

CHAPTER 1

INTRODUCTION

1.1 Research Background

Research and development are dependent on data, information, and knowledge, which become important tools used to make innovation and scientific output. A vast number of trustful and reliable data are demanded to produce good scientific outcome. In traditional ways, data, information, and knowledge are kept in various forms of books, and CDs. However, nowadays these things are captured in the form of an online database which is easy to access and disseminate through the Internet.

In the academic world, journal articles, conference proceedings, and patents are regarded as important resources of academic success, especially for research based education. In higher education, online academic databases have been adopted to provide a convenience for students, researchers, and professors to search for data, information, and knowledge relevant for their particular studies and research projects. Another benefit is that users can access online academic databases anytime and anywhere. Moreover, online academic databases collect a massive number of articles, proceedings, patents, and published materials from many sources around the world. In many universities, the use of online academic databases is important for students, researchers, and professors to search for articles and knowledge to build up their knowledge.

In Thailand, Thai universities have been forced to produce good academic research and invention so that a way to help to achieve such outcome is important. Online academic databases are regarded as a tool to help Thai research students and professors to produce their research output efficiently and effectively. In this country, well-known online databases are, for example, Thailis, Scopus, IEEE Explorer, Science Direct, and EBSCO. Most of them

have been purchased from developed countries. These databases have been designed for users not only for Thai users.

In this study, there is a need to understand the use of this kind of technology since different users from different countries and cultures present different behavior (Im, Hong, & Kang, 2011). Therefore, the objective of this study is to seek to understand causal factors that regulate research students to adopt online academic databases. One benefit of this research that may emerge from this study is providing opportunities and freedom for learners from developing countries. Another benefit is that the understanding factors are beneath the behavior of users may provide guidance for developers and engineers to develop new technology which will be better than the previous ones (Hevner & Chatterjee, 2010) since the understanding of how technology is adopted and diffused may help firms to expedite technological products to markets (Rogers, 1983) and predict the likelihood of success for a new invention (Venkatesh, Morris, Davis, & Davis, 2003).

1.2 Research Question

What is the structure of factors affecting the use of online academic databases?

1.3 Research Objective

To find out the structure of relationships regulating the use of online academic databases.

1.4 Research Scope

The study focuses on research students in a university in Bangkok Thailand.

1.5 Research Contributions

The benefits of this research are as follows:

1.5.1 The users of this research may understand the structure of relationships influencing the adoption behaviour of online academic databases.

1.5.2 The users of this research can use in teaching university students, especially in subjects like Management Information System: MIS because the research shows important factors regulating the success of IT systems.

1.5.3 The research can be used to develop a successful online academic database, especially for Thai universities.

1.5.4 Other researchers can use some factors of this research to find out other causal relationships.

CHAPTER 2

LITERATURE REVIEW

2.1 Theoretical Background

Literature in technology adoption has been constructed based on behavioral science (e.g. the theory of reasoned action (TRA) to explain why users adopt a specific technology. However, if considered in terms of theories that originate from information system discipline The Technology Acceptance Model (TAM) is one of oldest and most famous theories.

TAM is used to explain why users use information technology (Davis, 1993; Hossain & de Silva, 2009; Teo, Lee, Chai, & Wong, 2009; Turner, Kitchenham, Brereton, Charters, & Budgen, 2010) and it is built upon the theory of reasoned action (TRA) (Fishbein & Ajzen, 1975). TAM has three versions (Davis, Bagozzi, & Warshaw, 1989a; Venkatesh & Bala, 2008; Venkatesh & Davis, 2000b); each version has similar and different constructs. However, all version has three main constructs: behavioural intention (BI), perceived ease of use (PEOU) and perceived usefulness (PU) used to explain the use behaviour of information systems (UB) (Davis, Bagozzi, & Warshaw, 1989b; Venkatesh & Bala, 2008; Venkatesh & Davis, 2000a) .

Later, a newer version of technology adoption theories is Unified Theory of Acceptance and Use of Technology (UTAUT) which combines eight theories together including TAM. Then this theory was reconstructed again in 2012 (UTA (Venkatesh, L. Thong, & Xu, 2012). The figure 2.1 presents UTAUT1

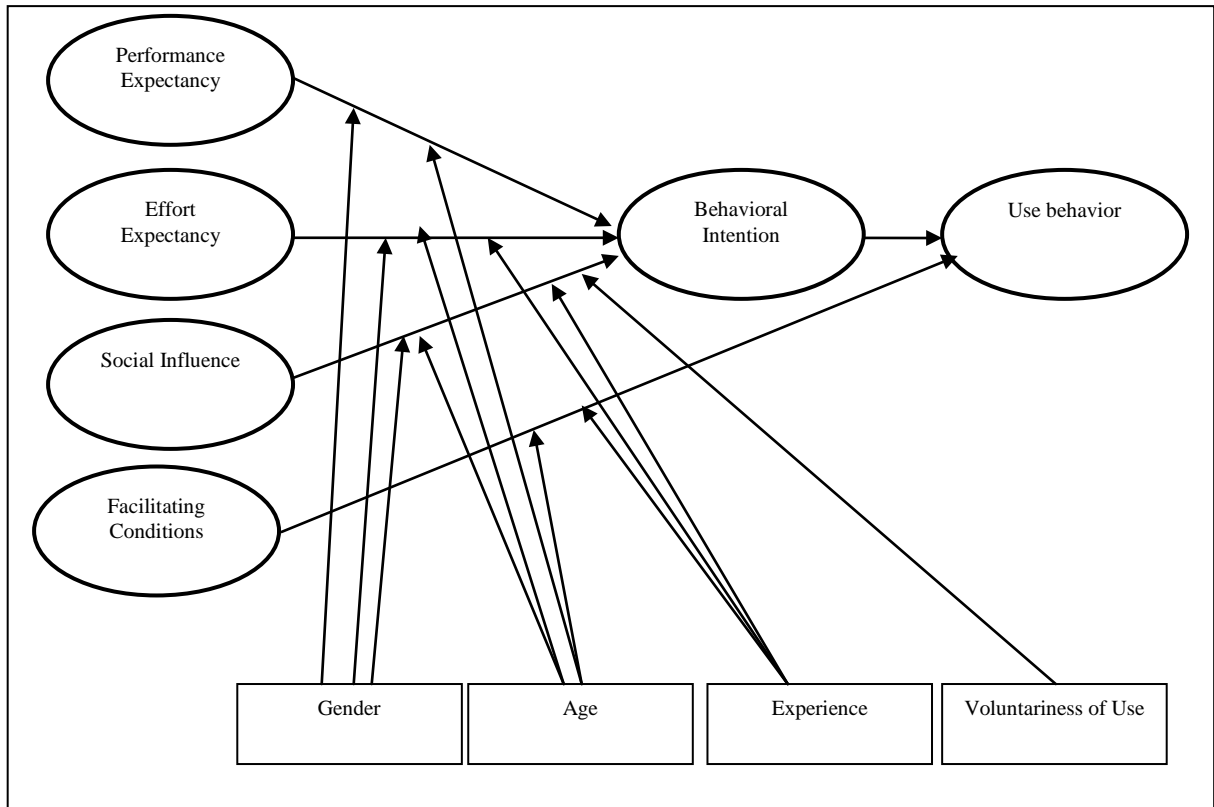


Figure 2.1 The structure of UTAUT1.

