Understanding User Acceptance of Electronic Information Resources: Effects of Content Relevance and Perceived Abilities

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要　旨

本稿の目的は、Electronic Information Resources（EIR）の受容行動の理解を探求することである。ユーザが EIR を利用する意図を特定するための理論的フレームワークとして、TAM モデルを用いる。スリランカの大学における社会・人文系 の学部生（最終学年）538 人に対して調査を行った。調査の結果、３つの知見が得られた。第１に感得能力（perceived abilities、コンピュータ活用や英語活用の実効性のこと）は perceived ease of use に直接影響し、EIR の利用意向には、間接的に影響することがわかった。第２に、perceived ease of use は、perceived usefulness よりも、ユーザの EIR の利用意向に直接影響した。第３に、perceived usefulness に対してユーザ関心が重要な影響があることが示唆することは、ユーザ情報に関する EIR 素材を改良して更新することによって、効果そのものは小さいながらも、EIR 利用の有用性をより認識させやすくなることである。これらの知見は、EIR を利用するためには、感得能力が重要であることを強調するものである。

Keywords: Electronic Information Resources, Technology Acceptance Model, Behavior Intentions, Perceived Abilities, Sri Lanka.

1. Introduction

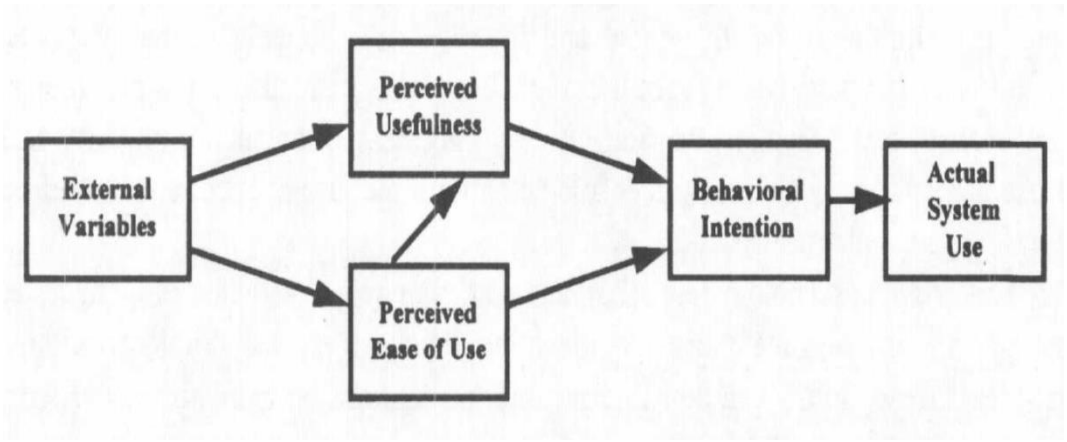
Rapid development of information communication technologies has led to the significant growth in availability of information resources. Over the past decades, information technology has enormously impacted libraries. Electronic information resources are becoming popular among the academic community and the emergence of the electronic information resources had made enormous changes to the library domain. It is now very convenient, provides current knowledge, highly efficient and save time of users as well as provide opportunities to users to access a variety of information resources. Therefore, many university

libraries in the world have spending large amount of money to purchase EIR services and introducing innovative electronic based services in order to provide fruitful services to their library users. Even though, there are numerous benefits to accessing EIR for learning and research, past research has identified it could still potentially under- used by users[1] [2] [3] [4] [5] [6] [7]. Although the EIR has been promoted to various levels of users, the intention among these remain very low[8]. Initial acceptance of EIR by users is an impotant as a first step towards enhancing access of EIR and also actual success requires continues usage too. Therefore, it is important to examine how users perceive the significance of using EIR for their learning and research from users perspective. In order to enhance the acceptance, continuous and increase usage of EIR, it is important to understand how users make decision on selection and acceptance of EIR. This study aims to explore specific EIR characteristics in terms of content relevance that affect users decisions to use EIRs for their learning and research; and how user abilities such as computer efficacy and English language efficacy effect the users acceptance to use EIR.

