

# E-Learning acceptance in a developing country: A case of the Indonesian Open University

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## Abstract

The rapid proliferation of the number people using the Internet and World Wide Web (WWW) has been identified by many academic institutions as a potential opportunity to promote distance learning activity. E-learning has been implemented by academic institutions worldwide for decades, including the Indonesian Open University. In this study, using the Indonesian Open University or Universitas Terbuka (UT) as study setting, we investigate the factors that were believed to affect acceptance of e-learning namely, computer self-efficacy, convenience, instructor's characteristics, instructional design, technological factors and institutional support. All these factors were examined to predict their contribution to the Technology Acceptance Model (TAM). From the literature, we developed a research model and eleven hypotheses. The research model was tested using structural equation modeling technique. The research findings suggest several implications and contributions to the e-learning knowledge and concept. The results provide interesting insights and suggestions. Instructional design (ID) and technological factors (TF) were shown to be strong predictors of both perceived ease of use (PEOU) and perceived usefulness (PU). Consistent with prior studies, CSE was confirmed to predict perceived usefulness. Other variables; convenience (CONV) and instructor's characteristics (IC) are found to be non-significant factors for perceived ease of use (PEOU). Perceived ease of use was found to be a strong predictor of perceived usefulness and intention to use.

## 1 Introduction

Recent development of Web resources has put a pressure on academic institutions to integrate online courses material into their educational environment (Saade & Bahli, 2005). Distance education has evolved through a number of different generations. The first generation was correspondence study, in which the principal media of communication are printed materials or assignments being sent by mail. The second generation was marked with the establishment of the first Open University in UK in the early 1970s. Although correspondence instructions were the mostly used method in distance education, the universities also used broadcast and recorded media such as radio, television and audiotapes. Thus, this led to the third generation of distance education, in which interaction issues were addressed through the

application of telephones, satellites and cables besides television broadcasting, audio and videotapes (Moore and Kearsley, 1996).

The new generation of distance education began in 1990's, where rapid development of communication technologies, computer networks, multimedia and the internet took place. Apparently, the integration and collaboration of new technologies related to education have initiated a new learning environment and entered the new era of student-centered learning (O'Malley, 1999; McIssac, 2002; Holcomb *et al.*, 2004; Allen *et al.*, 2004). Using the Indonesian Open University as the study sample and the technology acceptance model as our theoretical framework we identified five factors that were believed to influence learners' acceptance of e-learning system. The factors were computer self-efficacy, convenience, instructor's characteristics, instructional design, and technological factors. All the factors together with the acceptance factors, perceived usefulness, perceived ease of use and intention to use were tested in the proposed model using structural equation modeling technique.

## 2 Background

This section discusses the background of the Indonesian Open University and the Technology Acceptance Model (TAM).

### 2.1 Indonesian Open University

Distance education was introduced in Indonesia in 1955 with the establishment of correspondence diploma programme aimed at upgrading teaching qualifications. The purpose of the project is to provide in-service training for secondary and tertiary level teachers. In order to meet these demands, in 1984, The Indonesian Open Learning University or Universitas Terbuka (UT) was established as a 45<sup>th</sup> national university and the only one in Indonesia that offers distance education (Belawati, 2001). In the early age, UT has three main missions; to increase number of learners in higher education, to increase number of students in strategic areas and to upgrade the qualifications of primary and secondary school teachers from diploma degree to full teacher training degree (Universitas Terbuka, 2005). UT is fully supported by the government.

Since its inception, UT has become one of the biggest universities in the world with over 350,000 students and 34 branches located in almost all provinces in Indonesia. At present, UT has more than seven hundred courses through the thirty-two programmes offered by four major faculties; Economic and Development Studies, Social and Political Sciences, Mathematics and Natural Sciences, Teacher Training and Educational Sciences (Universitas Terbuka, 2005).

UT is the only university in Indonesia which implements teaching-learning method using open and distance learning mode. As any other open university, UT is open for everyone and students are allowed to study with their own degree of autonomy and free to select the curricula or develop their own curricula (Peters, 1993), there is no such limitation of age, registration period, time study, etc. It is also distance because of no face to face (F2F) interaction except facilitated by the printed and electronic media devices.

