting empirical methods for software engineering research. Guide to advanced empirical software engineering. Available online at

http://www.springerlink.com/index/n815725515063p2m.pdf.

Eriksson, P. & Kovalainen, A. 2008. Qualitative methods in business research, London: SAGE.

Fatoki, O. C. 2004. Impact of library resources and the Internet on undergraduate students' research: University of Ibadan, Nigeria. Nigerian Libraries, 38(1), 21-33.

Feindt, S., Jeffcoate, J. & Chappel, C. 2002. Identify success factors for rapidgrowth in SME e-Commerce. Small Business Economics, 19(1), 51-62.

Field, A. P. 2005. Discovering statistics using SPSS (2nd edition). London: Sage.Fukuyama, F. 1995. Trust: the social virtues and creation of prosperity. New York: Free Press.

Gallivan, M. J. 2001. Organizational adoption and assimilation of complex technological innovations: development and application of new framework. The database for Advances in Information Systems, 32, 51-85.

Gill, H., Boes, K., Finegan, J. & McNally, J. 2005. Antecedents of trust: establishing a boundary condition for the relationship between propensity to trust and intention to trust. Journal of Business & Psychology, 19(3), 287-302.

Glasow, P. A. 2005. Fundamentals of survey research methodology, MITRE, Washington.

Golafshani, N. (2003). Understanding reliability and validity in qualitative research. The Qualitative report, 8, 4, 597-606.

Guba, E. G. 1981. Criteria for assessing the trustworthiness of naturalistic inquiries. Educational Communication and Technology Journal. 29, 75-91.

Heeks, R. 2010. An ICT4D journal ranking table. Information Technologiesand International Development, 6(4), 71-75.

Hicks, N. & Streeten, P. 1979. Indicators of development: the search for a basic need yardstick. World Development, 7(6), 567-580.

Hooper, D., Coughlan, J. & Mullen, M. R. 2008. Structural equation modeling: guideline for determining model fit. The Electronic Journal of Business Research Methods, 6(1), 53-60.

International Statistical Institute 2015. Developing countries. Available online at http://www.isi-web.org/component/content/article/5-root/root/81-developing

International Telecommunication Union 2011. ICT and telecommunications in least developed countries: review of progress made during the decade 2000-2010.

International Telecommunication Union 2013. ICT facts and figures. Available online at
http://itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2013-e.pdf.

International Telecommunication Union 2014. ITU world telecommunications/ ICT Indicators database. Available at http://www.itu.int/en/ITU

Internet World Statistics 2011. Available at http://www.internetworldstats.com

Ismail, A. 2011. Diffusion of telecommunications services in a complex socio-economic context: a comparative diffusion analysis of the fixed line, mobile and Internet services in Pakistan. DTU management engineering, department of management engineering, Technical University of Denmark. Retrieved online at
http://www.orbit.dtu.dk/fedora/objects/orbit:89283/datastreams/file_6308147/content

Joubert, J. & Van Belle, J-P. 2013. The role of trust and risk in mobile commerce adoption within South Africa. International Journal of Business, Humanities and Technology, 3(2), 1-12.

Kaba, B., Diallo, A., Plaisent, M., Bernard, P. & N'da, K. 2006. Explaining the factors influencing cellular phone use in Guinea. The Electronic Journal of Information Systems in Developing Countries, 28(3), 1-7.

Katz, E., Blumler, J. & Gurevitch, M. 1974. Utilization of mass communication by the individual. In J. Blumer & Katz (Eds.), the uses of mass communication: current perspectives on gratifications research (pp. 19-34). Beverly Hills, CA: Sage.

Kende, M. & Hurpy, C. 2012. Assessment of the impact of Internet Exchange Points-empirical study of Kenya and Nigeria. Report for the Internet Society (ISOC), Ref: 20945-144.

Kenny, C. J. 2006. Expanding Internet access to the rural poor in Africa. Information Technology for Development, 9, 25-31.

Kerlinger, F. N. 1986. Foundation of Behavioral Research. New York: Holt, Rinehart and Winston.

Kirk, J. & Miller, M. L. 1986. Reliability and validity in qualitative research. Beverely Hills: Sage Publications.

60

Kitchenham, B. 2004. Procedures for performing systematic reviews. NICTA technical report 0400011T.1.

Kitchenham, B., Breretom, P. O., Budgen. D., Turner, M., Bailey, J. & Linkman, S. 2009. Systematic literature reviews in software engineering – A systematic literature review. Information and Software Technology, 51, 7-15.

Klien, H. K. & Myers, M. D. 1999. A set of principles for conducting and evaluating interpretive field studies in Information Systems. MIS Quarterly, 23(1), 67-93.

Koehn, D. 2005. Integrity as a business asset. Journal of Business Ethics, 58(1-3), 125-136.

Kraemer, K. L. 1991. Introduction paper presented at the Information Systems Research Challenge: Survey Research Methods.

Kuriyan, R., Kitner, K. & Watkins, J. 2010. ICTs, development and trust: an overview. Information Technology & People, 23(3), 216-221.

Kyobe, M. (2011). Investigating the key factors influencing ICT adoption in South Africa. Journal of Systems and Information Technology, 13(3), 255-267.

Laosethakul, K. & Boulton, W. 2007. Critical success factors for e-Commerce in Thailand: cultural and infrastructural influences. Electronic Journal on Information Systems in Developing Countries, 30(2), 1-22.

Leahy, K. B. & Yermis, I. V. 2003. Information and communication technology: gender issues in developing nations. Informing Science Journal, 6, 143-155.

Linder, A. & Santiso, C. 2003. Not everything that counts can be counted: a critical look at risk ratings and governance indicators. Nordic Journal of Political Economy, 29, 105-132.

Lloyd, M. 2005. Towards a definition of the integration of ICT in the classroom, accessed online at http://eprints.qut.edu.au/3553/1/3553.pdf .

Library of Congress 2008. Developing countries. Available online at http://www.loc.gov/acq/devpol/devcountry.pdf

Luambano, I. & Nawe, J. 2004. Internet use by students of the University of Dare es Salaam. Library Hi Tech News, 25(5), 13-17.

Mayer, R. C., Davis, J. H. & Schoorman, F. D. (1995). An integrative model of organization trust. Academy of Management Review, 20(3), 709-734.

Mayer, R. C. & Davis, J. H. 1999. The effect of the performance appraisal system on trust for management: a field quasi experiment. Journal of Applied Psychology, 84(1), 123-136.

Mhlanga, F. S. 2006. A developing country's information and communication technology industry in perspective: a vision for the 21st century. Journal of Integrated Design and Process Science, 10(1), 71-78.

Miles, M. B. & Huberman, A.M. 1987. Qualitative data analysis: a sourcebook for New Methods, 5th edition, SAGE publications, Beverly Hills, London, New Delhi.

Mofleh, S., Wanous, M., & Strachan, P. 2008. Developing countries and ICT initiatives: lessons learnt from Jordan's experience. The Electronic Journal Information of Systems Evaluation, 34(5), 1-17.

Morahan-Martin, J. & Schumacher, P. 1997. Incidence and correlates of pathological Internet use. Paper presented at the annual convention of the American Psychological Association.

Mouton, J. 1996. Understanding social research. Pretoria: Van Schaik.

Musa, P. F. 2006. Making a case for modifying the TAM to account for limited accessibility in developing countries. Information Technology for Development, 12, 213-224.

Nielsen, L. 2011. Classifications of countries based on their level of development: How it is done and how could it be done. IMF working paper WP/11/31. Available online at
http://www.imf.org/external/pubs/ft/wp/2011/wp1131.pdf.

Nunnally, J. 1978. Psychometric theory. New York: McGraw Hill.

Nwagwu, E. W., Adekannbi, J. & Bello, O. 2009. Factors influencing use of the Internet: a questionnaire survey of students of University of Ibadan, Nigeria. The Electronic Library, 27, 4, 718-734.

Obijiofor, L. 2009. Mapping theoretical and practical issues in the relationship between ICTs and Africa's socioeconomic development. Telematics and Informatics, 26, 32-43.

Oliveira, T. & Martins, M. F. 2011. Literature review of information technology adoption models at firm level. The Electronic Journal of Information Systems Evaluation, 14, 110-121.

Osang, F. 2012. Internet access in Nigeria: perception of National Open University of Nigeria (NOUN) students. International Journal of Emerging Technology and Advanced Engineering, 2(10), 492-497.

Oskiakwan, E. M. K. 2007. Is Africa in a digital guagmire? Available online at http://www.satsig.net/gispa-afrispa.htm.

Oyelaran-Oyeyinka, B. & Adeya, C. N. 2004. Internet access in Africa: empirical evidence from Kenya and Nigeria. Telematics and Informatics, 21, 67-81.

Pan, Z., Yan, W., Jing, G. & Zheng, J. 2011. Exploring structured inequality in Internet use behavior. Asian Journal of Communication, 21, 116-132.

Patchin, J. W. & Hinduja, S. 2006. Bollies move beyond the schoolyard: a preliminary look at cyberbullying. Youth Violence and Juvenile Justice, 4, 148-169.

Parasuraman, A. 2000. Technology readiness index (TRI): a multi-item scale to measure readiness to embrace new technologies. Journal of Service Research, 2, 307-320.

Pejovic, V., Johnson, D. L., Zheleva, M., Belding, E., Parks, L. & Van Stam, G. 2012. The bandwidth divide: obstacles to efficient broadband in rural Sub-Saharan Africa. International Journal of Communication, 6, 2467-2491.

Pinsonneault, A. & Kraemer, K. L. 1993. Survey research methodology in management information systems: an assessment. Journal of Management Information Systems, 10, 75-105.

Punnoose, A. C. 2012. Determinants of intention to use eLearning based on the technology acceptance model. Journal of Information Technology: Research, 11, 301-337.

Popola, N. F. 2013. The effect of trust in adoption of Internet banking: a case study of Nigeria. International Journal of Economic and Business Management, 1(2), 19-24.

Qiang, C. Z-W., Rossotto, C. M. & Kimura, K. 2009. Economic impacts of broadband. Available online at http://siteresources.worldbank.org/EXTICAD/Resources/ICAD_Broadband_35_50.pdf.

Recabarren, M., Nussbaum, M. & Leiva, C. 2008. Cultural divide and Internet. Computers in Human Behavior, 24, 2917-2926.

Raji, M. O. , Ayoade, O. B. & Usoro, A. 2006. The Prospects and problems of adopting ICT for poverty eradication in Nigeria. The Electronic Journal on Information Systems in Developing countries, 28(8),1-9.

Reijswould, V. V. 2009. Appropriate ICT as a tool to increase effectiveness in ICT4D: theoretical considerations and illustrating cases. The Electronic Journal on Information System in Developing Countries, 38(9), 1-18.

Rena, R. 2008. The Internet in tertiary education in Africa: recent trends. International Journal of Computing and ICT Research, 2(1), 9-16.

Robson, C. 2002. Real world research. Blackwell (2nd edition).

Rogers, E. M. 1995. Diffusion of innovations (4th ed.). New York: The Free Press.

Rosengren, K. E. 1974. Uses and gratifications: a paradigm outlined. In J. G. Blumer & E. Katz (Eds), the uses of mass communications: current perspectives on gratification research (p. 269-286). Beverly Hills, CA: Sage.

Rousseau, D. M., Sitkin, S. B., Burt, R. S. & Camerer, C. 1998. Not so different after all: across disciplinary view of trust. Academy of Management Review, 23(3), 393-404.

Runeson, P. & Höst, M. 2009. Guidelines for conducting and reporting case study research in software engineering. Empir Software Eng., 14, 131-164.

Safdar, M., Mahmood, K. & Qutab, S. 2010. Internet use behavior and attitude of college students: a survey of Leadership College Network. Library Philosophy and Practice (e-journal), paper 366.

Sahey, S. & Avgerou, C. 2002. Introducing the special Issue on Information and Communication Technologies in Developing Countries. The Information Society, 18, 73-76.

Sahin, Y. G., Balta, S. & Ercan, T. 2010. The use of Internet resources by university students during their course project elicitation: a case study. The Turkish Online Journal of Educational Technology, 9(2), 234-244.

Salman, A., & Hasim, M. S. 2011. Internet usage in a Malaysian sub-urban Community: a study of diffusion of ICT innovation. The Innovation Journal: The Public Sector Innovation Journal, 16(2), 1-15.

Silvius, S. 2011. Internet Exchange Points: A closer look at the differences between continental Europe and the rest of the world.

Siomos, K. E., Dafoulie, E. D., Braimiotis, D. A., Mouzas, O. D. & Angelopoulos, N. V. 2008. Internet addiction among Greek national adolescent students. Cyberpsychology and Behavior, 11, 653-657.

Six, F. 2005. The trouble with trust: the dynamics of interpersonal trust building. Cheltenham: Edward Elgar Publishing, Inc.

Strauss, A. L. 1987. Qualitative analysis for social scientists. New York: Cambridge University Press.

Strauss, A. & Corbin, J. 1990. Basics of qualitative research: grounded theory procedures and techniques. London: Sage.

Tahiroglu, A. Y., Celik, G. G., Uzel, M., Ozcan, N. & Avci, A. 2008. Internet use among Turkish adolescents. Cyberpsychology and Behavior, 11, 537-543.

Tellis, W. 1997. Introduction to case study, the Qualitative Report, 3, 2. Available online at http://www.nova.edu/ssss/QR/QR3-2/tellis1.html.

Thapa, D. 2011. The role of ICT actors and networks in development: the case study of a wireless project in Nepal. Electronic Journal of Information Systems in Developing Countries, 49(1), 1-16.

Thaw, Y. Y., Mahmood, A. K. & Dominic, P. D. D. 2009. A study on factors that influence the consumers' trust on e-commerce adoption. International Journal of Computer Science and Information Security, 4(1-2), 1-7.

The Gambia Public Utilities and Regulatory Authorsity (PURA) 2011. PURA's annual report. PURA, Banjul, The Gambia

Theodoropoulou, P. V. 2012. The introduction of digital television in the UK: a study of its early audience. a PhD thesis submitted to the department of media and communications, London School of Economics, London.

Touray, A. 2013. Internet abuse among university students: a neglected theme in Africa. International Journal on Information Technologies andSecurity, 5(4), 3-12.

Udende, P. 2010. Internet access and use among students of the University of Ilorin, Nigeria. Journal of Communication and Media Research, 2(1), 33-42.

UNICEF 2011. The state of the world's children report. Adolescence: an age of opportunity. Available online at http://www.unicef.org/adolescence/files/SOWC_2011_Main_Report_EN_02242011.pdf (accessed September 18 2014)

United Nations 2014. Geographical regions and composition. Available online at http://unstats.un.org/unsd/methods/m49/m49regin.htm

United States Central Intelligence Agency (www.cia.gov).

Venkatesh, V., Morris, M. G., Davis, G. B. & Davis, F. D. 2003. User Acceptance of Information Technology: Toward a Unified View. MIS Quarterly, 27(3), 425-478.

Venkatesh, V., Thong, J. Y. L. & Xu, X. 2012. Consumer acceptance and use of information technology: extending the Unified Theory of Acceptance and Use of Technology. MIS Quarterly, 36, 157-178.

64

Wahid, F. 2007. Using the technology adoption model to analyze Internet adoption and usage among men and women in Indonesia. Electronic Journal of Information Systems in Developing Countries, 32(6), 1-8.

Walsham, G. & Sahey, S. 2006. Research on information systems in developing countries: current landscape and future prospects. Information Technology for Development, 12, 7-24.

Weston, R. & Gore Jr., P. A. 2006. A brief guide to structural equation modeling. The Counseling Psychologist, 34(5), 719-751.

Williams, M. 2001. In whom we trust: group membership as an affective context for trust development. Academy of Management Review, 26(3), 377-396.

World Bank 2015. World development indicators. Available at http://data.worldbank.org

World Economic Forum 2011. The new Internet world: a global perspective on freedom of expression, privacy, trust and security online, a contribution to the Global Information Technology Report 2010-2011 transaction 2.0.

Wu, Y., Tao, Y. & Yang, P. 2008. The use of unified theory of acceptance and use of technology to confer the behavioral model of 3G mobile telecommunication users. Journal of Statistics & Management Systems, 11, 919-949.

Yahya, M., Nadzar, F., Masrek, N. & Rahman, B. A. 2011. Determinants of UTAUT in measuring user acceptance of e-Syariah portal in Syariah courts in Malaysia. a paper presented at the 2nd International Research Symposium in Service Management, Yogyakarta, Indonesia.

Yin, R. K. 1984. Case study research: design and methods, Beverly Hills, CA: Sage Publications.

Yin, R. K. 1994. Case study research: design and methods (2nd. edition), Beverly Hills, CA: Sage Publishing.

Yin, R. K. 2003. Case study research: design and methods (3rd edition), London, Sage.

Young, K. S. 1996. Addictive use of the Internet: a case study that breaks the stereotype. Psychological Reports, 79, 899-902.

Young, K. S. 1998. Internet addiction: the emergence of a new disorder. CyberPsychology and Behavior, 1(3), 237-244.

Young, K.S. 2004. Internet addiction: a new clinical phenomenon and its consequences. American Behavioral Scientist, 48(4), 402-415.

Zeffane, R. 2010. Towards a two-factor theory of interpersonal trust: a focus on trust in leadership. International Journal of Commerce and Management, 20(3), 246-257.

ORIGINAL PAPERS

I

INTERNET ABUSE AMONG UNIVERSITY STUDENTS: A NEGLECTED THEME IN AFRICA

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INTERNET ABUSE BY UNIVERSITY STUDENTS: A NEGLECTED THEME IN AFRICA

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Abstract: The purpose of this paper is to investigate potential Internet abuse by university students, an area lacking research focus in Africa. A case study was conducted at the University of The Gambia (UTG) in 2012. A total of 200 questionnaires were randomly administered to UTG students and 181 valid responses were available for analyses. The result indicates that about 18% of UTG students use the Internet for unspecified activities, demonstrating attributes that could reveal potential Internet abuse. Considering the negative implications of this phenomenon, African researchers cannot afford to neglect this theme.

Key words: Africa, Internet abuse, The Gambia, university students

1. INTRODUCTION

The Internet is important in human life [16] and its use has a great impact on students' academic career. It forms one of the largest knowledge depositories in the world [31]. The Internet is an inseparable part of today's educational system [34] and enables students to communicate in order to share ideas, knowledge, experiences and cultures [12]. According to these researchers, more students are relying on the Internet than other source areas for their academic needs. This finding is supported by other researchers [22 and 8]. On the contrary, [11] claim that more students in their study use the Internet for entertainment while others argue it is used for communication and academic purposes [18, 34 and 32].

However, previous studies conducted in Africa on students' use of the Internet seem to neglect the issue of Internet abuse. Therefore, this paper aims to initiate a continental research spectrum on the subject in order to bridge the research gap between Africa and other more widely studied regions. As the first research of its kind to be conducted in The Gambia, its findings will be equally vital to university administrator and policy makers in the country and beyond.

This paper utilizes the Uses and Gratifications (U&G) theory as its theoretical framework. The U&G theory explains that media do not do things to people; instead, people do things with media [20 and 33]. In other words, this theory seeks to highlight how individuals use mass communication to gratify their needs [6]. Users of mass media actively use whatever the media can offer [7 and 13]. These researchers stress that the Internet is one of the most dominant media which enables students to enjoy selecting the information that best suits their need. Of course, they may also use it for other reasons. This theory was used by [40] in an article entitled "Internet access and use among students of the University of Illorin." This research aims to answer the following questions:

- RQ1: What do you use the Internet for?
- RQ2: How often do you use the Internet and where do you access it?
- RQ3: How much time do you spend on each Internet related activity per session?