2. Theoretical Background

Technology Acceptance Model (TAM) used in this study as a theoretical framework and it provides an effective of explanation of the determinants of EIR acceptance. TAM is an established model that explains information systems adoption behavior[9]. Last few decades, several intention based theories and models have been proposed and empirically tested in order to understand the user information technology (IT) adoption and usage[10] [11] [12] [13]. But TAM is one of the most influential and most frequently tested model that has been developed to explain and predict computer usage behavior of users. User acceptance of any technology measured by a persons` intention to use the technology is determined by two beliefs of perceived usefulness(PU) and perceived ease of use (PEOU) which mediated the effects on external variables have on usage intention. Theoretical perspective employed in this study is for some reasons such as, the TAM helps to predict EIR acceptance by identifying the casual relationships that exist among individuals perceptions of an EIR usefulness, their perception of EIR ease of use and their behavioral intention to use EIR. It provides a framework for investigating the effects to external variables on EIR usage. The study traces the impact of external variables of content relevance (CR) and perceived abilities (PA) on the beliefs and intentions to use EIR.

Figure 1: Technology Acceptance Model (TAM)



Source: Davis, Bagozzi & Warshaw (1989)[14]

The TAM has been widely used to predict IT acceptance[15] [16] [17]. Most of these researches have investigated personal computer usage acceptance, e-leaning and web learning system acceptances. The researches done on e-library systems or services are still not sufficient. Among the empirical studies conducted using TAM and e-library systems and services are discussed as follows:

- Jeong (2011) studied the e-library usage and e-library acceptance behavior among elementary students in Korea. The study identified that the interface characteristics can indirectly influence the perceived usefulness via perceived ease of e-library system use. Content relevance and system quality can influence the perceived usefulness and the perceived ease of e-library system use. Study identified the perceived ease of use as a primary determinant of behavior intention[18].
- Donghua (2008) examined the roles of two aspects of e-resource characteristics namely information quality and system quality in predicting public health students intention to use e- resources for completing research paper assignments. The study found the perceived usefulness played a major role in determining students intention to use e-resources. Perceived usefulness and perceived ease of use fully mediated the impact that information quality and system quality had on behavior intention[19].
- The acceptance of web based subscription databases were studied by Kim (2006). The study tested an integrated model of antecedents and consequences of user beliefs about intended use by extending the technology acceptance model. Clarity of terminology and accessibility were found as the important determinants for ease of use of the database. Further, results indicated user training has no impact on

either perceptions of usefulness or ease of use. Results suggest that there is a need of user training in the context of web based subscription databases use[20].