UT also provides online student support services to facilitate interaction and communication within the UT community, local and abroad. One of the services is online learning or online tutorial which was launched in 1999. UT

used Moodle as the learning management software for its online teaching and learning activities. Moodle is a content management system for online learning aimed at equipping instructors with the tools to provide the materials for students to engage in collaborative and cooperative learning activities. Moodle's main features include announcement, news, course management, calendar, file sharing, discussion forum, chat room, online quiz and course evaluation. Either instructors or students could customize features on his or her personal pages. Like any other course management systems (CMS) such as WebCT and Blackboard, Moodle can also be used to conduct virtual class.

## 2.2 Technology Acceptance Model (TAM)

Technology acceptance studies has been the focus of many researchers in IS research for the last two decades. Adapted from the Theory of Reasoned Action (TRA) originated by Fishbein and Ajzen (1975), Davis (1986,1989) developed Technology Acceptance Model (TAM) which is specifically meant to explain computer usage behaviour. TAM is one of the most established theories applied in technology acceptance studies and known as a parsimonious powerful model for explaining and predicting technology acceptance (Davis and Venkatesh, 1996). The purpose of TAM is to provide an explanation of the determinants of computer acceptance in general as well as a basis for tracing the impact of external factors on internal beliefs, attitudes and intentions (Davis et al., 1989). TAM posits that perceived usefulness and perceived ease of use influence computer user's intention and actual computer usage behaviour. According to Davis (1989), perceived usefulness is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance". Meanwhile the perceived ease of use refers to "the degree to which a person believes that using a particular system would free of effort".

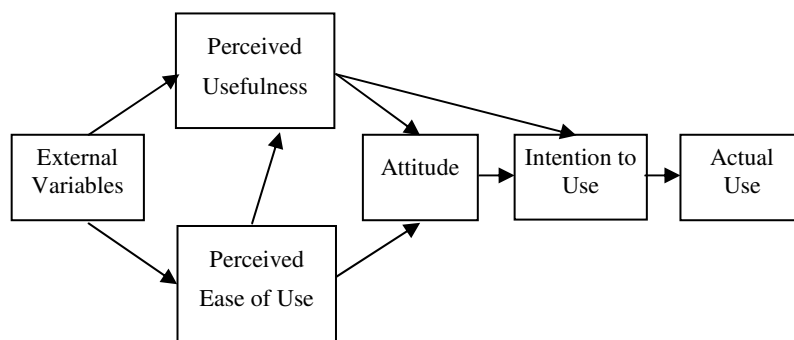


Figure 1: Technology Acceptance Model (TAM) by Davis (1986)

From the model (see Figure 1), perceived usefulness can be affected by various external variables and also perceived ease of use. External variables, such as system features, training, documentation etc. are also theorized to be determinants of perceived ease of use which indirectly affect perceived usefulness as well (Davis et al, 1989). The proliferation use of TAM theory as research model in predicting usage behaviour of new technologies in recent

years has also led researchers and practitioners to apply this theory in the internet and World Wide Web context (Gardner & Amoroso, 2004; Klop-ping & McKinney, 2004; Chen *et al*, 2002). However, only few researchers extend the TAM theory by associating with other variables or theories to fit with the online learning environment (Saade & Bahli, 2005; Pan *et al*, 2003; Brown, 2002

### 3 RESEARCH MODEL AND HYPOTHESES

This study examined five factors that were believed to influence learners' acceptance of online learning. The factors identified were computer self-efficacy, convenience technological factors, instructional design, and instructor's characteristics. In IS studies, many researchers attempted to extend the TAM with other external variables (Lee, 2003). Factors such as individual, organizational and task characteristics have long been identified as external variables that may influence perceived ease of use and perceived usefulness of an information system. This study attempts to investigate the effect of the external variables on technology acceptance variables. The proposed model (see Figure 2) shows the relationship between the external factors, namely, computer self-efficacy, convenience, instructor's characteristics, technological factors, and instructional design and the e-learning acceptance factors, namely, perceived ease of use, perceived usefulness and intention to use. We exclude the attitude variable in the proposed model since in some studies (Davis *et al*, 1992; Yi and Hwang, 2003), it was found that the factor 'attitude' is a weak mediator of technology acceptance. We discussed below the relationship of the variables and consequently develop the hypotheses of the study.

