

# Voluntariness Difference in Adoption of E-Learning Technology among University Students

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**Abstract**— The study aims to investigate the variables influencing the adoption of e-learning among university student and examine the voluntariness effect on the adoption. The study employs Perceive Ease of Use, Perceive Usefulness, Facilitating Condition, Social Influent, Task Technology Fit, Attitude, behavior intention (BI), and actual use. The 230 questionnaires were collected to test the proposed model and voluntariness difference is investigated to get the comprehension of the adoption. The finding reveals that the variables have fully statistically direct effect among Task Technology Fit on Perceive Ease of Use, Perceive Ease of Use on Perceive Usefulness, Perceive Ease of Use on Attitude, Attitude on Behavioral Intention, and Behavioral Intention on Use Behavior. The other variables have partially statistically direct effect among Perceive Usefulness on Attitude, Perceive Usefulness on Behavioral Intention, Social Influence on Behavioral Intention, and Facilitating Condition on Behavioral Intention. Voluntariness Differences prevail on the all variables on the model and the behavioral factor including Experience and the day per week students using e-learning.

**Keywords**—adoption technology, e-learning, voluntariness, university students

## I. INTRODUCTION

Learning technology innovations are moving so fast. The campus utilizes e-learning technology to provide learning services for lecturers and students on campus. The development of learning models using the adoption model of e-learning technology is an important part in answering the internet-based learning model.

E-learning makes students easier to understand the lesson and helps teachers and students can interact with each other and the knowledge transfer can be facilitate more effectively. The presence of e-learning in education contributes to the teaching process significantly. E-learning has been considered a compulsory teaching and learning approach in higher education with the problems regard to use and effectivity in using e-learning on lecturers, students and academic staff [1]. The development of e-learning has emerged as a catalyst for current educational institutions. The implementation of e-learning systems and improving learning services can develop organizational value better[2].

The Government of the Republic of Indonesia start on 2013 has arranged the implementation of distance learning (e-learning) and stated that e-learning is learning that utilizes information and communication technology-based information packages for learning purposes that can be

accessed by students anytime and in anywhere[3]. E-learning combines online and face-to-face learning and its proportion of online teaching materials is complemented by discussion.

Instead of to replace traditional classroom settings, E-learning is intended provide new opportunities for interaction and communication between students and teachers[4]. E-learning combines online and face-to-face ways and its proportion of online teaching materials is complemented by discussion

The e-learning platform attracting users is an important requirement, where a time flexibility, quizzes, compulsory training, and available material are important things to increase the value of e-learning more interestingly[5].

The e-learning success factors are always held by training, perceived benefits, student attitudes towards e-Learning, student self-efficacy, course quality, program flexibility, clear direction, relevant content, course flexibility, and internet self-efficacy[6]. Other studies reveal that the implementation of e-learning can be successful if curriculum design, technology awareness, motivation, and changes in student behavior can be further refined [7].

Other factors that influence each other in the implementation of e-learning in higher education are technological factors, pedagogical factors, institutional factors, management factors, ethical factors, evaluation factors, resource factors, and factors of social interaction between instructors and students [8].

The study have purpose to investigate the factors influencing the adoption of eLearning among university student and to examine the voluntariness effect on the adoption. The model is proposed and tested using 230 respondents to validate the model. The correlation and causal effect analysis are employed to test the model and voluntariness difference is investigated to reveal the difference and enhance the comprehension of investigation.

## II. REVIEWING PREVIOUS RELATED STUDIES

The technology acceptance model (TAM) has been widely adopted in an information technology and applied to various fields including e-learning. Researchers have determined factors for technology acceptance and various behaviors in using information technology[8]. Development of the Technology Acceptance Model (TAM) (see Figure 1) includes determinants, namely: Perceived Usefulness (POU), Perceived Ease of Use (PEOU), Attitude (AT), Behavior Intention to Use (BI), Actual Use (AU) is a determinant of

revenue in information technology (IT). TAM provides a basis for tracking the external impact that variables have on internal beliefs, attitudes, and intentions [9].

The technology acceptance model (TAM) says that Perceived Ease of Use (PEOU) and Perceived Usefulness (POU) are used to predict application usage. TAM is used as a basis for hypothesizing the variables of e-learning usage.

TAM is also used in assessing acceptance and intention to use the Learning management system (LMS), indicating that the intention to use LMS is determined by gadget design which is a structural element of technology[10].

