

CHAPTER IV DATA ANALYSIS AND FINDINGS

4.1 Introduction

In this chapter the results of data analysis are presented and deliberated. In processing the data obtained, the SPSS Version 20 was the software employed. In this section the results of the study are assembled in line with the objectives presented in Chapter 1. The points for discussion in this chapter are accordingly arranged. In particular, the chapter starts with the description on the data screening and after that, goodness of measures will be analysed in order to have both the validity as well as the reliability of the variables ascertained. In the last part of this chapter, the results of the test related to the relationships are presented.

4.2 Data Screening

The obtained data were scrutinised via the use of descriptive and visual instrument. The purposes of conducting this are to identify the data patterns that are missing, to ensure compliance with statistical assumptions via outliers' identification, and to obtain the skewness and kurtosis values. However, all data obtained were good and also, there were no missing data.

4.2.1 Missing Data

Missing data occurs when there is no available information with regard to a case or a subject, with respect to other information that is available (Hair et al., 2006). The occurrence of missing data is often caused by a respondent's failure in providing answer to one or more questions in a survey. There are generally two categories of missing data namely, known missing data and unknown missing data. As the term implies, for known missing data, the researcher knows which data is missing.

This situation can occur due to by technical factors for instance, data entry error which causes void codes. Another situation of known missing data is when respondents failed to respond to all items in the questionnaire, and thus, some known data are missing (due to incompleteness). It should be noted that known missing data entails data that can be identified.

On the other hand, the determination and accommodation of the 'unknown missing data' is more challenging to the researcher. This is due to the fact that the majority of this type of data is directly linked to the respondent(s). As indicated by (Hair et al., 2006), the occurrence of the unknown missing data can stem from the respondent's unwillingness to respond to certain questions or, respondent indicating 'no opinion' as answer or respondent is ill equipped knowledge-wise to respond to the questions. However, each data obtained for this study was good and complete.

4.2.2 Normality Assessment and Outliers

The purpose of executing a normality test was to ascertain if there was (or not) normal distribution to the population data before conducting any extensive analysis. In determining the distribution of the data, there is abundance of statistical devices that can be employed by the researcher. However, for this study, the Skewness and Kurtosis test were employed to gauge the normality distribution of the data. Here, the value of Skewness signifies the total achievement's regularity while a skewed variable's will not be found at the middle of the distribution. Meanwhile, as indicated by (Tabachnick and Fidell 2007), Kurtosis illustrates the distribution's 'peakness', and regarded as either being too peaked or too flat.

Conclusively the data groups with a higher Kurtosis would have an obvious peak that sets closer to the mean, plummet in quite a rapid manner, and possess tails that are considered as heavy. On the other hand, as indicated by (Hair et al., 2006) data groups that have a low kurtosis would possess a summit of a flat, instead of sharp shape close to the mean. Further, the Skewness and Kurtosis value of 0 suggests a normal distribution. Additionally, the mass of scores for the positive Skewness value will concentrate on the left side at a low value (Tabachnick & Fidell, 2007). On the other hand, the mass of scores for negative Skewness will concentrate at the right hand with a long tail on the left (Tabachnick & Fidell, 2007). Then, if the value of Kurtosis is less than 0, then it means that the shape of the distribution is somewhat flat. Such distribution is termed as 'platykurtic.' On the other hand, if the values of Kurtosis are above 0, then it entails a peak distribution. Such distribution is termed as 'leptokurtic.' As has been suggested,

samples should be sufficiently large, and in particular, the number of samples should be no less than 200. This is to prevent the occurrence of variance underestimation. Somehow, attaining results with flawless normality assumptions a rare incident. Table 4.1 illustrates a sample of the results, elaborating on the items of service quality. Meanwhile, the rest of the results can be referred in Appendix B.

Table 4.1: Skewness and Kurtosis for Service Quality (SQ)

Service Quality	N	Skewness		Kurtosis	
		Statistic	Std. Errors	Statistic	Std. Errors
P1	381	-.400	.125	-.241	.249
P2	381	-.365	.125	-.169	.249
P3	381	-.397	.125	-.382	.249
P4	381	-.928	.125	.864	.249
P5	381	-1.041	.125	.957	.249
AC1	381	-.122	.125	-.702	.249
AC2	381	-.484	.125	-.458	.249
AC3	381	-.480	.125	-.152	.249
AC4	381	-.488	.125	.226	.249
ID1	381	.102	.125	-.369	.249
ID2	381	-.037	.125	-.098	.249
ID3	381	-.317	.125	.243	.249
ID4	381	-.794	.125	.770	.249
CQ1	381	-1.358	.125	2.048	.249
CQ2	381	-.726	.125	.030	.249
CQ3	381	-.172	.125	-.292	.249
RS1	381	-.289	.125	.656	.249
RS2	381	-.295	.125	.364	.249
PS1	381	-.773	.125	1.184	.249
PS2	381	-.753	.125	-.034	.249