#### 3.1 Computer Self-Efficacy

In an IS and IT context, computer self-efficacy (CSE) is described as the judgment of one's capability to use an IT or computer (Compeau and Higgins, 1995; Agarwal *et al.*, 2000; Compeau *et al.*, 1995; Gist, 1989; Gist *et al.*, 1989). Marakas *et al* (1998) has suggested CSE into two distinct levels: General CSE and Task-specific CSE. General CSE is defined as an individual's judgment of efficacy across multiple computer domains, meanwhile task-specific CSE is defined as an individual's perception of efficacy in using a specific application or system within the domain of general computing. Previous studies have shown that computer self-efficacy is related to technology acceptance (Brown, 2002; Miller *et al*, 2003; Pan *et al*, 2003; Yi and Hwang, 2003; Martin & Kellermans, 2004; Ong *et al*, 2004; Hayashi *et al*, 2004; Grandon *et al*, 2005). It was discovered that individuals with a weak sense of computer self-efficacy will be more easily frustrated in performing computer related task compared to individuals with a strong sense of computer self-efficacy (Compeau and Higgins, 1995). According to Igarria and Ivari (1995), self-efficacy had a significant positive effect on perceived ease of use and perceived usefulness. Thus, we hypothesized,

**H1:** Computer self-efficacy has a positive effect on perceived usefulness of e-learning system.

**H2:** Computer self-efficacy has a positive effect on perceived ease of use of e-learning system.

### 3.2 Convenience

Convenience is related to the degree to which the online learning setting would enable students to utilize their time more efficiently (Grandon *et al*, 2005; Chang, 1999). Convenience is also one of the enabling factors identified in the online learning literature. Tobin (1998) described that convenience is achieved when students can access the learning at convenience times. Convenience is achieved when students can access the learning at convenience times and places. Students used online learning because it might reduce their commuting time and cost, so that they have flexibility in arranging and managing work and class schedule. Some studies have cited convenience as one of the reasons that motivates students to take online learning (Holcomb *et al* 2004). In online learning environments, convenience was predicted as an important factor that may affect students to adopt online classes. Meanwhile, Holcomb *et al* (2004) stated that students are more attracted to take online courses because they can access the courses when they would not have been able to otherwise participate. Moreover, students are able to enhance their knowledge in their areas of interest. It was believed that students who effectively used online learning would improve their learning quality and meet their learning needs at their own pace. Thus, from the above discussion, we hypothesized,

**H3:** Convenience has a positive effect on perceived ease of use of e-learning system.

### 3.3 Instructional Design

According to Seels & Richey (1994) instructional design is defined as the overall structuring of the design process, which includes defining what is to be learned, documenting the process of authoring and producing the instructional materials, implementing the use of the materials in context, evaluating the effectiveness of the materials formatively and evaluating the efficacy of the materials. According to Barker, (2003) and Chang (1999), the design of online learning starts in a similar fashion to a classroom format such as the course description, objectives, content, purpose, scope and evaluation. Interaction and communication between instructor-to-student and student-to-student must be carefully considered in designing and developing the content (Picciano, 2001), in this case, in e-learning environment, instructional interactivity must exist among the instructor, the learner, and the content. A well-designed application is believed to have an effect on online learning adoption. In this context, students must be able to easily find, read, download and save the materials online. Hence, we hypothesized,

**H4:** Instructional design has a positive effect on perceived usefulness of e-learning system.

**H5:** Instructional design has a positive effect on perceived ease of use of e-learning system.

### 3.4 Technological Factor

According to Poon *et al.* (2002), in the developing countries, technological factors still remain as an obstacle in implementing online learning system, where the advancement of IT infrastructures in those countries is far behind from their developed counterparts. Problems with connection, low

modem speed, availability of memory, missing links, loading page and the use of inappropriate terms are some of the obstacles facing student's learning (Peters, 2002). Poon *et al.* (2004) reported that problem with connectivity and low browsing speed will hamper students in taking online courses, thus, they asserted that technology must be designed and managed carefully in order to meet basic needs of online learning system. It was also believed that computer hardware problems may increase student concerns about computer access and consequently may affect the quality of their learning experience. Similarly Flowers (2001) stated that developers of online learning tools should consider the computer resources including both hardware and software abilities provided to their online students. From the above discussion above, we hypothesized,