To understand the patterns of user behavior, we include usability as a mediator in the relationship between ease of use and intention. The results provide invaluable information about user behavior patterns[11].

e-learning systems at Iranian universities have been successfully implemented if the quality of the system, the education system, the quality of the content and information, the quality of services are well done so as to form user satisfaction, and the intention to reuse[11]. This is very influential on system usage, system loyalty, and the achievement of e-learning goals.

#### *A. Perceived Ease of Use on Perceive Usefulness and Attitude*

Perceived Ease of Use (PEOU) is defined as the degree to which a person believes that using the system easily and will be free of difficulties [9]. And PEOU is a driver of close acceptance of new technology-based applications[11].

Perceived usefulness is defined as the degree to which someone believes that using a particular system will improve its performance. So that the system can be profitable or with the existence of a better performance system [9]. People must use a web-based application system because these applications are very useful in improving their performance[12].

Perceptions of benefits and perceptions of ease of use have a significant influence on attitude using technology[4]. TAM can be used to explain student acceptance of e-learning technology [4]. However, in other studies, perceived usefulness did not affect students of e-learning[1].

Perception of ease of use (PEOU) is theorized as a direct determinant of attitudes towards use (ATT). An increase in ease of use may not only be beneficial for influencing intentions, but also leads to a positive attitude. PEOU indirectly impacts the intention to use (ITU) through increasing perceived benefits (POU)[22].

Perceived of ease of use (PEOU) and perceived usefulness (PU) technology are predictors of user attitudes (ATT) in using technology, subsequent behavioral intentions and actual use. Perception of ease of use (PEOU) is also considered to influence the perception of the use of technology[4]. Therefore, we conclude that Perceived Ease of Use has statistically direct effect on Perceived Usefulness (H1) and Perceived Ease of Use has statistically direct effect on Attitude (H2).

#### *B. Perceived Usefulness on Attitude and Behavioral Intention*

Perceived Usefulness refers to the extent to which users believe that using technology will improve the performance of their work[9]. Perceived usefulness has a significant effect on intention to use[4]. Perceived usefulness and attitude towards using were associated positively with continuance intention[20]. Therefore, we conclude that Perceived Usefulness has statistically direct effect on Attitude (H3) and Perceived Usefulness has statistically direct effect on Behavioral Intention (H4).

#### *C. Attitude on Behavioral Intention*

When attitudes toward the use of the system are strong, attitudes can fully mediate the effect of beliefs in behavioral intentions. the power of attitude (Attitude) on the use of the system can moderate the effect of attitude on behavioral intention (BI). The positive relationship between behavioral attitudes and intentions tends to be much greater when the attitude is strong [21]. Therefore, we conclude that Attitude has statistically direct effect on Behavioral Intention (H5).

#### *D. Behavioral Intention on Actual Use*

Intention is defined as the possibility that an individual will use IS. Intention plays an important role in the actual use of new technology. Intention to use (BI) and actual use (AU) have a positive relationship so that in this context, (BI) intention to use is assumed to have a positive impact on actual use [11]. Therefore, we conclude that Behavioral Intention has statistically direct effect on Actual Use (H6)

#### *E. Task Technology Fit on Perceive Ease of Use*

The Task-Technology Fit (TTF) model is a theory used to evaluate how information technology leads to performance, assess the impact of usage, and assess the compatibility between tasks and technological characteristics. Task characteristics and technological characteristics can influence task-technology compatibility, which can determine the performance and utilization of users.

In the context of the use of technology in organizations, the use of TTF is considered very important when studying the use of technology in organizations. In the context of internet technology, the TTF significantly predicts actual use, and the better the system matches interest, the higher the system usage[13].

In another study TTF as extrinsic motivation factors showed that the indirect effects of TTF on ATU through PEOU and PU were very large. The indirect effect of TTF on PU through PEOU is significant but relatively smaller[14].. In TTF research on the adoption of MOOCs, the TTF as an external factor has an impact on user adoption and influences user adoption [15]. TTF allows students to feel the ease of use and usability of the MOOC.

Task Technology Fit (TTF) is the ability of Information Systems in accordance with the tasks that must be performed by the user, which is the main factor in explaining the level of performance of a job [16]. Perceived ease of use and perceived usefulness, can be the basis for forming perceptions about truly utilizing technology. In addition, empirical results have shown that perceptions of Perceived ease of use and perceived usefulness are influenced by Task

Technology Fit, i.e. users consider tools easier to use and useful for completing tasks. Technology features are expected to influence the effectiveness of online learning [15]. When users actively choose to use E-learning, the Fit Task Technology influences their perception of ease of use. Therefore, we conclude that The Task-Technology Fit has statistically direct effect on Perceived Ease of Use (H7).