As illustrated by the outcome, none of the values went beyond the accepted range of Skewness as recommended by (Hair et al., 2006) that should be within the range of 2.58 and -2.58, with the significance level of 0.01 or also acceptable, between the values of 1.96 and 1.96 with the significance level of 0.05. As far as Kurtosis is concerned, the range between -3 and +3 is considered as normal. As such, the obtained results indicate

that there were no major issues surfaced concerning the normality distribution of the data for ensuing assessment in this research.

4.3 Profile of the Respondents

The respondents' profile is illustrated in Table 4.2 below. As indicated, most of the respondents which accounts for 64%, were female while the remainder 36% were male. The high percentage of female respondents is in line with the report from the Ministry of Higher Education [MOHE] (2010) that percentage of majority among females has increased more than 60%.

Table 4.2 also shows that, most respondents (85.0%) belonged to the 18-24 years age group. Aside from that the majority of the respondents were from the science and business group at 50.9% and 42.0%, respectively, while respondents from the art studies group made up the smallest fraction (7.1%). As far as education level is concerned, most respondents had Bachelor's degree (81.4%), while the smallest fraction of respondents were PhD holders at only 5.2%. As for the master's degree holder, it accounted to 13.4% of the respondents. Thus, as indicated by the respondents' education level, this study's findings are representative to the varying student levels.

Table 4.2: The Demographic Data of Students (N=381)

Measure	Item	N	(%)	Cumulative %
Gender	Male	137	36.0	36.0
	Female	244	64.0	100.0
Age	18-24	324	85.0	85.0
	25-29	32	8.4	93.4
	30-34	13	3.4	96.9
	35-39	8	2.1	99.0
	More than 40	4	1.0	100.0
Education	Art Studies	27	7.1	7.1
	Science	194	50.9	58.0
	Business	160	42.0	100.0
Education Level	Bachelor	310	81.4	81.4
	Master	51	13.4	94.8
	PhD	20	5.2	100.0
Own Mobile device	Yes	381	100.0	100.0
	No	0.0		
Mobile Devise Type	Normal phone	217	57.0	57.0
		100	26.2	83.2
	Smartphone	63	16.8	100.0
	Tablets			
Mobile Application Experience	Less than 1 year	12	3.1	3.1
	1-3	328	86.1	89.2
	4-6 years	35	9.1	98.4
	More than 6 year	6	1.6	100.0
Wireless Connection	LTE	17	4.5	4.5
	3G	186	49.1	53.5
	2G	153	40.7	94.2
	None	22	5.8	100.0
Mobile Service Provider	CELCOM	45	11.8	11.6
	MAXIS	278	73.0	84.8
	DiGi	58	15.2	100.0

Based on the data obtained, all respondents (100%) admitted to possessing a mobile device. Among these owners, more than half of them (57.0%) had normal phone, while only a small fraction of them (16.8%) had a PDA. As for the smart phone owners, it was

equivalent to over one fourth of the respondents (26.2%). With regard to mobile application usage, majority of the respondents (86.1%) had 1-3 years of experience, while the rest: 9.2 percent had 4-6 years of experience, 3.1 percent had less than one year of experience, and 1.6 percent had more than 6 years of experience. Thus, it can be articulated that the respondents had decent experience with regard to mobile application.

Further, participants mode of wireless networks connection was also investigated. In relation to this, the findings indicate that almost half of the respondents (49.1%) utilized the 3G connection, while 40.7% of them used the 2G connection. Meanwhile, a small fraction of the participants (4.5%) connected via LTE whereas 5.8% used no wireless network. Additionally, MAXIS was the most popular network provider among the respondents which accounts for 73.0 percent, while DIGI and CELCOM were the other two chosen network providers at 15.2 percent and 11.8 percent respectively.

4.4 Goodness of Measures

The goodness and suitability of the measurement tool can be examined by testing the reliability and validity of its constructs.

4.4.1 Construct Validity

As indicated in Section 3.4.1 in the previous chapter almost all of the items used for the purpose of variable measurement in this study were obtained from the previous literatures which have been ascertained through discrimination and convergent validity, as indicated

by (Bianchi and pike, 2009). Literatures show that majority of the studies on the acceptance of m-learning services and its antecedent's factors were carried out in western countries particularly, USA, UK, Netherlands, and Canada. However, it should be noted that the culture as well as the environment of these said countries are totally distinct from the culture and environment in Malaysia. Aside from that, the said past studies may have used different samples (respondents) while the context of the study chosen may also differs. As such, these measures must be re-examined with respect to their validity. Accordingly, in order to ascertain that the items have validity i.e. they are measuring what they are designed to be measuring, and are appropriately serving this study's purpose, all items were subjected to exploratory factor analysis.

