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Peter Meso
Computer Information Systems Department, Robinson College of Business, pmeso@ggc.edu

Philip F. Musa
School of Business, The University of Alabama at Birmingham, musa@uab.edu

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Extending the ICT Technological Culturation Model: The Role of Accessibility and Perceived Socio-Economic Prospects on ICT Diffusion

Submitted by

Peter Meso, Ph.D. *

**Corresponding Author*

Computer Information Systems Department

Robinson College of Business, Georgia State University

35 Broad Street, NW, Atlanta, GA, 30302-4015

E-mail: pmeso@cis.gsu.edu

and

Philip F. Musa, Ph.D., P.E.

Associate Prof. of Management and Information Systems

School of Business

The University of Alabama at Birmingham

E-mail: musa@uab.edu

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Extending the ICT Technological Culturation Model: The Role of Accessibility and Perceived Socio-Economic Prospects on ICT Diffusion

Abstract:

This study extends the Technological culturation (TC) model proposed by Straub et al. by examining the influences of two additional constructs - accessibility of technology (AT) and perceived socio-economic prospects (PSEP) - on the usage (U) of information and communications technologies (ICTs). Research question was: In addition to technological culturation, do "accessibility of ICTs" and "individuals' perceptions of the socio-economic prospects" influence the usage of ICTs? The instrument measured the extent to which respondents are influenced by advanced technology cultures, accessibility to ICTs, and their perceptions of the long-term socio-economic outlook of their country. It also allowed them to rank their usage of ICTs. Using partial least squares (PLS), the research model tested the impacts of AT on TC and, and TC, AT, PSEP on ICT usage. Findings show strong supports for all tested links. Inferences from these findings and their implications on research and practice are also provided.

Key Words: Sub-Saharan Africa, Technological culturation, Accessibility, ICTs, Diffusion, Perceived Socio-Economic prospects, Partial Least Square.

1. INTRODUCTION

The ability to effectively employ information and communications technologies (ICTs) in day-to-day transactions is increasingly becoming a necessary skill in most economies of the world. Yet developing countries, especially those categorized as "least developed", are still unable to adopt and reap the benefits of such technologies. Past studies have pointed to several reasons for this disenfranchisement. Recent research on Diffusion of ICTs argues the degree of technological culturation (Loch, Straub and Kamel, 2003) of a society impacts the usage of a technology by that society. This view stresses that technologically culturated societies – that is, those societies in which technology is a normal aspect of daily living - will be heavier users of technology than those societies that are less technology culturated (Loch et al., 2003; Straub, Loch and Hill, 2001; Rose, Evaristo and Straub, 2003). These studies also found that such societies were more receptive to new technologies, including emerging ICTs compared to less technologically culturated societies. Therefore, the degree of exposure and culturation to technology influences the degree and rate of diffusion of a new technology (Loch et al., 2003).

Another argument made by research on the problem that is commonly referred to as the digital-divide (Cherry, 2004; Madon and Sahay, 2002; Walsham, 2003; Avgerou, 2003), argues the inability of most citizens in these countries to afford ICTs and that poor ICT infrastructures continues to impede access to these technologies. Accessibility is defined as the extent to which ICTs can be affordably, easily and effortlessly accessed (Meso, Musa and Mbarika, 2005). Meso, Musa and Mbarika's (2005) study found that accessibility impacted the use of mobile ICTs. Other studies have also found that accessibility influences the usage of ICTs. For example Yang, Cai, et al. (2005) found that accessibility influences the extent to which web portals are used, while another research by Ahituv and Greenstein (2005) found that there is there is a direct relationship between a system's accessibility and its informativeness which is then inferred to influence the extent to which employees employ an ICT system in their daily decision making. Culnan, (1985), found that users perceived information accessibility according to the dimensions of: ease of physical access to the information source, ease of user-source interface, and ease of physical retrieval of relevant information thereby concluding that the dimension of information accessibility is important in information service/system design and improvement.

While past diffusion research on technological culturation such as Loch et al., (2003) identify the linkage between technological culturation and ICT usage; it does not examine the

influence of accessibility on ICT usage. Research on the digital divide, barely addresses the construct of technological culturation as a determinant of ICT usage. Therefore the first objective of this paper is to unify these two perspectives by arguing there is an association between accessibility of ICTs and technological culturation. We argue that the accessibility of ICTs influences the technological culturation of a given society.

Economic theory of consumption suggests that rational beings tend to withhold spending or consumption when they perceive a downturn in the economy, preferring to limit consumption only to the bare necessities (Gul and Pesendorfer, 2004; Duesenberry, 1949, Mason, 2000). Since ICTs can arguably be considered to be non-essential goods/services, especially in least developed countries, it is very likely usage of ICTs will be significantly impacted by the perceptions held by citizens of a country's economy. For example, citizens who hold a bleak perception of the socio-economic environment may find little motivation to use expensive technologies such as ICTs. Therefore, as the second objective of this paper, we argue that an individual's perception of the socio-economic prospects – referred to hereafter as PSEP - of his/her country of residence, may impact the extent to which the individual uses ICTs.

2. LITERATURE REVIEW, RESEARCH MODEL AND HYPOTHESES

One of the motivations behind ICTs, especially in least developed countries is its potential to accelerate socio-economic development and associated quality-of-life benefits. The conundrum is that the very same promise that makes ICTs appealing –namely, the advanced nature of this technology, its digital nature and the sophisticated telecommunications infrastructure that is a result of a mature ICT environment – makes ICTs expensive and therefore slowly implemented in most developing countries. This in turn impedes the diffusion of these technologies in the regions where it may be most beneficial, thereby widening the digital-divide.

Historically, while several different theories have been used to study the problem of ICT usage, we limit our study to (a) the theories on the societal impacts of ICTs that elaborate the concept of the digital divide as evidenced in Cherry *(*2004), Madon and Sahay (2002), Kvasny, (2005) and Avgerou (2003), (b) the theories of IT diffusion, specifically the theory of technological culturation as defined by Straub et al. (2001), Loch et al., (2003) and Rose et al., (2003) and, (c) economic theories of consumption (Gul and Pesendorfer, 2004; Duesenberry,

1949; Mason, 2000). The foregoing sub-sections provide a brief review of background research and present the research questions and hypotheses for the study.