The remainder of this paper is organized as follows: *Section two* covers the literature review and *Section three* presents the research methodology. *Section four* covers the data analysis and presentation of results while *Section five* concludes the paper.

2. LITERATURE REVIEW

The Internet is a very important and indispensable resource for students [35] and there is a strong relationship between its use and educational performance [37, 30, 10 and 38]. Despite the potentials of the Internet, the aforementioned researchers argue that inappropriate use of this vital technology can significantly affect students' academic performance. According to [36], Internet use is said to be inappropriate when it undermines one's ability to fulfill his or her responsibilities. [9] stress the need to ask questions about Internet use as it exhibits warning signs to identify Internet addiction. Studies related to students' use of Internet and their attitudes towards it have attracted great interest from other parts of the world, as well. In fact, this subject has been investigated by other researchers [12]. It is important to obtain relevant information on students' educational use of the Internet [16]. Doing so would enable the identification of Internet abuse related issues. University students are considered to be high risk group for Internet addiction [44 and 23]. It is a new disorder that was first described by psychologist Kimberly Young [45]. Internet addiction is one danger of Internet abuse in addition to online gambling, trafficking of pornographic materials, cybersex and cyberbullying [43 and 29].

Africa has seen significant number of research focusing on university students' use of the Internet. An earlier study by Luambano and Nawe [22] that was conducted at the University of Dar es Salaam in Tanzania revealed that most of the students who used the Internet did not do so for academic

purposes. A study by Fatoki [17] contradicts this finding by stating that two thirds of the students in their research used the Internet for academics. Similarly, [40] also highlighted that most students in Nigeria use the Internet for academic purposes. However, subsequent study on the continent strengthened the findings by Luambano and Nawe [22] that more university students use the Internet for communication [5]. Several research have been conducted in Africa related to Internet use in a university environment [1, 2, 3, 4, 5, 15, 17, 21, 24, 25, 26, 27 and 28].

3. RESEARCH METHODOLOGY

This research employed case study design. Yin [42] defines this research design as an "empirical inquiry that investigates a contemporary phenomenon within a real-life context: when the boundaries between phenomenon and context are not clearly evident, and in which multiple sources of evidence are used." The case study is a valuable method of research with distinctive characteristics that make it ideal for many types of investigation. Tellis [39] considers it as a triangulated research strategy which could be used for a single case or multiple cases.

3.1 CASE CONTEXT

The University of The Gambia is the only university in The Gambia. The country is the smallest mainland nation in Africa with a population of about 1.8 million people and an Internet user percentage of just 7.6 [41]. The Gambia experienced a real GDP growth average of about 6.5 percent a year from 2008 to 2010 [19]. The same report indicates that it has recorded the best GDP growth from 2007 to 2010 among all Sub-Saharan African countries with the exceptions of South Africa and Namibia. The Gambia currently has six Internet Service Providers and it is the headquarters of the Africa Coast to Europe (ACE) submarine cable. The project was launched on December 20th, 2012 and will provide direct cable connectivity to Equatorial Guinea, Liberia, Mauritania, Guinea, Sao Tome & Principe, Sierra Leone and The Gambia.

Table 1: Country statistics

Country name	The Gambia
• capital city	Banjul
• geographic coordinates	13 27 N and 16 34 W
Area (square kilometers)	11,295
• land	10,000
• water	1,295
Land boundary (kilometers)	740
Coast line (kilometers)	80
Age structure (%)	
• 0-14	39.2
• 15-24	21.1
• 25-54	32.5
• 65 and above	3.2
Population	1,883,051
• population growth (%)	2.29
• birth rate	32.59 births/1000 population
• death rate	7.38 deaths/1000 population
Life expectancy at birth (years)	
• total population	64.09
• male	61.78
• female	66.47
Adult prevalence rate of HIV/AIDS (%)	2
Literacy rate (age 15 and above who can read and write) (%)	
• total population	51.1
• male	60.9
• female	41.9

Source: adapted from tradingeconomics.com

3.2 SURVEY ADMINISTRATION

The survey in The Gambia was conducted from September 19th to November 12th, 2012 at the University of The Gambia. In order to seek the consent of our potential respondents and also minimize the number of unreturned questionnaires, we first visited individual classes from the selected faculties and enlightened the participants about the research. During that period, those who were interested in participating in the research were asked to write their names under the administrative region they came from in The Gambia. This approach helped us to

have participants from every region of the country. A simple random sampling method was conducted to select the research participants. This was due to the fact that more people were willing to participate in the research than the target number of 200. Each selected participant was then given a questionnaire to complete within a week. Participants were sampled from four randomly chosen faculties, namely, Art & Science, Information and Communication Technology, Law and Business Administration. Out of the total 200 administered questionnaires, 181 valid responses were received representing about a 91% return rate. Among the valid respondents, 63 claimed to be females, 114 males and three did not indicate their gender.

4. DATA ANALYSIS & RESULTS

The data analysis phase in this paper comprises of descriptive statistics and quotations from respondents. The qualitative results reveal that most students from the University of The Gambia mainly used the Internet for social communication, followed by academic use and entertainment. However, about 18% of UTG students used this technology for unspecified activities at excessive levels (see Table 2). This demonstrates attributes that could reveal potential Internet abuse.

Table 2: Internet usage per session

usage purpose	extent of usage (%)							
	≤ 10	11-20	21-30	31-40	41-50	51-60	61-70	> 70
academic	0	5	10	25	30	35	40	16
work	8	20	13	20	4	12	2	1
social communication	6	8	12	50	14	50	14	16
entertainment	13	20	26	40	4	8	2	0
shopping	1	0	0	0	0	0	0	0
downloading movies	0	10	1	0	0	0	0	0
unspecified activities	1	2	0	0	3	4	15	6

Total respondents = 181 (11 of them did not indicate their Internet use pattern)
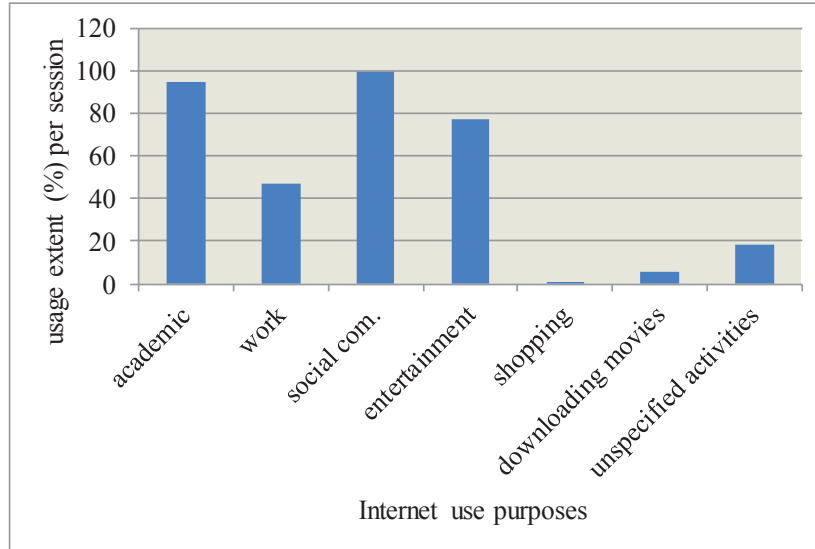
Figure 1: Internet usage pattern

The percentage frequency of UTG students' use of the Internet for various purposes is illustrated by Figure 2. Further qualitative analysis shows that most UTG students use the Internet on a daily basis primarily at Internet cafés (see Table 3). One respondent wrote the following comments:

> *"The Internet infrastructure in the university is really poor which makes most of us to go to Internet Cafés. We have a very high tendency to use the Internet for non-academic activities once we are off-campus."* (Anonymous)

Table 3: Use frequency and place of access

Internet usage	frequency	place of access	frequency
daily	79	university	70
weekly	62	home	38
every 2 – 3 weeks	25	work	37
rarely	9	Internet café	89

In order to effectively benefit from the potentials of the Internet as a knowledge repository, one UTG student assert the following statement:

"The UTG as the nation's only university should have an efficient Internet infrastructure for the students. The terrible Internet infrastructure force[s] us to learn using hard ways when there are modern learning tools such as the Internet. We have to utilize the full potentials of [this innovation] if we are to compete with our counterparts from other regions." (Anonymous)

5. CONCLUSION

The findings of this paper indicate that about 18% of students at The University of The Gambia (UTG) use the Internet for unspecified purposes. The key results can be broadly summarized as follows:

- There is evidence of potential Internet abuse by UTG students.
- Most UTG students access the Internet away from UTG campuses, mainly at Internet cafés.
- The majority of UTG students use the Internet for social communication followed by academic use and entertainment, respectively.
- Majority of UTG students use the Internet on a daily basis.

The findings of this paper suggest the need for a new research spectrum on the issue of Internet abuse or addiction by university students in Africa as it happened in other regions. A significant number of African scholars have investigated the continent's university students' use of the Internet. However, one can barely find any study that looks into inappropriate use of this technology such as Internet abuse patterns. The University of The Gambia needs to provide effective Internet access on UTG campuses. As one student asserts, they tend to explore the funny view of the Internet once they access it outside university campuses. Considering the negative implications of Internet abuse on individuals and societies, African researchers cannot afford to neglect this research spectrum.

REFERENCES

[1] Ani, O. E. (2010). Internet access and use: a study of undergraduate students in three Nigerian universities. *The Electronic Library*, 28, 4, 555-   567.

[2] Ani, O. E., Esin, J. E. & Edem, N. (2005). Adoption of Information and Communication   Technology (ICT) in academic libraries: a strategy for library networking in Nigeria. *The Electronic Library*, 23, 6, 701-708.

[3] Anunobi, C. V. (2006). Survey on impediments to students' use of Internet facilities. *The Information Technologist*, 3, 2, 40-50.

[4] Awoleye, M. O., Siyanbola, O. W. & Oladipo, F. O. (2008). Adoption assessment of Internet   usage amongst undergraduates in Nigeria   universities – a case study approach. *Journal of Technology   Management & Innovation*, 3, 1, 84-89.

[5] Badu, E. E. & Markwei, E. D. (2005). Internet awareness and use in the University of Ghana. *SAGE Journal Online*, 21, 4, 260-268.

[6] Baran, J. S. & Davis, D. K. (2001). Mass Communication Theory: Foundations, Ferment and Future, 3rd. edition, Belmont, CA: Thomson Wadsworth.

[7] Baran, J. S. (2002). Introduction to Mass Communication: media literacy and culture. Boston: McGraw-Hills Books.

[8] Biradar, B. S., Rajashekhar, G. R., Sampath and Kumar (2006). A study of Internet usage by   students and faculties in Kuvempu University. *Library Herald*, 44(4), 283-294.

[9] Caldwell, C. D. & Cunningham, T. J. (2010). Internet addiction and students: implications   for   school   counselors.   Retrieved   from http://counselingoutfitters.com/vistas/vistas10/Article_61.pdf

[10] Castiglione, J. (2007). Internet abuse and possible addiction among undergraduates: a developing concern for library and university administrators. *Library Review*, 57, 5, 358-371.

[11] Chhachhar, A. R., Khushk, G. M., Chachar, A. A. and Qureshi, B. (2013). Internet usage among university students in Pakistan. *Journal of Basic and Applied Scientific Research*, 3, 9, 31-35.

[12] Devi, C. B. & Roy, N. R. (2012). Internet use among university students: a case   study of Assam University Silchar. *Pratidhwani-A Journal of   Humanities and Social   Sciences*, 1, 2, 183-202.

[13] Devito, J. A. (1991). Human communication: the basic course. 5th. edition, New   Jersey: Prentice Hall.

[14] Eisenhardt, K. M. (1989). Building Theories from Case Study Research. *The Academy of Management Review*, 14, 532-550.

[15] Eke, F. M. (2006). Information and Communication Technologies (ICTSs), awareness and use by academic staff in tertiary institution in Imo   State.

Nigerian Library and   Information Science Trend: Journal of NLA, Imo State Chapter, 4, 1/2, 20-36.

[16] Fallow, D. (2004). The Internet and daily life: Many American use the Internet in everyday activities but traditional offline habits skill dominate. Retrieved from http://www.pewInternet.org/pdfs/pip-   college-   report.pdf.

[17] Fatoki, O. C. (2004). Impact of library resources and the Internet on undergraduate students' research: University of Ibadan, Nigeria. *Nigerian Libraries*, 38, 1, 21-33.

[18] George, C., Bright, A., Hurlbert, T., Linke, E. C., St. Clair, G. & Stein, J. (2006). Scholarly use of graduate students' information seeking behavior. Retrieved online from   http://repository.cmu.edu/lib_science/21.

[19] International Monetary Fund (2012). The Gambia 2011 Article IV Consultation, IMF Country Report No. 12/17, Washington, D.C.

[20] Katz, E., Blumler, J. & Gurevitch, M. (1974). Utilization of mass communication by the   individual. In J. Blumler & Katz (Eds.), the uses of mass communication: current perspectives on gratifications   research   (pp.   19-34). Beverly Hills, CA: Sage.

[21] Lawal, K. O., Adegbemile, A. A., Aribisala, J. O. & Oke, S. A. (2008). A survey on the use   of computers and Internet in conducting research and training in a developing country. *The Pacific Journal of Science   and   Technology*, 9, 1, 83-89.

[22] Luambano, I. & Nawe, J. (2004). Internet use by students of the University of Dare es Salaam. *Library Hi Tech News*, 25, 5, 13-17.

[23] Niemz, K., Griffifths, M. & Banyard, P. (2005). Prevalence of pathological Internet use among university students and correlations with self-   esteem,   the General Health Questionnaire (GHQ) and disinhibition.   *Cyberpsychologyand Behavior*, 8, 562-570.

[24] Nwagwu, E. W., Adekannbi, J. & Bello, O. (2009). Factors influencing use of the Internet: a questionnaire survey of students of University of Ibadan, Nigeria. *The Electronic Library*, 27, 4, 718-734.

[25] Ojokoh, B. A. & Asaolu, M. (2005). Studies of Internet access and usage by students of the Federal University of Technology in Akure, Nigeria.   *African Journal of Library, Archival and Information Science*, 15, 2,   149- 153.

[26] Okiy, R. B. (2005). Strengthening information provision in Nigeria university libraries through information and communication technologies. *The Electronic Library*, 23, 3, 311-318.

[27] Osang, F. (2012). Internet access in Nigeria: Perception of National Open University of Nigeria (NOUN) students. *International Journal of Emerging Technology and   Advanced Engineering*, 2, 10, 492-497.

[28] Osunade, O. & Ojo, O. O. (2006). Library and Internet usage: a case study of the University of Ibadan. *The Information Technologist*, 3, 2, 19-29.

International Journal on Information Technologies & Security, Volume 5, No. 4, 2013 appears in header.

[29] Patchin, J. W. & Hinduja, S. (2006). Bollies move beyond the schoolyard: a preliminary look   at cyberbullying. *Youth Voilence and Juvenile Justice*, 4, 148-169.

[30] Recabarren, M., Nussbaum, M. & Leiva, C. (2008). Cultural divide and Internet. *Computers in Human Behavior*, 24, 2917-2926.

[31] Rena, R. (2008). The Internet in tertiary education in Africa: recent trends. *International Journal of Computing and ICT Research*, 2, 1, 9-16.

[32] Rena, H. P., Pavlina, R. & Paul, S. (2007). A preliminary assessment of Google Scholar as a source of EAP students' research materials. *Internet and Higher Education*, 10, 1, 65-76.

[33] Rosengren, K. E. (1974). Uses and gratifications: a paradigm outlined. In J. Blumler & Katz (Eds.), the uses of mass communication: current perspectives on gratifications research (pp. 269-286). Beverly Hills, CA: Sage.

[34] Safdar, M., Mahmood, K. & Qutab, S. (2010). Internet use behavior and attitude of college students: a survey of Leadership College Network. *Library Philosophy and Practice (e-journal)*, paper 366.

[35] Sahin, Y. G., Balta, S. & Ercan, T. (2010). The use of Internet resources by university students during their course project elicitation: a case study. *The Turkish Online Journal of Educational Technology*, 9, 2, 234-244.

[36] Scherer, K. (1997). College life online: healthy and unhealthy Internet use.*Journal of College and Student Development*, 38, 6, 655-663.

[37] Siomos, K. E., Dafoulie, E. D., Braimiotis, D. A., Mouzas, O. D. & Angelopoulos, N. V. (2008). Internet addiction among Greek   national adolescent students. *Cyberpsychology and Behavior*, 11, 653- 657.

[38] Tahiroglu, A. Y., Celik, G. G., Uzel, M., Ozcan, N. & Avci, A. (2008). Internet use among Turkish adolescents. *Cyberpsychology and Behavior*, 11, 537-543.

[39] Tellis, W. (1997). Introduction to Case Study, the Qualitative Report, 3, 2. Retrieved from http://www.nova.edu/ssss/QR/QR3-2/tellis1.html.

[40] Udende, P. (2010). Internet access and use among students of the University of Ilorin, Nigeria. Journal of Communication and Media Research,   2(1), 33-42.

[41] United States census bureau (2012). Retrieved from http://www.census.gov/compendia/statab/2012/tables/12s1392.pdf

[42] Yin, R. K. (1984). Case Study Research: Design and Methods, Beverly Hills, Calif: Sage Publications.

[43] Young, K.S. (2004). Internet addiction: a new clinical phenomenon and its consequences. *American Behavioral Scientist*, 48, 4, 402-415.

[44] Young, K. S. & Rogers, R. C. (1998). The relationship between depression and Internet addiction. *Cyberpsychology and Behavior*, 1, 25-28.

[45] Young, K. S. (1996). Addictive use of the Internet: a case study that breaks the stereotype. *Psychological Reports*, 79, 899-902.

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II

ICT BARRIERS AND CRITICAL SUCCESS FACTORS IN DEVELOPING COUNTRIES

by

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ICT Barriers and Critical Success Factors in Developing Countries

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ABSTRACT
Since the early 1990s, Information and Communication Technology (ICT) has been perceived as a catalyst for development. However, the UNICEF State of the World's Children Report 2011 acknowledges that the poor in many developing countries remain largely excluded from ICT and its benefits. This paper aims to address three issues. Firstly, identify ICT barriers in the literature from 2000 to 2011. Secondly, identify ICT barriers through empirical findings and thirdly, categorize these barriers into critical success factors. These aims are achieved by comparing the findings in the literature to our recent empirical results. Two methodologies are used in this study, namely, a systematic literature review and a case study; the empirical data for our case study was collected from The Gambia in autumn of 2012. The systematic literature review covers 1107 studies (2000-2011) published in the top five ranked ICT4D journals in terms of journal citation ranking. The paper identifies a total of 43 ICT barriers. Forty of them are common to both studies while the remaining three were revealed in the case study, namely, lack of Internet exchange points, micromanaging and invisible hands. The barriers in both studies are grouped into eight possible critical success factors and their degrees of severity are then compared. This paper argues that lack of Internet exchange points is an important ICT barrier that is overlooked in our review pool.