#### F. Social Influence on Behavioral Intention

Social influence is the extent to which one views that important people believe that he must use a new system. Social influence is considered an important determinant of behavior. This social influence can shape user behavior [17].

Potential users can decide to use technology if people who are important to them say that they must use it [12]. Social influence, has a direct effect on employee intention to use the e-learning system [18]. SI significantly affects (BI) e-learning behavioral intentions. SI has a significant effect on BI in using collaborative technology [19].

Attitude to usage is the most important thing for students to use collaborative technology [19].

Behavior Intention is a prediction of determined behavioral intentions when the person has the intention of yes or no to use [12]. When attitudes toward the use of the system are strong, attitudes can fully mediate the effect of beliefs in behavioral intentions. the power of attitude (Attitude) on the use of the system can moderate the effect of attitude on behavioral intention (BI). The positive relationship between behavioral attitudes and intentions tends to be much greater when the attitude is strong [20]. Therefore, we conclude that Social Influence has statistically direct effect on Behavioral Intention (H8).

#### G. Facilitating Condition on Behavioral Intention

Facilitating condition (FC) is defined as the degree to which individuals believe that organizational and technical infrastructure can support the use of the system [14].

FC Facilitating Conditions such as organizational arrangements, system quality, and user independence has an important role in predicting the actual use (AU) of system

users [21]. In e-learning systems, FC significantly influences (BI) [12]. FC is a significant determinant of user behavior intention (BI) [22]. Therefore, we conclude that Facilitating Conditions has statistically direct effect on Behavioral Intention (H9).

### III. PROPOSED MODEL AND HYPOTHESIS

The purpose of this study was to examine the relationship between personal perceptions of users of e-learning systems on campus and the system beliefs provided by TTF model and the intention of daily routine use of students through the technology acceptance model (TAM). TAM employs variables: Perceive ease of use (PEOU), perceive usefulness (POU), attitude (ATT), behavior intention (BI), actual use (AU). The new variables, namely Facilitating Condition (FC) and Social Influence (SI), Task Technology Fit (TTF), Voluntariness (VOL) were added into research models to explore and investigate user perceptions of web-based e-learning systems and also to analyze quality features that affect user intention and satisfaction with the use of e-learning. The proposed model is shown in Figure 1.

### IV. METHODOLOGY

This study uses a sampling method, with respondents from college students who have been used web-based e-learning in Semarang-Indonesia. The 230 questionnaires were collected in one month and came from 5 universities in Semarang. E-learning uses the same platform that is web-based e-learning that is being used on campus. Students who are allowed to fill out this form are students who have used e-learning for at least 1 year.

The questionnaires were analyzed using correlation and causal effect analyses to examine the hypotheses of the research model. Prior to correlation analysis, the validity and reliability tests were employed to examine the questionnaires. The correlation analysis was done by Pearson Correlation method and causal effect analysis was done by AMOS-software.

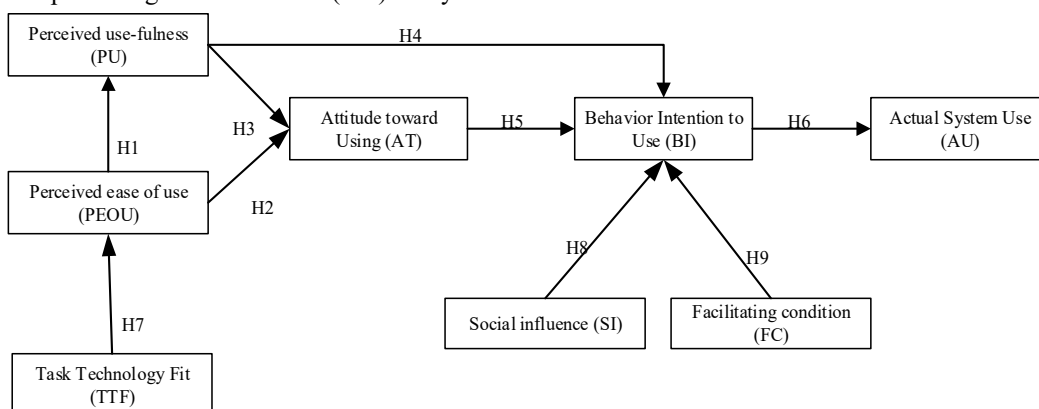


Figure 1. Proposed Theoretical Model.