4.4.2 Exploratory Factor Analysis (EFA)

There are eight key concepts of this study and in no particular order, they are, behavioral intention to use, compatibility, perceived ease of use, perceived usefulness, service quality, social influence, culture and use behaviour. These variables have been determined via the exploratory factor analysis which was performed separately. As indicated by (Hair et al., 2003), this step is necessary so that the proportion of variables to the size of the sample remains at 1:10. Aside from that, as reported by (Thi 2006), similar procedure was also conducted in past researches so that the factor loading of numerous constructs are stable. Additionally, with respect to the KMO statistic, the value of .5 is considered as bare minimum, between .5 and .7 as mediocre, between .7 and .8 as good,

between .8 and .9 as great and above .9 as superb (Kaiser, 1974; Hutcheson & Sofroniou, 1999).

4.4.2.1 Exploratory Factor Analysis on Service Quality (SQ)

A total of twenty items of service quality (SQ) were examined by employing the principle component and the Varimax rotated analysis. Meanwhile, the KMO and the BTS were carried out on the dimensions. In conjunction with that, Table 4.3 demonstrates that the KMO value for SQ variables is 0. 711 while the BTS value is very large (2686.283). Additionally, its associated significance value is very low ($P<0.00$). These clearly indicate that the twenty items in SQ factor fulfil the conditions required and thus are suitable for the subsequent factor analysis.

Table 4.3: The KMO and Bartlett’s Tests for Service Quality (SQ)

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		. 711
Bartlett's Test of Sphericity	Approx. Chi-Square	2686.283
	df	190
	Sig.	.000

Further, Table 4.4 exhibits the results of extracted components for service quality factors. It can be seen that a total of six factors have eigenvalue that exceeds the value of one. Hence, these six factors were employed via the latent root criterion which explains about 67 % of the variance.

Table 4.4: Extraction of Components for Service Quality (SQ)

Component	Total Variance Explained					
	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.487	17.434	17.434	3.487	17.434	17.434
2	2.819	14.093	31.527	2.819	14.093	31.527
3	2.208	11.042	42.569	2.208	11.042	42.569
4	1.917	9.586	52.155	1.917	9.586	52.155
5	1.499	7.493	59.648	1.499	7.493	59.648
6	1.481	7.407	67.055	1.481	7.407	67.055
7	.876	4.378	71.433			
8	.738	3.689	75.122			
9	.665	3.326	78.448			
10	.589	2.944	81.392			
11	.561	2.805	84.197			
12	.527	2.634	86.831			
13	.436	2.180	89.011			
14	.433	2.167	91.178			
15	.372	1.858	93.036			
16	.353	1.766	94.802			
17	.330	1.649	96.451			
18	.263	1.315	97.766			
19	.239	1.195	98.961			
20	.208	1.039	100.000			

In addition, each factor’s eigenvalues shown by the Screen plot further confirm the results of the extraction (refer to Figure 4.1). Here, the curve levels out from the factor six and this shows that six factors exist.