Technological Culturation, Accessibility and Usage of ICTs

The phenomenon of technological culturation, first defined by Straub, Loch and Hill (2001), and used in the study by Loch et al., (2003) has also been shown to influence usage of ICTs. Building on the theory base of anthropological literature as espoused in Escobar, (1994); Hakken, (1991); Ingold (1996); Pfaffenberger (1992); Schaniel, (1988); Eickelman (1981), and on the theories of brand acceptance as influenced by familiarity/trust published in the marketing and management literatures, for example, Luhmann (1988); Wedel et al., (1988); Park and Lessig (1981); Laroche, and Gulati (1995), both studies define technological culturation as the "cultural exposure and the experiences that individuals have with technology originally developed in other countries." They further explain that this construct differs from the traditional social science construct of "acculturation" which, as defined in anthropological studies, refers to the assimilation of the values and beliefs of one society by members of another society (Loch et al. 2003; Mendoza and Martinez, 1981).

In developing these construct, Straub et al., (2001) and Loch et al., (2003), make the assumptions that, like all other technologies, ICTs are not a neutral agent. Rather, ICTs represent embedded cultural-specific beliefs and values that emanate from the culture within which they were developed. In the ICT arena, technological culturation occurs when people become informed or educated about ICTs initially absent from their culture. This being the case, the culture of the receiving society may impede acceptance of ICTs to some degree, especially if the new ICTs are perceived to be opposed to prevailing cultural norms, beliefs and practices. Nonetheless, as the members of a culture become increasingly acculturated to a specific ICT, increased diffusion of the ICT within that society is anticipated (Figure 1). Therefore, the degree of technological culturation is seen as influencing the extent to which ICTs are used within a given society (Loch et al, 2003).

On the other hand, accessibility has been perceived as being an obstacle to ICT use in both the developing and developed countries of the world. Studies by (Musa, 206) have shown how limited access to ICTs by the minority groups and the poor in most developed counties such as the USA have contributed to a digital-divide among the citizens of these countries. Other

studies have demonstrated the same pattern of comparative disadvantage among the poor nations of the world when compared to the developed countries (Odedra-Straub, 1993; Madon and Sahay, 2002; Montealegre, 1999, Musa et al., 2005). The same is seen even within the poor countries, where the wealthier upper-class citizens enjoy the benefits brought about by ICTs at the detriment of the under-privileged masses.

Figure 1: Technological Culturation Influence on Usage of ICT, Loch et al. (2003)

While no comprehensive solutions yet exist on how to adequately address issues of ICT affordability by the masses in the poor nations of the world, the meteoric growth of mobile telephony is indicative of the potential these technologies can have when diffused in ways that allow for affordable access (ITU, 2003; UNCTAD, 2002). These findings likely offer some explanation why Sub-Saharan Africa recorded amongst the highest growth rates in teledensity in the past decade owing to the diffusion of mobile phones (ITU, 2003; UNCTAD, 2002). This trend is a significant proof of the fact that accessibility to ICTs is a major determinant of the usage of these technologies (ITU, 2003; Meso et al., 2005).

Moreover, other studies suggest that accessibility influences the ways in which ICTs are used. For example a study by Kvasny (2005) comparing usage of ICTs among the poorer inner-city communities in the USA to the wealthier suburban communities found support that lower levels of access propagated illiteracy in ICTs and subsequently reinforced low levels of ICT usage (Kvasny, 2005). Another example is the study by Meso et al., (2005), in which accessibility was one of the factors found to significantly impact the extent to which mobile ICTs are used for business.

The International telecommunications Union (ITU), using a measure termed the Digital Access Index (DIA), assessed the extent to which ICTs are accessible to residents of various countries, and how such access influences the degree of ICT usage. According to the ITU, “the DAI concentrates on factors that have an immediate impact on determining an individual's potential to access ICTs”, specifically the affordability of ICTs, the country’s levels of

teledensity, the quality of the country's ICT infrastructure, and the ICT knowledge base as indicated by the information technology literacy of the country's residents. The ITU established that accessibility, as measured by the DIA, influences the extent to which ICTs are used by a country's population (ITU, 2005). Therefore, the degree of access to ICTs is seen as influencing the extent to which ICTs are used within a given society (figure 2).

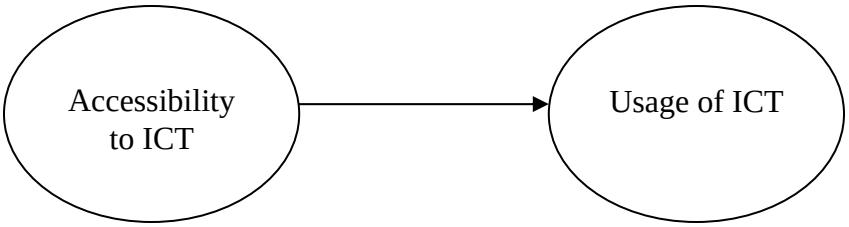


Figure 2: Influence of Accessibility to ICTs on Usage of ICTs

While, past studies have confirmed that technological culturation influences ICT usage (Loch et al., 2003), and that accessibility to ICTs also influences ICT usage (ITU, 2005, Meso et al., 2005), we do not know of any published study that has associated accessibility of ICTs to technological culturation. Therefore, one major contribution of this paper is that it examines this linkage (Figure 3). We argue that, in addition to influencing the usage of ICTs, accessibility to ICTs also impacts technological culturation.