Keywords: Barriers, critical success factors; developing countries; ICT

1. INTRODUCTION

Many researchers (Avgerou 2008; Bankole et al., 2011; Deliktas & Kok, 2003; Hicks & Streeten, 1979; Sahay & Avgerou, 2002 and Walsham & Sahay, 2006) perceive ICT as a platform for creating an information-intensive society. Other researchers argue that ICT has turned the world into an information-intensive society and it is considered as the nerve of growth that can tremendously transform the economic, political, cultural, and social conditions in many developing countries (Deliktas & Kok, 2003 and Hicks & Streeten, 1979). However, the achievement in today's ICT domain cannot exclude the tremendous role of the Internet because it provides the platform for any meaningful web-based application. The Internet is one of the

technologies required to support information processing in order to execute applications and deliver services (Mofleh et al,. 2008; Raji et al., 2006). However, the UNICEF State of the World's Children Report 2011 acknowledges that the poor in many developing countries remain largely excluded from ICT and its benefits. Research has shown the existence of such exclusion in terms of Internet access (Internet World Statistics Website 2011 and ITU 2011) which is the driving force of today's ICT domain. For instance, the Internet penetration rates in Africa and Asia are just 11.4% and 23.8%, respectively (Internet World Statistics Website 2011); they are both less than the world average of 30.2%. Furthermore, only 1.2% of the population in the least developed countries has access to Internet. Conversely, Internet users per 100 inhabitants in these regions are just 3.0 which is about one-tenth of the corresponding world average of 30.1. The digital divide between developed and developing nations also extends to bandwidth available to end-users. For example, while a 2 Mbps (megabit per second) ADSL (asynchronous digital subscriber line) link in the United States costs approximately 40 USD per month, a 2 Mbps broadband connection in Pakistan costs approximately 400 USD per month (Saif et al., 2009). Dada (2006) underscores that this wide disparity in access to technology implies that a solution in a country with high levels of connectivity will not necessarily work in a country with extremely low levels. Even if the income levels in these countries were the same, the Pakistani version still represents ten times the cost of the American region; it is worth mentioning that actual income would be even less favorable in the case of Pakistan. This study aims to synthesize the ICT barriers found in the top five ICT4D journals based on Heeks' (2010) journal citation rankings and compared them to our empirical findings in order to find out missing barriers. The identified barriers in both studies will then be categorized into critical success factors and compare the results from the systematic literature review to our empirical findings obtained through a case study.

The remainder of the paper is organized as follows: *Section 2* explains the key concepts used in this study and *Section 3* provides an overview of our research methodologies. *Section 4* covers the data analysis while *Section 5* entails our study results. *Section 6* focuses on discussion while Section *7 concludes* the paper and states the future of research.

2.   KEY CONCEPTS
For conceptual clarity, we have defined the key concepts used in this paper, namely, ICT, developing countries, critical success factors, barriers, Es and Ms. The concept of *ICT* could generally relate to those technologies that are used for accessing, gathering, manipulating and presenting or communicating information. The technologies could include hardware (e.g. computers and other devices), software applications and connectivity (e.g. access to the Internet, local networking infrastructure, videoconferencing, etc.) (Lloyd 2005). The term *developing countries* simply refers to countries that are typically found in the lower levels of different taxonomies (Nielsen 2011). Several definitions of the concept of critical success factors (CSFs) exit. One of the most frequently cited definitions is represented as follows:

> "*Critical success factors… are… the limited number of areas in which results, if they are satisfactory, will insure successful competitive performance for the organization. They are the few key areas where "things must go right" for the business to flourish. If results in these areas are not adequate, the organization's efforts for the period will be less than desired*" (Laosethakul and Boulton 2007, p.3).

It is worth mentioning that the aforementioned definition of CSFs can be extended beyond an organizational level. Hence, in this study, we define the *critical success factors* as categories of barriers (not individual barriers) that must be addressed in order to guarantee ICT success in developing countries. In our analysis part, we focus more on the critical success factors than the individual barriers. A number of researchers (Laosethakul and Boulton 2007; Feindt et al., 2002 and Brunn et al., 2002) have used the critical success factors approach to identify the key drivers of a particular phenomenon they have studied. A *barrier* is defined as "any condition that makes it difficult to make progress or to achieve an objective" (Schoepp 2005). A number of synonyms to barriers are used in ICT literature, namely, constraints, challenges, obstacles, impediments and difficulties. However, for the sake of simplicity, we refer to all these terms as barriers. The terms *Es* refer collectively to a set of applications that enable people to use electronic devices like computers and 3G phones to access, store, transfer information such as eCommerce, eBanking and eHealth, while the *Ms* perform similar function but with mobility, for example, m-banking, m-payments, m-transfer and m-finance (adopted from Donner & Tellez, 2008).

3.   RESEARCH METHODOLOGIES
This paper encompasses two methodologies, namely, a systematic literature review (SLR) and a case study. The SLR enables us to synthesize the ICT barriers from 1107 studies published from 2000-2011 in the top five ranked ICT4D journals in terms of journal citations rankings according to Heeks' (2010) ranking. The empirical data was collected through a case study methodology which helps us to identify the overlooked ICT barriers. The barriers from both studies are then categorized into critical success factors and their degrees of severity are compared.

3.1   Methodology for the Systematic Literature Review
The methodology we employed herein is based on systematic literature review (SLR), which is one of the common research methods used in identifying critical success factors of a particular phenomenon (Amberg at al. 2005). "SLR is a specific research methodology developed in order to gather and evaluate the available evidence pertaining to a focus topic" (Biolchini et al., 2005). Kitchenham (2004) defined SLR as means of identifying, evaluating and interpreting all available research relevant to a particular research question, topic, or phenomenon. Our review procedure follows a similar pattern to that of Kitchenham et al. (2009), namely, research questions, research process, inclusion and exclusion criteria, quality assessment, data collection, data analysis, results, discussion and conclusion

3.1.1 *Inclusion and Exclusion Criteria (IExC)*
This study employs two levels of inclusion and exclusion criteria, namely, IExC for journal selection and IExC for study selection. We limited the scope of this study only to ICT4D journals because they have a rich database when it comes to ICT studies in developing countries. This basis conforms to the study selection criteria in a systematic literature review (Kitchenham 2004). We included the following top five ICT4D journals according to Heeks' (2010) ranking based on the citation rates:

<div align="center">**Table 1:** Review Pool</div>

Source	Acronym
Information Technology for Development	IT4D
Electronic Journal of Information Systems in Developing Countries	EJISDC
Information Technologies & International Development	ITID
Asian Journal of Communication	AJC
African Journal of Information & Communication	AJIC

We considered a number of studies based on our adopted inclusion criteria: studies that are either research papers or articles, published from 2000 to 2011 and relevant to our research questions (see Kitchenham 2004 for more information). Based on these inclusion criteria, we excluded the following studies: practitioner reports, commentaries, special issues in the form of an introduction, editorial introductions, discussion papers and concept notes. The decision to include or exclude a study was based on four criteria, namely, study title, abstract, results or findings and conclusion. This helped us to reduce the time of the entire review process considering the huge amount of studies in the included journals.

3.1.2   Review Process
In order to maintain a clear level of consistency during the review process, we adopted a three-way recursive approach:

1. We accessed the online archive of each of the included journals.

2. We accessed the studies in their respective publication order, starting from the year 2000 through 2011.

3. We then looked at the title of each paper. If it seemed directly related to our research objective or question, it then formed part of the included studies and was marked *selected* (see Table 2). If not, we scanned through the abstract, results or findings, and the conclusion especially in search of the following key words, namely, barriers, challenges, obstacles, impediments, constraints and difficulties. Based on the scanning, we decided whether or not the study qualified as one of our selected studies.

These steps were repeated until all the studies in the included journals were exhausted. Table II shows the number of studies selected from each journal. The term *total* in this table refers to the number of studies in the archive of each of the included journals. The highlighted part of AJIC figures indicates that the included studies were published in 2009/2010 and 2010/2011, respectively.

Out of the 253 studies reviewed from the ITID journal, only 36 of them were selected as part of our review pool. For the EJISDC, 237 studies were selected out of 332, 40 out of 202 from the IT4D journal, 28 out of 76 studies from the AJIC journal and 13 out 244 from the AJC as part of our review pool. This implies that the ITID and EJISDC account for 10.2% and 66.9%, respectively out of the selected studies in our review pool. IT4D accounts for 11.3%, while AJIC and AJC each account for about 7.9% and 3.7%, respectively.

Table 2: Sources Searched for Years 2000 – 2011

Journal/Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	TOTAL
ITID (Total)	0	0	0	16	54	13	25	19	16	24	55	37	**253**
ITID (Selected)	0	0	0	1	1	5	1	4	5	3	4	12	**36**
EJISDC (Total)	20	14	27	37	24	16	45	29	21	33	33	33	**332**
EJISDC (Selected)	18	12	20	5	16	8	35	23	19	33	17	31	**237**
IT4D (Total)	19	0	0	22	0	25	23	26	26	24	26	11	**202**
IT4D (Selected0	9	0	0	9	0	7	2	6	5	6	4	1	**40**
AJIC (Total)	4	6	6	5	6	9	9	8	6	9		8	**76**
AJIC (Selected)	0	2	5	2	5	5	1	1	4	9		3	**28**
AJC (Total)	0	0	0	14	18	21	31	33	31	33	35	28	**244**
AJC (Selected)	0	0	0	1	0	1	2	2	5	0	0	2	**13**
Total number of studies reviewed													**1107**
Total number of studies selected													**354**

3.2   Case Study Methodology

A case study methodology was used in identifying the overlooked ICT barriers in an empirical form. This type of methodology is defined by Yin (1994) as an "empirical inquiry that investigates a contemporary phenomenon within a real-life context: when the boundaries between phenomenon and context are not clearly evident, and in which multiple sources of evidence are used." Case study is a valuable method of research with distinctive characteristics that make it ideal for many types of investigation. Tellis (1997) considers it as a triangulated research strategy which could be used for a single or multi-case.

3.2.1   Brief Background of the Case Country

The Gambia is the smallest country on mainland Africa with a population of about 1.8 million people and an Internet user percentage of just 7.6 (US Census Bureau 2012). The country is surrounded by Senegal on all sides except to the west where it borders the Atlantic Ocean. It is about 30 miles (48.2 kilometers) in width and about 149.1 miles (240 kilometers) in length. The Gambia is divided into seven administrative regions: Banjul City Council, Kanifing Municipal Council, West Coast Region, North Bank Region, Lower River Region, Central River Region and Upper River Region. The country had a real GDP growth average of about 6.5% a year from 2008 to 2010 (IMF 2012). The same report indicates that it recorded the best GDP growth from 2007 to 2010 among all Sub-Saharan African countries except for South Africa and Namibia. The Gambia is expected to experience an annual growth of 5.5% (IMF 2012).

Figure 1: Map of The Gambia

Source: worldatlas.com

The Gambia currently has six Internet Service Providers. A total of 10 Internet access technologies have been deployed in the country, namely, 3G, GPRS, DSL, ISDN, fiber, VPN, dial-up, CDMA, air-span and WCDMA. The Gambia is also the headquarters of the Africa Coast to Europe (ACE) submarine cable which is one of the most ambitious telecommunication projects in the sub-region. The project was launched on December 20th, 2012 and the total design capacity of the submarine cable is 5.12 terabytes. The 17,000 kilometer long submarine cable will provide direct cable connectivity to Equatorial Guinea, Liberia, Mauritania, Guinea, Sao Tome & Principe, Sierra Leone and The Gambia.

3.2.2   Data Collection

We used a case study methodology to identify the barriers to Internet diffusion adoption in The Gambia as a single case. The data was collected from September 19th to November 12th, 2012 in collaboration with The Gambia Public Utilities and Regulatory Authority (PURA) as the host institute.

We administered a total of 200 questionnaires related to Internet adoption at the user level. Our sample was drawn from students of the University of The Gambia. In order to seek the consent of participants and also minimize the problem of non-return questionnaires, we first visited each class from all selected faculties and enlightened the participants about the research. Since the study aims to generalize the results, the country was divided into clusters based on existing administrative demarcation. Those students interested in participating in the research were then asked to voluntarily write their names under the administrative region they came from in the country. The students were then randomly selected from each administrative region based on the students' voluntary information. This approach helped us to include participants from every region as we had planned earlier. We sampled the population using a simple random sampling method because the number of students who were willing to participate in the research was more than our target of 200 participants. The randomly selected faculties are Information

and Communication Technology, Law, Business Administration and Arts & Sciences. Each randomly selected student was then given a questionnaire to complete within a maximum period of one week. A total of 179 out of 200 questionnaires were successfully completed and returned (about 90% return rate) to the faculty office of each selected faculty. The Dean of each faculty identified two to three students who helped the researcher in collecting the data.

Table 3: Distribution of Research Respondents

| Age range | Gender | | Total number of participants |
	Female	Male	
≤ 20	4	6	10
21 - 25	48	47	95
21 - 25	*no gender specified*		2
26 - 30	4	30	34
26 - 30	*no gender specified*		2
31 - 35	3	16	19
36 - 40	1	6	7
41 - 45	0	1	1
46 - 50	0	0	0
51 - 55	0	1	1
56 - 60	0	0	0
≥ 61	0	0	0
no age range specified	5	3	8
Total number of participants	**65**	**110**	**179**

Five interviews were also administered at the Internet Service Providers (ISPs) level each lasting for at least forty-five minutes. The participating ISPs were GAMTEL, Netpage, Unique Solutions, Africell and Lanix. A formal written request of participation was sent to the CEOs of all ISPs prior to data collection. This communication was mainly channelled through The Gambia public utilities and regulatory authority but a personal follow-up was also conducted by the researcher. Upon receipt of acceptance to participate in the research, a formal visit was also made to all the ISPs in order to further educate them on the research before scheduling the respective interviews. The participants in the interviews were CEOs, technical directors, senior managers and managers. The managers and senior managers were drawn from two departments: technical and marketing or customer services departments.

4. DATA ANALYSIS

All the interviews were type-recorded and manually transcribed based on transcription schemes of direct type recording (Miles and Huberman 1987). The data was then analyzed using open coding and non-hierarchical axial coding (Strauss and Corbin 1990). These coding schemes were also used in the systematic literature review study. In the first phase of the analysis, we used the open coding technique (Strauss and Corbin 1990) to identify the main ICT barriers brought up in the selected articles of our review pool. This technique was conducted by sweeping through the results and conclusion of each of the studies. Different authors used different terminology like challenges, impediments, constraints, difficulties, etc. in describing ICT barriers. However, we simply refer to these different terminologies as barriers. Each identified barrier in both studies is essentially synonymous to one of those illustrated in Table 4. The barriers are then categorized

into critical success factors (see Table 5). However, the case study reveals three more barriers that were not explicitly captured in the systematic literature review study. They are lack of Internet Exchange Points, micromanaging and invisible hands (see Section 5).

Table 4: ICT Barriers in Both Studies

Common ICT Barriers		Overlooked ICT Barriers
lack or inadequate fixed telephone lines	insufficient use or non-existing universal service fund	lack of Internet exchange points (IXPs)
corruption	lack of research and development	micromanaging
lack of investment	political instability	invisible hands
insecurity	lack of language skills	
low income	lack of relevant local content	
lack of software and hardware	complex technology	
lack of political will	lack of access	
monopoly	limited sustainability of networks	
lack of cultural knowledge or limitations	low Internet bandwidth	
obsolete technologies	unreliable Internet connection	
high cost	inadequate or lack of electricity supply	
low returns on investment	perceived lack of privacy	
high risk for investment	lack of maintenance culture	
unnecessary bureaucracy	lack of proper planning and coordination	
resistance to change	lack of incentives	
inappropriate technologies	poor network reception	
poor regulation	lack of ICT skills	
high taxes	fear of technology	
lack of regional initiatives	high illiteracy	
lack of proper legal framework	scarcity of technical personnel	

In the second phase of analysis, we employed the non-hierarchical axial coding technique (Strauss and Corbin 1990) to group the identified barriers into eight categories that we called *critical success factors*. The frequency of occurrence per category was then identified for both studies (see Figure 4). Researchers proposed that success or failure of ICT projects can be understood in terms of several critical factors (Best & Kumar, 2008). However, this paper limits the scope of critical success factors (see Figure 3) to refer to the category of barriers that must be overcome in order to achieve success. For contextual clarity, we provide a brief explanation of the eight critical success factors.

- **Political & Leadership (PL):** most developing countries do not have ICT policies to guide the provision and usage of ICTs. It is, however, difficult to record progress in the absence of clear policies and the determined implementation of such policies. The role of government and good leadership is imperative in this process.

- **Socio-Cultural (SC):** this mainly encompasses language barriers, societal attitudes towards ICTs and the scarcity of local ICT content, particularly in developing countries. These factors hugely hinder access to ICT services in these regions.

- **Infrastructural (IF):** the success of ICT greatly depends on good infrastructure that enables the availability and accessibility of ICTs. Availability refers to the presence of infrastructure that delivers ICT services while accessibility denotes the freedom to use such services with minimum or without limitations. Rangaswamy & Nair (2010) underscore that the success of ICT requires large infrastructural investment.

- **Technical (TN):** this denotes the types of barriers that impede smooth delivery or implementation of ICTs. It essentially refers to the technological limitations associated with ICTs which include poor network reception, slow Internet connection, system integration problems, etc. Technical constraints differ from infrastructural in the sense that the latter do not entail technological limitations of ICTs. Instead they focus on the availability and accessibility of ICTs. Technical barriers essentially comprises of technology related barriers.

- **Educational & Skills (ES):** this mostly refers to the human capacity to understand, use and manage ICTs. It includes topics like illiteracy, lack of ICT skills and poor educational systems in developing countries.

- **Economical (EC):** this refers to the financial aspects involved in ICTs. It includes the ability of ICT users, services providers and investors to accommodate ICTs in terms of per capita income. It essentially denotes the cost factors of ICTs which include costs of ICT equipment, services and networks.

- **Security & Safety (SS):** this refers to the uncertainty associated with the use of ICTs. It includes the conditions of safely being able to use ICT and the freedom from danger that ICTs pose to individuals and societies at large.

- **Legal & Regulatory (LR):** ICT, especially in the developing world, is often impeded by laws and regulations. The legal and regulatory framework governing ICT in these countries is often not proactive. It essentially hinders individuals in using ICTs and deters potential ICT service providers. Regulators in developing countries are generally weak, dependent and often part of a system in which the legacy operator captures the regulatory and political process (Proenza 2006).

**Table 5: Barriers Grouped into Critical Success Factors**

Political & Leadership	Technical	Socio-Cultural	Economical	Security & Safety	Legal & Regulatory	Infrastructural	Educational & Skills
corruption	obsolete technologies	lack of cultural knowledge or limitations	low income	perceived lack of privacy	lack of proper legal framework	lack of or inadequate fixed telephone lines	scarcity of technical personnel
lack of political will	inappropriate technologies	resistance to change	lack of investment	insecurity	poor regulation	lack of software and hardware	high illiteracy
unnecessary bureaucracy	complex technology	fear of technology	low returns on investment			lack of access	lack of ICT skills
high taxes	low Internet bandwidth	lack of relevant local content	high costs			inadequate or lack of electricity supply	lack of research and development
lack of regional initiatives	unreliable Internet connection	lack of maintenance culture	insufficient use or non-existing universal service fund			lack of Internet exchange points	
political instability	poor network reception	lack of language skills	limited sustainability of networks				
lack of proper planning or cordination			lack of incentives				
monopoly			high risk on investment				
invisible hands							
micromanaging							

The frequency of occurrence of each critical success factor was then determined. The results from the systematic literature review and the empirical data from our case study were then presented (see Figure 2). A comparison of the degree of severity of the critical success factors in both studies is shown in this figure.