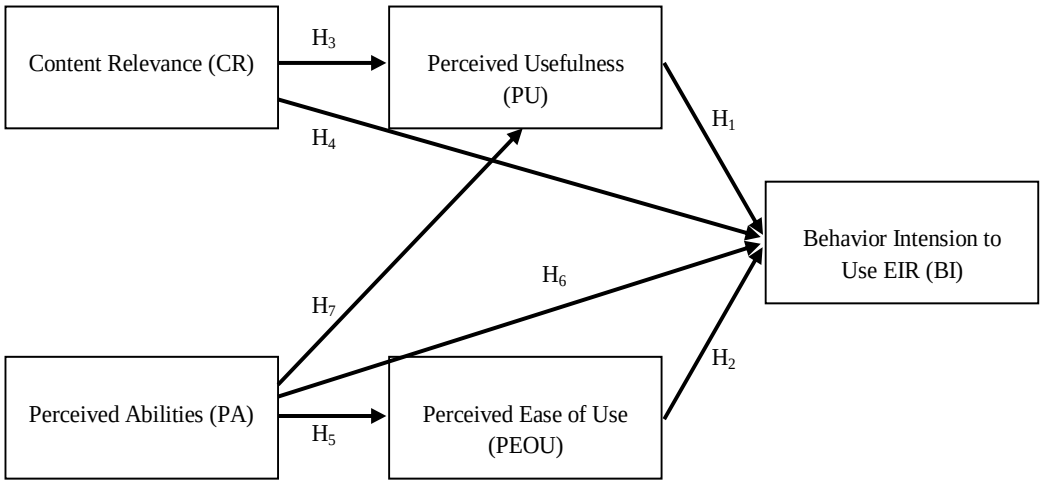
- Yi and Hwang (2003) studied the technology acceptance model by incorporating the motivation variables of self efficacy, enjoyment and learning goal orientation in order to predict the use of web based information systems. Self efficacy identified by the study is the more powerful determinant of actual system use. Enjoyment was found to positively influence usefulness, ease of use and application specific self efficacy. Learning goal orientation also had a positive effect on application specific self efficacy. These findings suggest that practitioners should provide a working and learning environment where self efficacy, personal enjoyment and learning goal orientation are supported and fostered in order to facilitate successful acceptance of technology[21].
- Goh and Liew (2009) examined the user acceptance of SMS based library catalogue system. The results showed that self efficacy has positive impact on the perceived ease of use and negative impact on perceived usefulness and also self efficacy does not have direct impact on intention to use. Overall, this study model explains 55.2% of variance of behavior intention of SMS based library catalogue system[22].
- Yusoff et al (2009) studied that usage of e- library among students in a public university in Malaysia using the Technology Acceptance Model. The results show that individual differences such as self efficacy and knowledge search domain had a significant positive relationship with perceived ease of use. Perceived ease of use showed significant relationship with perceived usefulness but non-significant with the actual usage of the e -library[23].
- Ramayah and Aafaqi (2004) also studied that the influence of self efficacy on e-library usage by university students from four different schools in a Malaysian public university. The results of the study suggest the self efficacy has significant direct impact on perceived usefulness and perceived ease of use when predicting e- library usage[24].

3. Research model

Based on previous research on e-library systems, the research model proposed in the study is illustrated in figure 2 which described TAM in the context of electronic information resource usage[25 26 27 28 29 30]. The model proposed herein consists of two independent variables, two belief variables and one independent

variable. Two independent variables are perceived abilities of user and content relevance of EIR. Two belief variables that have been used in this study include perceived usefulness and perceived ease of use. The dependent variable is the behavior intention to use EIR.

Figure 2: Proposed Research Model



According to the model, intention to use EIR is behavior intention (BI) construct is influenced by function of two cognitive behavior beliefs of perceived usefulness (PU) and perceived ease of use (PEOU). Content relevance and perceived abilities by serving as external variables that directly affect BI and PU and PEOU as well as indirectly affect BI through directly influencing PU and PEOU.

3.1 Hypotheses

Based on past studies of e-library systems and TAM, hypotheses were proposed by direct drawing constructs and their casual relationships from TAM, the impact of behavior beliefs on intention to use EIR are proposed below.

H_1: Perceived usefulness has positive effect on intention to use EIR.

H_2: Perceived ease of use has a positive effect on intention to use EIR

H_3: Content relevance of EIR has a positive effect on perceived usefulness.

H_4: Content relevance of EIR has a positive effect on intention to use EIR

H_5: Perceived abilities of user have positive effect on perceived ease of use.

H_6: Perceived abilities of user have positive effect on intention to use EIR

H_7: Perceived abilities of user have positive effect on perceived usefulness

4. Methodology

Survey research design was employed in this study and the stratified sampling method was applied as a sampling method. The research sample was 538 final year undergraduates attached to Social Sciences and Humanities faculties in three universities of Sri Lanka: University of Peradeniya, University of Colombo, University of Ruhuna. Research sample selected according to the Krejcie & Morgen (1970)[31] sampling table. A questionnaire was used as a data gathering instrument and personally questionnaire were administrated to undergraduates in order to reduce the non response rate. Questionnaire was administrated among 610 undergraduates and 538 of undergraduates dully completed and returned them.