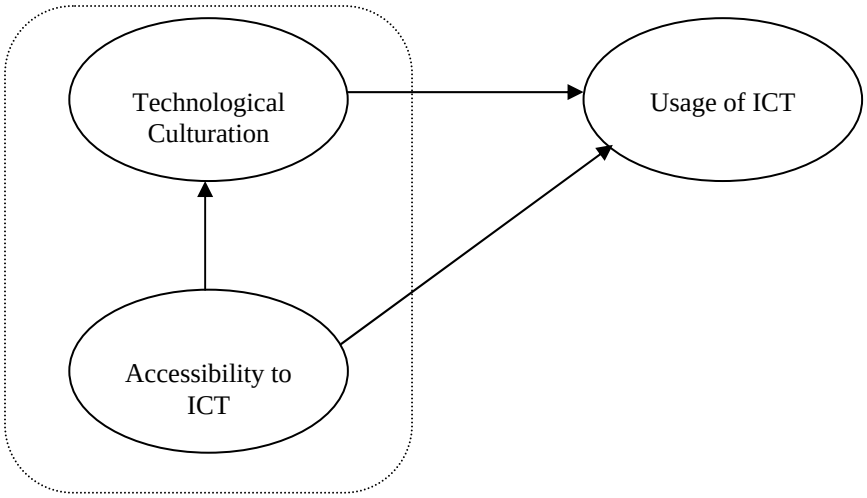


Figure 3: Influence of Accessibility to ICTs on Technological Culturation

The basis for this argument is that technological culturation, as defined by Loch et al. (2003), is a result of on-going exposure to technology, which in turn, enhances an individual's familiarization with the technology. This thesis, as argued by Straub et al. (2001), is based on the marketing theories of familiarity (Wedel et al., 1998; Park and Lessig, 1981). However, these marketing theories on brand familiarity imply that exposure to a product is enhanced by direct access to that product. Likewise, access to an ICT is bound to enhance an individual's familiarity with the ICT, hence enhancing the individual's technological culturation specific to that ICT. Where an individual is not able to access the technology, the opportunity to familiarize oneself with the technology diminishes. Subsequently, the potential for being acculturated to that ICT is also diminished. This being the case, our first research question is: To what extent does accessibility of ICTs influence the process of technological culturation? Based on this, we hypothesize that:

H_1: Accessibility to ICTs influences the process of technological culturation to ICTs.

Perceived Socio-Economic Prospects and Usage of ICTs

As stated earlier, there are many factors that affect the observable level of diffusion of ICTs within a country (Straub etc al., 2001; Loch et al., 2003; Madon and Sahay, 2002; Montealegre, 1999; Walsham and Sahay, 1999). Within IS research the tendency has been to use the theories of technology acceptance and/or cultural influences when examining antecedents and influencers of ICT diffusion. The publications that adopt an economic perspective on ICT diffusion are few and tend to relate to the influence of investment on the growth of ICT and its predecessor telecommunications sector (Montealegre, 1999; Duta, 2001; Mbarika, 2002). An even rarer practice within the realm of IS research has been the use of individual-level economic theories such as the theory of consumption (Gul and Pesendorfer, 2004; Duesenberry, 1949, Mason, 2000) to explain ICT diffusion. Since one way of assessing ICT diffusion is to assess the extent to which these technologies are used by a society, we posit that these theories contribute toward an understanding of what drives ICT diffusion, especially in lesser endowed economies.

According to the economic theory of consumption, consumers, being rational decision makers, would withhold spending or consumption when they perceive a downturn in the economy. They do so to preserve their resources with the knowledge that these limited resources may have to last them through a longer stretch of time before the opportunity to earn or expand

their resource base improves. Therefore they would tend to limit consumption to essential commodities (Gul and Pesendorfer, 2004; Duesenberry, 1949, Mason, 2000).

Since ICTs are perceived by many individuals as being expensive goods/services (Odedra-Straub, 1993; Avgerou, 2003), especially in the least developed countries, it is likely ICT usage will be significantly impacted by the perceptions of a country's economy held by citizens. For example, citizens who hold a bleak perception of the socio-economic environment may find little motivation to consume expensive technological goods and services.

Therefore, the second major contribution of this paper, is the proposition that an individual's perception of the socio-economic prospects – referred to hereafter as PSEP - of his/her country of residence, would impact their usage of ICTs and ICT-based services (Figure 4). Based on this thesis, our second research question is: To what extent does PSEP influence the usage of ICTs by individuals? From this, we hypothesize that:

H_2: Perceived Socio-Economic Prospects (PSEP) influences the extent of usage of ICTs.

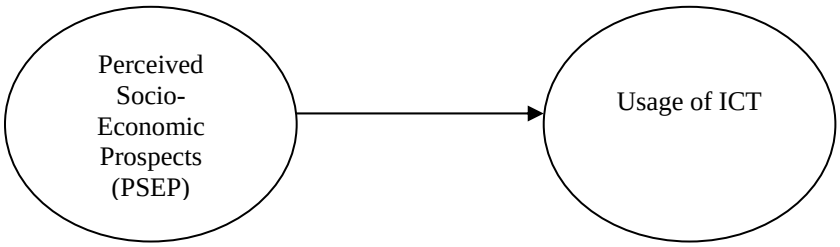


Figure 4: Influence of Perceived Socio-Economic Prospects (PSEP) on Usage of ICTs

The complete research model is presented in Figure 5. The two key hypotheses that we test are labeled H_1 and H_2 respectively. While the linkage between TC and usage of ICTs and Accessibility and usage of ICTs has been confirmed in past studies (Loch et al., 2003 and Meso et al. 2005 respectively), we re-examine them using the data collected in this study. Therefore the remaining hypotheses are:

H_3: Accessibility of ICTs influences the extent of usage of ICTs.

H_4: Technological culturation influences the extent of usage of ICTs.

The subsequent section specifies the approaches used to operationalize the key research constructs. It also presents a description of the methods used for data collection and the subsequent statistical analysis of the data. The results of the study and its implications for research and practice are then presented in the subsequent section.