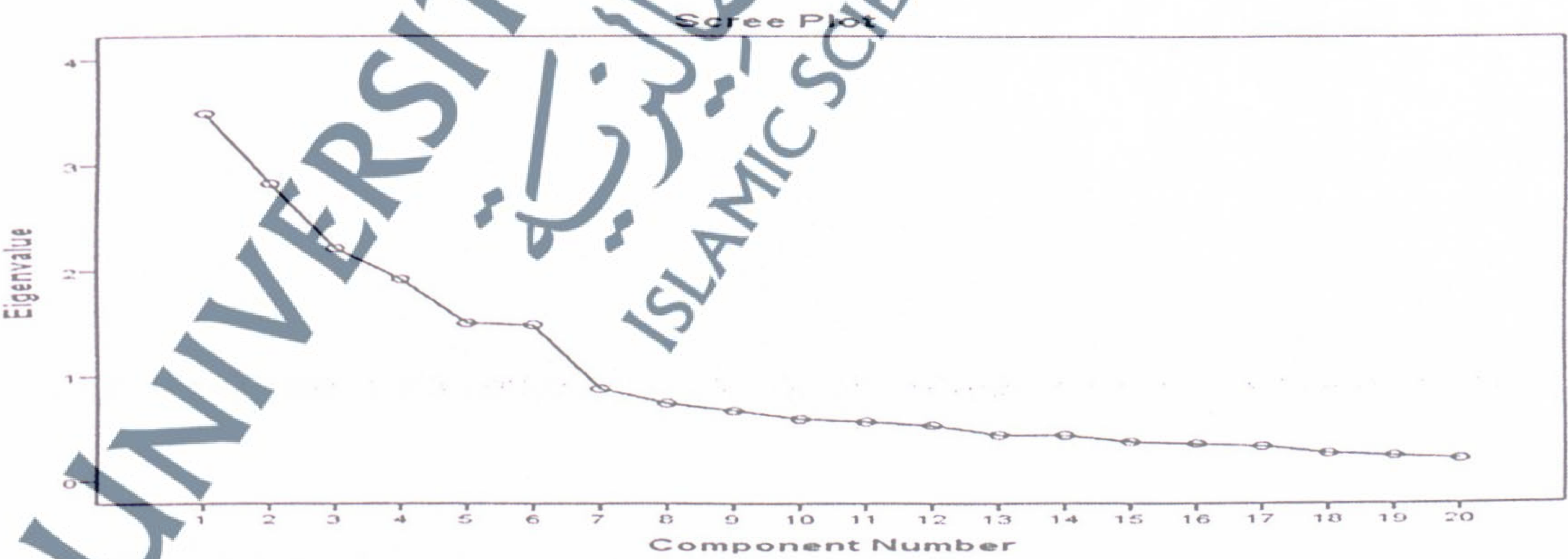


Figure 4.1: Screen Plot for Service Quality Factor (SQ)

The final factor loadings of each of the six service quality (SQ) factors and factor structures after rotation are shown in Table 4.5. For the twenty items; factor analysis has extracted six factors that explain 67.055% of the variance. As a result, the all rotated items were retained, as there is no cross-loading of items of more than 0.5 observed. Overall, the results imply that the factors' scale has goodness and the factors are also valid.

Table 4.5: The Factor Analysis Loadings of Service Quality Using the Varimax Rotation

	Component					
	1	2	3	4	5	6
P1	.809					
P2	.656					
P3	.821					
P4	.828					
P5	.794					
AC1		.558				
AC2		.643				
AC3		.652				
AC4		.749				
ID1			.527			
ID2			.525			
ID3			.586			
ID4			.610			
CQ1				.675		
CQ2				.703		
CQ3				.676		
RS1					.785	
RS2					.785	
PS1						.742
PS2						.759

4.4.2.2 Exploratory Factor Analysis on Social Influence (SI)

In terms of Social Influence, five items have been employed in assessing social influence and its influence on the acceptance of students on m-learning. Further, in order to test

whether factor analysis was appropriate for social influence, the KMO and the BTS were performed on the variables, in which the results are shown in Table 4.6. The KMO value for Social Influence is 0.664 and this value is higher than 0.50. On the other hand, the observed BTS value is 529.212 and this value is considered very large while its associated significance value is very low ($P<0.001$). In a nutshell, the results of the KMO and the BTS tests clearly indicate that the five social influence items have fulfilled the conditions required and thus are suitable for the subsequent factor analysis.

Table 4.6: The KMO and the Bartlett’s Tests of for Social Influence (SI)

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.664
Bartlett's Test of Sphericity	Approx. Chi-Square	529.212
	df	10
	Sig.	.000

Further, Table 4.7 exhibits the result of the extracted components for social influence. Here, the Table 4.7 shows two factors with eigenvalue exceeding one. The adoption of these two factors was made possible via the use of the latent root criterion which explains most of the variance (75%).

Table 4.7: Extraction of Components for Social Influence

Component	Total Variance Explained					
	Initial Eigenvalues			Extraction Sums of Squared		Loadings
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.307	46.145	46.145	2.307	46.145	46.145
2	1.423	28.462	74.607	1.423	28.462	74.607
3	.470	9.406	84.012			
4	.419	8.371	92.383			
5	.381	7.617	100.000			

Further, each factor’s eigenvalues in the screen plots further verify the results of the extraction as illustrated in figure 4.2. Here, it can be viewed that the curve levels out from the factor two and this signifies that two factors exist.



Figure 4.2: Screen Plot for Social Influence (SI)

The final factor loadings of each of the two social influence factors and factor structures after rotation are shown in Table 4.8. For the five items; factor analysis has extracted two factors that explain 74.607% of the variance. As a result, all the five rotated

items were retained, as there is no cross-loading of items with the values of more than 0.5 observed. Overall, the results indicate a goodness of the the factors in the scale their validation.