## V. FINDINGS AND DISCUSSION

### A. Demographic of Respondent

From an analysis of 230 respondents, the use of e-learning by respondents based on their age range, gender is presented in table I and the time of use of e-learning is presented in Table II.

As shown in Table II, students who use e-learning technology are divided into two parts, namely 159 men and 71 women. The age group divided into two parts, namely the 17-20 and 21-24 age groups. In the age group 17-20 there were 67 male students and 28 female students, while in the 21-24 age group there were 92 male and 43 female students.

TABLE I. AGE AND GENDER OF E-LEARNING USED BY RESPONDENTS

Age	Number of Male	Number of Female	total
17-20	67	28	95
21-24	92	43	135
total	159	71	230

Table II presents the time students use e-learning campus. Most of students (203 students) usually use e-learning within 1-3 hours each day. 27 students use e-learning more than 3 hours.

TABLE II. USE OF CAMPUS E-LEARNING

Hour per day	Freq.
1-3	203
>3	27

Table III shows that the use of e-learning mostly in everywhere. This indicates that internet access and e-learning access are utilized easily.

TABLE III. LOCATION AND TECHNOLOGY USED BY RESPONDENTS

Location	Number of Users
Home	14
Campus	52
Any where	164

### B. Construct Validity and Reliability Analysis of Questionnaires

The result of validity test using Component Factor Analysis and Reliability analysis using Cronbach's Alpha Coefficient is shown on Table V.

The reliability of the Analysis of Questionnaires table shows that the values of the PU, PEOU, FC, SI, TTF, ATT, and BI variables in Cronbach's Alpha are good by having an internal consistency good. FC variable has the lowest value with questionable internal consistency, and the actual use

variable has excellent internal consistency shown on Table V.

TABLE IV. CONSTRUCT VALIDITY ANALYSIS OF QUESTIONNAIRES

	BI-AU	FC-TTF-Alt	SI	PEU	PU
BI1	.572	.337	.198	.248	.344
BI2	.534	.381	-.129	.433	.204
BI3	.714	.248	.206	.273	.104
AU1	.782	.087	.316	.007	.227
AU2	.739	.091	.333	.228	.194
AU3	.853	.120	.220	.144	.182
FC2	.079	.534	.014	.431	.197
FC3	.174	.630	.036	.162	.206
TTF1	.238	.414	.605	.181	.177
TTF2	.149	.556	.489	.239	.171
TTF3	.101	.628	.479	.163	.202
Att1	.158	.643	.230	.336	.261
Att2	.240	.575	.370	.183	.347
Att3	.469	.540	.284	.175	.230
SI1	.278	.079	.704	.195	.188
SI2	.266	.058	.758	.175	.216
PEU1	.163	.176	.093	.752	.288
PEU2	.090	.115	.278	.793	.181
PEU3	.195	.218	.353	.724	.152
PEU4	.205	.405	.480	.421	.200
PU1	.233	.209	-.022	.393	.632
PU2	.212	.224	.061	.155	.798
PU3	.088	.190	.328	.150	.710
PU4	.119	.068	.431	.184	.693

TABLE V. RELIABILITY ANALYSIS OF QUESTIONNAIRES

Variable	Cronbach's Alpha	internal consistency
PU	.822	good
PEOU	.851	good
FC	.611	questionable
SI	.863	good
TTF	.861	good
ATT	.831	good
BI	.820	good
AU	.912	excellent

### C. Voluntariness Differences

Voluntariness difference among eLearning users is present on Table VI. The Tables reveal that all variables have mean difference between voluntariness and mandatory except for Age. Users with voluntary manner are different with users with mandatory manner. The negative of mean difference of mandatory and voluntariness means that users with mandatory manner hold less perceive of use, less easy in using eLearning, less getting help from another, less impressionable by friends or lecturer, their technology less support, less attitude with eLearning, and hold less intention than users with voluntariness manner.