**H6:** Technological factors have a positive effect on perceived usefulness of e-learning system.

**H7:** Technological factors have a positive effect on perceived ease of use e-learning system.

### 3.5 Instructor's Characteristics

Instructor's characteristic is another factor believed to influence student's perception of e-learning acceptance. A successful implementation of e-learning does not only rely on advanced technology, but also on instructors, as one of the key people, who is responsible in keeping the continuance of collaborative learning activities. Instructor as a facilitator in distance learning still plays the important role in motivating and encouraging student learning. Interaction and communication between instructors and students is an essential part in online learning (Wegner *et al.*, 1999). Instructor's positive attitude toward technology, interactive teaching style and control over technology to deliver lectures are some of the aspects that may influence student's motivation to take e-learning. Prior research has found that instructor's immediacy of technology is positively related to online learning effectiveness (Rovai & Barnum, 2003; Baker, 2004).

Webster and Hackley (1997) demonstrated that instructor's positive attitude toward technology, interactive teaching style and control over technology contributed to some of the success of effective learning. Meanwhile, instructors need to be aware of the impact that their immediacy behaviors and social presence or lack thereof may have on their student's satisfaction, motivation, and learning (Richardson and Swan, 2003; Arbaugh, 2001). According to Brooks (2003), the amount of communication between instructor and student in online learning environment could decrease the distance mode. Feedback from the instructors such as reply to student's query, arrange meetings and other form of interactions will affect the quality of online learning. From the above, we hypothesized:

**H8:** Instructor's characteristics have a positive effect on perceived ease of use e-learning system.

### 3.6 Perceived Ease of Use, Perceived Usefulness and Intention to Use

TAM proposed by Davis (1989) is a well established model of IT adoption. This parsimonious model theorizes that perceived ease of use and perceived usefulness are the key determinants of IT usage. Davis (1989) hy-

pothesized that perceived ease of use has a significant direct effect on perceived usefulness but not vice versa and both perceived ease of use and perceived usefulness have a direct effect on intention to use. This has led other researches to confirm these hypotheses. Therefore, we hypothesized:

**H9:** Perceived ease of use has a positive effect on perceived usefulness of e-learning system.

**H10:** Perceived usefulness has a positive effect on intention to use of e-learning system.

**H11:** Perceived ease of use has a positive effect on intention to use of e-learning system.

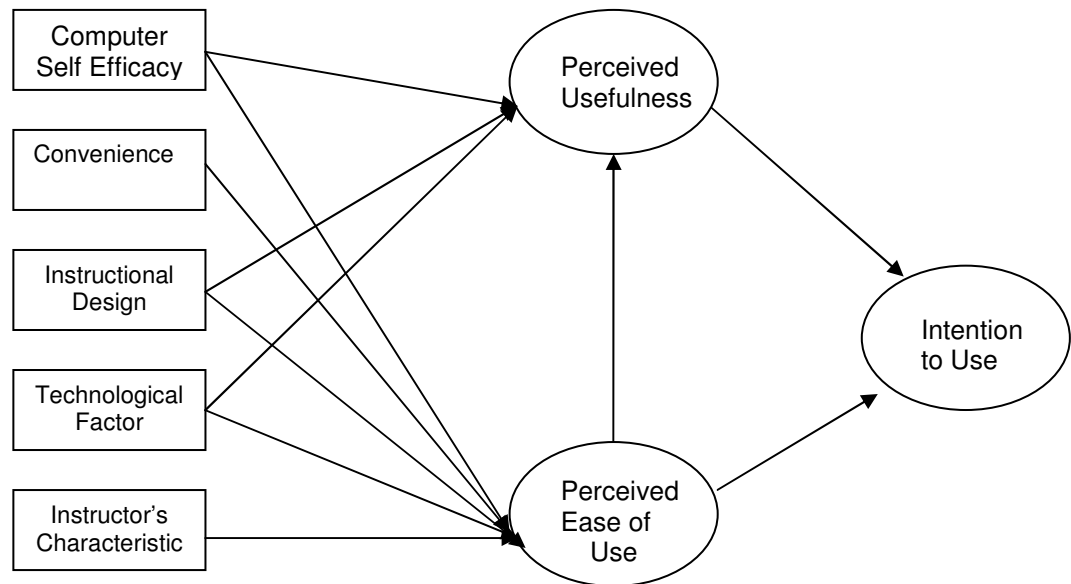


Figure 2 : Research Model

## 4.0 METHODOLOGY

### 4.1 Population, Sample and Instrument

The study used quantitative research design. The population of the study consists of online students of the Indonesian Open University (UT) from various major of study. Convenience sampling was used to collect data of the study. A questionnaire was designed to capture data on computer self-efficacy (CSE), convenience (CONV), instructional design (ID), technological factors (TF), instructor's characteristics (IC), Institutional supports (IS), perceived ease of use (PEOU) and perceived usefulness (PU). The study adapted measurement items from related IS studies. All these items were measured in a five point Likert scale, with 1 as strongly disagree and 5 as strongly agree. The questionnaires were administered through the learning

management system used by the university i.e. Moodle and only registered students could access the questionnaire. Prior to the actual study, a pilot study was conducted to test the reliability of the questionnaire. The final version of the questionnaire was reconstructed to overcome some problems such as ambiguity and time length to complete the questionnaire. Apparently, a total of 38 questionnaire items were developed to capture information on all constructs of the study.

## **5.0 RESULTS AND DISCUSSIONS**

### **5.1 Profile of Respondents**

Out of 164 responses collected, only 147 responses were usable for data analysis. The rest were unusable due to their incompleteness or other inconsistencies. Table 1 showed the background and profile of the respondents. About three fourths of the respondents (78.2%) were male and the rest (21.8%) were female (see Table 1). As predicted earlier, most of UT students are working students. From the table, it can be seen that most of the respondents were adult students. Only (1.4%) of the respondents were below age 20 followed by (35%) at age 20-24. The rest of the respondents considered as adult students in comparison with conventional students which usually ranging from 18 to 25 years old. About (41%) of the respondents were between 25 and 29 years old and (32%) were between 30 and 34 years old followed by (20%) were 35-39 years old. There were few respondents at age 40-44, 45-49 and over 50 years old representing (6.1%), (2.7%) and (2.7%) of the sample respectively. Majority of the respondents (50.3%) have studied in UT for 1 to 2 years followed by (22.4%) of the respondents who have studied for 3 to 4 years and (13.6%) of the respondents who have studied for 5 to 6 years.

Besides capturing the general profile of the respondents, information about respondent's computer experience is also reported. In terms of computer skills, majority of the respondents (68.7%) were intermediate users, followed by (17%) and (14.3%) were novice and expert user respectively. About (35.4%) of the respondents access the internet almost every day and slightly (34%) respondents access the internet seven days a week. Only (20.4%) of the respondents sometimes access the internet followed by (10.2%) respondents seldom access the internet. The table also exhibits that majority of the respondents (80%) access the internet from office. This result implies that most of UT students are working students. About (24.5%) of the respondents access the internet from Cyber Café or internet kiosk followed by (20%) of the respondents who access both from their home and office.



Items		Frequency	Percent
<b>Gender</b>	Male	115	78.2
	Female	32	21.8
<b>Age</b>	20-24	37	25.2
	25-29	41	27.9
	30-34	32	21.8
	35-40	20	13.6
	Over 40	17	11.6
<b>Year(s) of study</b>	below 1	12	8.2
	1-2	74	50.3
	3-4	33	22.4
	5-6	20	13.6
	over 6	8	5.4
<b>Computer skill</b>	Novice	25	17.0
	Intermediate	101	68.7
	Expert	21	14.3
<b>Access internet per week</b>	Seldom	15	10.2
	Sometimes	30	20.4
	Every day	102	69.4
<b>Place of access internet</b>	Home	9	6.1
	Office	80	54.4
	Home & Office	20	13.6
	Lab	2	1.4
	Cyber Cafe	36	24.5

Table 1 : Respondents Profile

## 5.2 Reliability Analysis

Cronbach's Alpha was used to report the reliability of the construct. According to Nunnally (1978), a Cronbach score .70 or higher is considered reliable. The result below (see Table 2) shows values of Cronbach's Alpha are higher than .80 indicating that all the constructs are reliable and suitable to measure the concepts employed in the study.