Table 4.8: Factor Analysis Loadings for Social Influence Using the Varimax Rotation

	Component	
	1	2
IM1	.758	
IM2	.807	
IM3	.799	
SN1		.735
SN2		.770

4.4.2.3 Exploratory Factor Analysis on Culture Factors (CF)

Fifteen items have been utilized in the assessment of the influence of culture on the acceptance of students in m-learning. It referring to culture contains the five initial dimensions of culture factors established by (Hofstede, 1991). These dimensions entail: (i) uncertainty avoidance (UA), (ii) power distance (PD), (iii) masculinity/femininity (MF), (iv) individualism/collectivism (IC), and (v) long versus short term time orientation (LST). Then, in order to ascertain whether factor analysis was acceptable instrument for the five culture factors, the KMO and the BTS were carried out on the variables, in which the results are shown in Table 4.9. The KMO value for culture factors is 0. 692. On the other hand, the observed BTS value is very large (1822.905) while its associated significance value is very low ($P<0.001$). In a nutshell, the results of the KMO and the BTS tests clearly indicate that the twenty cultural items have fulfilled the conditions required and thus are suitable for the subsequent factor analysis.

Table 4.9: The KMO and the Bartlett’s Tests of Culture Factor (CF)

KMO and Bartlett's Test			
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.			.692
Bartlett's Test of Sphericity	Approx. Chi-Square		1822.905
	df		105
	Sig.		.000

Further, Table 4.10 exhibits the result of the extracted components for culture factors. It shows five factors. Then, employing the latent root criterion, these five factors were used and it explains roughly 69% of the variance.

Table 4.10: Exploratory Factor Analysis on Culture Factor (CF)

Component	Total Variance Explained					
	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.138	20.917	20.917	3.138	20.917	20.917
2	2.009	13.395	34.311	2.009	13.395	34.311
3	1.925	12.832	47.143	1.925	12.832	47.143
4	1.682	11.211	58.354	1.682	11.211	58.354
5	1.651	11.007	69.361	1.651	11.007	69.361
6	.709	4.727	74.088			
7	.653	4.354	78.442			
8	.573	3.817	82.259			
9	.530	3.532	85.791			
10	.482	3.214	89.006			
11	.452	3.016	92.022			
12	.364	2.430	94.451			
13	.346	2.306	96.758			
14	.260	1.734	98.492			
15	.226	1.508	100.000			

In addition, the eigenvalues for all factors shown in the Screen plot provide further confirmation on the results of the extraction (see Figure 4.3). Here, it can be seen that the curve levels out from the factor five and thus, five factors exist.