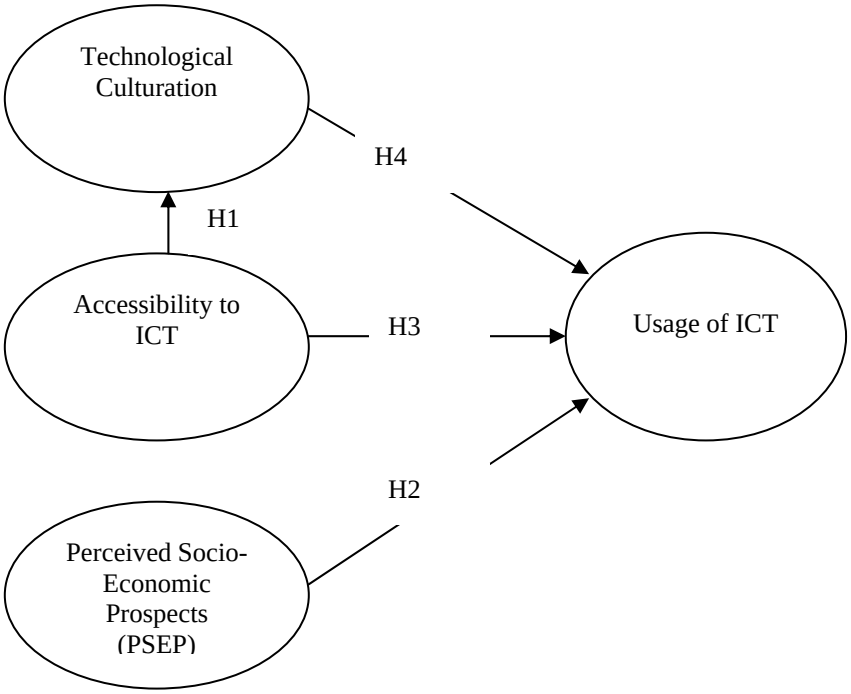


Figure 5: The Research Model

3. RESEARCH METHOD

We used the survey approach, instrumented via a questionnaire, to study the key research questions. The study was limited to Sub-Saharan Africa. Since this region is geographically rather large, conducting the survey in every country proved to be impractical. Therefore, we chose to limit the survey to a few representative countries. Our primary motivations in selecting these countries were to identify countries in the region where the survey could be administered without modifying the original instrument. We were also interested in selecting countries that were comparably similar in their levels of socio-economic development and ICT diffusion.

This being the case, we ended up selecting Kenya, Nigeria, and The Gambia. These three countries were chosen because they met our selection criteria. First, the primary language of formal government and business transactions in all three countries is English. Additionally, the education systems in all three countries use English as the primary language of instruction. Therefore, there was no need to modify the original questionnaire or the translation of the instrument to regional or country-specific dialects. Second, as is evident in Table 1, these countries have relatively similar scores for key social and economic indices. Third, according to

the ITU statistics published at the time of this study, their scores on key ICT indices such as teledensity, internet penetration, and mobile telephony (Table 2) were relatively similar.

Table 1: Key Socio-Economic Development Indicators for Countries in the Study

Country	Population (millions)	Life expectancy at birth (years)	Gross national income per capita (in 2002 $)	Under 5 mortality rate per 1,000 population (2001)
The Gambia	1.4	47	270	73
Kenya	31	46	360	78
Nigeria	133	45	300	84

(Data sourced from IBRD: The World Bank, 2005)

Table 2: Key ICT Indicators for Countries in the Study

Country	**Population**	**Main telephone lines**		**Mobile subscribers**		**Internet users**	
	000s	**000s**	**per. 100 population**	**000s**	**per. 100 population**	**000s**	**per. 100 population**
The Gambia	1'365	42	3.1	130	9.5	30	2.2
Kenya	31'708	328	1.0	1'591	5.0	500	1.6
Nigeria	123'314	853	0.7	3'149	2.6	1'600	1.3
Sub-Saharan	**647'686**	**6'230**	**1.0**	**18'363**	**2.8**	**5'667**	**0.9**
AFRICA	**841'547**	**25'180**	**3.0**	**51'678**	**6.1**	**13'857**	**1.6**

(Data sourced from ITU, 2005b)

Participants were asked to provide responses to a standard set of questions and also provide their personal views to a set of open-ended questions. We used the Likert scale method to measure all survey items, except those that provided personal information about the individual and their responses to the open-ended questions. However, the modalities that we had put in place to survey consumers in The Gambia fell apart just before the initiation of the data collection phase. Therefore, we were forced to forego collecting data from that country. Consequently, the questionnaire was filled out by knowledge workers and college level students in two countries – Kenya and Nigeria.

In total, 450 hard-copy questionnaires were distributed in Nigeria and 150 in Kenya. No incentives were offered to respondents for completing the questionnaire. As Table 2 shows, we received 198 responses from 122 males and 76 females – a 33% response rate. Of the 198 respondents, 8 did not indicate that they used ICTs. Given that the method of data analysis that we used allows for missing data cases to be included in the statistical tests, we did not exclude

these 8 cases. The respondents ranged in age from 18 to 60 years and had an average work experience of 8.18 years.

Respondents

To further ensure that we were gathering and analyzing data from similar countries, we assessed the self-reported demographic indices provided by the respondents (Table 3). This is in keeping with past studies that have employed the survey method (Loch et al., 2003). A comparison of the responses from the two countries indicated that they did not differ in their rating of cultural influences on the use of ICT, except for one item (question 4). There was no significant difference in the composition of the samples from the two countries with respect to gender. However, there was a significant difference in the mean age, and education level of respondents across the two countries. While this was the case, these two factors – age and education were determined as having no significant influence on how individuals used mobile ICT – even when the respondents from each country were tested independently. This being the case, we found no justification for separating the data into two samples based on country or respondents.