Constructs	Items	Cronbach $\alpha$
Comp. Self-efficacy (CSE)	6	0.840
Convenience (CONV)	3	0.828
Instructor's Characters(IC)	5	0.843
Instructional Design (ID)	5	0.817
Tech. Factors (TF)	4	0.766
Perceived Ease of Use (PEOU)	6	0.816
Perceived Usefulness (PU)	5	0.922
Intention to Use (IU)	2	0.805

Table 2 : Constructs and Reliability Test

### 5.3 Hypotheses Testing and Discussion

Data were analysed using structural equation modeling with AMOS 5.0. The model of the study fits the data well, as indicated by the results of the chi-square tests and several other fit measures,  $\chi^2 = 162.4$ ,  $p = 0.25$ ,  $\chi^2/df = 1.25$ , GFI = 0.90, AGFI= 0.85, CFI = 0.978 and RMSEA = 0.042. All measures are within the acceptable values indicating good model fit (Arbuckle & Wothke, 1999; Byrne 2001; Bollen , 1989).

Fit measure	Parameters
$\chi^2$	162.4
Degrees of freedom	129
p-value	.025
GFI	.898
Adjusted GFI	.849
Normed fit index (NFI)	.905
Relative fit index (RFI)	.875
Incremental fit index (IFI)	.979
Tucker Lewis index (TLI)	.971
Comparative fit index (CFI)	.978
RMSEA	.042

Table 3 : Parameters for Goodness of Fit

Figure 3 showed that instructional design and technological factor are significant predictors of perceived ease of use and they contribute 44% of the variance in perceived ease of use. The results are in line with other findings (Brown, 2004; and Thong et al., 2002). Surprisingly, computer self-efficacy and convenience had no effect on perceived ease of use, however, computer self-efficacy had an effect on perceived usefulness. The study also found that instructional design and computer self-efficacy and instructional design accounted for 61% of the variance in perceived usefulness. It was interesting to note that instructor's characteristics had no effect on perceived usefulness.

The results supported six hypotheses of the study. As hypothesized, H9, perceived ease of use predicted perceived usefulness ( $\beta=.23$ ,  $p<.05$ ) and H11, intention to use ( $\beta=.80$ ,  $p<.01$ ). The hypothesized significant relationship between perceived usefulness and intention to use was not supported ( $\beta=.11$ ,  $p>.05$ ). This finding appears to be consistent with many previous studies (Wagner and Flannery, 2004; Grandon et al. 2005). The model explained 76% of the variance in intention to use and 61% of the variance in perceived usefulness, suggesting that perceived ease of use is important in explaining the variance for intention to use and perceived usefulness.

Other hypotheses that were supported were H1, H4, H5 and H7. H1 was supported indicating computer self-efficacy has a positive effect on perceived usefulness ( $\beta=.37$ ,  $p<.01$ ). H4 and H5 were also supported indicating a positive effect of instructional design on perceived usefulness and perceived ease of use ( $\beta=.26$ ,  $p<.01$ ;  $\beta=.30$ ,  $p<.01$ ) respectively. The sixth hy-

pothesis which was supported is H7, indicating technological factor has a positive effect on perceived ease of use ( $\beta=.25, p<.01$ ).

Thus, the above findings imply that strong sense of one's judgment to use computer has an impact on his or her perceived usefulness of the e-learning system. Instructional design is also found to be a significant influential factor of e-learning acceptance. The design and layout of the e-learning management systems seems to have a positive effect on the acceptance of students in online teaching and learning mode. Thus, having a well-designed e-learning application may facilitate online discussion and further motivation in using the e-learning tools. In the context of an e-learning acceptance in a developing country, it seems that a good instructional design has more predictive powers than convenience and instructor's characteristics. The findings of the current study is consistent with Grandon *et al* (2005) who found convenience as a weak factor in explaining user acceptance of online learning in developing country.

As indicated in the results, technological factor is a significant predictor of e-learning acceptance in a developing country. The results imply that problems with connection and unstable server may create frustration for the students from interacting with the system. These problems may occur due to access made from remote locations or due to other accessibility and connectivity problems in a developing country. On the other hand, in a study conducted in a developed country, Arbaugh (2000) found that instructor's characteristic has a positive effect on online learning acceptance rather than technological factor.

