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## **The adoption of e-learning systems in low income countries: the case of Ethiopia**

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### **Abstract**

*This paper presents the Technology Acceptance Model (TAM) to examine the adoption of e-learning system in low-income countries, the case of Ethiopia. The research uses a quantitative research approach to examine Ethiopian tertiary level distance students' determinant factors for the acceptance of e-learning systems. A questionnaire-based survey was conducted to collect data from 255 undergraduate distance learners in a higher education institute in Ethiopia. The data were analyzed using the Structural Equation Modeling (SEM) (Hair et al, 2005) technique to examine the causal model. The results indicated that perceived usefulness and perceived ease of use significantly affected distance learners' behavioral intent to use e-learning system in low-income countries. This study is perhaps one of the first to use TAM model to examine the adoption of e-learning systems among under-graduate level distance students in Ethiopia. The paper provides initial insights in to factors that are likely to be significant antecedents of planning and implementing e-learning systems to enhance distance learners' acceptance in low income countries.*

**Key words:** E-learning system, Technology Acceptance Model (TAM), Distance Education, Low-Income Countries.

## **1. Introduction**

The environment of higher education is evolving because of rising costs, shortage of highly qualified teachers, shrinking budgets, and increasing needs for distance education are causing educational institutions in higher income countries to adopt e-learning system as a core teaching and learning system (New Media Consortium, 2007). However, low-income countries have failed to take the advantage of e-learning system (DeRouin, Fritzche & Salas, 2005). Ethiopia is one of the low income countries listed in the world ranking (World Bank, 2012). The total number of Ethiopian Tertiary Level Students in 2010/11 is 447,693, from this figure 17% of the total enrollments are distance learners (MOE, 2011). Distance learning in Ethiopia is currently totally dependent on print based media devoid of any communication technologies (MOE, 2013)

Therefore, this study will attempt to address the following main research question:

“How do tertiary levels distance students in Ethiopia view the adoption of e-learning systems?”

## **2. Theoretical background, Research model and Research hypothesis**

E-learning (using ICT in general for education) has been promoted as ways to overcome physical distance, availability problems and teacher shortages especially in low income countries (UNESCO, 2006). The first and most significant barrier of e-learning in low-income countries is the slow diffusion of user technologies in the learning communities (Blinco, 2004). Low-income countries have failed to take advantage of e-learning as an educational modality (DeRouin, Fritzche & Salas, 2005). Resource constrained institutions of higher learning

in low-income countries have failed to take advantage of advancement in Internet technologies to adopt and implement technology enhanced learning (Holmberg, 1980).

The attention accorded to e-learning in low-income countries is disproportionately minimal (Sandhaas, 2005). In Ethiopia, little is known as to the efforts made by the Ethiopian Education System to realign itself to the changing global landscape in e-learning systems (Tesfaye & Elizabeth, 2008).

Several studies examined the effectiveness of e-learning in facilitating enhanced teaching and learning as well as how they are perceived by learners (Clarke, Flaherty & Mottner, 2001). For instance, according to Scheffler and Logan (1999) conducted a study to identify technology related competencies that were important for teachers and students. They investigated on the studies the general operation of hardware and software has become less important for most teachers. However, none of the studies in e-learning identified the success of e-learning as dependent on the user/learner adoptability in low-income countries (Chao 2006 & Dunlap et al, 2003). To this end, Technology Acceptance Model is a well established model that has been used broadly to predict and explain human behavior towards the adoption of new Information systems in a given context (Lee et al, 2003).

Therefore, the following hypotheses are proposed with respect to the adoption of e-learning system in low income countries, the case of Ethiopian Tertiary Level Distance Students:

H1: Perceived usefulness has a direct effect on behavioral intention to use e-learning system in low income countries.

H2: Perceived ease of use has a direct effect on behavioral intention to use e-learning system in low income countries.

H3: Perceived ease of use has a direct effect on perceived usefulness of e-learning system in low income countries.

### **3. Research Methodology**

#### **3.1 Model instruments**

All measures for each construct of this study were derived from previous studies on TAM model (Davis, 1989).