TABLE 3: Descriptive Statistics of Respondents by Country

ITEM	Country	Valid N	Minimum	Maximum	Mean	Std. Deviation	Difference in mean	p-value
Age q1a	Both	187	18	60	32.813	8.649	3.1	.05
	Nigeria	150	20	60	33.427	8.835		
	Kenya	37	18	60	30.324	7.450		
Education Level* q2	Both	165	1	6	3.879	0.832	.48	.003
	Nigeria	131	2	6	3.977	0.827		
	Kenya	34	1	5	3.500	0.749		
Gender q1b	Both	177	1	2	1.31	.46	.13	.153
	Nigeria	141	1	2	1.28	.45		
	Kenya	36	1	2	1.42	.5		
Cultural* perspectives q3	Both	192	1	6	2.86	1.58	.44	.132
	Nigeria	156	1	6	2.78	1.51		
	Kenya	36	1	6	3.22	1.82		
Cultural* Perspectives q4	Both	196	1	6	2.77	1.64	1.62	.000
	Nigeria	159	1	6	2.46	1.54		
	Kenya	37	1	6	4.08	1.40		
Cultural* perspectives q5	Both	195	1	6	3.1	1.31	.33	.173
	Nigeria	158	1	6	3.16	1.26		
	Kenya	37	1	6	2.84	1.52		

* Likert scale of 1 to 6 used to measure education level with 1=no formal schooling, 2=primary certificate, 3=high school certificate, 4= bachelors degree or equivalent, 5= masters degree or equivalent, and 6= doctoral degree or equivalent; N=number of cases used in determining mean and std. Dev.

Measures and Instrumentation

In constructing the questionnaire instrument, we gave preference to previously tested questions and followed generally accepted guidelines for building survey instruments (Igbaria et al., 1997; Wixom & Watson, 2001; Gefen et al., 2003). We gave the initial survey instrument to researchers with specific expertise in technology transfer and IT diffusion in Africa. We then used their input to refine and restructure the instrument and establish its content validity. Finally, we pilot-tested the instrument with five academicians and practitioners who were natives of sub-Saharan Africa to identify problems with wording, content, structure, format and procedures. The pilot participants returned written comments, and we followed up with each one via telephone for more detailed feedback. We used their recommendations to develop the final version of the instrument.

Validity of the Instrument

To validate the instrumentation, including the constructs, i.e., to test the discriminant and convergent validity of the measures, we used, the Partial Least Squares statistical analysis as implemented in the PLS Graph software application (Wixom & Watson, 2001), Chin & Newsted, 1999). Although major portions of the questionnaire instrument were developed from instruments that had already been pre-tested and validated in previously published information systems research, we fully tested the instrumentation, as recommended by Straub (1989). The complete instrumentation is presented in Appendix A. When the scale formats varied, we employed normalized or adjusted Cronbach's alphas. These statistics are acceptable by Nunnally's (1967) standards for exploratory research.

This study, as reflected in figure 5, had three independent variables - Technological culturation, Accessibility to ICTs and Perceived Socio-Economic Prospects (PSEP) respectively, and one dependent variable – Usage of ICTs. Both Technological Culturation and PSEP were operationalized as formative constructs. Accessibility to ICTs and Usage of ICTs were operationalized as reflective constructs. This operationalization is consistent with past studies as evident is Loch et al, (2003), Straub et al., (2001), and Meso et al. (2005).

For reflective constructs it is standard practice to conduct a discriminant validity analysis by creating average variance explained (AVE) statistics and to compare these with the cross

correlations of other measures in the instrument (Gefen et al., 2000). When partial least squares (PLS) is utilized as the analytical tool, discriminant validity is considered to be sufficient for an instrumentation's reflective constructs when the average variance extracted (AVE) for each reflective construct is greater than the variance shared between the construct and other constructs in the in the instrumentation (Fornell & Bookstein, 1982; Wixom & Watson, 2001; Gefen et al., 2003). AVE analysis, however, is carried out only for the reflective measures but not for the formative ones. Table 5 presents correlations between the study's reflective constructs and the AVE of each reflective construct (presented as the bold entry in the diagonal of the table).

Table 5: Analysis of Discriminant Validity for Reflective Constructs

	Usage of ICTs	Accessibility to ICTs
Usage of ICTs	**0.869**	
Accessibility to ICTs	-0.481	**0.707**

For formative constructs, Loch et al., (2003) state that "The logic for discriminant validity is that the inter-item and item-to-construct correlations should correlate more highly with each other than with the measures of other constructs." This analysis is only possible where the measures of the formative constructs are contrasted against other constructs (Loch et al, 2003). Therefore, in keeping with Loch et al, we assessed the discriminant validity of technological culturation by comparing and contrasting its measurement items to the demographics variables (age, level of education, and gender) of the study. These demographic variables have been proved to correlate poorly with technological culturation, and in most cases, they do not (Loch et al., 2003). Table 6, which presents the results of the discriminant validity for the formative constructs, shows that this is indeed the case. The items that measure technological culturation do indeed correlate more strongly with the technological culturation construct than they do with any of the demographic constructs previously mentioned. Therefore the formative constructs in the instrument satisfy the requirements for discriminant validity.

Loch et al., (2003) further point out that Convergent validity for formative constructs is satisfied when the item-to-item and item-to-construct correlations for each construct are significant. The matrix presented in Table 6, in addition to displaying the normalized weight and correlations of both item-to-item and item-to-construct correlations for technological culturation and the demographic constructs also presents their respective measures of significance at the

95% level of confidence. These measures of significance confirm that technological culturation, and PSEP, the formative construct in the study, meets the requisite conditions for convergent validity.

Table 6: Analysis of Discriminant and Convergent Validity for Formative Constructs