Then this theory was reconstructed again in 2012 (Venkatesh, et al., 2012). Unlike TAM, UTAUT2 presents seven independent factors used to explain behavioral intention and use behavior. Moreover, the use behavior is explained by three factors: behavioral intention, facilitating conditions, and habits (Venkatesh, et al., 2012). UTAUT2 also provides three moderating factors: age, gender, and experience. UTAUT2 is a new theory which consists of limitations. The theory was created in Hong Kong; so, the results may not be applied to other countries. Second, the respondents were skewed to young people. Third, it is created upon one type of technology, mobile Internet (Venkatesh, et al., 2012).

2.2 Hypothesis Development

Theories TRA, TAM, UTAUT1, and UTAUT2 are different. TRA is constructed to describe why human beings perform a specific behavior that is similar to understanding why human beings use a specific technology while TAM is more focused on why people adopt new technology. UTAUT1 is created on eight theories including TAM and TRA. It used data from organizations to analysis. UTAUT2 extends UTAUT1 but it is developed to fit best with consumer adoption of technology. The researcher set the hypothesis based on UTAUT2 to understand to well the theory fits with organizational technology in this study is the online academic databases. However, in this study 'Price Value' is not included because unlike consumer technology, most organizational technology does not much require end users to pay for usage or services.

2.3 Use Behavior (UB).

The use behavior or actual use of technology is the amount of system employed by the user of the information system or technology (Davis, 1993). The use behavior is explained through frequency or how much time users use a specific information system (Chen, Gillenson, & Sherrell, 2002; Chen & Tan, 2004; Smarkola, 2008; Wu & Wang, 2005).

2.4 Behavioral Intention (BI).

Behavioral intention is normally viewed as a component of an attitude; behavioral intention means an intention of an individual to perform in a specific way toward someone or something (Robbins, 2005). Behavioral intention refers to the degree to which people intend to use a specific technology (Malhotra & Galletta, 1999). In TRA and TAM, behavioral intention is a sole factor used to predict use behavior, while other factors can only indirectly affect use behavior through behavioral intention (Davis, et al., 1989b; Fishbein & Ajzen, 1975; Venkatesh & Davis, 2000a). In UTAUT2, factors that affect use behavior are also habit and

facilitating conditions (Venkatesh, et al., 2012). A number of studies have indicated the linkage between behavioral intention and use behavior (Kaenprakob, 2010; Legris, Ingham, & Colletette, 2003; Venkatesh & Bala, 2008). In UTAUT2, the impact of behavioral intention on use behavior is moderated by the experience of users. The impact is stronger for user with less experience (Venkatesh, et al., 2012). The researcher set a hypothesis in the following.

H1. Behavioral intention has a positive effect on use behavior.

H1b. The effect of behavioral intention will decrease with increasing experience.

2.5 Performance Expectancy (PE).

Performance expectancy is the perception of an individual that using an information system will provide benefits to him or her (Venkatesh, et al., 2012). This construct is similar to perceived usefulness, the belief that using a particular technology improves their job performance (Davis, 1989). Both performance expectancy and perceived usefulness are accepted as extrinsic motivation; the outcome of technology is a way to improve job performance (Lin & Lu, 2011; Malhotra, Galletta, & Kirsch, 2008). Studies confirm that performance expectancy positively influences behavioral intention (Escobar-Rodríguez & Carvajal-Trujillo, 2014). In UTAUT1, the impact of performance expectancy on behavioral intention is moderated by gender and age; the impact is stronger for men than women and younger than older people. Therefore, the researcher set up hypotheses in the following:

H 2: performance expectancy of online academic database has a positive effect on behavioral intention.

H2a: The impact is stronger for men than for women.

H2b: The impact is stronger for younger users than for older users.

2.6 Effort Expectancy (EE).

Effort expectancy is used to present the extent to which users perceive the ease of use of an information system (Venkatesh, et al., 2003). Effort expectancy is similar to perceived ease of use; a person believes that users spend a little effort to use an information system (Davis, 1989). A study has shown that behavioral intention is influenced by effort expectancy (Escobar-Rodríguez & Carvajal-Trujillo, 2014).

H 3: effort expectancy has a positive effect on behavioral intention to use online academic databases.

H 3a: the effect of effort expectancy on behavioral intention is moderated by gender. The effect is stronger for women.

H3b: the effect of effort expectancy on behavioral intention is moderated by age. The effect is stronger for younger.

H3c: the effect of effort expectancy on behavioral intention is moderated by experience. The effect is stronger for users with less experience.

2.7 Social Influence (SI).

Social influence (SI) is viewed as the extent to which a person believes that important people think that the person should or should not use a specific information system (Venkatesh, et al., 2003). Social influence drives people adopting technology and it is associated with subjective norm in TRA and TAM (Vannoy & Palvia, 2010; Venkatesh, et al., 2003). Social influence or subjective norm directly affects behavioral intention (Ajzen, 1991; Escobar-Rodríguez & Carvajal-Trujillo, 2014; Fishbein & Ajzen, 1975, 2010; Venkatesh & Davis, 2000a). The effect of social influence on behavioral intention is stronger for older users than younger especially women (Suksa-ngiam & Chaiyasoonthorn, 2013; Venkatesh, et al., 2003).

H 4: Social influence has a positive effect on behavioral intention to use online academic databases.

H4a: The effect of social influence on behavioral intention is moderated by gender

H4b: The effect of social influence on behavioral intention is moderated by age

H4c: The effect of social influence on behavioral intention is moderated by experience.