5.   RESULTS

We identify a total of 43 ICT barriers in developing countries. Forty of them are common to both studies while the remaining three were revealed in our case study. However, the identified barriers can be essentially categorized as being economic socio-cultural (SC), infrastructural (IF), political and leadership (PL), legal and regulatory (LR), economical (EC), educational and skills (ES), technical (TN) and security and safety (SS) as shown in Figure IV. We refer to these terms as the critical success factors (CSFs) which represent varying degrees of severity. The frequency of occurrence of these CSFs shows that infrastructural and economic constraints are major problems in both studies. However, our results show some significant difference in the prevalence of the remaining ones. For instance, political and leadership constraints are minimal in The Gambia compared to the literature. Similar results also show that the literature review study has a much higher frequency of occurrence for legal and regulatory constraints. This is also true for security and safety. However, the remaining critical success factors still pose a problem in both studies, namely, educational and skills, socio-cultural and technical.

Figure 2: Frequency of the CSFs in Both Studies
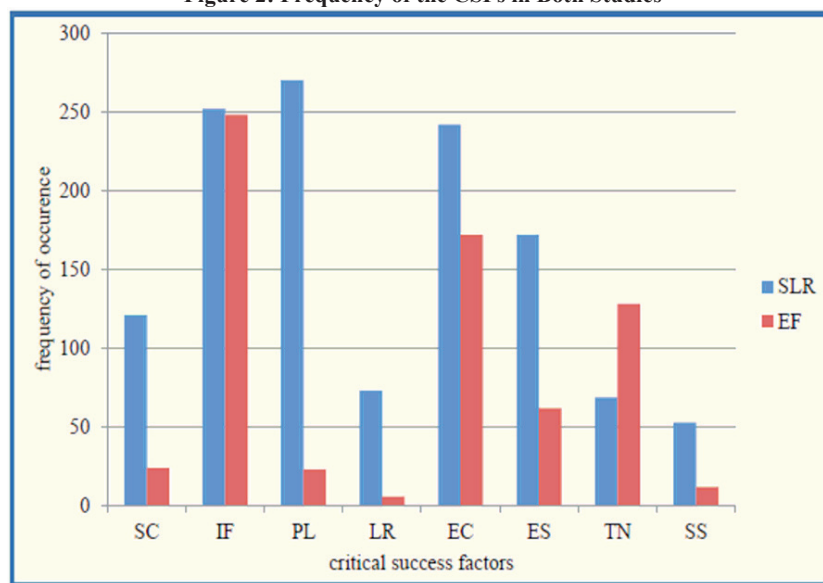
Our empirical data reveals three more barriers that are not explicitly captured in the systematic literature review study. They are the lack of Internet Exchange Points (IXPs), invisible hands and micromanaging. The lack of IXPs came up in all the five interviews and it

was highlighted as a single factor responsible for the high cost of Internet in developing countries. The participants argued that their Internet traffic is never local even for communications at national level, i.e., from one ISP to the other. Some of the highlights related to the overlooked ICT barriers from the systematic literature review study are quoted as follows:

- **Lack of Internet Exchange Points (IXPs):** "*[The] high cost of Internet in Africa as a whole depend[s] on the lack of continental, regional, cross-border and local IXPs. In Europe, America [as well as in] other developing countries, every state, city and town has an IXP. This is missing in Africa and until this happens, the cost of Internet will never be affordable*" (Abraham Simon, CEO of Netpage Gambia limited).
- **Micromanaging:** "*This has been a major problem [for] us. We delegate responsibility without the relevant authority to enforce it. Responsibility without authority is useless. Leaders should be able to say this is what I want and it has to be done; engage the right people to work on how it will be done and how much it will cost; engage someone who is able to sell the idea to someone who can finance or approve it. Once the selling is done and bought, it must not be subjected to further approva*l" (Pa Modou Gassama, former director of technical planning, Gambia Telecommunications Company Limited).
- **Invisible hands:** "*One of the main barriers we have been facing relates to foreign government/investors who fund development projects in developing countries and eventually force them to give contracts to their home companies regardless of the cost*" (Respondent X).

6.   DISCUSSION
The literature review included 66 different countries (see the APPENDIX). The studies included in the systematic literature review used a wide range of data collection technique. The main ones are online survey, interview (face to face, focus group, in-depth interview, expert interview), hyperlink analysis, questionnaires, content analysis observation, personal reflection, document and literature reviews. Conversely, the main methodologies used were case study (narrative, explorative and interpretive), literature review, ethnography, longitudinal, dramatism, survey and action research.

     The empirical data from the case study is very unique in the sense that studies focusing on The Gambia are hard to come by in ICT literature. Despite being the smallest mainland country in Africa with a population of about 1.7 million people, The Gambia has huge potential in terms of ICT. The country has a more favorable open market policy compared to other neighboring countries and Africa as a whole. For example, The Gambia has six Internet Service Providers compared to only two in Senegal with a population of about 13.3 million people. The Gambia Public Utilities and Regulatory Authority (PURA) is a very active institute in terms of regulation and consumer protection.

     It is important to equally highlight that at the moment, Gambians are very sensitive to issues relating to the role of government in general ICT dispensation. This has to do with citizens' individual perceptions that any negative statement they say about government is tantamount to sabotage and could warrant prosecution; this situation is completely different in developed countries. This particular attribute of fear and reservation greatly affect the entire data collection process within this research. People are completely afraid to discuss issues related to government's role. This makes it very difficult to conduct research in The Gambia. Another unique attribute of the country is that almost everyone is related and that people are hesitant to

decline a request. These social attributes have their advantages and disadvantages and will have an important impact on any research conducted in The Gambia. However, this research will serve as a catalyst for future studies in The Gambia.

This study acknowledges the significant contribution made by the research community towards achieving an information society through the use of ICT. However, there is room for further research, particularly in developing countries. For instance, the research published in the journals included in our research pool focuses more on ICT applications such as the Es and Ms at the expense of accessibility to Internet. It must be acknowledged that the effective use of the Es and Ms greatly depend on Internet access. Therefore, future research in developing countries should strive to have a balance between the Es and Ms and that of Internet access, particularly the last mile. Several studies have underscored the high cost of ICT in developing countries as one of the main factors impeding technology diffusion and adoption in these regions. However, the studies in our review pool neglect to explore the main factor responsible for this which is lack of Internet Exchange Points. This phenomenon has resulted to exorbitant cost of Internet service in developing countries compared to the developed nations.

7.   CONCLUSION

Many researchers (Avgerou 2008; Bankole et al., 2011; Deliktas & Kok, 2003; Hicks & Streeten, 1979; Sahay & Avgerou, 2002 and Walsham & Sahay, 2006) perceive ICT as a platform for creating an information-intensive society. However, in order to achieve this, ICT barriers must be effectively addressed. This paper shows that ICT barriers in developing countries do not differ to a great extent. We identify 43 ICT barriers in both studies that are grouped into eight possible critical success factors, namely, socio-cultural, infrastructural, political and leadership, legal and regulatory, economical, educational and skills, security and safety and technical. The frequency of occurrence of the critical success factors shows that infrastructural and economic constraints are major problems in both studies. However, our results show some significant difference in the prevalence of the remaining critical success. For instance, the empirical findings show that political and leadership constraints are minimal in The Gambia compared to the literature. Similar results also show that the literature review study has a much higher frequency of occurrence for legal and regulatory constraints. This is also true for security and safety. However, the remaining critical success factors still pose a problem in ICT diffusion and adoption in both studies. They are educational and skills, socio-cultural and technical.

This paper concludes that a lack of Internet Exchange Points (IXPs), micromanaging and invisible hands are very important factors that need to be explored in future studies. Micromanaging is a situation where responsibilities are given without the authority to enforce them. This phenomenon can greatly affect the implementation of ICT projects. Another identified ICT barrier from our empirical data is invisible hands which has been described by one of the interviewees as foreign governments or investors who fund developmental projects in developing countries and eventually force them to give contracts to their home companies regardless of the cost. This implies that ICT barriers go beyond the boundaries of developing countries. The availability of Internet Exchange Points can change the poor ICT status in developing countries mainly through affordable Internet service provision. Several studies have identified the high cost of Internet service as one ICT barrier. However, they neglect to explore the main factor responsible for this which is Internet Exchange Points. This study argues that future research in developing countries should focus on these overlooked ICT barriers

particularly, the lack of Internet Exchange Point. The main limitation of this paper is that it compares the result from multiple studies to that of a single case study result.

REFERENCES
Amberg, M., Fischl, F. & Wiener, M. (2005) Background of Critical Success Factors Research, Working Paper No.2/2005. Friedrich-Alexander-University Erlangen- Nuremberg, Germany.
Avgerou, C. (2008) Information Systems in Developing Countries: A Critical Research Review. *Journal of Information Technology*, **23**, 3, 133-146.
Bankole, F.O., Bankole, O. & Brown, I. (2011) Mobile Banking Adoption in Nigeria. *Electronic Journal on Information Systems in Developing Countries,* **47,** 2, 1-23.
Best, M. L. & Kumar, R. (2008) Sustainability Failures of Rural Telecenters: Challenges from the Sustainable Access in Rural India (SARI) Project. *Information Technologies & International Development*, **4,** 4, 31-45.
Biolchini, J., Mian, P. G., Natalia, A.C.C. & Travassos, G.H. (2005) Systematic Review in Software Engineering, Technical Report, RT-ES 679/05.
Brunn, P., Jensen, M. & Skovgaard, J. (2002) E-Marketplaces: Crafting a Winning Strategy. *European Management Journal*, **20**, 3, 286-298.
Dada, D. (2006) The Failure of E-Government in Developing Countries: A Literature Review. *The Electronic Journal on Information Systems in Developing Countries,* **26**, 7, 1-10.
Deliktas, E. & Kok, R. (2003) Efficiency Convergence in Transition Economies: 1991- 2002 A Non Parametric Frontier Approach, Department of Economics, Ege University.
Donner, J. & Tellez, C. A. (2008) Mobile Banking and Economic Development: Linking Adoption, Impact and Use. *Asian Journal of Communication*, **18**, 4, 318-332.
Feindt, S., Jeffcoate, J. & Chappel, C. (2002) Identify Success Factors for Rapid Growth in SME e-Commerce. *Small Business Economics*, **19**, 1, 51-62.
Heeks, R. (2010) An ICT4D Journal Ranking Table. *Information Technologies and International Development*, **6**, 4, 71-75.
Hicks, N. & Streeten, P. (1979) Indicators of Development: The Search for a Basic Need Yardstick. *World Development*, **7**, 6, 567-580.
International Monetary Fund (2012) The Gambia 2011 Article IV Consultation, IMF Country Report No. 12/17, Washington, D.C.
Internet World Statistics (2011) http://www.internetworldstats.com

International Telecommunication Union (2011) ICT and Telecommunications in Least Developed Countries: Review of Progress made during the Decade 2000-2010.

Kitchenham, B. (2004) Procedures for Performing Systematic Reviews. NICTA Technical Report 0400011T.1.

Kitchenham, B., Breretom, P.O., Budgen. D., Turner, M., Bailey, J. & Linkman, S. (2009) Systematic Literature Reviews in Software Engineering- A Systematic Literature Review. *Information and Software Technology*, **51**, 7-15.

Laosethakul, K. & Boulton, W. (2007) Critical Success Factors for E-Commerce in Thailand: Cultural and Infrastructural Influences. *Electronic Journal on Information Systems in Developing Countries*, **30**, 2, 1-22.

Lloyd, M. (2005) Towards a Definition of the Integration of ICT in the Classroom, http://eprints.qut.edu.au/3553/1/3553.pdf.

Miles, M.B. & Huberman, A.M. (1987) Qualitative Data Analysis: A Sourcebook for New Methods, 5th edition, SAGE publications, Beverly Hills, London, New Delhi.

Nielsen, L. (2011) Classifications of Countries Based on their Level of Development: How it is Done and How Could it be Done. IMF Working Paper WP/11/31. http://www.imf.org/external/pubs/ft/wp/2011/wp1131.pdf.

Proenza, F.J. (2006) The Road to Broadband Development in Developing Countries is through Competition Driven by Wireless and Internet Telephony. *Information Technologies & International Development*, **3**, 2, 21-39.

Rangaswamy, N. & Nair, S. (2010) The Mobile Phone Store Ecology in Mumbai Slum Community: Hybrid Networks for Enterprise. *Information Technologies & International Development*, **6**, 3, 51-65.

Raji, M.O., Ayoade, O.B. & Usoro, A. (2006) The Prospects and Problems of Adopting ICT for Poverty Eradication in Nigeria, *The Electronic Journal on Information Systems in Developing countries*, **28**, 8, 1-9.

Sahay, S. & Avgerou, C. (2002) Introducing the Special Issue on Information and Communication Technologies in Developing Countries. *The Information Society*, **18**, 73-76.

Saif, U., Chudhary, A.L., Butt, S., Butt, N.F. & Murtaza, G. (2009) A Peer-to-Peer Internet for Developing World. *Information Technologies & International Development*, **5**, 1, 31-47.

Schoepp, K. (2005) Barriers to Technology Integration in a Technology-Rich Environment, Learning and Teaching in Higher Education. *Gulf Perspectives*, **2**, 1, 1-24.

Strauss, A. & Corbin, J. (1990) Basics of Qualitative Research: Grounded Theory Procedures and Techniques. London: Sage.

Tellis, W. (1997) Introduction to Case Study, the Qualitative Report, 3, 2. http://www.nova.edu/ssss/QR/QR3-2/tellis1.html.

US Census Bureau (2002) http://www.census.gov/compendia/statab/2012/tables/12s1392.pdf.

Walsham, G. and Sahay, S. (2006) Research on Information Systems in Developing Countries: Current Landscape and Future Prospects, *Information Technology for Development*, **12**, 7-24.

Yin, R.K. (1994) Case Study Research: Design and Methods (2nd. edition), Beverly Hills, CA: Sage Publishing.

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APPENDIX

Countries Covered in the SLR Study

Africa	Asia	Europe	Middle East	South America
Benin	Bangladesh	Croatia	Bahrain	Argentina
Botswana	China	Estonia	Iraq	Bolivia
Burkina Faso	India	Poland	Jordan	Brazil
Cameroon	Indonesia	Romania	Kuwait	Chile
Chad	Malaysia	Russia	Lebanon	Colombia
Cote d'Ivoire	Maldives		Oman	Dominican Republic
Egypt	North Korea		Palestine	Ecuador
Ethiopia	Pakistan		Qatar	Mexico
Ghana	Singapore		Saudi Arabia	Peru
Kenya	South Korea		Syria	
Liberia	Sri Lanka		United Arab Emirates	
Malawi	Taiwan		Yemen	
Mali	Thailand			
Mauritius	The Philippines			
Morocco	Uzbekistan			
Mozambique	Vietnam			
Namibia				
Nigeria				
Rwanda				
Senegal				
South Africa				
Sudan				
Tanzania				
Tunisia				
Zimbabwe				

III

THE IMPACT OF MODERATING FACTORS ON BEHAVIORAL INTENTION TOWARDS INTERNET: A TRANSNATIONAL PERSPECTIVE

by

Touray, A., Salminen, A., & Mursu, A., 2013

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The Impact of Moderating Factors on Behavioral Intention Towards Internet: a Transnational Perspective

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Abstract—**Moderating factors are interacting terms used when the relationship between a dependent and independent variable is weak, inconsistent or nonexistent. They form an integral part of both the Unified Theory of Acceptance and Use of Technology (UTAUT) and its extended version (UTAUT2). In this paper, we examine the direct impact of six moderating factors (age, gender, experience, complexity and education) on behavioral intention towards Internet which influence Internet use. The first three factors are used in both UTAUT frameworks to study technology use. Survey research methodology was employed in which data was collected from 368 respondents in Nigeria and The Gambia. Our findings suggest that only experience and complexity influence behavioral intention towards Internet in both countries. The impacts of age, gender, income and education however, vary significantly between these two countries. For instance, the respondents' support of gender, income and education more strongly influences their behavior towards Internet in The Gambia than in Nigeria, while that of age is weaker. On the contrary, respondents' support of age is stronger in Nigeria whereas that of gender, income and education are relatively weak compared to The Gambia. These statistics suggest that socio-demographic variables like age, gender, income and education influence behavioral intention towards Internet. However, the extent to which this is true varies significantly across national boundaries.**

Keywords-behavioral intention; Internet use; moderating factors; Nigeria; The Gambia

I. INTRODUCTION

The Internet is one of the most important innovations that transformed today's ICT domain. It is significantly changing the costs and modes of communication within Africa and between Africans and the rest of the world [21]. The Internet is a technology required to support information processing which is needed to execute applications and deliver services [30][36]. Among the prominent applications of the Internet are the *Es* and *Ms* which are used in Africa in areas such as health, education, governance and journalism [27]. The term Es refers collectively to a set of applications that enable people to use electronic devices like computers and 3G phones to access, store or transfer information such as eCommerce, eBanking, eHealth, etc. The Ms perform similar functions overcoming mobility such as m-banking, m-payment, m-transfer and m-finance [16]. Research shows that Sub-Saharan Africa has the highest known ratio of mobile users of any region in the world [19]. However, studies have shown that this boom in the mobile voice industry does not translate to corresponding Internet use [6]. Other researchers like [51] focus their study on the impact of the Internet. One important factor for the success of information technology is users' acceptance and use of technology [1]. Therefore, it is imperative to investigate the factors that determine individuals' behavior towards a technology like the Internet.

The unified theory of acceptance and use of technology (UTAUT) [44] and its extended version UTAUT2 [45] are widely used to study technology use. A moderating variable is an interacting term used when the relationship between independent and dependent variable is surprisingly weak, inconsistent or nonexistent [2]. They are extensively used in both UTAUT frameworks mainly to moderate the relationship between core determinants (e.g., performance expectancy, effort expectancies, social influence, etc.) and behavioral intention. Still the application of the UTAUT theory has produced contradictory findings in terms of the relationship between social influence and behavioral intention. For instance, Abubakar & Ahmed [3] found a significant relationship between these two UTAUT constructs. Their findings were supported by other researchers [18][50]. However, the study by Birch & Irvine [10] reveals no significant relationship between social influence and behavioral intention in technology adoption. Their findings were substantiated by other researchers [48]. These

contradictory findings are due to the fact that contextual similarity between different studies does not necessarily produce consistent findings [2]. For instance, Foon & Fah [18] focuses on the relationship between the four core UTAUT determinants (performance expectancy, effort expectancy, social influence and facilitating conditions) and behavioral intention. However, [10] utilizes both the aforementioned core determinants as well as three moderating factors.

In this paper, we took a novel approach by neglecting the effect of UTAUT core determinants on behavioral intention as in previous studies [10][3][4][50]. Instead, we examine the direct impact of six moderating factors on behavioral intention towards Internet. The rest of this paper is organized as follows: *Section 2* explains the theoretical background and *Section 3* describes our research methodology. *Section 4* entails the data analysis and our results are presented in *Section 5*. *Section 6* concludes the paper, states its limitations and provides the direction of future research.