4.1 Instrument construction

This study measured five constructs such as perceived usefulness, perceived ease of use, content relevance, perceived abilities and behavior intention to use EIR. All measurement items that were used in this study were developed according to the past studies. The measurement items of perceived usefulness, perceived ease of use and behavioral intention were adopted from measurements that were originally defined by (Davis 1989)[32] and Venkatesh and Davis (1996, 2000)[33] [34]. The measurement items for content relevance were adapted from past research done by Hong et al. (2002)[35], Thong et al. (2004)[36], Ramayah (2006)[37] and Tibenderana (2010)[38]. The measurement items for perceived abilities were adapted from the Hong et al (2002)[39] and Krimpanot (2007)[40]. The scale consists 23 items with each construct being measures by 7 Likert scale options. A seven part Likert scale was used to gather responses ranges from “strongly disagree (=1)” to” strongly agree (=7)”.

5. Results

Response rate is 88% of the 538 participating students 30% were male and 70% were female of them. The data were analyzed by using SPSS (20) and model estimation was carried out by using multiple

OLS (Ordinary Leased Square) regression method. Factor analysis was performed by using principle component method.

According to Mugenda (2008)[41] validity is defined as the degree in which an instrument supposed to measure. Validity establishes the relationships between the data and the constructs within the study, and estimates how accurate the collected data represents a given construct in the study**.** The study measured the construct validity and reliability to ensure whether the results are reliable and consistent. The reliability analysis measured for identify the internal validity and consistency of items used for each construct. Cronbach`s Alpha coefficient test run for the factor reliability. Factor reliability indicates the how set of items are closely related as a group. Cronbach`s alpha values for all factors are above 0.7 and indicate that all evidence suggests that the items in the scale had adequate measurement properties. Table 1 shows that reliability estimates of each constructs, that exceeding (= 0.7 to 0.8).

Table 1: Reliability Analysis of Constructs

Scale	**Cronbach`s alpha**
Perceived usefulness(PU)	0.717
Perceived Ease of Use(PEOU)	0.780
Content Relevance (CI)	0.766
Perceived Abilities (PA)	0.802
Behavior Intention to Use (BI)	0.814

To assess convergent validity, the factor loadings of the EIR usage questionnaire present the sample of 538 undergraduates using the individual student as the unit of analysis. The results of factor loadings indicated that greater than 0.50 and the evidence suggests that the scale had adequate measurement properties (see Appendix table 01).The KMO and Bartlett`s test was performed to recognize the correlations among the factors and to test whether the correlation matrix is an identity matrix. The study indicates KMO value is 0.837 and Bartlett`s test shows that $p \leq .000$.Therefore factor analysis is statistically significant at 0.001 level.

Table 2: KMO and Batlett`s Test

Kaiser – Meyer –Olkin Measure of sampling Adequacy		0.837
Bartlett`s Test of	Approx.Chi-Square	4210.621
Sphericity	df	253
	Sig	.000

Discriminant validity was assessed by inspecting the correlations between the five factors. To test the discriminant validity comparison of inter construct correlations and the square root of the average variance extracted (AVE). The square root of the AVE should be greater than the inter-construct correlations[42]. Table 3 indicates that the square root of the AVE measures for all constructs (in diagonals) is greater than the inter-construct correlations (off –diagonals). The results have shown that all the constructs indicate the adequate discriminant validity. All the constructs demonstrate adequate reliability and validity indicate the measurement model is acceptable.

Table 3: Discriminant Validity: Inter - Construct Correlations

Construct	**PUSE**	**PEASE**	**IQC**	**PA**	**BI**
PUSE	**0.819**				
PEASE	.469**	**0.798**			
IQC	.205**	.448**	**0.741**		
PA	.270**	.255**	.303**	**0.808**	
BI	.403**	.416**	.305**	.177**	**0.804**