H4d: The effect of social influence on behavioral intention is moderated by voluntariness of use

2.9 Facilitating Conditions (FC).

Facilitating conditions represent to what extent a user believes that technological infrastructure supports the use of the information system (Venkatesh, et al., 2003); this construct is built upon compatibility in Diffusion of Innovation (DoI) and perceived behavioral control (TPB) (Ajzen, 1991; Rogers, 1983; Taylor & Todd, 1995; Venkatesh, et al., 2003). UTAUT2 claims that facilitating conditions directly affect both behavioral intention and use behavior (Venkatesh, et al., 2012) whereas UTAUT1 says that facilitating conditions only affect use behavior. In UTAUT1, age and experience of the user moderate the path from facilitating conditions to use behavior whereas in UTAUT2, age and experience of the user do not moderate the relationship between facilitating conditions and use behavior. However, UTAUT2 provides the path from facilitating conditions to behavioral intention and the path is moderated by age, gender and experience (Venkatesh, et al., 2012). Research has confirmed that facilitating conditions affect both behavioral intention and use behavior (Escobar-Rodríguez & Carvajal-Trujillo, 2014). Facilitating conditions, in this study, are the extent to which a user of an information system perceives that he or she is supported by organizational and infrastructure to use the system (Venkatesh, et al., 2003). Taylor & Todd (1995) applied facilitating conditions are an antecedent of perceived behavioral control; they found that facilitating conditions were the most important factor affecting perceived

behavioral control. In UTAUT (Venkatesh, et al., 2003), facilitating conditions are used to explain behavioral intention and use behavior directly. Thus, the researcher set two hypotheses:

H5: Facilitating conditions directly affect behavioral intention.

H6: Facilitating conditions directly affect use behavior.

H5a: The effect of facilitating conditions on behavioral intention is moderated by gender

H5b: The effect of facilitating conditions on behavioral intention is moderated by age

H5c: The effect of facilitating conditions on behavioral intention is moderated by experience.

H5d: The effect of facilitating conditions on behavioral intention is moderated by voluntariness of use

H6b: The effect of facilitating conditions on use behavior is moderated by age

H6c: The effect of facilitating conditions on use behavior is moderated by experience.

The structural constructs raised from the previous hypotheses are demonstrated in figure 2.2 and table 2.1 shows the summary of hypothesis.

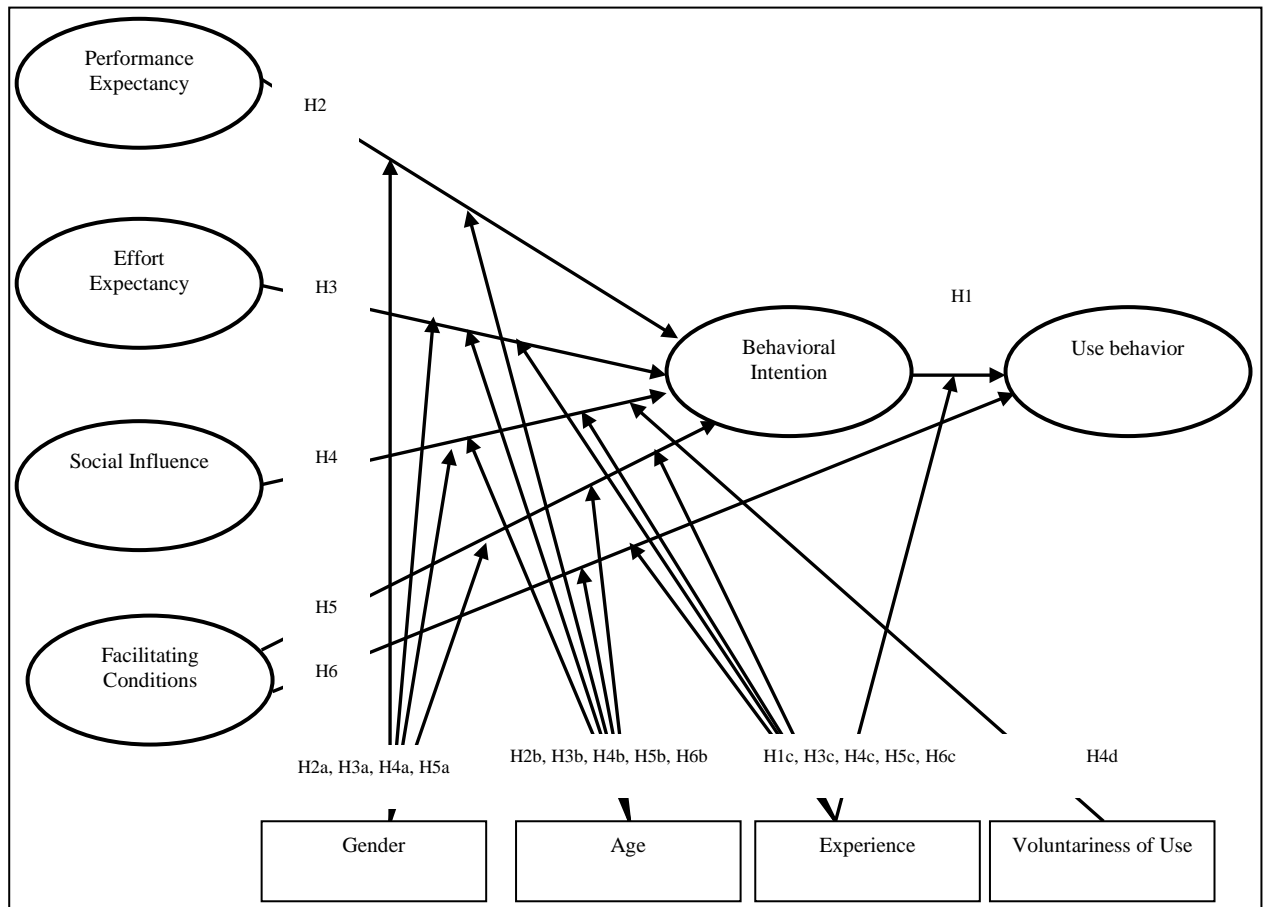


Figure 2.2 The conceptual framework.

Table 2.1 The summary of hypothesis

Relationships	Moderators	Hypothesis Number
Intention → Use Behavior	Experience	H1, H1c
Performance expectancy → Behavioral Intention	Gender, Age	H2, H2a, H2c
Effort Expectancy → Behavioral Intention	Gender, Age, Experience	H3, H3a, H3b, H3c
Social Influence → Behavioral Intention	Gender, Experience, Voluntariness of Use	H4, H4a, H4c, H4d
Facilitating Conditions → Behavioral Intention	Gender, Age, Experience	H5, H5a, H5b, H5c
Facilitating Conditions → Use Behavior	Age, Experience	H6, H6a, H6c

CHAPTER 3

METHODOLOGY

3.1 Sample Size and Sampling Method

The number of respondents in this study is more than minimum requirement. The model presented in this study consists of 6 latent and 23 observed variables. If considered both numbers of latent and observed variables, the sample size should be greater than 526 samples with effect size at 0.1 and power level at 0.8 (Cohen, 1988; Soper, 2012; Westland, 2010). In this research, 614 respondents were asked; so the sample size is greater than the minimum requirement. The researcher used quota sampling dividing groups of respondents approximately equally between male and female and between the younger group and the older group (Suksa-ngiam & Chaiyasoonthorn, 2013).