II. THEORETICAL BACKGROUND

There are essentially three schools of thought in technology adoption: adoption, diffusion and domestication [34]. This taxonomy has been used by a number of other researchers [14][15][23][28][41]. These researchers argue that the diffusion school broadly describes the pattern by which technologies are typically adopted by a group of people over time. The adoption school focuses on the decision to adopt a particular technology and tries to explain the factors that influence the decision plan on an individual level. The domestication school typically tries to understand how information and communication technologies are domesticated. This paper is based on the adoption school. The unified theory of acceptance and use of technology (UTAUT) is our adapted theoretical framework. We chose this theory because of its explanatory power since it integrates eight other models while accounting for their limitations. The integrated models are the technology acceptance model (TAM), the diffusion of innovation theory (DOI), the theory of planned behavior (TPB), the theory of reasoned action (TRA), the motivational model, Combined-TAM-TPB, PC utilization and the social cognitive theory [2]. According to Wu and other researchers [48], the explanatory power of UTAUT for technology-using behavior is about seventy percent making it more effective than any of the previously used models. This model has been applied and adapted to a number of studies that are similar to ours [8][11][13][26][45][49]. There are opportunities for future research to strengthen the unified theory of acceptance and use of technology in understanding technology acceptance and use [44]. They stress the need to identify and test additional model boundary conditions in order to contribute to an even richer comprehension of technology adoption and usage behavior [43]. This assertion has led to the extension of UTAUT to UTAUT2 [45] in which
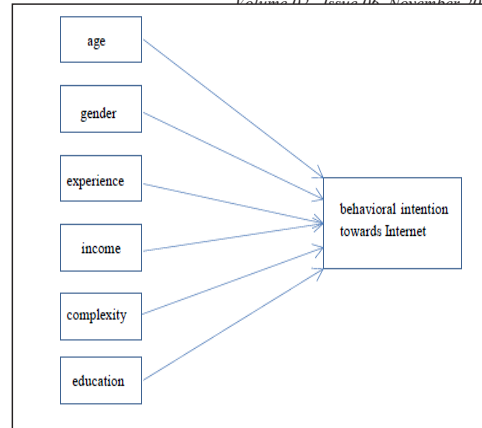

Figure 1. Research framework

three more core determinants are added, namely, hedonic motivation, price value and habit.

This paper utilizes three moderating factors of the unified theory of acceptance and use of technology: age, gender and experience. We added three more potential factors, namely, income, complexity and education. The use of these additional factors is based on their importance in general ICT diffusion and adoption as evidence in previous research. For instance, [37] underscores the significance of complexity in technology diffusion while [36] echoes similar sentiment about education. The impact of income in technology ICT diffusion and adoption has been revealed by other studies [7][31]. A recent study has also shown the importance of all the six variables in ICT diffusion and adoption in developing countries [42]. We develop a research framework based on these factors and investigate their respective impact on behavioral intention towards Internet.

III. RESEARCH METHODOLOGY

Research is defined as an accepted investigation to find answers to a problem [5]. This research employs survey methodology. According to [35], it has a precise procedures which, when followed closely, yield valid and easily interpretable data. Kraemer [29] highlights that survey research has three distinct characteristics. Firstly, the phenomenon to be studied should involve examining the relationship among variables. Secondly, the data are collected from people. Finally, survey research should use a selected portion of the population. The scope of survey is determined by the independent and dependent variables a researcher considers. Other researchers suggest that survey research also required to have a predicate model that depicts the expected relationship among variables [22]. In this paper, we strive as much as possible to adhere to the guidelines stipulated by [22] for the design and implementation of survey research.

A.   Case selection

The case countries for this research are Nigeria and The Gambia. Both countries are situated in Sub-Saharan Africa. It is important to mention that no sampling approach was used in choosing these countries. Instead, we adopted the deliberate and theoretical sampling plan used in the Warwick study [17]. The sampling approach included one case country (Nigeria) which demonstrated clear success in terms of telecommunication and infrastructural development and another case country (The Gambia) with a minimal success in the same context. Another key factor that was used in selecting the aforementioned case countries in this research is one of the authors' conscious living experiences in both countries; he spent approximately six years in Nigeria and 20 in The Gambia. Additionally, he has extensive knowledge of these countries' respective cultures, politics, economics, education and a range of other issues which are relevant to and were extremely supportive of this research.

*B.   Survey administration and sample size*

This paper comprises of two separate surveys which were conducted within four months of each other. The data were collected from university environments in the respective countries. The survey in The Gambia was conducted from September 19th to November 12th, 2012 at the University of The Gambia. In order to seek the consent of our potential respondents and also minimize the number of unreturned questionnaires, we first visited individual classes from the selected faculties and enlightened the participants about the research. During that period, those who were interested in participating in the research were asked to write their names under the administrative region they came from in The Gambia.

This approach helped us to have participants from every region of the country. Since the number of potential respondents who were willing to participate in the research exceeded our target of 200, we employed a simple random sampling method. This enabled us to select our research respondents in an unbiased manner from all administrative regions of the country within the selected faculties. We could not sample from the entire university population due to our time constraint. Each potential respondent was then given a questionnaire to complete within a week. The sampled faculties were Information and Communication Technology, Law, Business Administration and Arts & Sciences.

The survey in Nigeria was conducted from April 1st to April 30th, 2013. We applied the same sampling approach as we did in The Gambia. However, minor variations exist in terms of the target population and survey administration. The shorter duration in Nigeria was mainly possible because of the lessons we learned in The Gambia.

The variation in the target population is based on the fact that it was not feasible to select our potential respondents from

Figure 2. Map of The Gambia and Nigeria
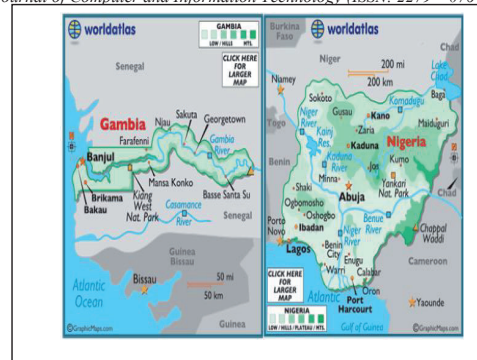
every administrative region in Nigeria as we did in The Gambia. This constraint was due to the size of the country and the political instability present in some regions at the time of our survey. Instead, we limited the scope of the survey to the University of Ibadan in Oyo State.

It is imperative to highlight that the sampling approach we use in both surveys has been employed by other researchers [11][25][46][39][40]. We endeavor to maintain both reliability and validity through appropriate use of case study protocol [38].

C.   Questionnaire

We administered 400 questionnaires between the two surveys. In The Gambia, 200 questionnaires were administered to students at the University of The Gambia. Out of this total, we received 179 valid responses corresponding to about a 90 percent return rate. This includes 65 respondents who claimed to be females, 110 males and three who did not indicate their gender. In Nigeria, we also administered 200 questionnaires from which we received 184 valid responses. This corresponds to about a 92 percent return rate. Among the valid respondents, 85 claimed to be females, 89 males and 10 who did not indicate their gender. The age distribution of our research respondents is between 20 to 60 years. In order to achieve the aims of this paper, we focused on a number of hypotheses:

- *H1: Young people have a more positive view of the potential benefits of Internet use than the elderly.*
- *H2: Gender plays an important role in the way an individual perceives the usefulness of the Internet.*
- *H3: Prior Internet experience determines an individual's attitude toward its potential benefits.*
- *H4: An individual's income determines his/her behavior towards Internet usage.*
- *H5: The simpler the Internet is to use, the faster individuals would want to learn how to use it.*
- *H6: Education has a direct impact on one's behavior towards the Internet.*

These hypotheses correspond to age, gender, experience, income, complexity and education, respectively.

D.   Data analysis

A number of data analysis techniques can be used for quantitative data. They include descriptive statistics and correlation analysis [38]. This paper utilizes the former to present our results in a form that is easy to understand. We then categorized our responses from these tables into three regions (see TABLES III, IV & V) for further analyzes.

(1) *region of positive certainty:* this region represents responses corresponding to the strongly agree (1) and agree (2) scales.

(2) *region of uncertainty:* this region represents responses corresponding to somewhat agree (3), not applicable (4) and somewhat disagree (5) scales.

(3) *region of negative certainty:* this region represents responses corresponding to disagree (6) and strongly disagree (7) scales.

We first determined the frequency count for each hypothesis and the total number of valid respondents for each of the two studies. The frequency count (FC) of the responses was determined for each region.

TABLE I.   RESPONDENTS' SUPPORT OF HYPOTHESES (HYPO)

Study 1: The Gambia								
Hypo	response based on seven-point likert scale							total resp.
	frequency count (FC)							
	1	*2*	*3*	*4*	*5*	*6*	*7*	
H1	20	40	51	8	7	33	18	177
H2	85	43	27	5	4	9	5	179
H3	55	59	44	6	3	7	2	176
H4	104	46	18	6	2	1	2	179
H5	84	49	25	1	6	7	5	177
H6	79	45	13	10	8	6	17	178

1= STRONGLY AGREE; 2= AGREE; 3= SOMEWHAT AGREE; 4= NOT APPLICABLE; 5= SOMEWHAT DISAGREE; 6= DISAGREE; 7= STRONGLY DISAGREE

TABLE II.   RESPONDENTS' SUPPORT OF HYPOTHESES (HYPO)

Study 2: Nigeria								
Hypo	response based on seven-point likert scale							total resp.
	frequency count (FC)							
	1	*2*	*3*	*4*	*5*	*6*	*7*	
H1	90	66	19	1	5	0	3	184
H2	16	28	30	16	10	40	41	181
H3	54	68	38	3	10	6	1	180
H4	10	30	25	44	24	35	10	178
H5	79	63	18	3	6	8	5	182
H6	27	56	40	12	11	21	14	*181*

1= STRONGLY AGREE; 2= AGREE; 3= SOMEWHAT AGREE; 4= NOT APPLICABLE; 5= SOMEWHAT DISAGREE; 6= DISAGREE; 7= STRONGLY DISAGREE

TABLE III.   POSITIVE REGION OF CERTAINTY

Hypo	The Gambia		Nigeria	
	FC	% FC	FC	% FC
H1: age	60	**33**	156	**85**
H2: gender	128	**72**	44	**24**
H3: experience	114	**65**	122	**68**
H4: income	150	**84**	40	**22**
H5: complexity	133	**75**	142	**78**
H6: education	124	**67**	83	**46**

TABLE IV.   REGION OF UNCERTAINTY

Hypo	The Gambia		Nigeria	
	FC	% FC	FC	% FC
H1: age	60	**33**	156	**85**
H2: gender	128	**72**	44	**24**
H3: experience	114	**65**	122	**68**
H4: income	150	**84**	40	**22**
H5: complexity	133	**75**	142	**78**
H6: education	124	**67**	83	**46**

TABLE V.   NEGATIVE REGION OF CERTAINTY

Hypo	The Gambia		Nigeria	
	FC	% FC	FC	% FC
H1: age	51	**29**	3	**2**
H2: gender	14	**8**	81	**45**
H3: experience	9	**5**	7	**4**
H4: income	3	**2**	45	**25**
H5: complexity	12	**7**	13	**7**
H6: education	23	**13**	35	**19**

The percentage responses for each region of both countries
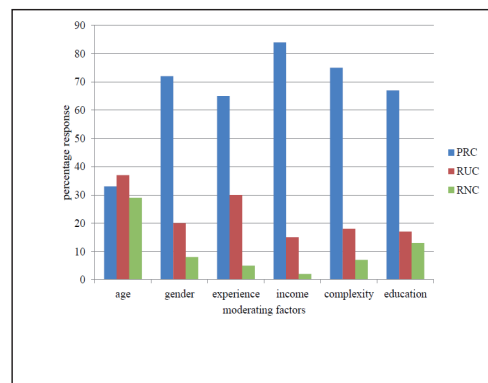
were calculated from TABLES III, IV & V. in order to provide description pictures.
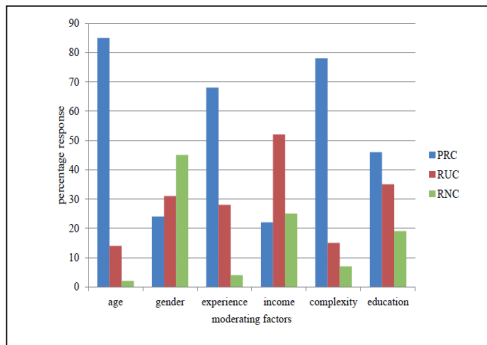
Figure 3. Responses from The Gambia

Figure 4. Responses from Nigeria

IV. RESEARCH FINDINGS

Moderating factors are traditionally used in the literature to study the relationship between UTAUT core determinants and behavioral intention. This paper examines their direct impact on behavioral intention towards Internet from university students in Nigeria and The Gambia. Our main findings are broadly summarized as follows:

- The percentage of respondents' support for the impact of experience and complexity on behavioral intention towards Internet is strong in both countries. In particular, the support for experience in Nigeria and The Gambia is 68 and 65 percent, respectively. The support for complexity is 75 and 78 percent, respectively.

- The percentage impact of age on behavioral intention towards Internet is stronger in Nigeria than in The Gambia. About 85 percent of the respondents in Nigeria support this impact while only 33 percent support it in The Gambia.

- The impacts of gender, income, education on behavioral intention towards the Internet are all stronger in The Gambia than in Nigeria. The respondents' support of these three factors in The Gambia is 72, 84 and 67 percent, respectively. Respondents' support of them in Nigeria is 24, 22 and 46 percent, respectively.

- Fifty-two (52) percent of the respondents in Nigeria are uncertain about the impact of income on behavioral intention towards Internet.

- Almost half of the respondents in Nigeria (45 percent) do not support the impact of gender on behavioral intention towards the Internet.

The aforementioned findings of this paper demonstrate a huge divergence in behavioral intention towards Internet.

V. CONCLUSION

Moderating factors are interacting terms used when the relationship between a dependent and independent variable is weak, inconsistent or nonexistent. They form an integral part of both the Unified Theory of Acceptance and Use of Technology (UTAUT) and its extended version (UTAUT2). We can conclude from the findings of this paper that the impact of moderating factors on behavioral intention towards the Internet can be directly examined. In previous research [44][45][10], these factors are used to moderate the relationship between dependent and independent variables. The complexity associated with the use of the Internet influences behavioral intention towards it. This confirms the impact of perceived ease of use of a technology on user behavior [37]. It is quite surprising that 52 percent of our respondents in Nigeria are uncertain about the impact of income on behavioral intention towards Internet. One possible explanation for this specific result could relate to the study by [9] which demonstrates that the effect of income on Internet activity has greater impact on countries with lower Internet usage rate than countries with higher one. Our findings suggest the impact of all six independent variables on behavioral intention towards Internet. However, the respondents' support for each one varies significantly across country boundaries. This is particularly true for the impact of age, gender, income and education on behavioral intention towards Internet in both countries. The diverging responses for these independent variables might depend on the difference of some cultural dimensions between Nigeria and The Gambia. This could be explored in future research in order to provide a deeper understanding of behavioral intention towards the Internet. There are two main limitations of this paper. Firstly, the research participants are drawn from only university students. Secondly, the survey focuses on four randomly selected faculties at each university.

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REFERENCES

[1] L. Abdulwahab and Z. M. D. Dahalin, "Conceptual model of Unified Theory of Acceptance and Use of Technology (UTAUT): modification on   Telecentre acceptance in Nigeria," Journal of Information Systems: New Paradigms, vol. 1(1), 2011, pp.43-49.

[2] F. M. Abubakar and H. B. Ahmad, "The moderating effect of technology awareness on the relationship between UTAUT constructs and behavioral intention to use technology: a conceptual paper," Australian Journal of Business and Management Research, vol. 3(2), 2013, pp.14-23.

[3] S. Al-Shafi and V. Weerakkody, "Factors affecting E-Government adoption in the state of Qatar," European and Mediterranean Conference on Information Systems, Abu Dhabi, UAE, 2009.

[4] A. Alkhunaizan and S. Love, "What drives mobile commerce? An empirical evaluation of the revised UTAUT model," International Journal of Management and Marketing Academy, vol. 2(1), 2012, pp.82-99.

[5] S. Alwashaishi and V. Snasel, "Consumers' acceptance and use of Information and Communications Technology: a UTAUT and Flow Based Theoretical Model," Journal of Technology Management & Innovation, vol. 8(2), 2013, pp.61-73.

[6] A. Avila, "Underdeveloped ICT areas in Sub-Saharan Africa," Informatics Economica,vol. 13(2), 2009, pp.136-146.

[7] M. Baliamoune-Lutz, "An analysis of the determinants and effects of ICT diffusion in developing countries," Information Technology for Development, vol. 12, 2003, pp. 151-169.

[8] F. O. Bankole, O. O. Bankole, and I. Brown, "Mobile banking adoption in Nigeria," The Electronic Journal of Information Systems in Developing Countries, vol. 47(2), 2011, pp.1-23.

[9] R. Beilock, and D. Dimitrova, "An exploratory model of inter-country Internet diffusion. Telecommunications Policy, vol. 27(3-4), 2003, pp.237-252.

[10] A. Birch and V. Irvine, "Preservice teachers' acceptance of ICT integration in the classroom: applying the UTAUT model," Educational Media International, vol. 46(4), 2009, pp.295-315.

[11] I. Brown, B. Letsididi, and M. Nazeer, "Internet access in South African homes: A Preliminary Study on Factors Influencing Consumer Choice," The Electronic   Journal   of Information Systems in Developing Countries, vol. 38(2), 2009, pp.1-13.

[12] S. A. Brown and V. Venkatesh, "Model of adoption of technology in households: a baseline model test and extension incorporating household lifecycle," MIS Quarterly, vol. 29(3), 2005, pp.399-426.

[13] K. J. Bwalya, "Factors affecting adoption of E-Government in Zambia," The Electronic Journal of Information Systems in Developing Countries, vol. 38(4), 2009, pp.1-13.

[14] A. Chigona, W. Chigona, P. Kayongo, and M. Kausa, "An empirical survey on domestication of ICT in schools in disadvantaged communities in South Africa," International Journal of Education and Development using ICT (IJEDICT), vol. 6(2), 2010, pp.21-32.

[15] S. E. Colesca and D. Liliana, "E-government adoption in Romania," International Journal of Human and Social Sciences, vol. 4(14), 2009, pp.1040-1044.

[16] J. Donner and C. A. Tellez, "Mobile banking and economic development: Linking adoption, impact, and use," Asian Journal of Communication, vol. 18(4), 2008, pp.318-332.

[17] K. M. Eisenhardt, "Building theories from case study research," The Academy of Management Review, vol. 14(4), 1989, pp.532-550.

[18] Y. S. Foon and B. C. Y. Fah, "Internet banking adoption in Kuala Lumpur: an application of UTAUT model," International Journal of Business and Management, vol. 6(4), 2011, pp.161.

[19] D. M. Ford, "Technologizing Africa: on the bumpy information highway," Computers and Composition, vol. 24, 2007, pp.302-306.

[20] W. Foster and S. E. Goodman,, "The Diffusion of Internet in China,"   Retrieved   from http://www.fosterandbrahm.com/docs/chinainternet.pdf., 2000.

[21] W. Foster, S. Goodman, E. Osiakwan, and A. Berstein, "Global diffusion of the Internet IV: the Internet in Ghana," Communications of the Association for Information Systems, vol. 13(38), 2004, pp.1-47.

[22] P. A. Glasow, "Fundamentals of survey research methodology," MITRE, Washington C3 Center, McLean, Virgina. Retrieved fromwww.mitre.org/work/tech_papers/tech_paper_05/05_0638/05_0638.pdf, 2005.

[23] L. Haddon, "The contribution of domestication research in in-home computing and media consumption," The Information Society, vol. 22(4), 2006, pp.195-203.

[24] Internet   World   Stats   website.   Retrieved fromhttp://www.internetworldstats.com, 2012.

[25] A. Ismail, "Diffusion of telecommunications services in a complex socio-economic context: a comparative diffusion analysis of the fixed line, mobile and Internet services in Pakistan," DTU Management   Engineering,   Department   of   Management Engineering, Technical University of Denmark, 2011.

[26] B. Kaba, A. Diallo, M. Plaisent, P. Bernard, and K. N'da, "Explaining the factors influencing cellular phone use in Guinea," The Electronic Journal of Information Systems in Developing Countries, vol. 28(3), 2006, pp.1-7.

[27] C. J. Kenny, "Expanding Internet access to the rural poor in Africa," Information Technology for Development, vol. 9, 2006, pp.25-31.