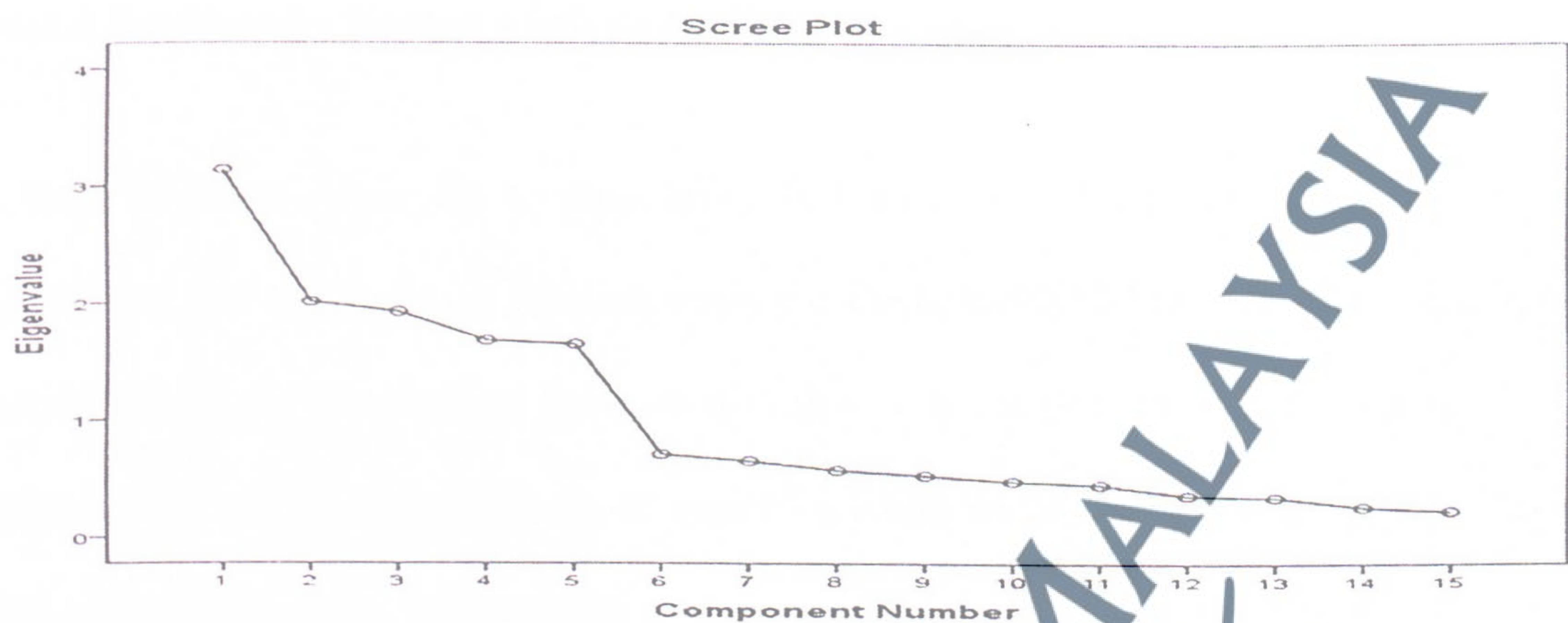


Figure 4.3: Screen Plot for Culture Factor (CF)

The factor loadings of each of the five culture factors and factor structures after rotation are shown in Table 4.11. For the fifteen items, the factor analysis performed has extracted five factors that explain 69.361% of the variance. Meanwhile, all the fifteen rotated items were retained, as there is no cross-loading of items of more than 0.5 observed. Overall, the results indicate a goodness of the factors in the scale and their validation.

Table 4.11: Factor Analysis Loadings of Culture Using the Varimax Rotation

	Component				
	1	2	3	4	5
UA1	.713				
UA2	.713				
UA3	.742				
LST1		.636			
LST2		.702			
LST3		.632			
PD1			.680		
PD2			.685		
PD3			.640		
IC1				.685	
IC2				.675	
IC3				.649	
MF1					.546
MF2					.633
MF3					.522

4.4.2.4 Exploratory Factor Analysis on Compatibility (C)

A total of three items for Compatibility (C) were examined utilizing the principle component and the Varimax rotation analysis. Then, the KMO and the BTS tests were carried out on the dimensions. In relation to this, Table 4.12 demonstrates that the value generated by the KMO test for the C variables 0.656 while the BTS value is very large (213.161). Meanwhile, with respect to its associated significance, the value is very low ($P<0.001$). These clearly indicate that the three items in the C factor fulfil the conditions required and thus are suitable for the subsequent factor analysis.

Table 4.12: The KMO and the Bartlett's Tests of Compatibility (C)

KMO and Bartlett's Test		.656
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		
Bartlett's Test of Sphericity	Approx. Chi-Square	213.161
	df	3
	Sig.	.000

Further, Table 4.13 exhibits the results of extracted components for the Compatibility (C) factor. Here, it can be seen that only one factor has eigenvalue that is higher than 1. Hence, one factor was employed by employing the latent root criterion, and this describes roughly 63% of the variance.

Table 4.13: Extraction of Components for Compatibility (C)

Component	Total Variance Explained					
	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.890	63.007	63.007	1.890	63.007	63.007
2	.637	21.249	84.256			
3	.472	15.744	100.000			

In addition, every factor’s eigenvalues shown in the Screen plot demonstrate more confirmation on the results of the extraction (see Figure 4.4). Here, it can be viewed that the curve levels out from the factor one and this shows that only one factor exists.