5.1 Tests of Hypotheses

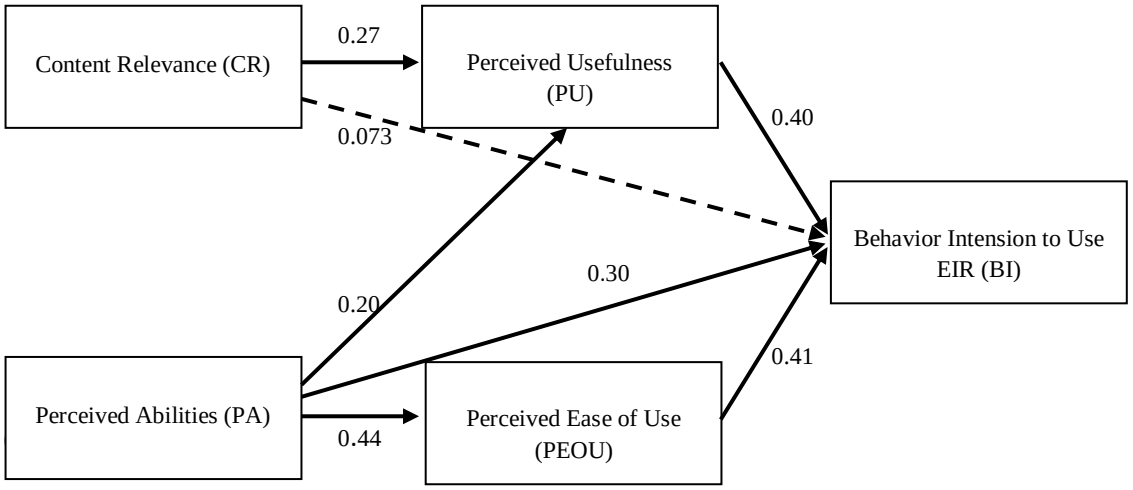
Path analysis of the combined hypotheses was presented in fig. 3. The results, including the standardized β coefficient for each independent variable and total variance explained and *t*-value for each dependent variable. The first two hypotheses proposed that perceived usefulness and perceived ease of use would predict behavior intention to use the system. The results indicated positive signs for both. The path for H_1 was significant (R^2=.161, β =.403, t =10.206, p<0.05). Perceived usefulness explained the 16.1% of the variance in behavior intention to use EIR. Similarly, the path for H_2 was significant (R^2=.172, β =.416, t =10.604, p<0.05). Perceived ease of use explained the 17.2% of the variance in behavior intention to use EIR.

Both H_1 and H_2 were supported.

The third hypothesis proposed that content relevance of EIR has a positive effect on perceived usefulness. The proposed path was significant in the hypothesized direction (R^2=.071, β =.270, t =6.495, p<0.05). Therefore H_3 was accepted. The fourth hypothesis is assumed that content relevance of EIR has a positive effect on intention to use EIR. Results indicated that the path for H_4 was not significant (β =.073, t =1.781, p>0.05), contrary to expectation. Thus hypothesis four was not supported. Further, the indirect effect of content relevance of EIR on intention to use EIR mediated by perceived usefulness was tested. The effect was significant [β = 0.108 (.270 *.403)]. Hypotheses five to seven (H_5 to H_7) tested the effect of perceived abilities. H_5 was proposed that perceived abilities of user have positive effect on perceived ease of use. The proposed path was significant in the hypothesized direction (R^2=0.20, β =0.448, t =11.592, p<0.05). Perceived abilities explained the 20% of the variance in perceived ease of use. The result indicated that path of $H_5$was significant. Similarly, H_6 tested perceived abilities of user have positive effect on intention use EIR. The direct effect of perceived abilities of user on intention was significant (R^2=0.091, β =0.305, t =7.404, p<0.05). The effect of perceived abilities of user on intention to use EIR mediated by ease of use was β = 0.186 (0.416 *0.448). Further total effect of perceived abilities on behavior intention was 0.491 (0.305+ 0.416*0.448). As same as, indirect effect of perceived abilities on behavior intention to use EIR mediated through perceived usefulness was significant [β = 0.387(0.205 *0.403+0.305)]. Lastly, hypothesis 7, which proposed a positive path from perceived abilities of user on perceived usefulness was supported (β =.205, t =4.837, p<0.05) as expected. According to findings, the major determinant was the perceived abilities which has a total influence of 0.491 [largely due to the direct relationship (0.448) and partly due to its indirect relationship (0.186)].The results of the hypotheses testing are illustrated in Fig 3. Wherein the significant paths are marked with bold lines and the insignificant path are marked in dash lines.