[28] A. Kivi, "Diffusion of mobile Internet services," Doctoral dissertation, Aalto University publication, 2011, ISBN 978-952-60-4303-6.

[29] K. L. Kraemer, "Introduction. Paper presented at the Information Systems Research Challenge: Survey Research Methods." 1991.

[30] S. Mofleh, M. Wanous, and P. Strachan, "Developing countries and ICT initiatives: lessons learnt from Jordan's experience," The Electronic Journal Information of Systems Evaluation, vol. 34(5), 2008, pp.1-17.

[31] P. F. Musa, "Making a case for modifying the TAM to account for limited accessibility in developing countries," Information Technology for Development, vol. 12(3), 2006, pp.213-224.

[32] P. Musa, P. Meso, and V. Mbarika, "Towards sustainable adoption of technologies for human development in Sub-Saharan Africa: precursors, diagnostics and prescriptions," Communications of Association for Information Systems, vol. 15, 2005, pp.592-608.

[33] P. E. Pedersen, "Adoption of mobile Internet services: an exploratory study of mobile commerce early adopters," Journal of Organization Computing and Electronic Commerce, vol. 15(2), 2005, pp.203-222.

[34] P.E. Pedersen and R. Ling, "Modifying adoption research for mobile Internet service adoption: cross-disciplinary interactions," Proceedings of the 36th Hawaii International Conference on System Sciences, 2003.

[35] A. Pinsonneault and K. L. Kraemer, "Survey research methodology in Management Information Systems: An assessment," Journal of Management Information Systems, vol. 10, 1993, pp.75-105.

[36] M. O. Raji, O. B. Ayoade, and A. Usoro, "The prospects and problems of adopting ICT for poverty eradication in Nigeria," The Electronic Journal of Information Systems in Developing countries, vol. 28(8), 2006, pp.1-9.

[37] E. M. Rogers, "Diffusion of Innovation," 5th Edition, Free Press New York, NY 10020, 2003.

[38] P. Runeson and M. Höst, "Guidelines for conducting and reporting case study research in software engineering," Empir Software Eng., vol. 14, 2009, pp.131-164.

[39] A. Salman and M. S. Hasim, "Internet usage in a Malaysian sub-urban community: a study of diffusion of ICT innovation," The

Innovation Journal: The Public Sector Innovation Journal, vol. 16(2), 2011, article 6..

[40] D. Thapa, "The role of ICT actors and networks in development: the case study of a wireless project in Nepal," Electronic Journal of Information Systems in Developing Countries, vol. 49(1), 2011, pp.1-16.

[41] P. V. Theodoropoulou, "The Introduction of digital television in the UK: a study of its early audience," A PhD thesis submitted to the Department of Media and Communications, London School of Economics, London, 2012.

[42] A. Touray, A. Salminen, and A. Mursu, "ICT barriers and critical success factors in developing countries," The Electronic Journal of Information Systems in Developing Countries, vol. 56(7), 2013, pp.1-17.

[43] United States Census Bureau. Retrieved from http://www.census.gov/compendia/statab/2012/tables/12s1392.pdf, 2012.

[44] V. Venkatesh, M. G. Morris, G. B. Davis, and F. D. Davis, "User acceptance of Information Technology: Toward a unified view. MIS Quarterly, vol. 27(3), 2003, pp.425-478.

[45] V. Venkatesh, J. Y. L. Thong, and X. Xu, "Consumer acceptance and use of Information Technology: extending the Unified Theory of Acceptance and Use of Technology," MIS Quarterly, vol. 36(1), 2012, pp.157-178.

[46] F. Wahid, "Using the technology adoption model to analyze Internet adoption and usage among men and women in Indonesia," Electronic Journal of Information Systems in Developing Countries, vol. 32(6), 2007, pp.1-8.

[47] Worldatlas. Retrieved online at www.worldatlas.com, 2012.

[48] I. A. Wong and L. D. A. Dioko, "Understanding the mediated moderating role of customer expectations in the customer satisfaction model: the case of casinos," Tourism Management, vol. 36, 2013, pp.188-199.

[49] Y. Wu, Y. Tao, and P. Yang, "The use of unified theory of acceptance and use of technology to confer the behavioral model of 3G mobile telecommunication users," Journal of Statistics & Management Systems, vol. 11(5), 2008, pp.919-949.

[50] M. Yahya, F. Nadzar, N. Masrek, and B. A. Rahman, "Determinants of UTAUT in measuring user acceptance of E-Syariah portal in Syariah courts in Malaysia," paper presented at the 2nd International Research Symposium in Service Management, Yogyakarta, Indonesia, 2011.

[51] I. N. Zainuddin and W. A. K. W. Dollah, "Internet access and use in reference service: a case study in Universiti Putra Malaysia (UPM)," International Journal of Computers and Information Technology, vol. (2), 2013, pp.123-126.

IV

INTERNET ADOPTION AT THE USER LEVEL: EMPIRICAL EVIDENCE FROM THE GAMBIA

by

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Internet adoption at the user level: empirical evidence from The Gambia

The Unified Theory of Acceptance and Use of Technology (UTAUT) is used to investigate technology adoption. However, its application in Sub-Saharan Africa is rare and barely extended to the validation phase. In this paper, we introduce six new moderating factors for UTAUT core determinants and two other direct determinants of Internet adoption. The objective of this approach is to identify relevant elements of Internet adoption at the user level in The Gambia. Moderating factors are interacting terms used when the relationship between independent and dependent variable is weak, inconsistent or non-existent. A case study research design was employed and the data was gathered in Autumn of 2012. A total of 200 questionnaires were administered to randomly selected students from the University of The Gambia. The students represented all administrative regions of the country. Our results suggest that Internet adoption at the user level in The Gambia can be viewed as a three-layered pyramid. It consists of seven moderating factors (age, gender, experience, voluntary use, friends' influence, Internet Service Providers and regulators), four indirect determinants (performance expectancy, effort expectancy, social influence and facilitating conditions) and three direct determinants (education, behavioral intention and income). This paper proposes an Internet adoption framework. We recommend it to be tested and validated in other African countries in order to determine its applicability.

Keywords: Internet adoption; moderating factors; indirect determinants; direct determinants

1. Introduction

The Internet is one of the most important innovations that has transformed the Information and Communications Technology (ICT) domain. It is one of the technologies required to support information processing in order to execute applications and deliver services (Leahy & Yermis, 2003; Mofleh, Wanous, & Strachan, 2008 and Raji, Ayoade, & Usoro, 2006). Among the prominent applications of the Internet are the Es and Ms which are used in Africa in such areas as health, education, governance and journalism (Kenny, 2006). The term *Es* refer collectively to a set of applications that enable people to use electronic devices like computers and 3G phones to access, store or transfer information; e.g., eCommerce, eBanking, eHealth, etc. The *Ms* perform similar function but with mobility, for example, m-banking, m-payments, m-transfer and m-finance (adopted from Donner & Tellez, 2008). The importance of the Internet in our daily life cannot be overemphasized. However, with an Internet penetration rate of just 15.6 percent (World Internet Statistics, 2012) and only 16 percent per 100 inhabitants using the Internet (International Telecommunication Union [ITU], 2013), it can be argued that Africa is hugely behind compared to developed nations. Sub-Saharan Africa, for example has the highest known ratio of mobile users of any region in the world (Ford, 2007). However, this boom in the mobile voice industry does not translate to the corresponding data usage (Avila, 2009). This implies that being a mobile user does not necessarily mean that one has access to the Internet. Research has shown that very few studies have investigated consumers' choice of technology (Brown, Letsididi, & Nazeer, 2009).

The technology adoption theories have been used to investigate user behavior towards technology. The main reason for choosing Sub-Saharan Africa to broadly frame this research is sequel to key prior research findings. One such finding underscores that no African country, not even Nigeria which represents 2.5 percent of the world's population, is among the top countries for Internet use (Ford, 2007). Research has shown that these theories should be applied in developing countries in order to identify the need for potential modification (Musa, 2006). Mere exposure to a technology does not necessarily translate to its usage (Oyelaran-Oyeyinka & Adeya, 2004). Therefore, studies related to Internet diffusion should also account for its adoption at the user level. The problem of Information Technology (IT) adoption in developing countries is often investigated

without keeping the user in mind (Kaba, Diallo, Plaisent, Bernard, & N'da, 2006). Essentially, research of mainstream information systems rarely focuses on Sub-Saharan Africa (Sahey & Avgerou, 2002). Most technology adoption theories do not focus on developing countries (Gallivan, 2001, & Musa, 2006). Therefore, this paper aims to identify relevant elements of Internet adoption in The Gambia by using the UTAUT as its theoretical guide. A number of hypotheses are formulated in order to achieve this aim (see Table 1 in APPENDIX B).

The rest of this paper is organized as follows: *Section two* explains the theoretical bases and *Section three* presents the research methodology. *Section four* gives an overview of data analysis. The results are presented in *Section five* while *Section six* focuses on discussions. *Section seven* concludes the paper, states its limitations and indicates the future research direction.

2. Theoretical framework

Pedersen and Ling (2003) broadly grouped the technology adoption schools into three categories: diffusion, adoption and domestication. This taxonomy has been used by a number of other researchers (Chigona, A., Chigona, W., Kayongo, & Kausa, 2010; Colesca & Liliana, 2009; Haddon, 2006; Kivi, 2011 and Theodoropoulou, 2012). These researchers state that the diffusion school broadly describes the pattern typically adopted by a group of people over time. The adoption school focuses on the decision to adopt a particular technology and tries to explain the factors that influence the decision plan on an individual level. The domestication school typically tries to understand how information and communication technologies are domesticated.

The most used technology adoption theories are the Technology Acceptance Model (TAM), the Theory of Planned Behavior (TPB), the Unified Theory of Acceptance and Use of Technology (UTAUT), the Theory of Diffusion of Innovation (DOI) and the framework of Technology Organization and Environment (TOE) (Bankole, F., Bankole, O., & Brown, 2011; Bwalya, 2009 and Oliveira & Martins, 2011). The approaches of technology diffusion and acceptance could be useful in empirically identifying the particular factors of a social and organizational context that affect ICT adoption (Avgerou, 2010).

This paper focuses on the adoption school using the UTAUT (Venkatesh, Moris, Davis, G., & Davis, F., 2003) as its theoretical guide. Our main reason for using it is based on its explanatory power which is about 70 percent with regards to technology-using behavior and more effective than any of the previously used models (Wu et al., 2008). They indicated that the use of the UTAUT model has gone beyond areas of mobile commerce, online learning and wireless networks, to name a few. Since this research accounts users' wishes and behavior, this model provides a good theoretical guide compared to other adoption models.

The UTAUT was developed as a result of the limitations of the TAM. This limitation relates to the unaccountability of social influence which subsequently resulted in UTAUT model by Venkatesh et al. (2003). The UTAUT model places social influence as an important construct that determines usage intention and behavior. The UTAUT has been applied and adapted to a number of studies that are similar to ours (Bankole et al., 2011; Brown et al., 2009; Bwalya, 2009; Kaba et al., 2006; Venkatesh, Thong, & Xu, 2012 and Wu et al., 2008). The key determinants of the model are Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI) and Facilitating Conditions (FC). Venkatesh et al. (2003) defined the aforementioned UTAUT key constructs as follows:

- Performance Expectancy: "the degree to which an individual believes that using the system will help him or her to attain gain in job performance."
- Effort Expectancy: "the degree of ease associated with the use of the system."
- Social Influence: "the degree to which an individual perceives that important others believe he or she should use the new system."

- Facilitating Conditions: "the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system."

The UTAUT integrates the PE, EE, SI and FC into the core determinants. It uses gender, age, experience and voluntariness of use as their control variables (Venkatesh et al., 2003). The research framework of this paper adapted nine UTAUT constructs: gender, age, experience, voluntariness of use, PE, EE, SI, FC and Behavioral Intention (BI). In addition, we use social status, friends' influence, relatives' influence, government, Internet Service Providers (ISPs), regulators, education and income (see Figure 1 in APPENDIX A) as external constructs. Research indicate that technology adoption by an individual is influenced by friends and relatives (Brown & Venkatesh, 2005; Choudrie & Dwivedi, 2004 and Rao & Troshani, 2007). Governments and regulators are found to be facilitating conditions in general ICT diffusion and adoption (Foster & Goodman, 2000 and Raji et al., 2006). Individuals also adopt Internet in order to acquire higher social status (Venkatesh et al., 2003). The literature also highlights the importance of education in technology adoption (LaRose, Gregg, Strover, Straubhaar, & Carpenter, 2007) and participation in knowledge society (Raji et al., 2006). Income is another vital factor in technology diffusion and adoption (Baliamoune-Lutz, 2003; LaRose et al., 2007 and Musa, Meso, & Mbarika, 2005). A recent study substantiates these prior research findings (Touray, Salminen, & Mursu, 2013).

3. Research methodology

This research employed the case study design. Yin (1984) defines this research design as an "empirical inquiry that investigates a contemporary phenomenon within a real-life context: when the boundaries between phenomenon and context are not clearly evident, and in which multiple sources of evidence are used." Case study is a valuable method of research with distinctive characteristics that make it ideal for many types of investigation. Tellis (1997) considers it as a triangulated research strategy which could be used for a single or multi-case. Case study design has the ability to test theory (Anderson, 1983; Eisenhardt, 1989 and Pinfield, 1986).

3.1 Brief overview of The Gambia

The Gambia is the smallest country on mainland Africa with a population of about 1.8 million people and an Internet user percentage of just 7.6 (US Census Bureau, 2012). The country is surrounded by Senegal on all sides except to the west where it is bordered by the Atlantic Ocean. The Gambia is divided into seven administrative regions: Banjul City Council, Kanifing Municipal Council, West Coast Region, North Bank Region, Lower River Region, Central River Region and Upper River Region. The country had a real Gross Domestic Product (GDP) growth average of about 6.5 percent a year from 2008 to 2010 (International Monetary Fund [IMF], 2012). The same report indicates it recorded the best GDP growth from 2007 to 2010 among all Sub-Saharan African countries except for South Africa and Namibia. An overview of the map of The Gambia is presented in Figure 2 (see APPENDIX A).

The Gambia currently has six Internet Service Providers. A total of 10 Internet access technologies have been deployed in the country, namely, 3G, General Packet Radio Service (GPRS), Digital Subscriber Line (DSL), Integrated Services Digital Network (ISDN), fiber, Virtual Private Network (VPN), dial-up, Code Division Multiple Access (CDMA), air-span and Wideband Code Division Multiple Access (WCDMA). The country also held the headquarters of the Africa Coast to Europe (ACE) submarine cable which is one of the most ambitious telecommunication projects in the sub-region. The project was launched on December 20th, 2012 and the total design capacity of the submarine cable is 5.12 terabytes. The 17,000 kilometers submarine cable will provide direct cable connectivity to Equatorial Guinea, Liberia, Mauritania, Guinea, Sao Tome & Principe, Sierra Leone and The Gambia.

It is important to mention that no sampling method was used in selecting The Gambia as a case country for this research. Its selection is based on a 20 years living experience of the country by one of the authors of this paper. The researcher has extensive knowledge of the country's telecommunications industry, culture, politics, economy, education, markets and other issues which are relevant to and extremely supportive of this research. The social attributes of Gambian culture have their advantages and disadvantages and will have an important impact on any research conducted within the country.

3.2 Data collection

The data used in this study was collected from students from the University of The Gambia from September 19th to November 12th, 2012. We administered a total of 200 questionnaires with a return rate of about 91 percent. Out of the 182 returned questionnaires, three of them were considered invalid due to missing pages. The research participants were randomly selected from four randomly chosen faculties of the University of The Gambia. We could not sample from the entire population due to our time constraint. The affected faculties are Information and Communication Technology, Law, Business Administration and Arts & Sciences. The Dean of each faculty identified two to three students who helped the researcher in collecting the data. For the purpose of generalizing our result, the country was divided into clusters based on the existing administrative demarcation. In order to seek the consent of the participants and also minimize the problem of non-return questionnaires, we first visited each class in all the selected faculties and enlightened the participants about the research. During that period, those who were interested in participating in the research were asked to write their names under the administrative region they came from in the country. This approach helped us to have participants from every region as earlier planned. Since the number of students who were willing to participate in the research was more than our target of 200 participants, we randomly sampled a number of students from each administrative region using a simple random sampling method. Each selected student was then given a questionnaire to complete within a maximum period of one week. The completed questionnaires were then returned to the faculty office of each of the selected faculties. The age distribution of the respondents in this research is given in Table 2 of APPENDIX B.

Questionnaires which are not returned are always an issue in research of this nature. Non-return questionnaires refer to questionnaires that were not returned to the researcher by the research participants. This issue can hardly be overcome completely in a research like ours. However, our approach helped us to minimize it significantly. Misinterpretation of questions in a questionnaire is another issue. This was addressed in our research by using commonly understood terms and providing a brief explanation to each section of the questionnaire. Also, questions in the questionnaire were all preceded by a very clear and simple instruction. Both reliability and validity were achieved by the appropriate use of case study protocol as outlined by Runeson & Höst (2009). One way of achieving the aim of this research was by choosing our samples from an enthusiastic and well-informed population like university students. The decision to use this approach is based on two main justifications:

(1) Three quarters of the African population is illiterate (Obijiofor, 2009) and Sub-Saharan Africa is not an exception. Therefore, drawing a sample from such a population requires a wise approach in order to minimize the problem of non-return questionnaires that could ultimately undermine the entire research purpose. Hence, the best way to draw an appropriate sample with maximum, valid and reliable returns from such a population is by focusing on university students who are permanent residents of these areas. It is important to highlight that these student only reside in urban areas during the academic calendar year and return to their respective villages or towns during holiday. According to Oyelaran-Oyeyinka & Adeya (2004), universities are the gatekeepers of advanced technologies as well as the

first users of Internet in most countries. They used a very similar approach in their research entitled "Internet access in Africa: empirical evidence from Kenya and Nigeria." However, their units of analysis were university professors and teachers instead of students. We chose the latter in this research because it was more realistic to have a good number of students from all the administrative regions of the country than that of university professors and teachers. Hence, we strongly believe that the adopted sampling strategy is the best approach for our study. The Gambia like any other developing country has a high level of illiteracy. Based on this reason, we decided to sample from the portion of the population that will provide a very representative view of the entire country. Students at the University of The Gambia come from all administrative regions of the nation. Therefore, they provide the best population for our research sample.

(2) The younger generation such as those most often represented by university students are among the most enthusiastic and well-informed users of the Internet (Pan, Yan, Jing, & Zheng, 2011). Hence considering this population will provide extremely fruitful data and also minimize the issue of non-return questionnaires. It will also ensure validity of the research findings because this group has a good knowledge of the use of the Internet and its importance to them. Research has shown that this group of people accounts for a large body of Internet users (Ismail, 2011) and The Gambia is not an exception.

It is vital to note that this form of sampling from a population with a high illiteracy rate is used by a number of researchers (Brown, 2002; Ismail, 2011; Wahid, 2007; Salman & Hasim, 2011 and Thapa, 2011). Our questionnaires were based on a seven-point scale ranging from one (strongly agree) to seven (strongly disagree). Each of the eighteen hypotheses corresponds to either performance expectancy, effort expectancy, social influence, facilitating conditions or behavioral intention toward the Internet (see Table 1 in APPENDIX B). According to Kaba et al. (2006), using scales of two or three items are less reliable particularly when one's data analysis is to be based on the weighted mean response of the respondents. The seven-point scale has been used in other studies (Bankole et al., 2011; Colesca & Liliana, 2009; Kaba et al., 2006; LaRose et al., 2007 and Pedersen, 2005).