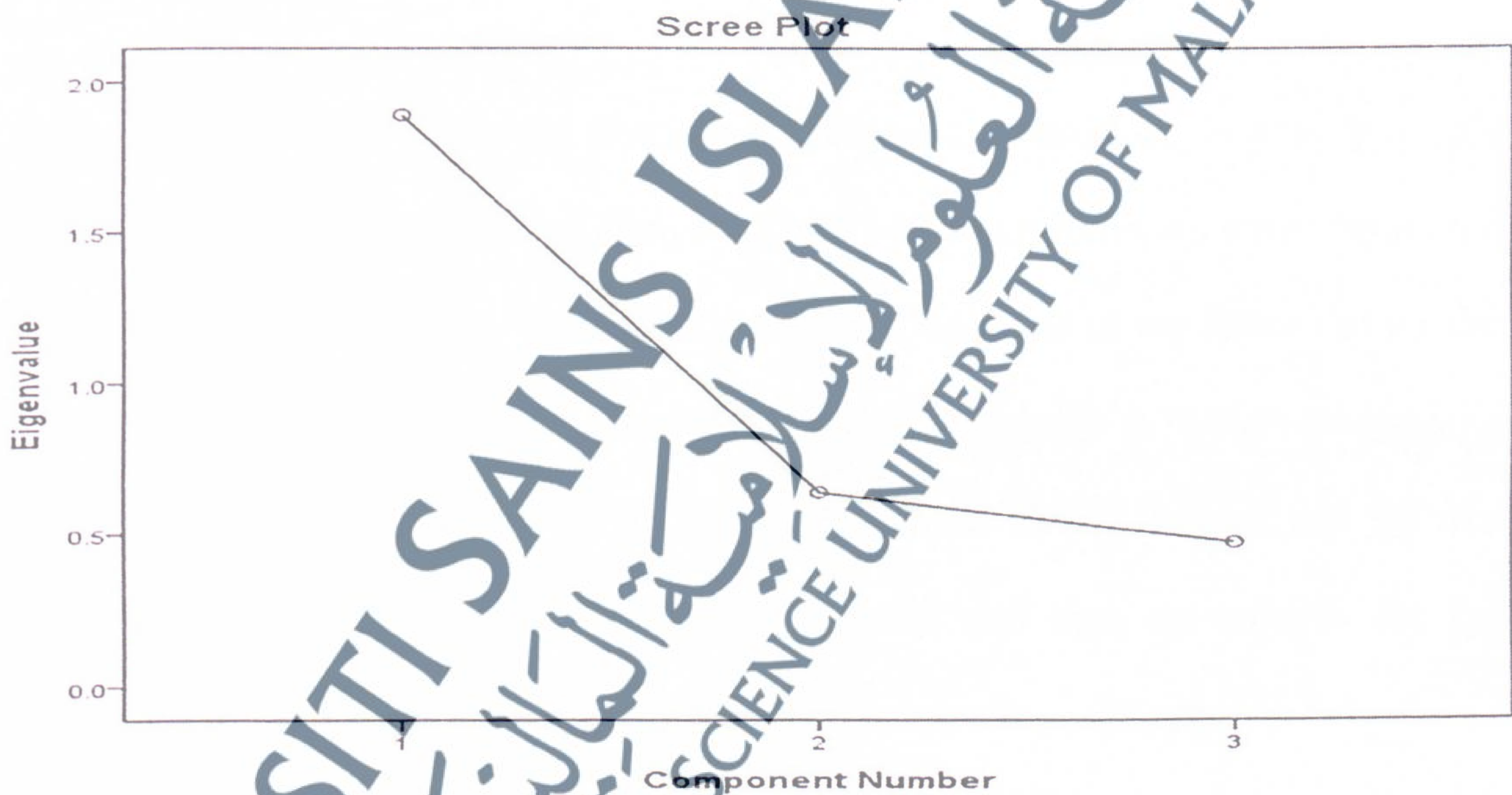


Figure 4.4: Screen Plot for Compatibility (C)

Table 4.14 illustrates the final the factor loadings of each of the one Compatibility (C) factor and factor structures following the rotation. For these three items; factor analysis has extracted one factor that explains 63.007% of the variance. As a result, all of

the rotated items were retained, as there is no cross-loading of items of more than 0.5 observed. Overall, the results indicate a goodness of the factor scale and its validation.

Table 4.14: Factor Analysis Loadings of Compatibility (C) Using the Varimax Rotation

Component	
	1
C1	.780
C2	.838
C3	.761

4.4.2.5 Exploratory Factor Analysis on Perceived Usefulness (PU)

A total of five items of Perceived Usefulness (PU) were examined using the principle component and the Varimax rotated analysis. The KMO and BTS were carried out on the dimensions. In relation to this, Table 4.15 shows that the value of the KMO test for the PU variables is 0.708. Meanwhile, the BTS value is very large (678.392) whereas its associated significance value is very low ($P<0.001$). These clearly indicate that the five items in the PU factor fulfil the conditions required and thus are suitable for the subsequent factor analysis.

Table 4.15: The KMO and the Bartlett’s Tests for Perceived Usefulness (PU)

KMO and Bartlett's Test	
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.708
Bartlett's Test of Sphericity	Approx. Chi-Square 678.392
	df 10
	Sig. .000

Further, Table 4.16 exhibits the results of extracted components for perceived usefulness (PU). It can be viewed that one factor has eigenvalue higher than the value of

one. Hence, this one factor was employed via the use of the latent root criterion and this describes roughly 55% of the variance.

Table 4.16: Extraction of Components for Perceived Usefulness (PU)

Component	Total Variance Explained					
	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.750	55.007	55.007	2.750	55.007	55.007
2	.886	17.711	72.718			
3	.673	13.457	86.175			
4	.481	9.617	95.792			
5	.210	4.208	100.000			

In addition, all factors' eigenvalues as demonstrated in the screen plot indicates further confirmation on the results of the extraction as illustrated by Figure 4.5. It is seen that the curve flattens out from the factor one signifying that there is only one factor.

