CHAPTER 4 : RESEARCH RESULT

4.0 INTRODUCTION

This chapter will present the research result based on the analysis performed on the data. Some demographic information is presented, following a data cleaning process and identification of outliers. Normality test, correlation and regression are also performed and the results presented in this chapter.

4.1 SUMMARY STATISTICS

One-hundred and twenty (120) data, ninety-four (94) were collected from online survey, eighteen (18) were from hardcopy of questionnaire, eight (8) were from softcopy sent through email. Thirteen (13) data did not contain responses on the constructs, thus, these data are being taken out and not being considered for analysis. The missing responses may probably be due to online system error or network unavailability making the data unable to be captured and collected.

The assumptions made were :

- The respondents understand the Cloud Computing definition as a brief description is made available in the front page of the questionnaire.
- that the respondents did not fill up the questionnaire more than once.

Data cleaning is performed on the data where data containing only demographic information is taken out from the analysis :

i. Data No 4, 8, 14, 15, 21, 22, 25, 46, 52, 54, 73, 78, 81 only contains demographic information but not responses on the variables, thus, the data is purged and eliminated from being analysed.

ii. Data No 76 is kept although the demographic information is missing because the rest is good for analysis, except for the missing demographics.

4.2 ANALYSES OF MEASURES

4.2.1 Descriptive Analysis

The descriptive analysis is based on cleaned data, i.e. minus the eliminated data which are not going to be analysed further on the correlation and regression.

4.2.2 Gender

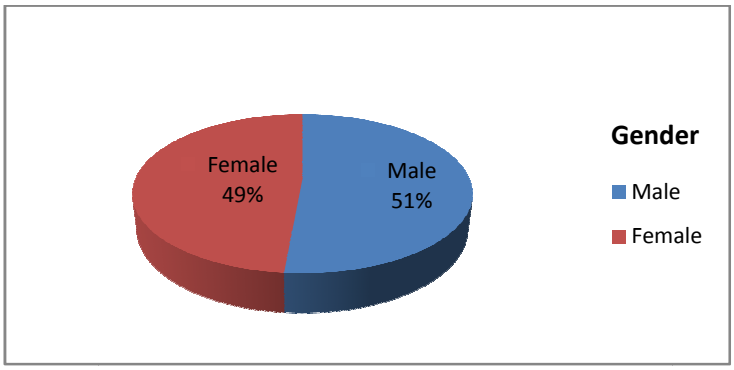

Figure 4.2-1 : Respondents Gender

From the data collected, the distribution of the gender is almost fairly distributed, whereby the respondents are 51% Male and 49% Female.

4.2.3 Ethnicity

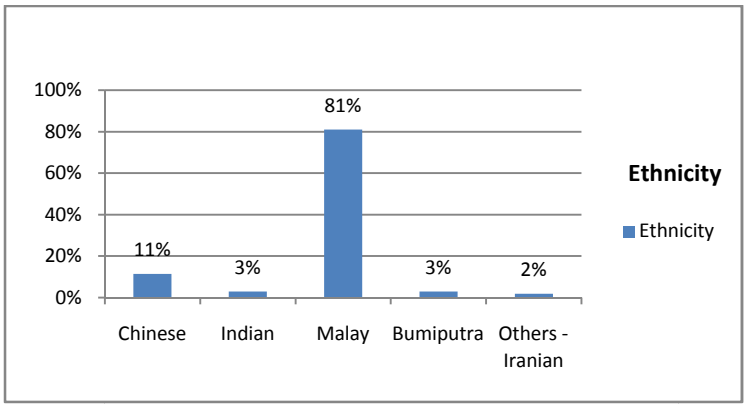

Figure 4.2-2 Respondents Ethnicity

The bar graph has shown that the respondents' ethnicity is not fairly distributed. From the respondents, the ethnic Malay is the highest, whom contributed 81% to this questionnaire, followed by Chinese, contributed an 11%, Indian and Bumiputra, each contributed 3% and other Ethnic, which is Iranian contributed a 2%.