The survey questionnaire consisted of a concise instruction and the e-learning system definition for this study and recorded the subject's perception of each variable in the model. This part asked each subject to indicate his or her degree of agreement with each item. Data were collected using a five point Likert-type scale from one, being "strongly disagree", to five, being "strongly agree".

#### **3.2. Subjects**

Subjects for this study were Ethiopian Tertiary level distance students (at under-graduate level). One college specializing only in distance education having many branches around different corners of the country is selected for the purpose of the study. Since quantitative research methodology by use of sampling has the advantage of generalizability over large population (Stone, 1978), the research uses a quantitative approach to examine Ethiopian tertiary level distance students' determinant factors for the acceptance of e-learning systems. Data were distributed and collected via random sampling method.

#### **3.3 Analysis methods**

The reliability and validity of the measurement model was assessed by a conformity factor analysis (CFA) (Byrne, 2006) using the LISREL software and the maximum likelihood method was applied to estimate the parameters of the model. This step was used to test if the empirical data confirmed to the

presumed model. Then, the structural equation modeling (SEM) (Hair et al, 2005) technique was used to examine the causal model.

### 4. Results and Discussion

The SEM technique was used to examine the structural model so the effects among those latent constructs were tested. Fig. 1 presents the standardized path coefficients that refer to the significant structural relationship among the variables. Most of the hypotheses were strongly supported. The results indicated that perceived usefulness and perceived ease of use are important determinants to users’ behavioral intent to use e-learning systems in low income countries. From the 255 returned questionnaires (a total of 300 questionnaires were distributed) which were statistically analyzed, the tests of structural model indicated that perceived usefulness has a direct effect on behavioral intention to use e-learning systems (H1:  $\beta=0.22, p<0.05$ ). While the perceived ease of use has a significant direct effect on behavioral intention to use e-learning systems (H2:  $\beta=0.48, p<0.01$ ). It also has an indirect effect on behavioral intention to use through the mediator of perceived usefulness; meanwhile, PEOU has an extremely strong effect on perceived usefulness (H3:  $\beta=0.69, p<0.001$ ).

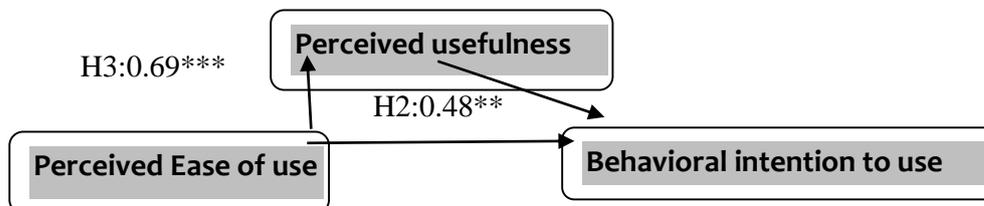


Fig.1. The empirical results of e-learning systems. Path coefficients ( $\beta$ ) are indicated in the path diagram. \*Path is significant at the 0.05 level. \*\*Path is significant at the 0.01 level. \*\*\*Path is significant at the 0.001 level.

The measurement model included 15 items describing three latent constructs: perceived usefulness, perceived ease of use and behavioral intention to use. The various goodness-of-fit statistics are shown in table 1 and present a good fit between the data and the proposed measurement model. The goodness- of – fit (GFI) value of 0.86 is slightly less than the benchmark of 0.9 but very close to it. The results show that the measurement model has a good fit with the data based on other indices of fit such as normed fit index (NFI: 0.91), non-normed fit index (NNFI: 0.95), comparative fit index (CFI: 0.96), and root mean square residual (RMSR: 0.039). Hence, we could proceed to evaluate the psychometric properties of the instrument in terms of reliability, convergent validity, and discriminant validity.