Overall, the study had evidently support instructional design, computer self-efficacy and technological factor as predictors of e-learning acceptance in a developing country.

## 6.0 CONCLUSIONS

The results provide interesting insights and suggestions. The study evidently support the findings conducted in an open university in a developing country differ from an institution in a developed country. In the case of the Indonesian Open University, instructional design, technological factor and computer self-efficacy play a very important role in facilitating learners' acceptance towards e-learning. Unlike in the developed country, convenience and instructor's characteristics were not dominant factors in UT. Hence, in order to improve their e-learning initiatives, developing countries should focus on improving their technological infrastructures such as improved accessibility and improved connectivity. The study has several limitations. Firstly, the proposed model only focused on external variables and their effect on perceived ease of use and perceived usefulness. Secondly, the use of convenience sampling may create biasness, thus, the findings may only be applicable to the Universitas Terbuka. Apparently, extra caution need to be considered in generalizing the results. We also recommend that future studies to look into other factors not explained by the research model.

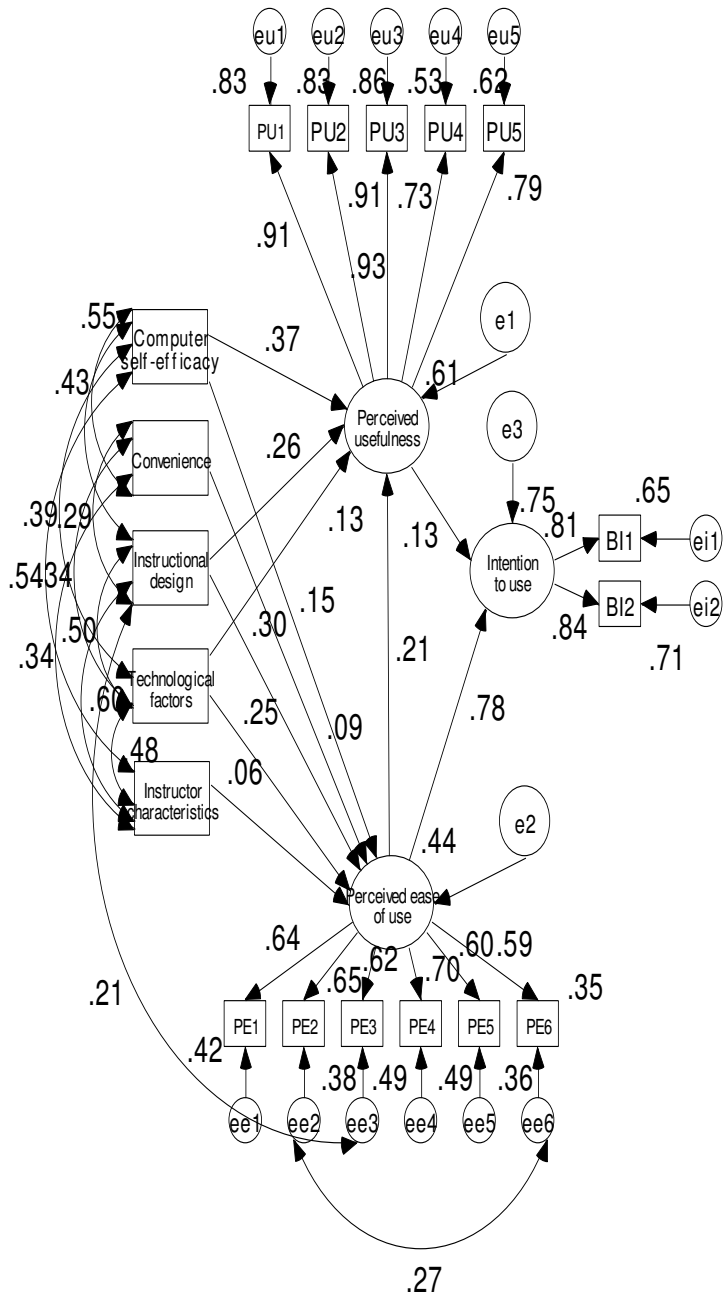


Figure 3 : The Structural Model of the Study

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