4.2.4 Age

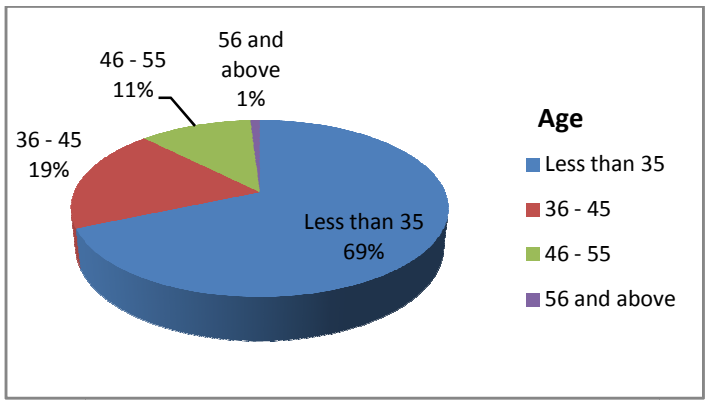

Figure 4.2-3 Respondents Age

The age of the respondents varies, but most respondents are from the age less than 35, which is 69%, 19% is from age band 36 to 45, 11% is from the age band 46 to 55 and 1% is 56 year old and above.

4.2.5 Level of Education

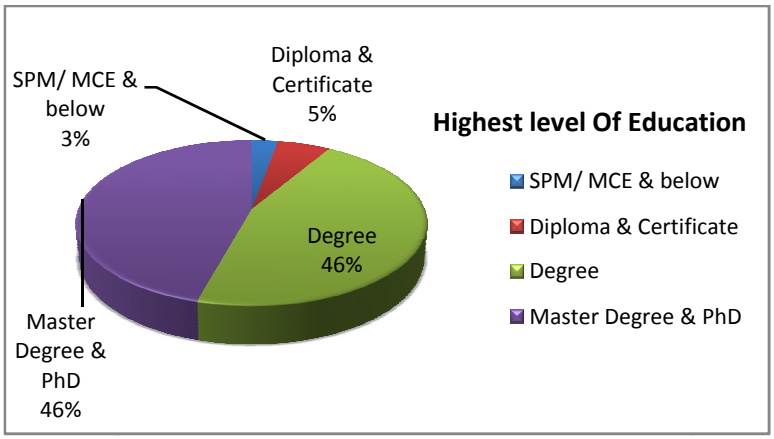

Figure 4.2-4 Level of Education

The respondents' Level of Education, ranges from having a Master Degree and PhD to SPM/ MCE and below holders. The biggest contributor is from the Degree and Master degree and PhD holders, each group is 46%, followed by the Diploma and Certificate holder, 5% and the SPM/ MCE holder, which contributed a 3%.