construct		Technological culturation				Perceptions of Socio-Economic Prospects (PSEP)							
	Item #	q6	q7	q8	q9	q10_b	q10_c	q10_d	q10_e	q11_b	q11_c	q11_d	q11_e
Technological Culturation	q6	1.000	0.509	0.443	0.423	-0.104	-0.110	-0.080	-0.106	-0.020	-0.048	-0.035	-0.048
	q7	0.509	1.000	0.591	0.235	-0.032	-0.045	-0.059	0.024	-0.027	0.063	0.051	0.005
	q8	0.443	0.591	1.000	0.248	0.040	0.083	-0.059	0.020	-0.021	0.000	0.067	0.029
	q9	0.423	0.235	0.248	1.000	-0.162	-0.166	-0.175	-0.195	0.055	-0.035	-0.024	-0.095
Perceived Socio-Economic Prospects (PSEP)	q10_b	-0.104	-0.032	0.040	-0.162	1.000	0.455	0.494	0.511	0.097	0.262	0.226	0.308
	q10_c	-0.110	-0.045	0.083	-0.166	0.455	1.000	0.403	0.516	0.138	0.208	0.197	0.242
	q10_d	-0.080	-0.059	-0.059	-0.175	0.494	0.403	1.000	0.471	0.144	0.260	0.176	0.266
	q10_e	-0.106	0.024	0.020	-0.195	0.511	0.516	0.471	1.000	0.228	0.287	0.317	0.389
	q11_b	-0.020	-0.027	-0.021	0.055	0.097	0.138	0.144	0.228	1.000	0.119	0.291	0.275
	q11_c	-0.048	0.063	0.000	-0.035	0.262	0.208	0.260	0.287	0.119	1.000	0.318	0.363
	q11_d	-0.035	0.051	0.067	-0.024	0.226	0.197	0.176	0.317	0.291	0.318	1.000	0.758
	q11_e	-0.048	0.005	0.029	-0.095	0.308	0.242	0.266	0.389	0.275	0.363	0.758	1.000
Demographic Items	q1_a	0.060	0.096	0.055	0.078	0.010	0.038	-0.044	0.052	-0.029	-0.090	0.027	-0.043
	q1_b	0.024	0.089	0.116	0.077	-0.133	-0.201	-0.100	-0.202	-0.046	0.100	0.082	-0.007
	q2	0.154	0.091	-0.033	0.077	-0.071	-0.100	0.039	-0.130	-0.010	-0.063	-0.154	-0.213

For reflective constructs, convergent validity is satisfied when items load highly on their respective constructs. For exploratory research, the convergent validity is satisfied when all item loadings are above 0.6 (Nunnally, 1967). In explanatory research the acceptable threshold is 0.7 (Watson and Wixom, 2002). Table 7 shows the item loadings for the reflective constructs in the study. All the items except for one (q12e) load above the recommended level of 0.6 on their respective constructs. This is sufficient evidence that the questionnaire instrument's reflective constructs satisfy the conditions for convergent validity.

Table 7: Analysis of Convergent Validity for Reflective Constructs

construct	Item #	Loading	Mean of Sub-Samples	Standard Error	T-Statistic
Usage of ICTs	q13	0.885	0.890	0.021	41.874
	q14	0.854	0.852	0.033	26.035
Accessibility to ICTs	q12a	-0.776	-0.760	0.051	15.347
	q12b	-0.819	-0.812	0.039	21.028
	q12c	-0.526	-0.495	0.095	5.559
	q12d	-0.678	-0.673	0.058	11.604
	q12e	-0.569	-0.564	0.102	5.595

Data Analysis

In PLS, the structural model tests, which entail estimating the path coefficients and the R^2 values, provide the information necessary to assess the hypotheses in a research model. Path coefficients represent the strength of the relationships between dependent and independent variables. These need to be significant and directionally consistent with expectations. The R^2 value represents the amount of variance explained by the independent variables, thereby providing insights into the model's predictive power. Together, both explain how well the structural model is performing. The greater the R^2 value, the better the model's predictive quality (Fornell and Bookstein, 1982; Chin and Newsted, 1999; Wixom & Watson, 2001). Therefore, results for hypotheses 1 through 9 were determined by running the bootstrap resampling method (with 100 resamples) in PLS. The sample size of 198 was well above the recommended minimum of 40 for model testing (Wixom and Watson, 2001).

RESEARCH RESULTS

Discussion of results from the study and well as discussion, implications, and conclusions will be provided at the conference or at the request of the conference organizers.

REFERENCES

Ahituv, N. and Greenstein, Gil., (2005), "The impact of accessibility on the value of information and the productivity paradox", *European Journal of Operational Research*. Vol.161, Issue. 2, pp. 505

Avgerou, (2003), "The link between ICT and Economic Growth in the Discourse of Development', in Korpela, M., Montealegre, R., and Poulymenakou, A. *Organizational Information Systems in the Context of Globalization*, Boston, Kluwer, pp 373-386 (2003)

Campbell D. T., and D. W. Fiske, (1959), "Convergent and Discriminant Validation by the Multitrait-multimethod Matrix," *Psychology Bulletin*, vol. 56, pp. 81–105.

Cherry, S, (2004), "A World Divided By A Common Internet", *IEEE Spectrum***,** New York: Feb. Vol. 41, Issue 2; p. 56

Checchi, R. M., Sevcik, G. R., Loch, K. D., and Straub, D. W., (2002), "An instrumentation process for measuring ICT policies and culture", *Proceedings of International Conference on Information Technology, Communications and Development,* Kathmandu, Nepal, December 1-3, 2002.

Chin, W. W., (1998a), "The partial least squares approach to structural equation modeling," in *Modern Methods for Business Research*, G. A. Marcoulides, Ed. London, U.K., pp. 295–336.

Chin, W. W., (1998b), "Issues and opinion on structural equation modeling," *MIS Quarterly*, Vol. 22, pp. VII–XVI.

Chin, W., and Newsted, P. (1999), "Structural Equation Modeling Analysis with Small Samples Using Partial Least Squares," In S. S. F. S. S. Research (Ed.), (pp. 307-341): Sage Publications.

Culnan, M., (1985), "The Dimensions of Perceived Accessibility to Information: Implications for the Delivery of Information Systems and Services," *Journal of the American Society for Information Science*, New York: Vol.36, September Issue 5; pg. 302, 7 pgs.

Diamantopoulos A., and H. M.Winklhofer, (2001), "Index Construction with Formative Indicators: An alternative to Scale Development," *Journal of Marketing Research*, Vol. 38, pp. 269–277.

Duesenberry, J. S. (1949), *Income, Savings and the Theory of Consumer Behaviour*, Cambridge, Mass: Harvard University Press

Dutta A., (2001), "Telecommunications and economic activity: An analysis of Granger causality", *Journal of Management Information Systems***,** Armonk: Spring 2001. Vol. 17, Issue 4; p. 71 (25 pages)

Eickelman, D. F., (1981), *The Middle East: An Anthropological Approach*, Englewood Cliffs, NJ: Prentice-Hall.

Escobar, A.(1994), "Welcome to Cyberia: Notes on the anthropology of cyberculture," *Current Anthropology*, vol. 35, pp. 211–231.