3.2 Measurement

The measurement of this study is self-reported. In terms of Use behavior (UB), respondents were asked to report their average days of usage per month, average times of usage per month, and average number of articles downloaded per month. Then logarithm transformation is used to solve skewed data. Behavioral intention (BI), Social influence (SI), performance expectancy (PE), effort expectancy (PE), and consist of bi-polar semantic differential items (strongly agree (7)-strongly disagree (1)).

3.3 Reliability

Cronbach's Alpha is an index of measuring reliability and it should be greater than 0.7 (Hair, Black, Babin, & Anderson, 2010). The researcher archive the acceptable level of Cronbach's Alpha which is greater than 0.7. The researcher also use composite reliability (C.R.) as another indicator of reliability as shown in equation 1.

$$C.R. = \frac{(\sum \lambda_i)^2}{(\sum \lambda_i)^2 - \sum Var(\varepsilon_i)} \quad \text{----- (1)}$$

3.4 Construct Validity

Standardized factor loadings, and the average variance extracted (AVE) are used to demonstrate construct validity. The acceptable value for a standardized factor loading is 0.5; however the level of more than 0.7 is preferable (Hair, et al., 2010). For AVEs, a value greater than 0.50 is acceptable to achieve good construct validity (Hair, et al., 2010).

3.5 Discriminant Validity

Discriminant validity is used to prove how constructs are different from others. The way to prove is to comparison between AVEs and the squared correlation between two constructs. If The AVEs is greater than the squared correlation; thus, a construct is different from other (Hair, et al., 2010).

3.6 The Estimation

The maximum likelihood estimation is the estimation employed in this study to estimate structural equations. In terms of normal distribution, kurtosis and skewness were used to test normality of the data.

3.7 Computer Software

IBM's SPSS and AMOS 21.0 were used in this research.

CHAPTER 4

RESEARCH RESULTS

4.1 Descriptive Statistics

The respondents were slightly more male students (51.3%) than female students (48.7). The respondents came from engineering school (50.8 %), followed by science school (34 %). In terms of education levels, the majority of respondents were from master students (59 %), followed by undergrad students (41%). In the case of age, this study divided the respondents into two groups: younger (50.7%) and older groups (49.3). Table 4.1 shows the characteristics of the respondents.

Table 4.1 Demographic characteristics of the samples (n=614).

Categories	Samples	%
Gender		
Male	315	51.3
Female	299	48.7
School		
Engineering	312	50.8
Science	209	34.0
Other	93	15.2
Level of study		
Undergraduate	195	41.0
Master	401	59.0
PhD	18	2.9
Age		
younger (25 and below)	311	50.7
older (above 25)	305	49.3

In terms of databases that the respondents used last time, most students used ScienceDirect (58%) followed by IEEE/ET (19.1) %. Table 99 presents the databases that the respondents accessed most recently. Table 4.2 shows the databases used by the respondents.

Table 4.2 The databases accessed most recently

Databases	Frequency	Percent
ScienceDirect	356	58.0
IEEE/ET	117	19.1
EBSCO	7	1.1
AMC Digital Library	43	7.0
Proquest	22	3.6
Thailis	32	5.2
Scopus	21	3.4
ISI Web of Science	13	2.1
Others	3	.5
Total	614	100.0

Table 4.3 presents general statistics describing mean, skewness, kurtosis, and standardized factor loading. Also it presents content reliability (C.R.) and Cronbach's alpha.

Table 4.3 General statistics: mean, standardized loadings and reliability.

Latent variables	Observed variables	Skewness	Kurtosis	Loading	C.R.	Alpha
UB	Log(UB1)	-1.23	1.09	.93	.82	.86
	Log(UB2)	-1.31	1.66	.90		
	Log(UB3)	-.58	-.02	.69		
BI	BI1	-.71	-.01	.82	.82	.92
	BI2	-.54	-.33	.86		
	BI3	-.49	-.40	.88		
	BI4	-.64	-.09	.83		
PE	PE01	-.83	.17	.77	.78	.90
	PE02	-.66	-.19	.79		
	PE03	-.44	-.64	.89		
	PE04	-.50	-.42	.82		
EE	EE01	-.49	-.41	.84	.78	.88
	EE02	-.32	-.60	.87		
	EE03	-.41	-.46	.85		
SN	SN01	-.58	-.25	.81	.83	.89
	SN02	-.43	-.46	.83		
	SN03	-.46	-.28	.88		
	SN04	-.49	-.28	.84		
FC	FC02	-.54	-.28	.85	.83	.89
	FC03	-.38	-.59	.92		
	FC04	-.57	.128	.79		

The researcher then analyzed CFA in table 4.4, the standardized loadings of all manifest variables are greater than 0.7 as suggested by Hair et al.(2010). The AVEs are all greater than 0.5 (0.77-0.86). When compared to squared correlations, the values of all AVEs are greater than squared correlations. The requirement of construct validity, discriminant validity and reliability are satisfied.

Table 4.4 Squared correlations and AVEs.

	UB	BI	PE	EE	SI	FC
UB	.72					
BI	.10	.71				
PE	.06	.47	.67			
EE	.11	.57	.47	.73		
SI	.12	.33	.35	.48	.71	
FC	.09	.38	.50	.57	.38	.73

Diagonal elements are AVEs and off-diagonal values are squared correlations

4.2 The Structure of Equations

The results of the structural equation modeling are presented in figure 4.1. The figures in the model are shown in standardized loadings and all paths are statistically significant ($P > 0.001$) except the path from social influence to behavioral intention ($P = .893$).