4.2.6 Occupation

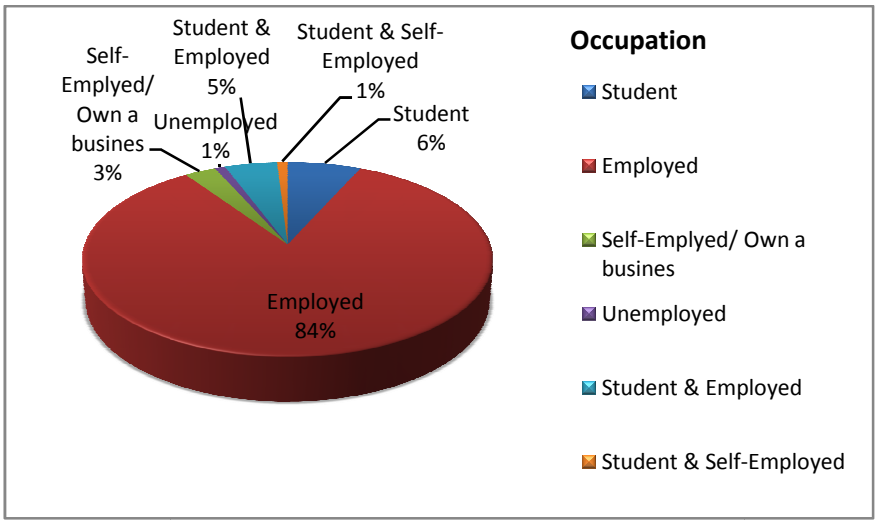

Figure 4.2-5 Occupation

4.2.7 Job Type

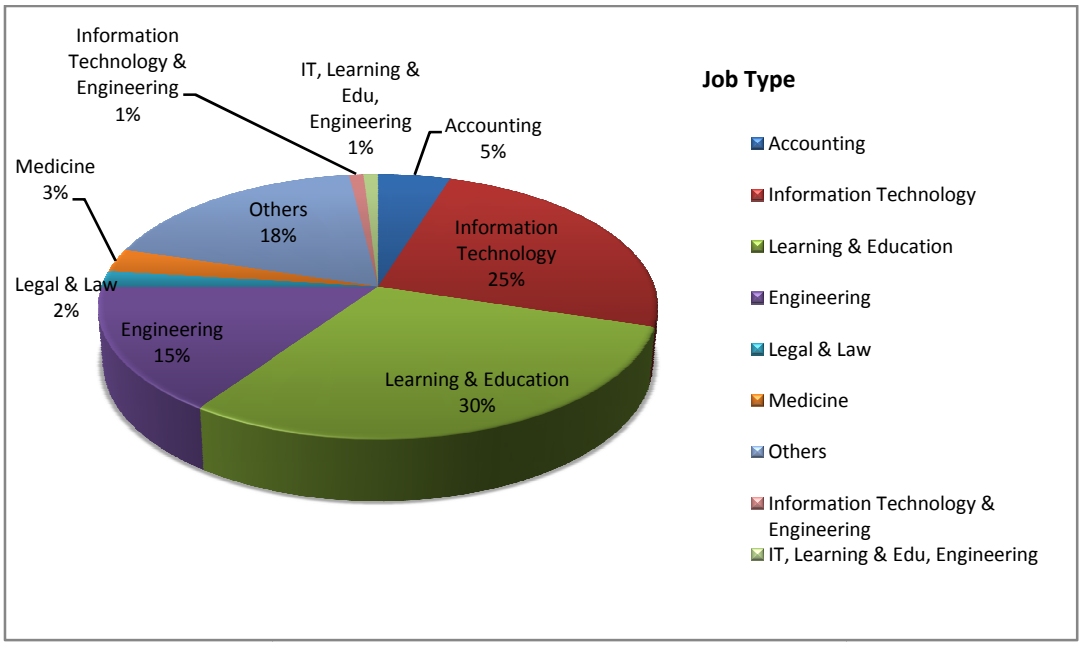

Figure 4.2-6 Job Type

4.2.8 Other Job

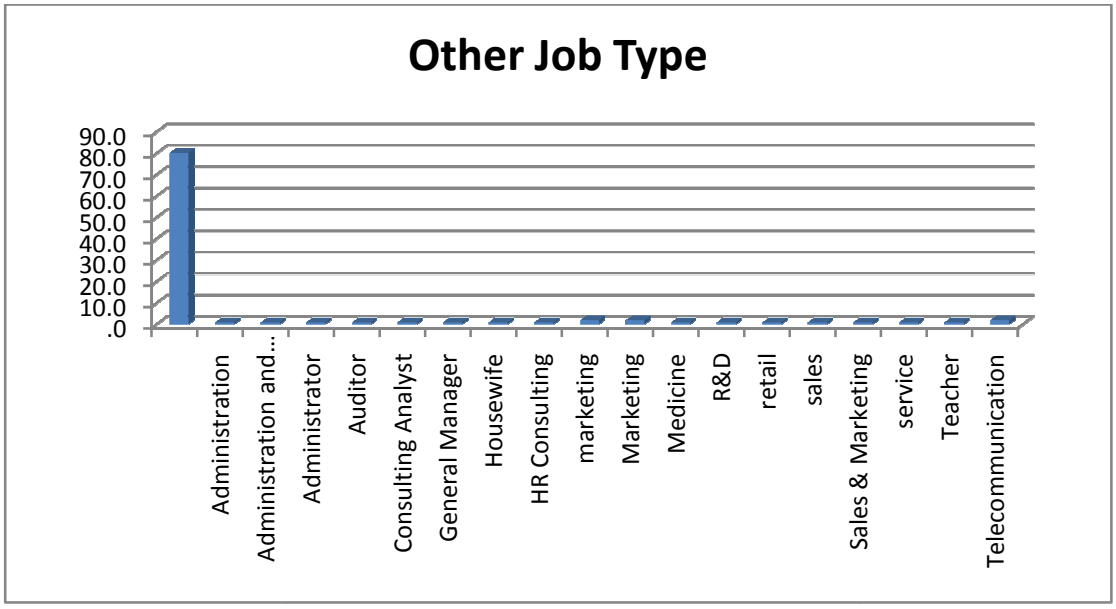

Figure 4.2-7 Other Job Types

4.3 TESTING OF THE HYPOTHESIS

Using SPSS 17, the following analyses were conducted in relation to the research questions: descriptive statistics, reliability analysis, factor analysis, single and multiple regression analysis.