Fornell, C., and Bookstein, F. L. (1982), "Two Structural Equation Models: LISREL and PLS Applied to Consumer Exit-Voice Theory," *Journal of Marketing Research*, 19(4, November), 440-452.

Gefen, D., Straub, D., and Boudreau, M., (2000), "Structural Equation Modeling and Regression: Guidelines for Research Practice," c*ommunications of AIS*, vol. 7, pp. 1–78.

Gefen, D., Karahanna, E., and Straub, D. (2003), "Trust and TAM in Online Shopping: An Integrated Model," *MIS Quarterly*, 27(1, March), 51-90.

Gul, F., and Wolfgang, P., (2004), "Self-Control and the Theory of Consumption", *Econometrica*, Evanston: January Vol. 72, Issue. 1; p. 119 (40 pages).

Gulati, R. (1995), "Does familiarity breed trust? The Implications of Repeated Ties for Contractual Choice in Alliances," *Academic Management Journal*, vol. 38, pp. 85–112.

Hakken, D. (1991), "Culture-centered computing: Social policy and Development of New Information Technology in England and in the United States," *Human Organization*, vol. 50, pp. 406–423.

IBRD: The World Bank, 2005, Sub-Saharan Africa: regional data from the WDI database, World Development Indicators Database for 2004, Accessed on April 6, 2005, http://www.worldbank.org/data/databytopic/ssa_wdi.pdf

Igbaria, M., Cragg, P., and Zinatelli, N. (1997), "Personal Computing Acceptance Factors in Small Firms: A Structural Equation Model," *MIS Quarterly*, 21(3), 279-305.

Ingold, T. (1996), "Technology and culture," in *Encyclopedia of Cultural Anthropology*, E. Levinson and M. Ember, Eds. New York: Holt, pp. 1297–1301.

ITU (2003), *World Telecommunications Development Report 2003: Reinventing Telecoms.* ITU, Geneva, Switzerland.

ITU (2005a), "ITU Digital Access Index: World's First Global ICT Ranking Education and Affordability Key to Boosting New Technology Adoption," Accessed on April 6, 2005, http://www.itu.int/newsarchive/press_releases/2003/30.html".

ITU, (2005b), "Africa ICT Indicators for 2003", Accessed on April 6, 2005, http://www.itu.int/ITU-D/ict/statistics/at_glance/af_ictindicators.html

Jensen, M. (2002), “Information and Communication Technologies (ICTs) in Africa – A Status Report,” United Nations.

Kvasny, L. (2005), "The Role of the Habitus in Shaping Discourses about the Digital Divide", *Journal of Computer Mediated Communication*, Vol. 10, No. 2.

Laroche, M., C. Kim, and L. Zhou, (1996), “Brand familiarity and confidence as determinants of purchase intention: An empirical test in a multiple brand context,” *Journal of Business Research*, vol. 37, pp. 115–120.

Luhmann, N., (1988), “Familiarity, confidence, trust: Problems and alternatives,” in *Trust*, D. G. Gambetta, Ed. New York: Basil Blackwell, pp. 94–107.

Loch *K.*, Straub, D., and Kamel, S. (2003), “Diffusing the Internet in the Arab world: The role of Social Norms and Technological Culturation,” *IEEE Transactions on Engineering Management,* Vol. 50, February Issue 1; p. 45

Madon, S., and Sahay, S., (2002), “An information-based model of NGO-mediation for the Empowerment of slum dwellers in Bangalore,” *The Information Society*, 18, 1.

Mason. R.,(2000), “The social significance of consumption: James Duesenberry's contribution to consumer theory”, Journal of Economic Issues, Lincoln: Sep. Vol. 34, Issue 3; p. 553 (20 pages)

Mbarika, V., Musa, P., Byrd, T., and McMullen, P., (2002), “Teledensity growth constraints and strategies for Africa's LDCs: "Viagra" prescriptions or sustainable development strategy?” *Journal of Global Information Technology Management, Vol. 5, Iss. 1; p. 25 (18 pages)*

Mbarika, V.A.W. (2004). "TeleEducation in Sub-Saharan Africa: A Breakout Approach to Sub-Saharan Africa's Education Dilemma," *IEEE Technology and Society* (22:4), pp. 20-26.

Mendoza, R. H., and J. L. Martinez Jr., (1981), “The measurement of acculturation,” in *Explorations in Chicano Psychology*, J. A. Baron, Ed. New York: Praeger, pp. 1–83.

Meso, P., Musa, P.F., and Mbarika, V. W., (2005), “Towards a Model of Consumer Use of Mobile Information and Communication Technology in LDCs: The Case of Sub-Saharan Africa”, Information Systems Journal, Vol. 15, pp. 119-146.

Montealegre, R., (1999), “A temporal model of institutional interventions for information technology adoption in less-developed countries”, *Journal of Management Information Systems,* Armonk: Summer, Vol. 16, Issue 1; p. 207 (26 pages).

Musa, P.F., Meso, P., and Mbarika, V. W., (2005), “Toward Sustainable Adoption of Technologies for Human Development in Sub-Saharan Africa: Precursors, Diagnostics, and Prescriptions”, Communications of AIS, Vol. 15, April, pp. 592-608.

Musa, P. F., (2006), "Making a Case for Modifying the Technology Acceptance Model to Account for Limited Accessibility in Developing Countries", *Journal of Information Technology for Development (JITD),* Vol. 12, No. 3, summer 2006, pp. 213-224.

Nunnally, J. C., (1967), *Psychometric Theory*. New York: McGraw-Hill.

O'Brien, J.A. (2005). *Introduction to Information Systems*, Irwin/McGraw-Hill, Burr Ridge, USA,.

Odedra-Straub, M., (1993), "Critical Factors Affecting Success of CBIS: Cases from Africa", *Journal of Global Information Management***,** Summer Vol. 1, Issue 3; p. 16 (16 pages).

Okoli, C., Mbarika, V., and McCoy, S., (2004). "The Effects of Culture on E-Business in Sub-Saharan Africa", *Proceedings of the Fifth Annual Global Information Technology Management (GITM) World Conference*, San Diego.