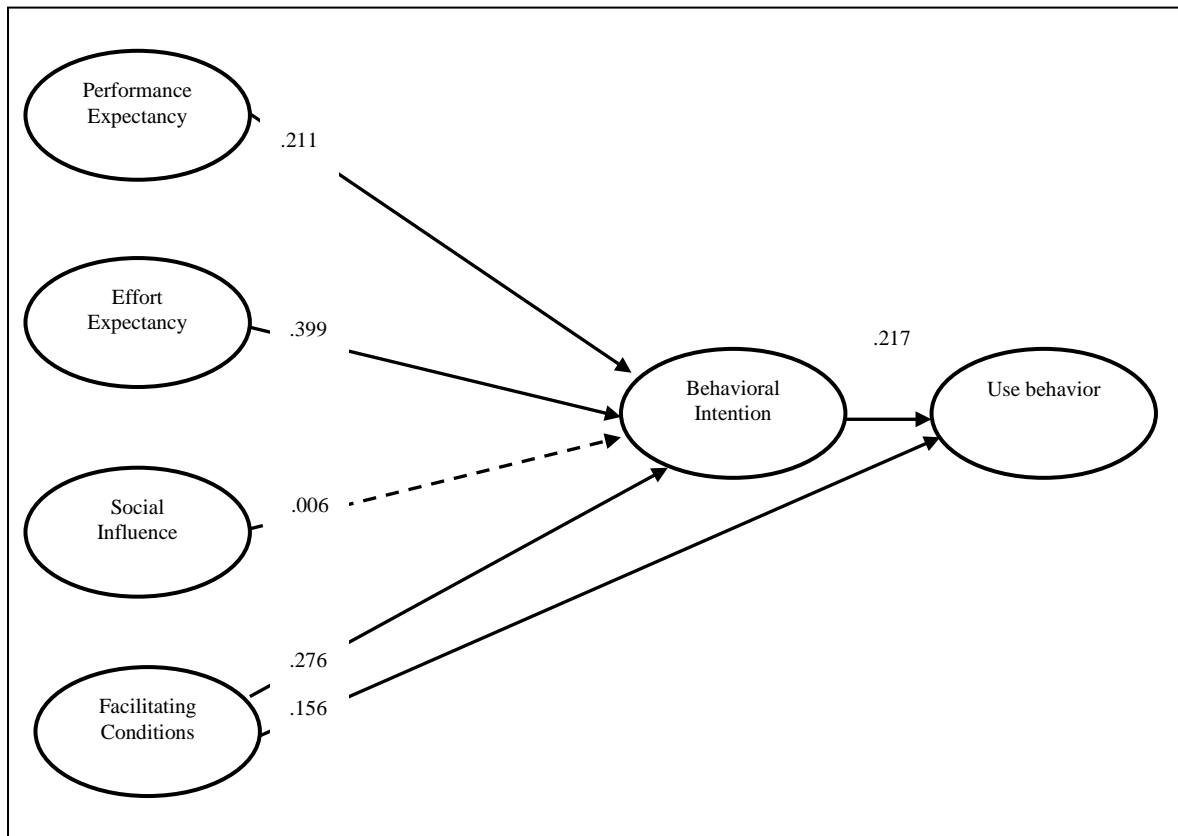


Figure 4.1 The Structural Model.

$\chi^2/df = 2.521$, P-value = 0.000 , SRMR = 0.493, RMSEA = 0.050 ,

CFI = 0.974 , TLI = 0.967, GFI = 0.939 , PGFI = 0.691 ,

AGFI = 0.971 , PNFI = 0.775

Table 4.5 Path analysis.

Paths	Hypothesis	Standardized beta	P	R ²
BI → UB	H1	.217	.000	0.12
FC → UB	H6	.156	.021	
PE → BI	H2	.211	.000	
EE → BI	H3	.399	.000	
SI → BI	H4	.006	.893	
FC → BI	H5	0.276	.001	0.65

The results shown in table 4.5 indicate that behavioral intention and facilitating conditions together can explain the variance of use behavior at 12 % ($R^2 = 0.12$) while performance expectancy, effort expectancy, social influence, and facilitating conditions explains the variance of behavioral intention at 65 % ($R^2 = 0.65$). However, according to figure 4.1 and table 4.5, social influence does not significantly affect behavioral intention in the case of online academic library.

Table 4.6 Standardized direct, indirect, and total effects.

		FC	SI	EE	PE	BI
BI	Direct	.276	.006	.399	.211	.000
	Indirect	.000	.000	.000	.000	.000
	Total	.276	.006	.399	.211	.000
UB	Direct	.156	.000	.000	.000	.217
	Indirect	.060	.001	.086	.046	.000
	Total	.215	.001	.086	.046	.217

Table 4.6 shows that the primary factor that directly and indirectly influences use behavior is behavioral intention (.217), followed by facilitating conditions (.215). Considering behavioral intention, the researcher found that effort expectancy is the primary factor (.399), followed by facilitating conditions (.276).

4.3 Multiple Group Moderating Effects

The researcher analyzed the effect of moderating factors by employing Chi-square difference tests. The relationship paths are moderated by the four moderating factors: gender, age, experience, and voluntariness of use.

In terms of gender, according to table 4.7 and 4.8, this study has proved that the relationship path from effort expectancy to behavioral intention is moderated by gender. The relationship path is stronger for the female group than the male group.

Table 4.7 Comparison between male and female.

Paths	Male				Female			
	Estimate	S.E.	C.R.	P	Estimate	S.E.	C.R.	P
PE → BI	0.342	0.087	3.930	0.000	0.205	0.084	2.426	0.015
EE → BI	0.231	0.073	3.170	0.002	0.571	0.105	5.457	0.000
SI → BI	-0.004	0.053	-0.079	0.937	0.060	0.090	0.669	0.503
FC → BI	0.348	0.081	4.320	0.000	0.189	0.091	2.082	0.037

Table 4.8 The results of moderating effects of gender.

Constrained paths	χ^2	Df	P(model)	RMSEA	GFI	AGFI	CFI	$\Delta \chi^2 / \Delta df$	P (χ^2)
Default	682.774	340	0.000	0.041	0.908	0.875	0.965	N/A	N/A
PE → BI	684.049	341	0.000	0.041	0.908	0.875	0.965	1.275	0.259
EE → BI	690.071	341	0.000	0.041	0.907	0.875	0.964	7.297	0.007
SI → BI	683.14	341	0.000	0.040	0.908	0.875	0.965	0.366	0.545
FC → BI	684.447	341	0.000	0.041	0.908	0.875	0.965	1.637	0.196

In terms of age groups, this study divided the respondents into two age groups: 19-25 years old and 25-37 year old. According to table 4.9 and 4.10, the study confirms that age moderates three relationship paths: the paths from performance expectancy to behavioral intention, from effort expectancy to behavioral intention, and from social influence to behavioral intention.

This study indicates that the path from performance expectancy to behavioral intention is stronger for the older than the younger respondents. The path from effort expectancy to behavioral intention is moderated by age. The effect is stronger for the younger than the older group. Lastly, the path from social influence to behavioral intention is moderated by age. The path is stronger for the younger group than the older group. However, when the samples are pooled together, the path does not significantly affect behavioral intention.

Table 4.9 Comparison between the younger group and the older group.

Paths	The younger group				The older group			
	Estimate	S.E.	C.R.	P	estimate	S.E.	C.R.	P
PE → BI	0.022	0.079	0.279	0.780	0.708	0.106	6.682	0.000
EE → BI	0.495	0.087	5.708	0.000	0.113	0.088	1.294	0.196
SI → BI	0.205	0.086	2.383	0.017	-0.027	0.052	-0.508	0.612
FC → BI	0.298	0.092	3.223	0.001	0.155	0.077	2.002	0.045

Table 4.10 The results of moderating effects of age.