Testing of hypotheses first started with testing for normality of data, i.e. the independent variables (Perceived usefulness, Perceived Ease of Use, Compatibility, Trialability, Cloud Trust) and the dependent variable (Intention To Use).

4.3.1 Reliability Test

Reliability Tests are performed to examine the internal consistency of the variable. It is to test if the questions used are the right tool to measure the variable. Cronbach's alpha reliability analysis was conducted between the questions within the construct for the variables :

i. Perceived Usefulness (PU)

ii. Perceived Ease of Use (PEOU)

iii. Compatibility (CP)

iv. Trialability (TR)

v. Cloud Trust (CT)

vi. Intention To Use (ITU) – dependent variable

In Table X below, items associated with Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Compatibility (CP), Trialability (TR), Intention To Use (ITU), are proven a reliable tool to measure the particular variable with values ranging from 0.795 to 0.906.

Except for the Cloud Trust, where the Cronbach's Alpha's value is **0.370**, way below and accepted level of Cronbach's Alpha's value to be a reliable tool.

Table 4.3-1

Reliability Test Result

Factors	Cronbach's Alpha	No of Items
Perceived Usefulness (PU)	0.904	3
Perceived Ease Of Use (PEOU)	0.867	3
Trialability (TR)	0.795	2
Compatibility (CP)	0.906	3
Cloud Trust (CT)	**0.370**	3
Intention To Use (ITU)	0.798	3

Further to the reliability test, Mean and Standard Deviation is derived and the table below provide the reference to the result :

Table 4.3-2 :

Mean and Standard Deviation Table

Table 4-2 : Summary of Factors, n = 106				
Factors	M	SD	Min	Max
Perceived Usefulness (PU)	3.88	.764	1.67	5.00
Perceived Ease Of Use (PEOU)	3.82	.726	2.00	5.00
Trialability (TR)	4.07	.743	2.00	5.00
Compatibility (CP)	3.70	.798	1.00	5.00
Cloud Trust (CT)	3.48	.707	1.00	5.00
Intention To Use (ITU)	3.81	.760	1.67	5.00

The Reliability Test for the particular variable Cloud Trust is shared below :

Table 4.3-3

Cloud Trust Cronbach's Alpha

Cronbach's Alpha	N of Items
.370	3

The Cronbach's Alpha is 0.370, i.e. very low and is not consistent with the required Cronbach's Alpha, i.e. is between 0.7 to 0.8, or above 0.8 (Kline, 1999).

Table 4.3-4

Itemised Cloud Trust Cronbach's Alpha

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
CT1	6.87	2.173	.386	-.087[a]
CT2	7.01	1.914	.333	-.006[a]
CT3	7.03	3.799	-.029	.637

a. The value is negative due to a negative average covariance among items. This violates reliability model assumptions. You may want to check item codings.

Legend :

CT1 : I feel worried about the security in Cloud Services

CT2 : It scares me to think that I could lose a lot of data by using Cloud Services

CT3 : I have trust in Cloud Services

4.3.1.1 Dropping of a Variable : Cloud Trust

Cronbach's Alpha's value for Cloud Trust if item is deleted (deleted question labelled CT3) shows gradual improvement of the Cronbach's Alpha's value to 0.637. The negative Cronbach's Alpha if item CT1 and CT2 is deleted is due to the reversed-sentenced used in the questionnaire. The Cronbach's Alpha's value of 0.637 is still a relatively low value. The acceptable Cronbach's Alpha is between 0.7 to 0.8, or above 0.8 in accordance to Kline (1999).

The scores, though have been reversed back for the purpose of preventing a cancellation out of variables with positive and negative loadings. Reverse scoring is the process by which the data values for a variable are reversed so that its correlations with other variables are reversed.

Nonetheless, the Cronbach's Alpha value is still unconvincing after the elimination of one (1) question (CT3), that the construct used are unreliable in measuring the Cloud Trust.

4.3.1.1.1 The Possible Cause of the Negative Cronbach's Alpha Value

The low Chronbach's Alpha value or the low reliability of this construct is possibly due to the usage of the two (2) reverse-sentenced items (CT1 and CT2) in the questionnaire which may resulted in a response bias during responding to it, when other items are positively sentenced. Response bias is a type of cognitive bias which could affect the result of a statistical survey if respondents answer questions in the way they think the questioner wants them to answer rather than according to their true beliefs.

In addition, the variable Cloud Trust is taken based on previous studies of Udoh, E.. (2010) adopting Hebron (2008)'s study on The adoption of grid computing technology by organizations : A quantitative study using technology acceptance model and not from an academic theory.