TABLE 1. Model evaluation overall fit measurement

Indices	Recommended Value	Value
The goodness- of – fit (GFI)	$\geq 0.9$	0.86
Normed fit index (NFI)	$\geq 0.9$	0.91
Non-normed fit index	$\geq 0.9$	0.95
Comparative fit index (CFI)	$\geq 0.9$	0.96
Root mean square residual (RMSR)	$\leq 0.05$	0.039

Reliability and convergent validity of the construct were estimated by cronbach’s  $\alpha$ , composite reliability, and average variance extracted (see table 2). All were greater than the benchmark of 0.60 recommended by Bagozzi and Yi (Bagozzi & Yi, 1988). The average variance extracted for all measures exceeded the recommended 0.5

level (ranged from 0.59 to 0.87). This illustrates that all measures had strong and adequate reliability and discriminant validity.

Table 2. Assessment of Construct reliability

Variables	Cronbach's $\alpha$ (>0.7)	Composite reliability (>0.6)	Average variance extracted (>0.6)
Perceived Usefulness	0.84	0.95	0.87
Perceived ease of use	0.95	0.85	0.66
Behavioral intention to use	0.94	0.94	0.84

## 5. Conclusion

The testing results of the TAM model, therefore, showed that in low income-countries, distance students' perception to use e-learning systems can be explained or predicted through perceived usefulness and perceived ease of use ( Vankatesh & Davis, 2000), and their perception of usefulness is also influenced by the perception of e-learning systems ease of use. Therefore, our initial three hypotheses H1, H2, and H3 are well supported by the model. Although distance students in low income countries such as Ethiopia might seem that they may not find the application of e-learning systems important for their learning due to less ICT infrastructure and access (MOE, 2011), this study provided important insight to examine their intention to use as determined by perceived usefulness and perceived ease of use. Therefore, these results provide initial insights into factors that are likely to be significant antecedents of planning and implementing e-learning systems in low income countries.

## 6. Implications for further research

This study can be considered as confirmatory research method towards the test of TAM model in the adoption of e-learning systems in low income countries. The study is useful in that it will give policy makers in the distance education sector and distance education institutes to understand the adoption level of distance students towards e-learning system and, therefore, enhance the delivery of education anywhere and anytime with added features than the accustomed standard print based traditional distance educational modality. Further research exploring determinant factors for the adoption of e-learning system in low-income countries should be researched to explore whether there are other factors that determine for the adoption of e-learning system in the context of low-income countries.

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### **About the Authors**



Yonas Hagos is a PHD student at the Addis Ababa University, Ethiopia. He has served as a lecturer for more than ten years in different higher education institutes in Ethiopia, consultant in real estate businesses, researcher in insurance and textile manufacturing companies. His current research is e-commerce, e-learning, marketing and knowledge management.

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**APPENDICE****Constructs and Items used based on TAM model**

Construct	ITEMS	Sources
Perceived Usefulness (PU)	PU1: Learning through e-learning systems would be easy for me.	Davis (1989)
	PU2: I would find it easy to use e-learning systems to actively learn anywhere and anytime.	Davis (1989)
	PU3: My interaction with my teachers and classmates through e-learning systems would be clear and understandable	Davis (1989)
	PU4: It would be easy for me to become skillful at using e-learning systems.	Davis (1989)
	PU5: I would find e-learning systems to be flexible to interact with.	Davis (1989)
	PU6: I would find e-learning systems useful in my learning.	Davis (1989)
Perceived Ease of Use (PEU)	PEU1: Using e-learning systems in my learning would enable me to accomplish my learning activities and tasks more quickly.	Davis (1989)
	PEU2: Using e-learning systems would improve my performance in my learning.	Davis (1989)
	PEU3: Using e-learning systems in my learning would increase my result.	Davis (1989)
	PEU4: Using e-learning systems would enhance my effectiveness on my learning.	Davis (1989)
	PEU5: Using e-learning systems would make it easier to do learning activities and tasks.	Davis (1989)
	PEU6: I would find e-learning systems easy to use.	Davis (1989)
Behavioral Intention to Use (BI)	BI1: I intend to use e-learning system as often as needed.	Davis (1989)
	BI2: Whenever possible, I intend to use e-learning systems.	Davis (1989)
	BI3: I estimate that my chances of using e-learning systems in my learning are frequent.	Davis (1989)