Constrained paths	χ^2	Df	P(model)	RMSEA	GFI	AGFI	CFI	$\Delta \chi^2 / \Delta df$	P (χ^2)
Default	700.872	340	0.000	0.042	0.904	0.869	0.962	N/A	N/A
PE → BI	728.999	341	0.000	0.043	0.900	0.864	0.960	28.104	0.000
EE → BI	710.443	341	0.000	0.042	0.903	0.868	0.961	9.571	0.002
SI → BI	706.139	341	0.000	0.027	0.903	0.869	0.962	5.267	0.022
FC → BI	702.237	341	0.000	0.042	0.904	0.870	0.962	1.365	0.243

In terms of experience, according to table 4.11 and 4.12, the results show that experience moderates two relationship paths: from performance expectancy to behavioral intention and from social influence to behavioral intention. The path from performance expectancy to behavioral intention is moderated by experience: the path is stronger for higher experience group than lower experience group. The path from social influence to behavioral intention is also moderated by experience. The path is stronger for lower experience than higher experience groups. However, when the samples are pooled together, the path is not significant.

Table 4.11 Comparison between the lower and higher experience groups.

Paths	The lower experience group				The higher experience group			
	estimate	S.E.	C.R.	P	estimate	S.E.	C.R.	P
PE → BI	0.077	0.085	0.906	0.365	0.385	0.078	4.932	0.000
EE → BI	0.497	0.085	5.863	0.000	0.280	0.080	3.473	0.000
SI → BI	0.34	0.087	3.918	0.000	-0.13	0.052	-2.483	0.013
FC → BI	0.168	0.083	2.017	0.044	0.303	0.086	3.509	0.000
BI → UB	0.063	0.025	2.549	0.011	0.030	0.024	1.247	0.212
FC → UB	0.019	0.028	0.691	0.489	0.003	0.026	0.120	0.905

Table 4.12 The results of moderating effects of experience.

Constrained paths	χ^2	df	P(model)	RMSEA	GFI	AGFI	CFI	$\Delta \chi^2 / \Delta df$	P (χ^2)
Default	755.603	340	0.000	0.045	0.901	0.865	0.955	N/A	N/A
PE → BI	762.524	341	0.000	0.045	0.900	0.864	0.955	6.921	0.000
EE → BI	759.018	341	0.000	0.045	0.901	0.865	0.955	3.415	0.065
SI → BI	777.494	341	0.000	0.046	0.898	0.862	0.953	21.891	0.000
FC → BI	756.827	341	0.000	0.045	0.901	0.865	0.955	1.221	0.269
BI → UB	756.456	341	0.000	0.045	0.901	0.865	0.955	0.853	0.356
FC → UB	755.776	341	0.000	0.045	0.901	0.865	0.955	0.173	0.677

In terms of voluntariness of use, according to table 4.13 and 4.14, the results show that voluntariness of use moderates three relationship paths: from performance expectancy to behavioral intention, from effort expectancy to behavioral intention, and from behavioral

intention to use behavior. The relationship from performance expectancy to behavioral intention is moderated by voluntariness of use; the path is stronger for higher voluntariness of use than lower voluntariness of use group. The relationship from effort expectancy to behavioral intention is moderated by voluntariness of use: the relationship is stronger for lower voluntariness of use group than higher voluntariness of use group. The relationship from behavioral intention to use behavior is moderated by voluntariness of use: the path is stronger for lower voluntariness of use group than higher voluntariness of use group.

Table 4.13 Comparison between the lower and higher voluntariness of use groups.

Paths	The lower voluntariness of use group				The higher voluntariness of use group			
	estimate	S.E.	C.R.	P	estimate	S.E.	C.R.	P
PE → BI	0.102	0.082	1.255	0.209	0.584	0.103	5.689	0.000
EE → BI	0.519	0.083	6.272	0.000	0.115	0.105	1.094	0.274
SI → BI	-0.061	0.061	-0.998	0.318	0.049	0.065	0.754	0.451
FC → BI	0.310	0.093	3.318	0.000	0.318	0.096	3.307	0.000
BI → UB	0.087	0.028	3.137	0.002	0.003	0.025	0.132	0.895
FC → UB	0.021	0.033	0.643	0.520	0.051	0.030	1.69	0.091

Table 4.14 The results of moderating effects of voluntariness of use.

Constrained paths	χ^2	Df	P(model)	RMSEA	GFI	AGFI	CFI	$\Delta \chi^2 / \Delta df$	P (χ^2)
Default	774.252	340	0.000	0.046	0.899	0.862	0.943	N/A	N/A
PE → BI	788.010	341	0.000	0.046	0.897	0.861	0.942	13.758	0.000
EE → BI	783.235	341	0.000	0.046	0.898	0.862	0.942	8.983	0.003
SI → BI	775.751	341	0.000	0.046	0.899	0.863	0.943	1.499	0.221
FC → BI	774.256	341	0.000	0.046	0.899	0.863	0.944	0.004	0.950
BI → UB	779.236	341	0.000	0.046	0.898	0.862	0.943	4.984	0.026
FC → UB	774.695	341	0.000	0.046	0.899	0.863	0.943	0.443	0.507

CHAPTER 5

CONCLUSIONS AND DISCUSSIONS

5.1 Conclusions

This study attempts to understand why research students adopt online academic databases. The results confirm that behavioral intention and facilitating factors positively affect use behavior significantly: the researcher accepts hypothesis 1 and 6. In the case of factors affecting behavioral intention, the results show that performance expectancy, effort expectancy, and facilitating conditions positively affect behavioral intention so that the researcher accept hypothesis 2, 3, and 5. However, social influence does not significantly affect behavioral intention as suggested by UTAUT. Nonetheless, UTAUT provides satisfied goodness of fit indexes: $\chi^2/df = 2.521$, P-value = 0.000 , SRMR = 0.493, RMSEA= 0.050 , CFI = 0.974 , TLI= 0.967, GFI = 0.939 , PGFI= 0.691 , AGFI= 0.971 , and PNFI = 0.775. These numbers are good for structural equation modeling.

5.2 Discussions

When considering path by path, the researcher found that UTAUT provides five significant relationship paths.

The path from behavioral intention to use behavior, in this study, is found significant. It provides a standardized regression weight of .217 that is quite small. Like behavioral intention, facilitating conditions positively affect use behavior with a regression weight of .156, which is also quite small. Both behavioral intention and facilitating conditions can merely explain the variance of use behavior at 12 % ($R^2=0.12$). The use of behavioral intention in explaining use behavior is limited. A study investigating the use of education technology indicates that the behavioral intention is not a significant factor affecting use behavior (Murillo Montes de Oca & Nistor, 2014). There is a gap between behavioral intention

and use behavior. The gap needs to be adjusted all the time. It is accepted that psychological and instrumental conditions interacting between behavioral intention and use behavior (Bagozzi, 2007). Users consider that obstruction and attractions can happen between behavioral intention and use behavior. There are uncertainty and the interaction among conditions between behavioral intention and use behavior. When users adopt a technology, they changes their experience fundamentally so that the need to study the relationship between behavioral intention and use behavior should be done in a dynamic and interaction way (Bagozzi, 2007). However, even though behavior intention does not much explain use behavior, the path is still significant.