However, although the questions are taken from a previous study (Udoh, E, 2010), but not all the questions on Cloud Trust construct is considered in this study, thus, the

possibility that Cloud Trust could not be measured what it suppose to measure. This is totally my (the researcher's) mistake and the researcher is now well aware of the mistake.

Although tests were further tested (with Cloud Trust variable in), for correlation and regression and showed a relationship, but since the variable Cloud Trust did not pass the reliability test in the first place, the variable is decided to be totally dropped from further analysis. Due to this reason, the variable Cloud Trust is proposed to be dropped from further analysis of regression and correlation to avoid more statistical issues and to proceed with only the variables taken from academic theories.

4.4 VALIDITY TESTS

Validity Test is skipped due to the reasons that the questionnaires used were from the valid tools from the theories and has been used many times by the previous studies.

4.5 CHECKING FOR OUTLIERS

Outliers were first checked visually by using the Box-plot graphs and logical inference by looking back at the submitted questionnaires.

These potential outliers from each question were further compared to the average mean of the questions (variable) data is further checked against the submitted questionnaire. The potential outliers shown in the average mean is further checked against the submitted questionnaire. However, only data ID no. 28, 50,105, 106, 107, 108, 109, 110 (Data number : 21, 42, 92, 93, 94, 95, 96, 97 respectively). The others were collected from the online survey system.

Findings showed that there was no confirmed typo error, thus, it is the researcher's decision not to eliminate the response data shown with extreme or potential outlier response (Refer Appendix 3b). This is due to the reason that the respondents may have represented his true response, although looks extreme in one part. Thus, there is no elimination for there is no reasoning to eliminate those from. **Thus, further analysis is done without eliminating any potential outliers.**

4.5.1 Perceived Usefulness

Table 4.5-1

PU Potential Outliers

Question	**Potential Outliers**	**Extreme Case**
PU1	**26**, 23, 52	nil
PU2	72	nil
PU3	**26**,52	nil
PU (Mean)	2, 14, 38, 39, 52	12, 15, 72

The table above is self-explanatory in terms of the data that shows potential outliers and being examined.

4.5.2 Perceived Ease of Use

Table 4.5-2

PEU Potential Outliers

Variable	**Potential Outliers**	**Extreme Case**
PEU1	36	nil
PEU2	nil	nil
PEU3	nil	nil
PEU (Mean)	36, 12,15, **26**, 52, 72	nil

4.5.3 Trialability

Table 4.5-3

TR Potential Outliers

Variable	Potential Outliers	Extreme Case
TR1	**26**, 12,34	nil
TR2	**26**	nil
PEU (Mean)	**26**	nil

4.5.4 Compatibility

Table 4.5-4

CP Potential Outliers

Variable	Potential Outliers	Extreme Case
CP1	**42**	nil
CP2	**42**	nil
CP3	**42**	nil
CP (Mean)	**42**	nil

4.5.5 Cloud Trust

Table 4.5-5

CT Potential Outliers

Variable	Potential Outliers	Extreme Case
CT1	18, 93	nil
CT2	18, 40, 43, 48	nil
CT3	38, **42**, 90, 105	nil
CT (Mean)	**42**	nil

4.5.6 Intention To Use

Table 4.5-6

ITU Potential Outliers

Variable	Potential Outliers	Extreme Case
ITU1	**26**, 52, 15, 72	nil
ITU2	7, **26**	nil
ITU3	nil	
ITU (Mean)	**26**	nil

4.6 NORMALITY TEST

Normality Tests were done based on :

i. Visual tests using histogram and P-P Plot graphs

ii. Statistical tests

   a. Skewness & Kurtosis

   b. Kolmogorov-Smirnov (K-S) test

Normality tests were first performed based on graphical (histogram) followed by statistical tests (Skewness and Kurtosis). Based on the histograms (Refer **Appendix 3a**) the distributions are visually normal. To further confirm, the P-P Plot graphs were plotted (Refer **Appendix 3a**). With both graphical tests, it is confirmed that the data is normal. Thus, the tests for normal distribution assumptions were proposed to be conducted and opted for.

In the Statistical Tests (Table 4.5.-1 and 4.5.-2), shows that the data is a little bit skewed. The value of Skewness and Kurtosis shows that the skewness is a little bit

negative, and that it is skewed to the right. Nevertheless, despite the skewness shown, the tests for normal data distribution were resumed.