4. Data analysis

The aim of this section is to explain and present the factors that influence the Internet adoption at the user level in The Gambia. The analysis and presentation of our results are based on descriptive statistical tools, namely, the mean, weighted mean response (WMR) and total percentage frequency count (PFC) of our respondents. The WMR and total PFC for each hypothesis is calculated as follows (see Table 3 of APPENDIX B):

- $WMR_i = \sum_{j=1}^{18} \sum_{i=1}^{7} [(FC_i H_j)/tR_i)]$

- total $PFC_i = \sum_{j=1}^{18} \sum_{i=1}^{2} [(FC_i H_j)/tR_i) * 100]$

The variables in the two formulae are interpreted as follows: FC_i represents the frequency count of each response scale (strongly agree to strongly disagree), H_j represents each hypothesis (H1a – H5) and tR_i is the total number of respondents for each hypothesis. For the computation of the total percentage frequency count, we consider only the strongly agree and agree scales for each hypothesis. These two scales are herein referred to as the *positive certainty region*. We see this as

the region where the respondents are strongly confident in support of the hypothesis. The distribution of respondents' support of hypotheses is presented in Table 3 of APPENDIX B.

The respondents found hypothesis H3f to be more favorable, i.e., education has a direct impact on using the Internet. Dissimilarly, they do not support H1a, H3a, H3c, H3d or H4a as shown in the WMR and the total PFC columns. This information can be interpreted as follows:

- Gender plays no important role in the way an individual perceives the usefulness of the Internet.
- People do not use the Internet in order to gain a higher social status.
- Young people are not less likely to be influenced by others than older people in using the Internet.
- Men are not more easily influenced by friends and relatives than women when it comes to using the Internet.
- Government has no significant role in the way individuals tend to use the Internet.

For each hypothesis associated with Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions and Behavioral Intention towards Internet use, we show the mean of the weighted mean response and the total percentage frequency count of the respondents (see Table 4 in APPENDIX B). In Figure 3 (see APPENDIX A), we presented the mean of the weighted mean response (MWMR) for each hypotheses. An MWMR of approximately two (agree) is recorded for Performance Expectancy (PE), Effort Expectancy (EE) and Behavioral Intention Towards Internet Use (BITIU) while approximately three (somewhat agree) is recorded for both the Facilitating Conditions (FC) and Social Influence (SI). These statistics indicate that the respondents were more supportive of the hypotheses related to PE, EE and BITIU than SI and FC. From our empirical data, we presented herein the modified version of our research framework in Figure 4 of APPENDIX A. The data demonstrate a weak relationship between gender and Performance Expectancy. This is also true for gender and Social Influence. A weak relationship is also identified for social status and relatives' influence as moderating factors for Social Influence. A similar relationship exists between governments and Facilitating Conditions. These imply that respondents are not supportive of the validity of the hypotheses associated with these moderating factors.

5. Results

The aim of this section is to provide a new insight about technology adoption at the user level. This will be achieved by comparing our empirical results to that of prior research findings. The procedure in doing this is as follows:

- What do we know from the UTAUT in terms of explaining technology adoption?
- What are the other factors in ICT literature that influence technology adoption?
- What did our empirical findings tell us?

We know from Wu et al. (2008) that Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions are core determinants for Behavioral Intention Towards the Internet. They also consider gender, age, experience and voluntary use as moderating factors. We know from the literature that an individual's behavior to adopt a technology is influenced by the way others will view them as a result of using that technology (Venkatesh et al., 2003). Other researchers indicate that technology adoption by an individual is influenced by friends and relatives (Brown & Venkatesh, 2005; Choudrie & Dwivedi, 2004 and Rao & Troshani, 2007). Governments and regulators are found to be facilitating conditions in general ICT diffusion and adoption (Foster & Goodman, 2000 and Raji et al., 2006). The literature also highlights the importance of education in technology adoption (LaRose et al., 2007) and participation in knowledge society (Raji et al., 2006).

Income is another vital factor in technology diffusion and adoption (Baliamoune-Lutz, 2003; LaRose et al., 2007 and Musa et al., 2005). The results from our empirical data (see Table 3, 4 and Figure 4 in APPENDIX A and B, respectively) can be broadly summarized as follows:

- The empirical data fails to support hypotheses H1a, H3a, H3c, H3d and H4a. This implies that gender is not a moderating factor for Performance Expectancy and Social Influence; social status and relatives' influence are not moderating factors for Social Influence and government is not a moderating factor for Facilitating Conditions.
- The empirical data support Performance Expectancy, Effort Expectancy and Facilitating Conditions as core determinants for Behavioral Intentions Towards the Internet with a total percentage frequency count of 81.5, 69.7 and 69.4, respectively.
- The empirical data support education (ED), income (IN) and Behavioral Intention Towards Internet Use as direct determinants for Internet adoption. They each record a total percentage frequency count of 92.1, 59.8 and 79.1, respectively.
- The empirical data supports Internet Service Providers and regulators as moderating factors of Facilitating Conditions. A total percentage frequency count of 70.5 and 66.9 respectively was recorded for these moderators.

Based on these results, we propose a new framework for Internet adoption at the user level (see Figure 5 in APPENDIX A). This framework comprises of seven moderating factors (age, gender, experience, voluntary use, friends' influence, Internet Service Providers and regulators), four indirect determinants (Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions) and three direct determinants (Education, Behavioral Intention Towards Internet Use and Income) of Internet adoption. The core determinants are performance expectancy, effort expectancy, social influence and facilitating conditions.

6. Discussion
This research is very special in the sense that studies focussing on The Gambia are hard to come by in ICT literature. Despite being the smallest mainland country in Africa, it has huge potential in terms of ICT. The country has a more favorable open market policy compared to other neighboring countries and Africa as a whole. It is important to highlight that the people in The Gambia are very sensitive to issues relating to the role of government in general ICT dispensation. This has to do with the citizens' individual perception that any negative statement they say about government is tantamount to sabotage and could warrant prosecution; this situation is completely different in developed countries. This particular attribute of fear and reservation were evident in our data in terms of the role of government as a moderating factor for Facilitating Conditions. A lot of ICT research in Africa and other developing countries see government and regulators as key players in technology diffusion and adoption. However, the responses from respondents in this research in terms of government role in Internet adoption at the user level might not reflect their true perception but instead influenced by the sensitivity to discuss the role of government.

The other interesting and unique feature of The Gambia is that individuals are more likely to be influenced by friends in adopting the Internet than their relatives or family members. The finding is not only interesting but it diverges from prior research results like the one by Wu et al. (2008) and Venkatesh et al. (2003). The Gambia is a very unique country in the sense that almost everyone is related and that people are hesitant to decline a request.

7. Conclusions
The findings of this study indicate seven determinants that influence Internet adoption at the user level. They are Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Conditions (FC), Behavioral Intention Towards Internet Use (BITIU), Education (ED) and Income (IN). The most important core determinant for Internet adoption at the user level is

Education; it records a total percentage frequency count of about 92.1 and a 1.5 weighted mean response rate. This statistic does not only confirm the finding by LaRose et al. (2007) that education is important to broadband Internet service adoption in rural areas but Internet adoption in general at the user level. The role of ISPs and regulators must also be seen as very instrumental moderating factors that should always be accounted for. Cumulatively, Internet adoption at the user level can be viewed as a three-layered pyramid comprising of the moderating factors, indirect determinants and direct determinants. Moderating factors are interacting terms used when the relationship between a dependent and independent variable is weak, inconsistent or nonexistent (Abubakar & Ahmed, 2013).

Our proposed framework suggests that individuals adopt a particular Internet access technology based on their level of education, income and the way they generally perceive it. Their perception of the technology is influenced by performance expectancy, effort expectancy, social influence and facilitating conditions. These factors are moderated by gender, age, experience, voluntary use, friend's influence, Internet Service Providers and regulators. However, the means for the weighted mean response and total percentage frequency count (see Table 4) suggest that respondents weakly support social influence as a core determinant in Internet diffusion compared to others.

Future studies in Sub-Saharan Africa should test the validity of our proposed framework in order to determine its applicability. Similar research of this nature should also be conducted in other neighboring countries in order to provide a multi-case comparison of results. These two suggestions will essentially unveil a well-focused line of research for the region.

The main limitations of this research are twofold: Firstly, we focus only on university students from the University of The Gambia. Secondly, the research participants come from only four randomly selected faculties of the university; we could not cover the whole university population as initially aimed in our data collection plan.

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Airi Salminen is a Professor of Digital Media in the Department of Computer Science and Information Systems at the University of Jyväskylä, in Finland. She has been the head of several

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Anja Mursu works currently as an advisor for the consultancy company Salivirta & Partners in Finland. She obtained her PhD in Information Systems in 2002 at the University of Jyväskylä, Finland. She worked for the research projects (at the University of Eastern Finland) first as a researcher and then as a research leader for nine years. Her research interests were in activity driven information systems development, and sustainability and usability of information systems. Her research partners came from Nigeria, South Africa and Mozambique (INDEHELA-project).

References

Abubakar, F. M., & Ahmed, H. B. (2013). The Moderating Effect of Technology Awareness on the Relationship between UTAUT Constructs and Behavioral Intention to Use Technology: A Conceptual Paper. Australian Journal of Business and Management Research, 3, 14-23.

Anderson, P. A. (1983). Decision Making by Objection and the Cuban Missile Crisis. *Administrative Science Quarterly* 28, 201-222.

Avgerou, C. (2010). Discourses on ICT and Development. *Information Technologies and International Development*, 6(3), 1-18.

Avila, A. (2009). Underdeveloped ICT areas in Sub-Saharan Africa. *Informatics Economica*, 13, 136-146.

Baliamoune-Lutz, M. (2003). An analysis of the determinants and effects of ICT diffusion in developing countries. *Information Technology for Development*, 12, 151-169.

Bankole, F. O., Bankole, O. O., & Brown, I. (2011). Mobile Banking Adoption in Nigeria. *The Electronic Journal of Information Systems in Developing Countries*, 47(2), 1-23.

Brown, I., T., J. (2002). Individual and Technological Factors Affecting Perceived Ease of Use of Web-Based Learning Technologies in a Developing Country. *The Electronic Journal of Information Systems in Developing Countries,* 9(5), 1-15.

Brown, I., Letsididi, B., & Nazeer, M. (2009). Internet Access in South African Homes: A Preliminary Study on Factors Influencing Consumer Choice. *The Electronic Journal of Information Systems in Developing Countries*, 38(2), 1-13.

Brown, S. A., & Venkatesh, V. (2005). Model of Adoption of Technology in Households: A Baseline Model Test and Extension Incorporating Household Lifecycle. *MIS Quarterly*, 29, 399-426.

Bwalya, K. J. (2009). Factors Affecting Adoption of E-Government in Zambia. *The Electronic Journal of Information Systems in Developing Countries*, 38(4), 1-13.

Chigona, A., Chigona, W., Kayongo, P., & Kausa, M. (2010). An empirical survey on domestication of ICT in schools in disadvantaged communities in South Africa. *International Journal of Education and Development using ICT* (IJEDICT), 6, 21-32.

Choudrie, J., & Dwivedi, Y. K. (2004). Analyzing the Factors of Broadband Adoption in the Household. Retrieved online at http://www.csrc.lse.ac.uk/asp/aspecis/20040034.pdf.

Colesca, S. E., & Liliana, D. (2009). E-government Adoption in Romania. *International Journal of Human and Social Sciences*, 4, 1040-1044.

Donner, J., & Tellez, C. A. (2008). Mobile banking and economic development: Linking adoption, impact, and use. *Asian Journal of Communication*, 18, 318-332.

Eisenhardt, K. M. (1989). Building Theories from Case Study Research. *The Academy of Management Review*, 14, 532-550.

Ford, D. M. (2007). Technologizing Africa: On the bumpy information highway. *Computers and Composition*, 24, 302-306. Retrieved online at www.sciencedirect.com.

Foster, W., & Goodman, S. E. (2000). The Diffusion of Internet in China. Retrieved online at http://www.fosterandbrahm.com/docs/chinainternet.pdf.

Gallivan, M. J. (2001). Organizational Adoption and Assimilation of Complex Technological Innovations: Development and Application of New Framework. *The DATA BASE for Advances in Information Systems*, 32, 51-85.

Haddon, L. (2006). The Contribution of Domestication Research in In-Home Computing and Media Consumption. *The Information Society*, 22, 195-203.

International Monetary Fund (2012). The Gambia 2011 Article IV Consultation, IMF Country Report No. 12/17, Washington, D.C.

International Telecommunication Union (2013). ICT Facts and Figures. Retrieved online at www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2013.pdf

Ismail, A. (2011). Diffusion of Telecommunications Services in a Complex Socio-Economic Context: A Comparative Diffusion Analysis of the Fixed Line, Mobile and Internet Services in Pakistan, DTU Management Engineering, Department of Management Engineering, Technical University of Denmark. Retrieved online at http://www.orbit.dtu.dk/fedora/objects/orbit:89283/datastreams/file_6308147/content.

Kaba, B., Diallo, A., Plaisent, M., Bernard, P., & N'da, K. (2006) Explaining the Factors Influencing Cellular Phone Use in Guinea. *The Electronic Journal of Information Systems in Developing Countries*, 28(3), 1-7.

Kenny, C. J. (2006). Expanding Internet access to the rural poor in Africa. *Information Technology for Development*, 9, 25-31.

Kivi, A. (2011). Diffusion of Mobile Internet Services. Doctoral dissertation, Aalto University publication, ISBN 978-952-60-4303-6.

LaRose, R., Gregg, J. L., Strover, S., Straubhaar, J., & Carpenter, S. (2007). Closing the rural broadband gap: Promoting adoption of the Internet in rural America. *Telecommunications Policy*, 31, 359-373.

Leahy, K. B., & Yermis, I. V. (2003). Information and Communication Technology: Gender Issues in Developing Nations. *Informing Science Journal*, 6, 143-155.

Mofleh, S., Wanous, M., & Strachan, P. (2008) Developing Countries and ICT Initiatives: Lessons Learnt from Jordan's Experience. *The Electronic Journal Information of Systems Evaluation*, 34(5), 1-17.

Musa, P. F. (2006). Making a Case for Modifying the TAM to Account for Limited Accessibility in Developing Countries. *Information Technology for Development*, 12, 213-224.

Musa, P., Meso, P., & Mbarika, V. (2005). Towards Sustainable Adoption of Technologies for Human Development in Sub-Saharan Africa: Precursors, Diagnostics and Prescriptions. *Communications of Association for Information Systems*, 15, 592-608.

Obijiofor, L. (2009). Mapping theoretical and practical issues in the relationship between ICTs and Africa's socioeconomic development. *Telematics and Informatics* 26, 32-43. Retrieved online at www.sciencedirect.com.

Oliveira, T., & Martins, M. F. (2011). Literature Review of Information Technology Adoption Models at Firm Level. *The Electronic Journal of Information Systems Evaluation*, 14, 110-121.

Oyelaran-Oyeyinka, B., & Adeya, C. N. (2004). Internet access in Africa: empirical evidence from Kenya and Nigeria, *Telematics and Informatics*, 21, 67-81. Retrieved online at www.ElsevierComputerScience.com.

Pan, Z., Yan, W., Jing, G., & Zheng, J. (2011). Exploring structured inequality in Internet use behavior. *Asian Journal of Communication*, 21, 116-132.

Pedersen, P. E. (2005). Adoption of Mobile Internet Services: An Exploratory Study of Mobile Commerce Early Adopters. *Journal of Organization Computing and Electronic Commerce*, 15, 203-222.

Pedersen, P. E., & Ling, R. (2003). Modifying adoption research for mobile Internet service adoption: Cross-disciplinary interactions. Proceedings of the 36th Hawaii International Conference on System Sciences, IEEE Computer Society Washington, DC, USA, ISBN: 0-7695-1874-5. Retrieved online at http://www.hicss.hawaii.edu/HICSS36/HICSSpapers/DTMCC05.pdf

Pinfield, L. (1986). A field evaluation of perspectives on organizational decision making. *Administrative Science Quarterly*, 31, 365-388.

Raji, M. O., Ayoade, O. B., & Usoro, A. (2006). The Prospects and Problems of Adopting ICT for Poverty Eradication in Nigeria. *The Electronic Journal of Information Systems in Developing countries*, 28(8), 1-9.

Rao, S., & Troshani, I. (2007). A Conceptual Framework and Propositions for the Acceptance of Mobile Services. *Journal of Theoretical and Applied Electronic Commerce Research*, 2, 61-73.

Runeson, P., & Höst, M. (2009). Guidelines for conducting and reporting case study research in software engineering. *Empir Software Eng.*, 14, 131-164. Retrieved online at www.Springerlink.com.

Sahey, S., & Avgerou, C. (2002a). Special Issue: ICTs in Developing Countries Liberalization and the Computer Industry: A Comparison of Four Developing Countries. Retrieved online at http://www.indiana.edu/~tisj/readers/full-text/18-2%20Sahey.html.

Sahey, S., & Avgerou, C. (2002b). Introducing the special Issue on Information and Communication Technologies in Developing Countries. *The Information Society*, 18(2), 73-76.

Salman, A., & Hasim, M. S. (2011). Internet Usage in a Malaysian Sub-Urban Community: A Study of Diffusion of ICT Innovation. *The Innovation Journal: The Public Sector Innovation Journal*, 16(2), 1-15. Retrieved online at http://www.innovation.cc/case-studies/salman%20hasim_internet_usage_sub-urban_community5rvsd1final_v16i2a8.pdf.

Tellis, W. (1997). Introduction to Case Study, the Qualitative Report, 3, 2. Retrieved from http://www.nova.edu/ssss/QR/QR3-2/tellis1.html.

Thapa, D. (2011). The Role of ICT Actors and Networks in Development: The Case Study of a Wireless Project in Nepal. *Electronic Journal of Information Systems in Developing Countries*, 49(1), 1-16.

Theodoropoulou, P. V. (2012). The Introduction of Digital Television in the UK: A Study of its Early Audience. A PhD thesis submitted to the Department of Media and Communications, London School of Economics, London. Retrieved online at http://etheses.lse.ac.uk/349/1/Theodoropoulou_The%20Introduction%20of%20Digital%20Television%20in%20the%20UK.pdf

Touray, A., Salminen, A., & Mursu, A. (2013). ICT Barriers and Critical Success Factors in Developing Countries. *The Electronic Journal of Information Systems in Developing Countries*, 56(7), 1-17.

US Census Bureau (2012). The United States Census Bureau. Retrieved online at http://www.census.gov/compendia/statab/2012/tables/12s1392.pdf

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly*, 27, 425-478.

Venkatesh, V., Thong, J. Y. L., & Xu, X. (2012). Consumer Acceptance and Use of Information Technology: Extending the Unified Theory of Acceptance and Use of Technology. MIS Quarterly, 36, 157-178.

Wahid, F. (2007). Using the technology adoption model to analyze Internet adoption and usage among men and women in Indonesia. *Electronic Journal of Information Systems in Developing Countries*, 32(6), 1-8.

World Internet Statistics Website (2012). World Internet Statistics' Facts and Figures. Retrieved online at http://www.internetworldstats.com.

Wu, Y., Tao, Y., & Yang, P. (2008). The use of unified theory of acceptance and use of technology to confer the behavioral model of 3G mobile telecommunication users. *Journal of Statistics & Management Systems*, 11, 919-949.

Yin, R. K. (1984). Case Study Research: Design and Methods, Beverly Hills, Calif: Sage Publications.