Pal, A., Mbarika, V.A.W., Cobb-Payton, F., Datta, P., and McCoy, S. (2005). "TeleMedicine Diffusion in a Developing Country: The Case of India," *IEEE Transactions on Information Technology in BioMedicine* (9:1), 2005, pp. 59-65.

Park, C. W. and Lessig, P. V., (1981), "Familiarity and its impact on consumer decision biases and heuristics," *Journal of Consumer Research*, vol. 8, pp. 223–230.

Pfaffenberger, B., (1992), "Social Anthropology of Technology," *Ann. Rev. Anthropology*, vol. 21, pp. 491–516.

Rose, G. M., Evaristo, R., and Straub, D., (2003), "Culture and Consumer Responses to Web Download Time: A Four-Continent Study of Mono and Polychronism," *IEEE Transactions on Engineering Management*, 50(1, February), 31-44.

Schaniel, W., (1988), "New Technology and Cultural change in Traditional Societies," *Journal of Economic Issues*, vol. 22, pp. 493–498.

Straub, D. W., (1989), "Validating instruments in MIS research," *MIS Quarterly.*, vol. 13, pp. 147–169, Ethics, and the Academy of Management.

Straub, D.W., Loch, K., and Hill, C., (2001), "Transfer of Information Technology to the Arab world: A test of cultural influence modeling," *Journal of Global Information Management*, vol. 9, pp. 6–28.

UNCTAD (2002), *E-Commerce and Development Report 2002*. United Nations, New York, USA.

Wedel, M., Vriens, M., Bijmolt, T., Krijnen, W., and Leefland, P., (1998), "Assessing the effects of abstract attributes and brand familiarity in conjoint choice experiments," *International Journal of Marketing Research*, vol. 15, pp. 71–78.

Walsham, G., (2003), “Development, Global Futures and IS Research A Polemic” Keynote Address to the IFIP WG 8.2 -IFIP WG 9.4 Conference “IS Perspectives and Challenges in the Context of Globalization” Athens, Greece, June 2003.

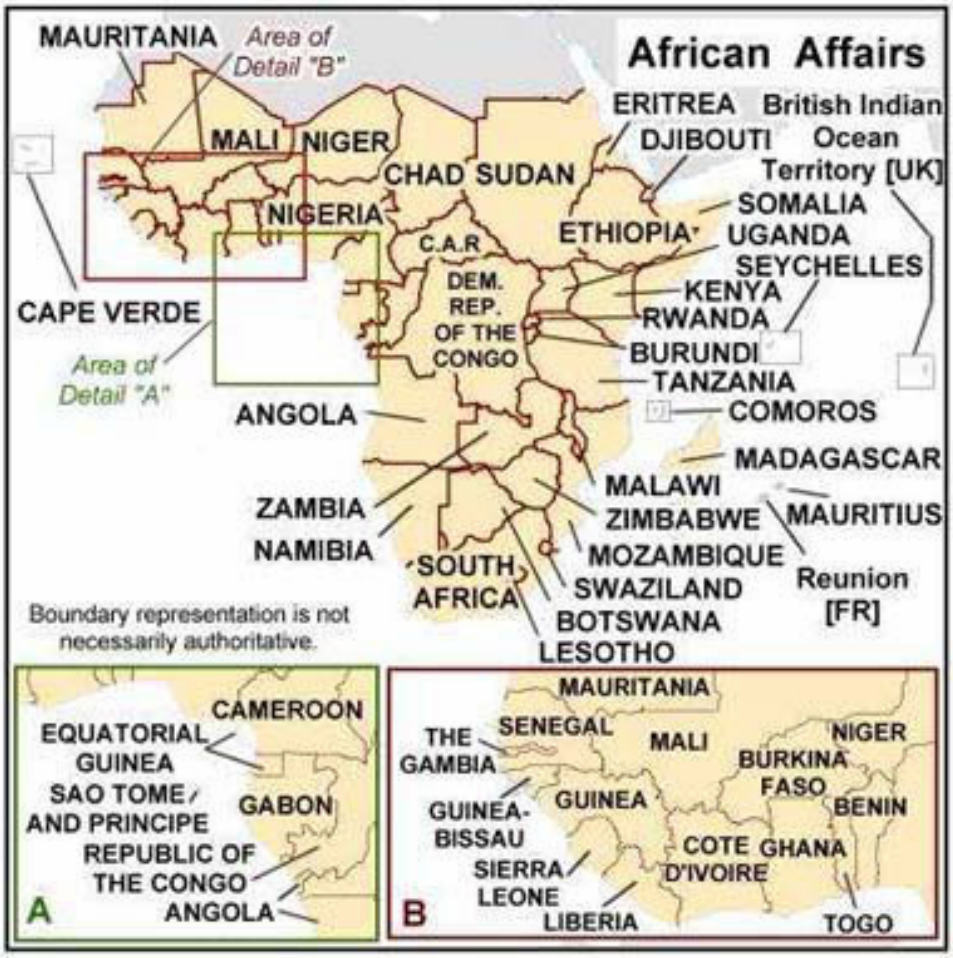
Walsham, G., and Sahay S., (1999), **“**GIS for district-level administration in India: Problems and opportunities”, *MIS Quarterly*, Minneapolis: Mar 1999. Vol.23, Issue 1; p. 39 (27 pages).

Wixom, B. H., and Watson, H. J., (2001), “An Empirical Investigation of the Factors Affecting Data Warehousing Success,” *MIS Quarterly*, Vol.25(1), pp.17-41.

World Bank "A Definition of E*Government," World Bank, 2005. http://www1.worldbank.org/publicsector/egov/definition.htm (as of April 2005).

Yang, Z., Cai, S., Zhou, Z., Zhou, N., (2005), “Development and validation of an instrument to measure user perceived service quality of information presenting Web portals”, *Information and Management*, Vol.42, Issue 4, pp. 575

APPENDIX A: MAP OF SUB-SAHARAN AFRICA



Source: U.S. Department of State
Web Site: http://www.state.gov/p/af/ci/
Last accessed August 13, 2008.