The results of this study indicate three major significant findings. First, perceived abilities of user to use EIR can indirectly influence the behavior intention to use EIR via perceived ease of use. Second, perceived ease of use can directly influence the behavior intention to use EIR. Third, Perceived usefulness directly influence to behavior intention to use EIR, but Perceived ease of use has a stronger power of the intention to use the EIR than perceived usefulness. (0.403 versus 0.416).

Figure 3: Structural Model Analysis



Present study attempted to explore the effect of two external variables on the behavior intention inusing EIR. Present study finds that perceived abilities of user is the strong predictor of behavior intention via perceived ease of use which explains 20% of the behavior intention of EIR use. Previous research has recognized the impact of perceived abilities on the usage of information retrieval systems[43 44 45 46 47]. Researchers have also found that computer self efficacy positively impacts the perceived ease of use. Thong et al (2002)[48] also found the computer self efficacy is a key determinant of perceived ease of use. Igbaria and Iivari (1999)[49] demonstrated that computer self efficacy has a direct effect on perceived ease of use, but not on perceived usefulness. Byrne (2003)[50] emphasized the importance of having an appropriate language skills and clear comprehension of the literature in the system acceptance. Similarly, Du (1999)[51] also found that English literacy skills were important determinant for using Internet, because of the high proportion of websites are written in English. As emphasized in previous research, these results also suggest that users ability of computer self efficacy and language efficacy have strong effect on the EIR acceptance.

The study results clearly indicate that TAM appears to provide researchers of EIR use a theoretically sound and parsimonious model with which they can predict users behavior intentions. The findings of this study indicate both the perceived ease of use and perceived usefulness are important determinants for adopting EIR use. Although majority of previous research found perceived usefulness to have a stronger influence, in this study found that perceived ease use has exerts a stronger influence than perceived usefulness[52 53 54 55 56]. This indicates that users tent to rate EIR are easy to use as they experienced less difficulties when accessing EIR and their ability of using computer and English language efficacy may be

a strong determinant for use EIR with ease. These findings suggest that improving perceived abilities of user may be most effective way to help undergraduates to use EIR with ease. The effect of content relevance was found to have no direct significant positive impact on behavior intention to use EIR. Although content relevance was not found direct effect on BI to use EIR, study found the impact of content relevance on perceived usefulness of EIR. This result is consistent with the findings of previous studies[57] [58] [59] [60] [61]. Content relevance showed indirect effect on behavior intention to use EIR via perceived usefulness. Along with the earlier research, these findings support the need to increase content relevance of EIR to meet students' information needs. Therefore, library professionals must pay more attention to user requirement analysis in order to identify user expectations and their academic content requirements as well as continuously update and incorporate more relevant EIR materials in to library collection. This will increase successful adoption and usage of EIR.

7. Conclusion

Similar to previous studies, present study conformed TAM to be a useful theoretical model in helping to understand and explain behavioral intention to use EIR. Utilizing TAM as a theoretical framework, present study identified three important predictors of perceived abilities of user, perceived ease of use and perceived usefulness of EIR. The effect of perceived abilities of user was found as a stronger determinant on intention use EIR adoption via perceived ease of use. The findings of this study have implications for enhance the EIR usage. As the millions of money spent for subscribe EIR many universities, it is of paramount importance to ensure that students will actually use them. In order to achieve this goal, library professionals and respective university management should focus their attention when planning to purchase EIR, organizing trainings to develop undergraduate computer self efficacy and English language efficacy level. Students with higher computer self efficacy will be more able to use the EIR efficiently and effectively. At the same time university library management and faculty staff should take necessary action to continuously update EIR, add relevant materials to the library collection according to the user requirements, as user`s final decisions on whether to use a system or not depend on the contents of EIR which relevant to their study needs. However this research did not incorporate actual usage behavior in the proposed model and further research can examine whether other determinants have any effect on the acceptance of EIR use.