APPENDIX A
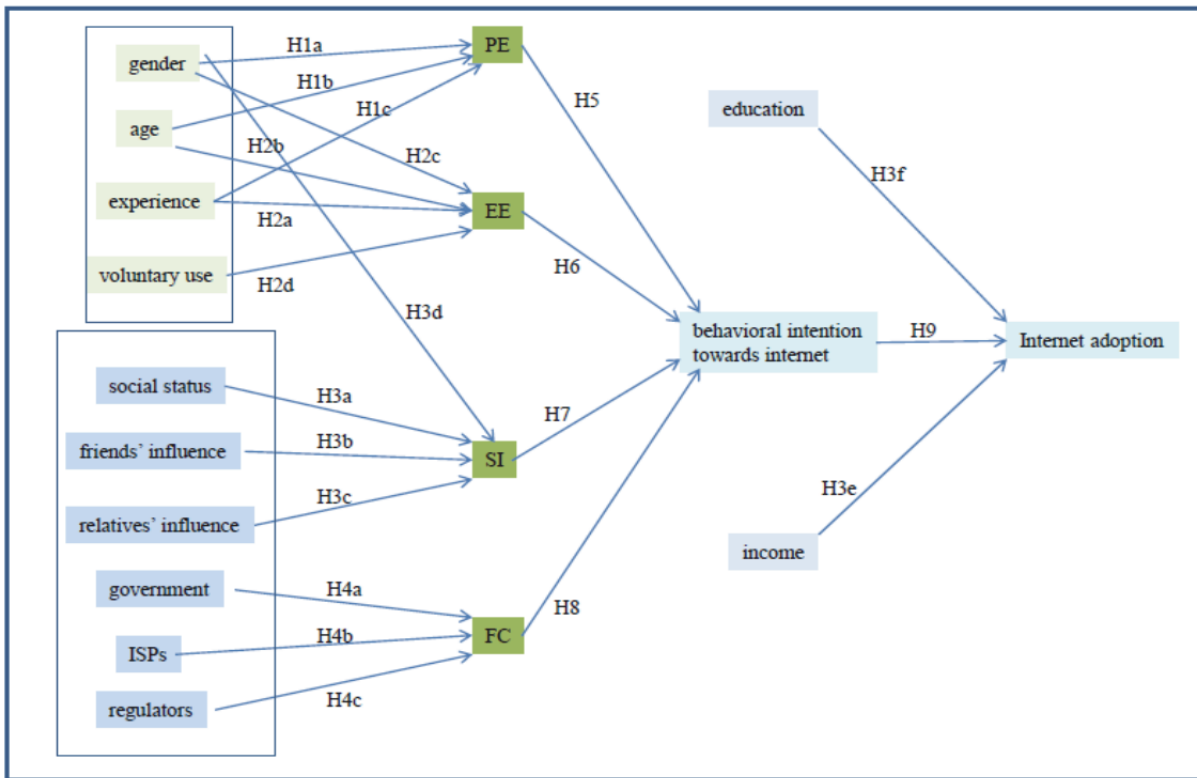**Figure 1:** Unified Theory of Acceptance and Use of Technology (UTAUT) research framework
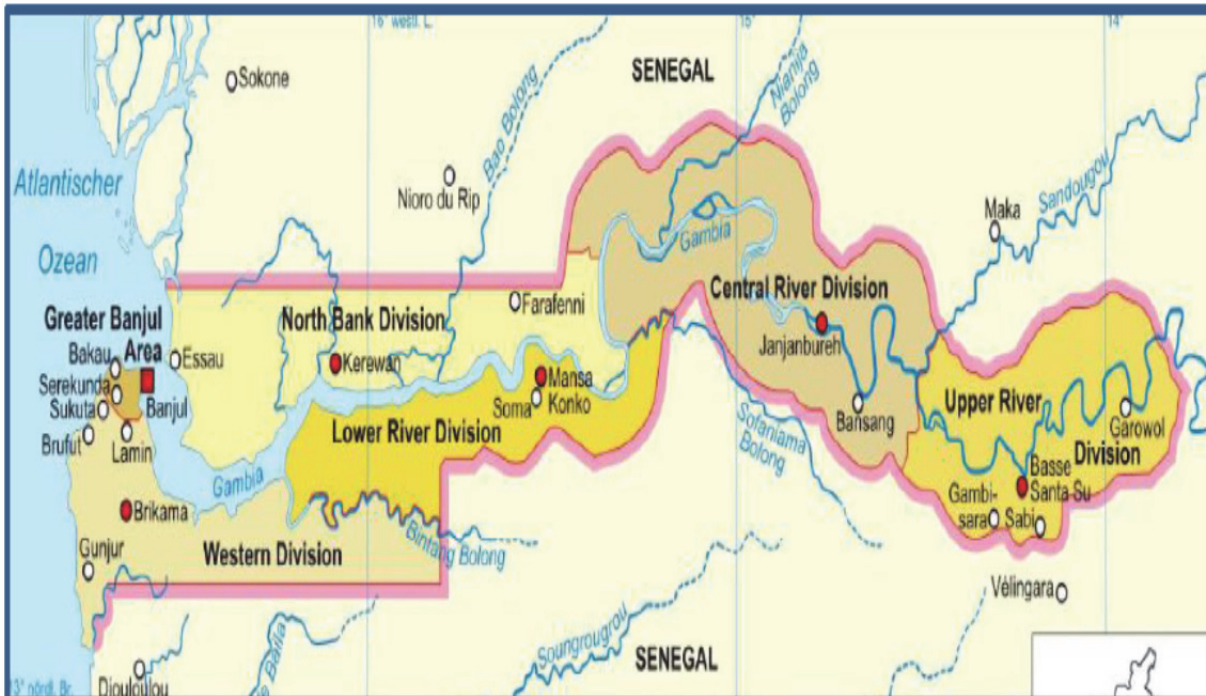

Figure 2: Overview of the map of The Gambia

Source: Adopted from worldmaps.net
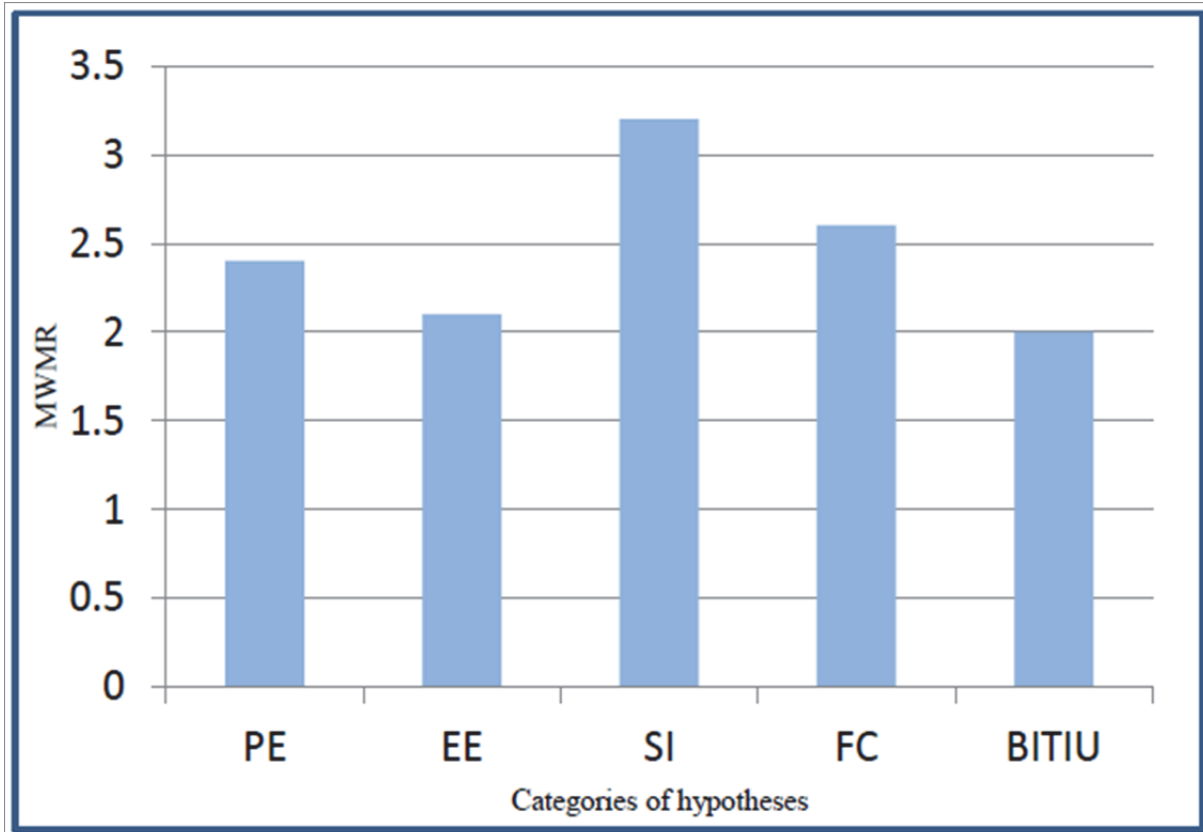
Figure 3: MWMR for each category of hypotheses
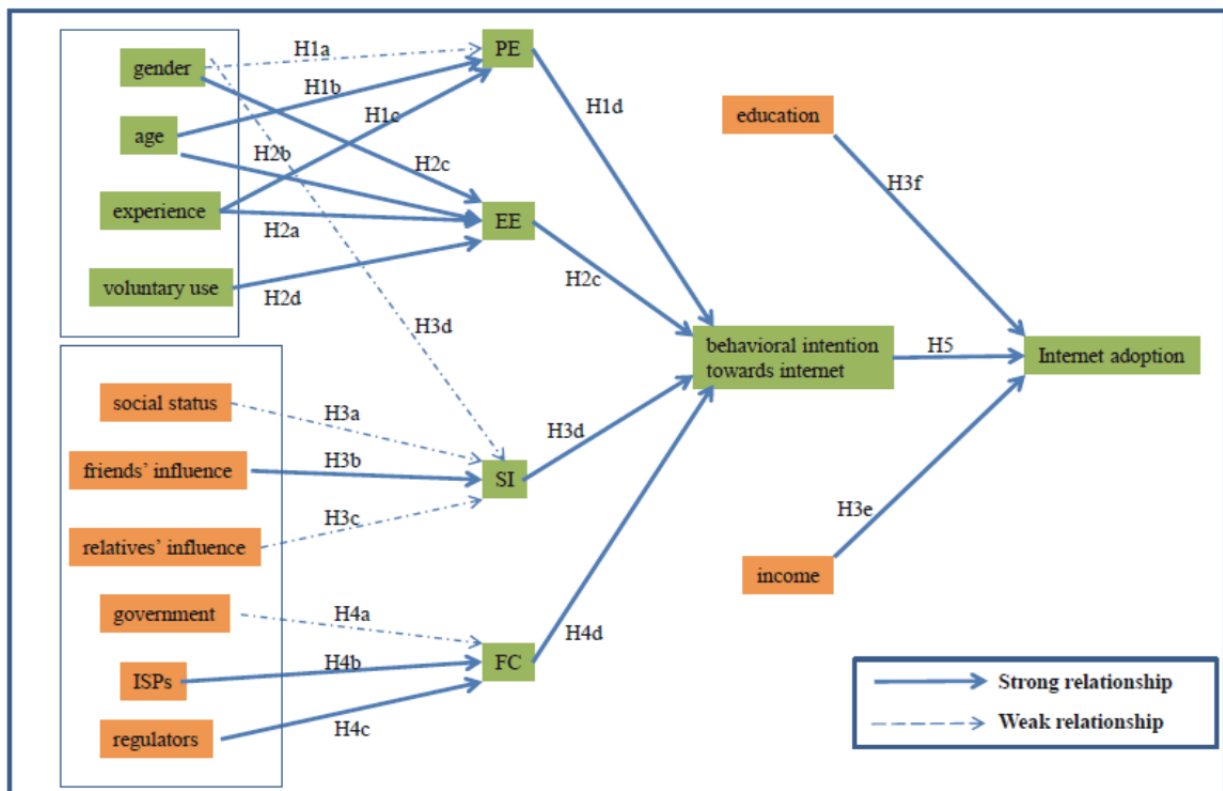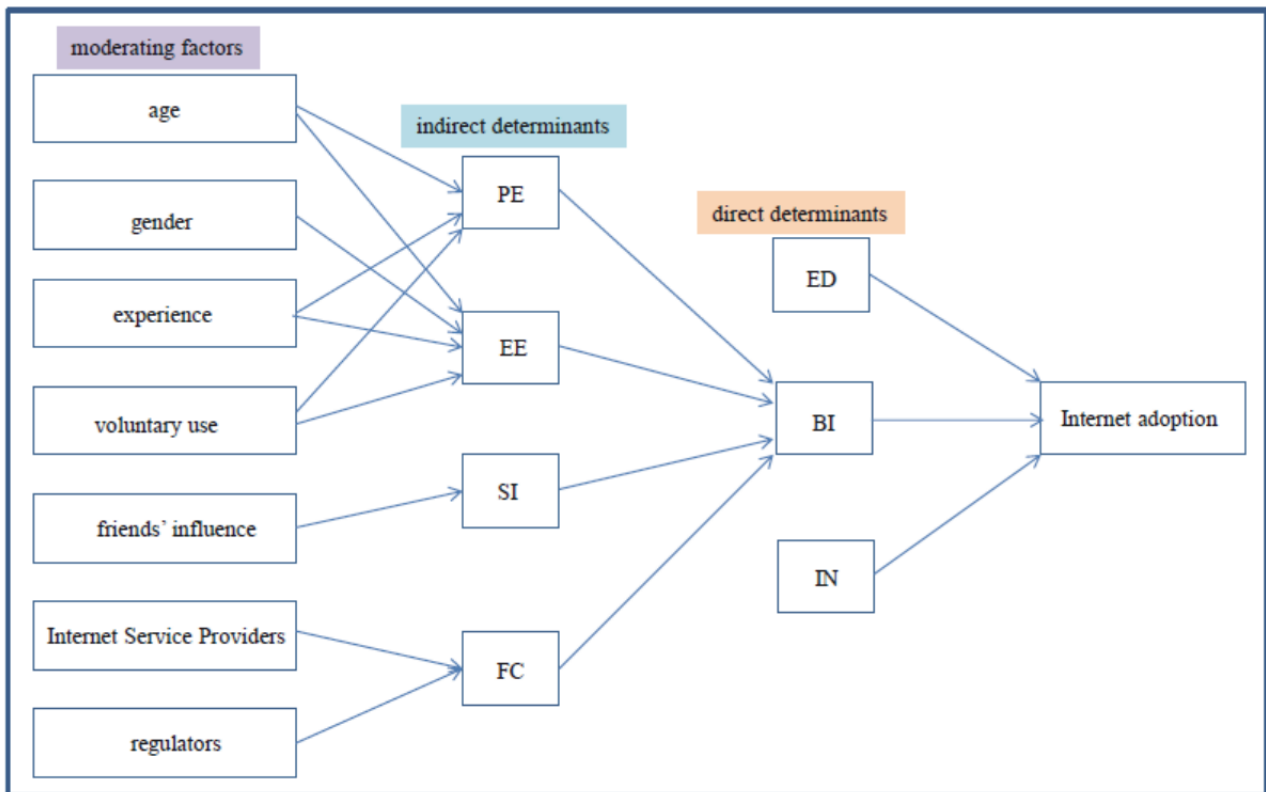

Figure 4: Modified UTAUT framework

Figure 5: Proposed Internet adoption framework

APPENDIX B

<div align="center">

Table 1: List of hypotheses
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H1: Performance Expectancy (PE)	H1a: Gender plays an important role in the way an individual perceives the usefulness of the Internet.
	H1b: Young people have a more positive view on the potential benefits driven by the use of Internet than the elderly.
	H1c: Prior Internet experience determines an individual's attitude toward its potential benefits.
	H1d: The more an individual knows about the potential ability of the Internet, the more positive his/her attitude towards its use.
H2: Effort Expectancy (EE)	H2a: The simpler the use of Internet, the faster individuals would want to learn how to use it.
	H2b: People with higher level of education have a higher tendency of using the Internet.
	H2c: The less effort required in using Internet, the greater the interest in using it.
H3: Social Influence (SI)	H3a: People use the Internet in order to gain a higher social status.
	H3b: Friends and family members influence an individual's use of the Internet.
	H3c: Young people are less likely to be influenced by others than older people in using the Internet.
	H3d: Men are more easily influenced by friends and relatives than women when it comes to using the Internet.
	H3e: An individual's income determines his/her use of the Internet.
	H3f: Education has a direct impact on using the Internet.
H4: Facilitating Conditions (FC)	H4a: Government has a significant role in the way individuals tend to use the Internet.
	H4b: Internet Service Providers play an important role in Internet adoption in rural and remote areas of Sub-Saharan Africa.
	H4c: The role of independent regulators will enhance the use of Internet.
	H4d: The level of support provided by Internet Service Providers influences an individual's behavior towards the use of a particular Internet access technology.
H5: Behavioral Intention Towards Internet Use (BITIU)	An individual's attitude towards Internet determines his/her choice in using it.

Table 2: Distribution of research respondents

age range	gender		total number of participants
	female	male	
≤ 20	4	6	10
21 - 25	48	47	95
21 - 25	*no gender specified*		2
26 - 30	4	30	34
26 - 30	*no gender specified*		2
31 - 35	3	16	19
36 - 40	1	6	7
41 - 45	0	1	1
46 - 50	0	0	0
51 - 55	0	1	1
56 - 60	0	0	0
≥ 61	0	0	0
no age range specified	5	3	8
Total number of participants	65	110	179

Table 3: Distribution of respondents' support of hypotheses

hypotheses	Response based on a 1-7 point scale							Weighted Mean Response (WMR)	total Percentage Frequency Count (PFC) for scales 1 & 2	total number of respondents per hypothesis
	1	2	3	4	5	6	7			
	frequency counts (FC)									
H1a	20	40	51	8	7	33	18	3.4	33.9	177
H1b	85	43	27	5	4	9	5	2.1	71.5	179
H1c	55	59	44	6	3	7	2	2.3	64.8	176
H1d	85	60	21	1	7	2	2	1.9	81.5	178
H2a	104	46	18	6	2	1	2	1.7	83.8	179
H2b	84	49	25	1	6	7	5	2.1	75.1	177
H2c	79	45	13	10	8	6	17	2.5	69.7	178
H3a	2	22	56	9	33	32	19	4.3	13.9	173
H3b	29	67	57	4	10	6	4	2.6	54.2	177
H3c	19	36	31	3	17	43	23	4.1	32.0	172
H3d	10	32	43	17	19	36	21	4.1	23.6	178
H3e	57	50	36	4	5	16	11	2.7	59.8	179
H3f	114	50	7	1	4	2	0	1.5	92.1	178
H4a	13	58	46	10	12	23	12	3.4	40.8	174
H4b	63	59	32	5	5	5	4	2.2	70.5	173
H4c	49	66	31	14	4	7	1	2.3	66.9	172
H4d	40	80	36	4	6	7	2	2.3	69.4	175
H5	55	85	29	3	1	2	2	2.0	79.1	177

Table 4: Mean for WMR

constructs	related hypothesis	Mean for the WMR (MWMR)
Performance Expectancy (PE)	H1a	2.4
	H1b	
	H1c	
	H1d	
Effort Expectancy (EE)	H2a	2.1
	H2b	
	H2c	
Social Influence (SI)	H3a	3.2
	H3b	
	H3c	
	H3d	
	H3e	
	H3f	
Facilitating Conditions (FC)	H4a	2.6
	H4b	
	H4c	
	H4d	
Behavioral Intention Towards Internet (BITIU)	H5	2.0

V

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VI

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