TABLE VI. MEAN DIFFERENCES BETWEEN MANDATORY AND VOLUNTARINESS

	Levene's Test for Equality of Variances		t-test for Equality of Means		
	F	Sig.	t	Sig. (2-tailed)	Mean Difference
Age	2.102	.148	-6.57	.512	-.2686
Experience	7.227	.008	-4.141	.000	-.7371
Hour per Day	31.439	.000	-4.336	.000	-.3975
Perceived of Use	.199	.656	-7.584	.000	-.67495
Perceived Ease of Use	4.972	.027	-8.995	.000	-.73810
Facilitating Condition	1.568	.212	-7.457	.000	-.62629
Social Influence	5.192	.024	-6.730	.000	-.69772
Task Technology Fit	.045	.833	-8.263	.000	-.78537
Attitude	4.281	.040	10.000	.000	-.81781
Behavior Intention	1.678	.197	-8.699	.000	-.78054
Actual Use	2.160	.143	-6.553	.000	-.76881

D. Correlation Analysis

Perceived Ease of Use has a statistically significant correlation to Perceived Usefulness with a correlation number of .692 \*\*. Perceived Ease of Use has a statistically significant correlation to Attitude with a correlation number of .625 \*\*. Perceived Usefulness has a statistically significant correlation to Attitude with a correlation number of .621 \*\*. Perceived Usefulness has a statistically significant correlation to Behavioral Intention with a correlation number of .669 \*\*. Attitude has a statistically significant correlation to Behavioral Intention with a correlation number of .689 \*\*. Behavioral Intention has a

statistically significant correlation to Actual Use with a correlation number of .753 \*\*. The Task-Technology Fit has a statistically significant correlation to Perceived Ease of Use with a correlation number of .634 \*\*. Social Influence has a statistically significant correlation to Behavioral Intention with a correlation number of .693 \*\*. Facilitating Conditions has a statistically significant correlation to Behavioral Intention with a correlation number of .615 \*\*. It can be concluded that all of the latent variables employed on the model are correlate to each other. The based on statistical correlation analysis that all variables affect the expected variable. The additional result is the behavioral variable, Experience, which is correlating to all of the latent variables.

VI. CAUSAL EFFECT ANALYSIS

The result of Causal Effect analysis is present on Figure 2. From Figure 2, Perceived Ease of Use (PEOU) has statistically significant direct effect on attitude with a value of .758 \*\*\*/.735 (L). PEOU has statistically significant direct effect on Perceived Usefulness with a value of .894 \*\*\*/.770(L). Furthermore, Perceived Usefulness (PU) has not statistically significant direct effect on Attitude with a value of .182 (NS)/.204 (M) and PU has not statistically significant direct effect on Behavior Intention to Use (BI) where the value of PU is .100(NS)/.088(S).

The Attitude towards Using (ATT) has statistically significant direct effect on Behavior Intention to Use (BI), where the ATT value is .806 \*\*\*/.634 (L). Other result present that Behavior Intention to Use (BI) has statistically significant direct effect on Actual Use (AU) where the BI value is 1.047 \*\*\*/.797 (L).

Furthermore, The Task Technology Fit (TTF) has statistically significant direct effect on Perceived Ease of Use (PEOU) where the TTF value is .689 \*\*\*/.879 (L). Social Influence (SI) has also statistically significant direct effect on Behavior Intention to Use (BI) where the SI value is .184 (NS)/.202 (M). The last, Facilitating Conditions (FC) has statistically significant direct effect on Behavior Intention to Use (BI) where the SI value is .023 (NS)/.017 (S).

TABLE VII. CORRELATION ANALYSIS OF VARIABLES

correlation	A	G	E	H/D	RPU	REU	RFC	RSI	RTTF	RATT	RBI	RAU
A	1	-.076	.031	-.040	-.015	-.021	.018	.049	-.004	-.035	.049	.009
G	-.076	1	.026	.120*	-.037	-.015	.012	-.003	-.104	-.084	-.103	-.038
E	.031	.026	1	.268**	.229**	.290**	.340**	.224**	.300**	.252**	.292**	.286**
H/D	-.040	.120*	.268**	1	.258**	.226**	.254**	.219**	.245**	.254**	.277**	.332**
RPU	-.015	-.037	.229**	.258**	1	.692**	.582**	.638**	.601**	.621**	.669**	.563**
REU	-.021	-.015	.290**	.226**	.692**	1	.682**	.667**	.634**	.625**	.675**	.598**
RFC	.018	.012	.340**	.254**	.582**	.682**	1	.555**	.575**	.599**	.615**	.568**
RSI	.049	-.003	.224**	.219**	.638**	.667**	.555**	1	.599**	.593**	.693**	.630**
RTTF	-.004	-.104	.300**	.245**	.601**	.634**	.575**	.599**	1	.634**	.670**	.635**
RATT	-.035	-.084	.252**	.254**	.621**	.625**	.599**	.593**	.634**	1	.689**	.522**
RBI	.049	-.103	.292**	.277**	.669**	.675**	.615**	.693**	.670**	.689**	1	.753**
RAU	.009	-.038	.286**	.332**	.563**	.598**	.568**	.630**	.635**	.522**	.753**	1