Endnote

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Appendix Table01: Factor loadings of scale items

Scale Item	Component1	Component2	Component3	Component4	Component5	Component6
PA5 (Perceived Abilities to use EIR)	0.756					
PA 1	0.729					
PA 2	0.685					
PA3	0.682					
PA 6	0.672					
PA 4	0.589					
BI 2 (Behavior Intention to use EIR		0.818				
BI3		0.785				
BI4		0.719				
BI1		0.613				

Pease 3(Perceived ease of use EIR)			0.770			
Pease 4			0.731			
Pease 1			0.662			
Pease 2			0.560			
Puse3 (Perceived Usefulness)				0.815		
Puse 4				0.750		
Puse 2				0.646		
Puse1				0.568		
Cr2 (Content Relevance of EIR)					0.698	
Cr1					0.692	
Cr3					0.631	
Cr4					0.564	
Cr5						0.599
Eigenvalue	6.06	2.32	1.6	1.5	1.17	1.02
Variance (%)	26.35	10.08	7.16	6.8	5.11	4.44

Questionnaire

Survey on the acceptance of Electronic Information Resources (EIR) by undergraduates within Sri Lankan Universities

SECTION A : Background of your information. Please answer for the following questions

A1. What is your university?

University of Peradeniya	
University of Colombo	
University of Ruhuna	

A 2. What is your gender?

Male	
Female	

A3. Are you a registered member of the library?

Yes	
No	

A4. What is your regularity of library visits?

Regularity of library visit	
Everyday	
1-3 days a week	
4-6 days a week	
Once in two weeks	
Never	
Other	

A5. Do you use the Electronic Information Resources (EIR) available at the Library?

Yes	
No	

Section B: The effect of factors towards the EIR usage and behavior intention

Please rate the extent to which you agree with each statement below

1= Strongly Disagree 2= Quite Disagree 3= Slightly Disagree 4= Neutral 5=Slightly Agree 6= Quite Agree 7= Strongly Agree	1	2	3	4	5	6	7
1. Perceived usefulness about the EIR usage							
1.Using EIR enables me to accomplish tasks more quickly	1	2	3	4	5	6	7
2.Using an EIR would improve my learning performance	1	2	3	4	5	6	7
3.Using an EIR would enhance my effectiveness in my learning	1	2	3	4	5	6	7
4. Using an EIR would increase my learning productivity	1	2	3	4	5	6	7
2. Perceived Ease of use about the EIR usage							
1.learning to use an EIR would be easy for me	1	2	3	4	5	6	7
2.Using an EIR would improve my skills	1	2	3	4	5	6	7
3.I find that use of EIR easy to understand	1	2	3	4	5	6	7
4. I find that an EIR is very easy to use	1	2	3	4	5	6	7
3. Perceived abilities (self efficacy of computer & language) about using EIR							
1. I feel confident when I use the EIR on my own.	1	2	3	4	5	6	7
2. I feel confident to search academic information.	1	2	3	4	5	6	7
3. I am able to browse the internet and access EIR even if there is no one around to show me how to use it	1	2	3	4	5	6	7
4. I can compete my task by using the Internet if I can call someone for help if I get stuck	1	2	3	4	5	6	7
5. I feel confident to manage EIR even those are in English	1	2	3	4	5	6	7
6.Lanaguage is not a barrier to use EIR	1	2	3	4	5	6	7
4.Content Relevance of EIR							
1.EIR available in the library relates well to my studies	1	2	3	4	5	6	7
2.Library has enough EIR resources for my studies	1	2	3	4	5	6	7

3.I believe that use of EIR is very efficient study tool	1	2	3	4	5	6	7
4.I found that contents of EIR are quality & useful	1	2	3	4	5	6	7
5.I found that EIR available at the library contains academic databases and journals	1	2	3	4	5	6	7
5.Behavior intention to use the EIR							
1. I intend to use EIR when I need research information	1	2	3	4	5	6	7
2. I intend to use the EIR for　my learning & research	1	2	3	4	5	6	7
3. I intend to use the EIR more for enhancing research knowledge	1	2	3	4	5	6	7
4. I intend to use the EIR more in the future all of my work	1	2	3	4	5	6	7

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