Table 4.6-1

Statistical Test : Skewness and and Kurtosis

		PU	PEU	TR	CP	CT	ITU
N	Valid	106	106	106	106	106	106
	Missing	0	0	0	0	0	0
Skewness		-.738	-.329	-.621	-.469	-.126	-.406
Std. Error of Skewness		.235	.235	.235	.235	.235	.235
Kurtosis		.678	.076	-.099	.385	.806	.068
Std. Error of Kurtosis		.465	.465	.465	.465	.465	.465

Table 4.6-2

K-M and Shapiro-Wilk tests for Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
PU	.215	106	.000	.915	106	.000
PEU	.165	106	.000	.938	106	.000
TR	.200	106	.000	.906	106	.000
CP	.155	106	.000	.949	106	.000
CT	.124	106	.000	.962	106	.004
ITU	.100	106	.011	.954	106	.001

a. Lilliefors Significance Correction

Based on the significance (Sig.) of <0.05 for both Kolmogorov-Smirnov and Shapiro-Wilk tests, the values tell us that there is significant difference from normal distribution. However, based on the book reference by Andy Field, Discovering Statistics Using SPSS, Third Edition (2009) these tests have limitations in a large

sample sizes (pg. 144) because with large sample sizes it is very easy to get significant results from a small deviations from normality, and thus, the result from these tests is not considered due to the assumption that the sample size is large i.e. 106 (40% from the target sample size of 300).

4.7 FACTOR ANALYSIS

4.7.1 Factor Loading

No factor loading is performed due to the reason that the variables are valid variable taken from solid theories of technology adoption, ie. TAM and IDT previously.

4.7.2 Correlation

Correlation tests were first done visually by using Scatter-plot Graphs (**Refer Appendix 3b)**. The graphs confirmed that there are relationships between the variables and **that all relationships are positively correlated**.

Based on the value, r (Pearson Correlation co-efficient) above, it could be concluded that there are positive relationship between the independent variable and the dependent variable.

Table 4.7-1

Pearson Correlation Coefficient

Pearson Correlation, r	PU	PEU	TR	CP	ITU
PU	1	.853**	.408**	.806**	.757**
PEU	-	1	.546**	.765**	.816**
TR	-	-	1	.526**	.669**
CP	-	-	-	1	.742**
ITU	-	-	-	-	1

**. Correlation is significant at the 0.01 level (1-tailed).

PU : Perceived Usefulness

PEU : Perceived ease of use

TR : Trialability

CP : Compatibility

ITU : Intention To Use

4.8 REGRESSION ANALYSIS

The Regression analysis is done to predict one variable from another, i.e. how a variable affect the dependent variable individually (simple regression) as well as the whole independent variables affect the dependent variable (multiple regression).

In double testing the variables, all variables (predictors) were first underwent the Stepwise – backward method to test if any of the variables meets the removal criteria which is set at 5% of Entry F probability value and removal threshold of F probability value of 10%.

The first test showed that Cloud Trust VIF is between 1 and 10 but the Minimum Tolerance for Cloud Trust is below 0.2 indicating a potential problem of collinearity. Thus, the justification to exclude Cloud Trust to be part of the variable in this study is better justified.

The variable (predictor) Compatibility has VIF of 3 (above 1 and below 10) but the Minimum Tolerance of more than 0.2, indicating that there is no collinearity within the data.

The regression using Hierarchical (Blockwise Entry) is further used and predictors are selected based on past studies, in this case, the TAM and IDT theories. Just to reconfirm, the Cloud Trust is put in the 3rd block.

4.9 SUMMARY OF RESEARCH RESULT

To address the research questions about the influence of technology acceptance factors on Cloud Computing, **multiple regression** analysis was conducted. It dealt with the relationships between the complex variables pre predictors in the Adoption of Cloud Computing process. The summary of the values are indicated in the table 4.9.1.

To address this research questions, the independent factors that were included in the model, were the four (4) variables on intention to adopt Cloud Computing technology:

i. Perceived Usefulness (PU)

ii. Perceived Ease of Use (PEU)

iii. Compatibility

iv. Trialability

The Intention To Use is the dependent variable. The results of this analysis is presented in Table 4.9-1 **:** Regression Analysis Result Summary. The theoretical bases in this study are the TAM (Davis., 1989), (IDT) (Rogers, 1983;1995) and Hebron (2008).