The path from facilitating conditions to use behavior is found significant. This study shows that facilitating conditions act in a similar way of perceived behavioral control in TPB which affect both behavioral intention and use behavior (Fishbein & Ajzen, 2010) while the original UTAUT indicates that facilitating conditions affect only use behavior (Venkatesh, et al., 2003). The researcher accepts both hypotheses 5 and 6. Both the paths from facilitating conditions to behavioral intention and from facilitating conditions to use behavior are not found that they are significantly moderated by gender, age, experience, or voluntariness of use. These are surprising results against the notion from the theory.

The path from performance expectancy to behavioral intention is significant. This study affirms the theory and part studies that performance expectancy or in a similar concept perceived usefulness is a significant factor affecting behavioral intention. The path from performance expectancy to behavioral intention is moderated by age, experience, and voluntariness of use. The effect of performance expectancy on behavioral intention is stronger for older than younger users. The older users are more motivated by perception of benefits or performance than the younger users. Likewise, the effect of performance expectancy on behavioral intention is stronger for users with higher experience than users with lower experience. Users with higher experience have a higher intention to adopt online library than those who have lower experience when they see the benefits of the technology.

In addition, voluntariness of use moderates the relationship from performance expectancy to behavioral intention. Users who have higher voluntariness of use have intention to adopt this technology more than those who have lower voluntariness of use. The surprising result of this issue is that gender is not a moderating effect of this path relationship. Previous studies also indicate that male and female are not significantly different in terms of technology adoption (Chung, Park, Wang, Fulk, & McLaughlin, 2010; Suksa-ngiam & Chaiyasoonthorn, 2013). This raises an issue that gender is not an appropriate moderating factor of the path from performance expectancy to behavioral intention.

Effort expectancy is the most important factor determining behavioral intention. It consists of a standardized regression weight of .399. The path is stronger for women than men. The users of online academic library who are female are more influenced by effort expectancy than the counterpart group. The relationship is also found in different age groups. The behavioral intention of the younger users is more influenced by effort expectancy than that of the older users. Likewise, the study confirms that this path is moderated by voluntariness of use. The path is stronger for users who have lower voluntariness of use than those who have higher voluntariness of use. However, there is no significant difference between higher and lower experience users.

Another interesting aspect of this study is that the path from social influence to behavioral intention. The path from social influence to behavioral intention is hypothesized based on the cognitive part and on the affective part with evaluations of the outcome of behavior and norm of both individual and other people perceptions (Bagozzi, 1992). In this study, social influence does not significantly affect behavioral intention. However, when considering different groups, the path is stronger for users with low experience than higher experience. In other words, behavioral intention to use online academic databases of users with lower experience is more dependent on beliefs of other people while those who have more experience receive insignificant effects. Likewise, age moderates this relationship. The

behavioral intention of younger people is more influenced by society than those who are older. However, when all respondents are pooled together this path is not significant.

5.3 Recommendations for Future Research

5.3.1 Recommendations about research methodology

This research is based on the UTAUT model which is built upon organizational technologies in the US [citation]. However, it is accepted that adoption research in different cultures may yield different outcomes. The use of the quantitative approach, based on a specific theory, may not be appropriate if there are huge differences between the US and Thai users. Hence, the mixed method approach is perhaps more appropriate, especially the one that both employs a qualitative generating approach like grounded theory and a quantitative approach of theory testing such as structural equation modeling (SEM).

5.3.2 Recommendations about constructs

As indicated in chapter 4, social influence does not affect the behavioral intention when the samples are pooled together. However, the low experience respondents rely on social influence because social influence does affect behavioral intention for the low experience group (standardized beta = 0.34 and sig = 0.000). Conversely, the results of those who have higher experience show that social influence negatively affects behavioral intention (standardized beta = -0.13 and sig = 0.013). The similar results are also found between age groups. Therefore, future research should focus on this issue.

5.3.3 Recommendations about longitudinal studies

As suggested by Fishbein & Ajzen (2010), the relationship between behavioral intention and behavior can be either measured at the same time or different time frames. However, TAM and UTAUT profoundly prefer to measure the two constructs at the same time (Venkatesh & Bala, 2008; Venkatesh, et al., 2003). It might be a good idea that

future research may consider compare the tests or the two constructs measured at the same time and different time.

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APPENDICES

APPENDIX A

THE QUESTIONNAIRE

Appendix: แบบสอบถามภาษาไทย

Questionnaire No

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แบบสอบถามเรื่องการยอมรับการใช้งานฐานข้อมูลวิชาการออนไลน์ในมหาวิทยาลัย

Q1. โปรดทำเครื่องหมาย ☐ ลงบนฐานข้อมูลใดดังต่อไปนี้ที่ท่านใช้งานล่าสุด

- | | | |
|------------------------|-----------------------|---------------|
| 1. ScienceDirect | 2. IEEE/IET | 3. EBSCO |
| 4. ACM Digital Library | 5. ProQuest | 6. ThaiLIS |
| 7. Scopus | 8. ISI Web of Science | 9. อื่นๆ โปรด |

ระบุ.....

E1. ประสบการณ์ในการใช้งานฐานข้อมูลนี้ (โดยประมาณ)เดือน

การใช้งานฐานข้อมูล

USE01: โดยเฉลี่ยท่านเข้าใช้งานฐานข้อมูลนี้ (โดยประมาณ).....วัน ต่อ เดือน

USE02: โดยเฉลี่ยท่านเข้าใช้งานฐานข้อมูลนี้ (โดยประมาณ).....ครั้ง ต่อ เดือน

USE03: ในแต่ละเดือนท่านดาวน์โหลดเอกสารอิเล็กทรอนิกส์จากฐานข้อมูลนี้ (โดยประมาณ) จำนวน.....ฉบับ ต่อ เดือน

โปรดทำเครื่องหมาย ☐ วงกลมลงบนตัวเลข 1 ถึง 7

โดยที่เลข 7 หมายถึง เห็นด้วยกับข้อความด้านขวามาก

1 หมายถึง เห็นด้วยกับข้อความด้านซ้ายมาก

ความตั้งใจที่จะใช้งานฐานข้อมูลนี้

BI1: ฉันตั้งใจที่จะใช้งานฐานข้อมูลนี้อย่างต่อเนื่อง

ไม่เห็นด้วยอย่างยิ่ง	1	2	3	4	5	6	7	เห็นด้วยอย่างยิ่ง
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BI2: ฉันจะพยายามที่จะใช้งานฐานข้อมูลนี้

ไม่เห็นด้วยอย่างยิ่ง	1	2	3	4	5	6	7	เห็นด้วยอย่างยิ่ง
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BI3: ฉันวางแผนที่จะใช้งานฐานข้อมูลนี้บ่อยๆ