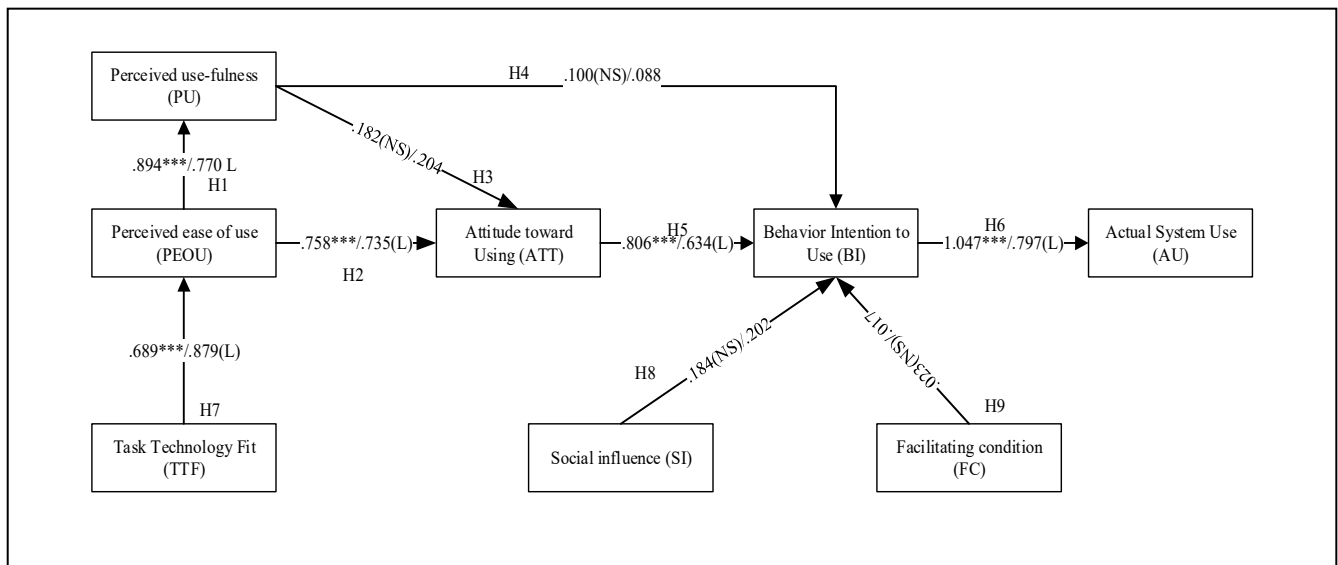


Figure 2. The Causal Effect Analysis of the Model.

## VII. CONCLUSION

The finding of the study can be concluded from Correlation and Causal Effect Analysis. The analysis of Correlation was derived by Pearson Correlation analysis and Causal Effect analysis on proposed model was done by SEM analysis and the result presents on Figure 2 The Finding from the two analysis presents statistically significant correlation and significant direct effect among variables Task Technology Fit to Perceive Ease of Use, Perceive Ease of Use to both Perceive Usefulness and Attitude, Attitude to Behavioral Intention, and Behavioral Intention to Use Behavior. Therefore the hypotheses H1, H2, H5, H6, H7 were full support.

The variable Perceive Usefulness has statistically correlation to Attitude, but PU has not statistically significant direct effect to Attitude. Therefore, H3 is partially support. Other finding on the analysis reveals that the variables Perceive Usefulness has statistically correlation to Behavior Intention to Use, but PU has not statistically significant direct effect to Behavior Intention to Use. Therefore, H4 is partially support. Furthermore, Social Influence (SI) has statistically correlation to Behavior Intention to Use, but SI has not statistically significant direct effect to BI. Therefore, H8 is partially support. The last, the variables Facilitating Condition (FC) has statistically correlation to Behavior Intention to Use (BI), but FC has not statistically significant direct effect to BI. Therefore, H9 is partially support.

The sample of study is limited to 230 students from private universities. A large of population with a more number of universities is better to fulfill a good requirement of statistically analysis and it can be expected to get a better analysis.

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