Table 4.9-1

Regression Analysis Result Summary

Usage	*R*	R^2	ΔR^2	*B*	*SE B*	β
Step 1	0.82	0.67	0.67			
Constant				0.55	0.23	
Perceived Ease of Use				0.85	0.06	0.82*
Step 2	0.82	0.68	0.67			
Constant				0.45	0.23	
Perceived Ease of Use				0.66	0.11	0.63*
Perceived Usefulness				0.22	0.11	0.22*
Step 3	0.87	0.76	0.76			
Constant				-0.24	0.24	
Perceived Ease of Use				0.38	0.11	0.36*
Perceived Usefulness				0.22	0.11	0.22*
Trialability				0.33	0.06	0.32*
Compatibility				0.11	0.08	0.12*

Note : R^2 = 0.67 for Step 1, ΔR^2 = 0.67 for Step 2, ΔR^2 = 0.76 for Step 3 ($p < .001$). *$p < .001$.

Regression analysis was performed to test the relationships between the variables and Technology Acceptance, in this case, the Cloud Computing. Referring to the Step 3 in Regression Analysis Result Summary. The linear regression analysis of the model Regression Analysis Result Summary reveals that the R-square (R^2) of the model is 0.76. This means the model explains **76% of the variance in the dependent variabl**e, actual use of the system. The model is statistically significant as the p-value for the model is 0.000.

4.10 RESEARCH QUESTIONS DISCUSSIONS

In view of the Research Question 1: Does perceived usefulness have a positive effect to the user's behavioral intent to adopt cloud computing? And its associated hypotheses :

$H1_0$: Perceived usefulness will have a negative effect to adoption of cloud computing.

$H1_A$: Perceived usefulness will have a positive effect to adoption of cloud computing.

Perceived usefulness (PU) is defined as the degree to which an individual believes that using the system will enhance his job performance (Davis, 1989). The **regression coefficient (β) for perceived usefulness is 0.22 (p= 0.000, p<=0.05)**. The regression result indicated that the null hypothesis can be rejected. Therefore, the alternative hypothesis stands. Perceived usefulness is positively influencing the adoption of Cloud Computing, that is, the more perceived usefulness to the potential user, the more likely it is that he/she have intention to adopt the system. This study finds that there are relationships between perceived usefulness and adoption of Cloud Computing. **This result is similar to Davis et al. (1989), Igbaria et al., (1995) and Nelson and Jantan (2003) that perceived usefulness are positively related to intention to adopt the technology.**

Research Question 2 : Does Perceived Ease of Use have a positive effect to the user's behavioral intent to adopt cloud computing? And its hypotheses are :

H20 : Perceived ease of use of Cloud Computing will have a negative effect to adoption of Cloud Computing.

H2A : Perceived ease of use of Cloud Computing will have a positive effect to adoption of cloud computing.

Perceived Ease of Use suggests that the easier the user experiences using the system, the tendency for him to start using the system is positively influenced (intention to adopt). The regression coefficient **(β) is 0.36 (p= 0.000, p<=0.05),** therefore null hypothesis can be rejected.

Ease of Use is positively related to the Cloud Computing technology Acceptance. The result is consistent with Davis (1989), Igbaria et al. (1997) and Teo, (2001) that Perceived Ease of Use is a dominant factor in explaining intention to adopt a new technology, Cloud Computing.

Research Question 3 : Does Compatibility to the current tasks have a positive effect to the user's behavioral intent to adopt cloud computing? The related hypothesis are :

$H3_0$: Compatibility to the current task will have a negative effect to the user's behavioral intention to adopt cloud computing.

$H3_A$: Compatibility will have a positive effect to the user's behavioral intention to adopt cloud computing.

Compatibility is where the consumer identified how compatible the device was with his or her own lifestyle (e.g. work habits, etc.) (Hebron, 2008). It suggests that the more compatible the device (system) was with her or her own lifestyle, the tendency for him or her to adopt or start using the system is positively influenced. The regression coefficient (β) is 0.12 (p= 0.000, p<=0.05), therefore null hypothesis can be rejected.

Compatibility is again positively related to the Cloud Computing technology Acceptance and the result is consistent with Davis (1989), Igbaria et al. (1997) and Teo, (2001) that Compatibility is a dominant factor in explaining intention to adopt a new technology, Cloud Computing.

Research Question 4 : Does Trialability towards an innovation have any effect to the user's behavioral intent to adopt cloud computing?