ไม่เห็นด้วยอย่างยิ่ง	1	2	3	4	5	6	7	เห็นด้วยอย่างยิ่ง
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BI4: ฉันคาดหวังที่จะใช้งานฐานข้อมูลนี้อย่างต่อเนื่อง

ไม่เห็นด้วยอย่างยิ่ง	1	2	3	4	5	6	7	เห็นด้วยอย่างยิ่ง
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ความคาดหวังจากประสิทธิภาพจากฐานข้อมูลนี้

PE1: ฉันพบว่าการใช้งานฐานข้อมูลนี้มีประโยชน์ในการเรียนของฉัน

ไม่เห็นด้วยอย่างยิ่ง	1	2	3	4	5	6	7	เห็นด้วยอย่างยิ่ง
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PE2: การใช้งานฐานข้อมูลนี้ทำให้ฉันมีโอกาสได้รับสิ่งต่างๆที่สำคัญ

ไม่เห็นด้วยอย่างยิ่ง	1	2	3	4	5	6	7	เห็นด้วยอย่างยิ่ง
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PE3: การใช้งานฐานข้อมูลนี้ช่วยให้การเรียนของฉันสำเร็จอย่างรวดเร็ว

ไม่เห็นด้วยอย่างยิ่ง	1	2	3	4	5	6	7	เห็นด้วยอย่างยิ่ง
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PE4: การใช้งานฐานข้อมูลนี้ช่วยเพิ่มประสิทธิภาพในการเรียนของฉัน

ไม่เห็นด้วยอย่างยิ่ง	1	2	3	4	5	6	7	เห็นด้วยอย่างยิ่ง
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ความคาดหวังจากความพยายาม

EE1: การเรียนรู้การใช้งานฐานข้อมูลนี้ง่ายสำหรับฉัน

ไม่เห็นด้วยอย่างยิ่ง	1	2	3	4	5	6	7	เห็นด้วยอย่างยิ่ง
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EE2: การใช้งานฐานข้อมูลนี้มีความชัดเจนและเข้าใจได้ง่าย

ไม่เห็นด้วยอย่างยิ่ง	1	2	3	4	5	6	7	เห็นด้วยอย่างยิ่ง
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EE3: ฉันพบว่าการใช้งานฐานข้อมูลนี้ใช้งานได้ง่าย

ไม่เห็นด้วยอย่างยิ่ง	1	2	3	4	5	6	7	เห็นด้วยอย่างยิ่ง
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แรงผลักดันจากสังคม

SL1: บุคคลที่สำคัญสำหรับฉันคิดว่าฉันควรใช้งานฐานข้อมูลนี้

ไม่เห็นด้วยอย่างยิ่ง	1	2	3	4	5	6	7	เห็นด้วยอย่างยิ่ง
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SL2: บุคคลที่มีอิทธิพลต่อพฤติกรรมของฉันคิดว่าฉันควรใช้งานฐานข้อมูลนี้

ไม่เห็นด้วยอย่างยิ่ง	1	2	3	4	5	6	7	เห็นด้วยอย่างยิ่ง
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SL3: บุคคลที่ฉันชื่นชอบในความคิดเป็นผู้แนะนำให้ใช้งานฐานข้อมูลนี้

ไม่เห็นด้วยอย่างยิ่ง	1	2	3	4	5	6	7	เห็นด้วยอย่างยิ่ง
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SL4: คนที่ฉันนับถือและยกย่องมักจะส่งเสริมการใช้งานฐานข้อมูลนี้

ไม่เห็นด้วยอย่างยิ่ง	1	2	3	4	5	6	7	เห็นด้วยอย่างยิ่ง
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เงื่อนไขการสนับสนุน

FC2: ฉันมีความรู้เพียงพอ สำหรับการใช้งานฐานข้อมูลนี้

ไม่เห็นด้วยอย่างยิ่ง	1	2	3	4	5	6	7	เห็นด้วยอย่างยิ่ง
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FC3: การใช้งานฐานข้อมูลนี้ เข้ากันได้กับเทคโนโลยีอื่นๆที่ฉันใช้งานอยู่

ไม่เห็นด้วยอย่างยิ่ง	1	2	3	4	5	6	7	เห็นด้วยอย่างยิ่ง
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FC4: ฉันมักได้รับความช่วยเหลือจากบุคคลอื่นๆเมื่อฉันพบกับปัญหาในการใช้งานฐานข้อมูลนี้

ไม่เห็นด้วยอย่างยิ่ง	1	2	3	4	5	6	7	เห็นด้วยอย่างยิ่ง
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ความสนใจในการใช้งาน

VU01: คนที่มีอำนาจเหนือฉันต้องการให้ฉันใช้งานฐานข้อมูลนี้

ไม่เห็นด้วยอย่างยิ่ง	1	2	3	4	5	6	7	เห็นด้วยอย่างยิ่ง
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VU02: การใช้งานฐานข้อมูลนี้ของฉันเป็นไปโดยความสมัครใจ

ไม่เห็นด้วยอย่างยิ่ง	1	2	3	4	5	6	7	เห็นด้วยอย่างยิ่ง
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VU03: การใช้งานฐานข้อมูลนี้ของฉันคือการใช้งานตามความต้องการของคนที่มีอำนาจเหนือฉัน

ไม่เห็นด้วยอย่างยิ่ง	1	2	3	4	5	6	7	เห็นด้วยอย่างยิ่ง
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VU04: คนที่มีอำนาจเหนือฉันไม่ได้ขอร้องให้ฉันใช้งานฐานข้อมูลนี้

ไม่เห็นด้วยอย่างยิ่ง	1	2	3	4	5	6	7	เห็นด้วยอย่างยิ่ง
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VU05: ฉันไม่ได้ถูกบีบบังคับให้ใช้งานฐานข้อมูลนี้

ไม่เห็นด้วยอย่างยิ่ง	1	2	3	4	5	6	7	เห็นด้วยอย่างยิ่ง
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ข้อมูลส่วนบุคคล

SES1: เพศ ☐ 1 ชาย ☐ 2 หญิง

SES2: อายุ.....ปี

SES3: ท่านกำลังศึกษาอยู่ในระดับ

☐ 1.ปริญญาตรี ☐ 2.ปริญญาโท ☐ 3.ปริญญาเอกหรือสูงกว่า

SES4: ท่านกำลังศึกษาอยู่ในคณะใด

☐ 1. วิศวกรรมศาสตร์ ☐ 2. สถาปัตยกรรมศาสตร์ ☐ 3. วิทยาศาสตร์
☐ 4. เทคโนโลยีการเกษตร ☐ 5. อุตสาหกรรมเกษตร ☐ 6. เทคโนโลยีสารสนเทศ
☐ 7. วิทยาลัยการบริหารและจัดการ ☐ 8. ครุศาสตร์อุตสาหกรรม ☐ 9. อื่นๆระบุ.....

ข้อเสนอแนะเพิ่มเติม

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