The related hypotheses are:

$H4_0$: Trialability will have a negative effect to the user's behavioral intent to adopt cloud computing

$H4_A$: Trialability will have a positive effect to the user's behavioral intent to adopt cloud computing

Trialability can be the adopters' perception of the degree to which an innovation can be used on a trial basis before confirmation of the adoption must occur (Rogers, 1995; Lancaster & Taylor, 1986) and the ability to test the technology, or helped to encourage broader use; (Hebron, 2008). It suggests that the more trialability is available to the user, the tendency for him or her to adopt or start using the system is positively influenced. The regression coefficient (β) is 0.32 (p= 0.000, p<=0.05), therefore null hypothesis can be rejected.

Trialability is again positively related to the Cloud Computing technology Acceptance and the result is consistent with Davis (1989), Igbaria et al. (1997) and Teo, (2001) that Trialability is a dominant factor in explaining intention to adopt a new technology, Cloud Computing.

For Research Question 5, since the variable is not reliable, and has been dropped, the associated Research Question is not tested :

Research Question 5 : Does Cloud Trust (anxiety about security and privacy) towards an innovation have any effect to the user's behavioral intent to adopt cloud computing? The related hypotheses are :

$H5_0$: Cloud Trust (anxiety about security and privacy) will have a negative effect to the user's behavioral intention to adopt cloud computing.

$H5_A$: Cloud Trust (anxiety about security and privacy) will have a positive effect to the user's behavioral intention to adopt cloud computing.

Consequently, correlations of all variables with acceptance are displayed in Figure 4.10-1 below. In overall, all H1, H2, H3, H4 are supported. In ranking, these variables show that :

i. Perceived Ease of Use;

ii. Trialability;

iii. Perceived Usefulness; and

iv. Compatibility.

were found to be the most influential factors in determining intention to adopt Cloud Computing.

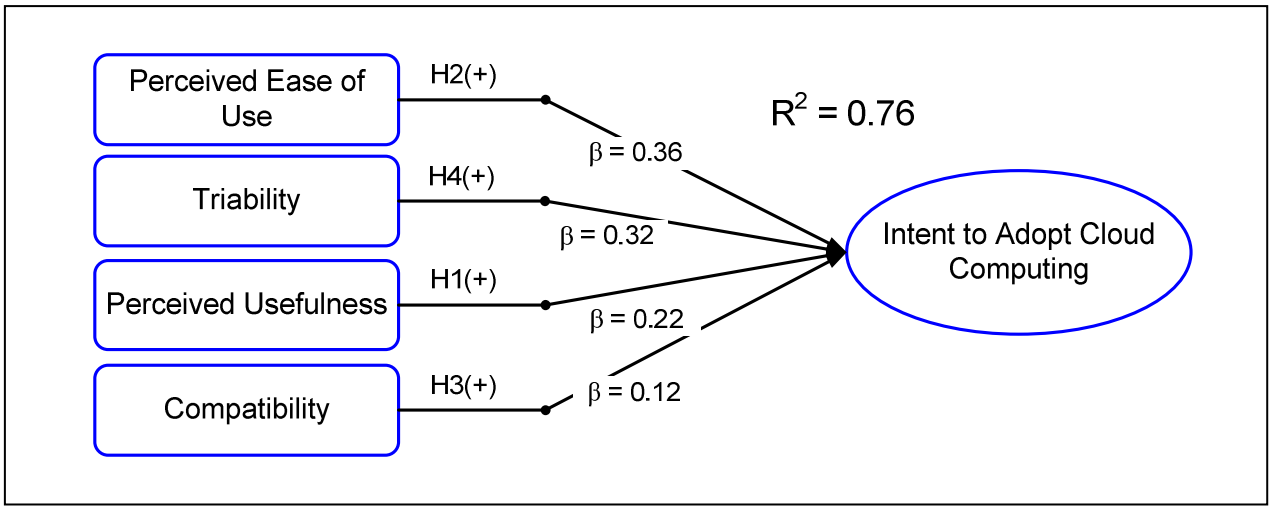

Figure 4.10-1 : Findings from the Hypotheses Testing via Multiple Regression Analysis

4.11 CHAPTER SUMMARY

This chapter presents the research result performed on the data. In this chapter, the data is shown on the normality tests performed and the reliability of the variable. In this chapter as well that one of the variable is shown dropped.

Other statistical tests such as correlation and regression are also performed on the data to test the relationship and if the analysis supports the theories and the previous studies. Surprisingly, this analysis is in supportive to the theories and the previous studies, except for the dropped variable, which couldn't be tested further.