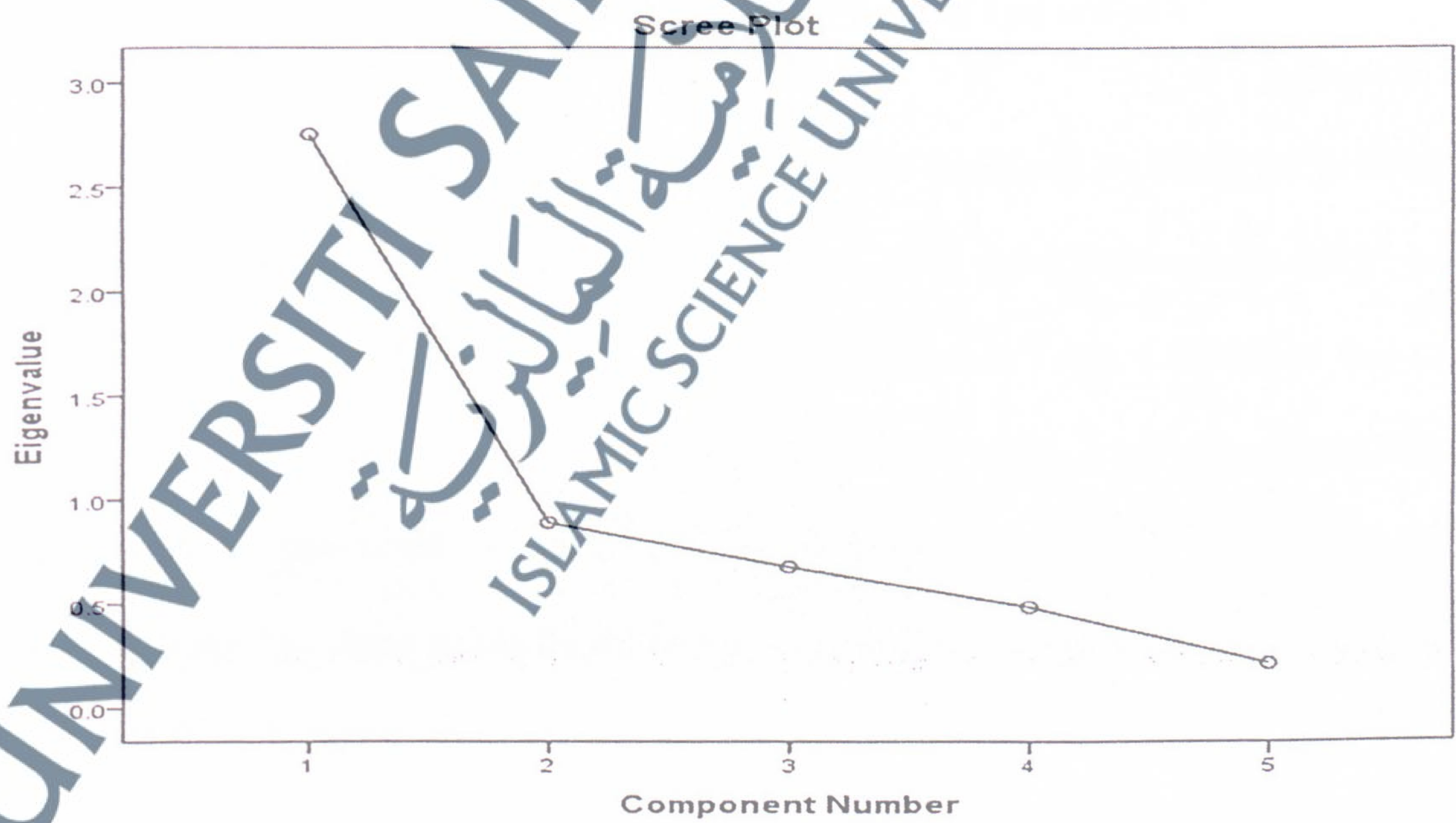


Figure 4.5: Screen Plot for Perceived Usefulness (PU)

The final factor loadings of each of the Perceived Usefulness (PU) factor and factor structures after rotation are shown in Table 4.17. For the five items, factor analysis has extracted one factor that explains 55.007% of the variance. As a result, all rotated items were retained, as there is no cross-loading of items of more than 0.5 observed. Overall, the results indicate a goodness of the factor scale and its validation.

Table 4.17: Factor Analysis Loadings of Perceived Usefulness (PU) Using the Varimax Rotation

Component	
	1
PU1	.826
PU2	.710
PU3	.664
PU4	.681
PU5	.812

4.4.2.6 Exploratory Factor Analysis on Perceived Ease of Use (PEoU)

Overall, five items Perceived Ease of Use (PEoU) were examined by using the principle component and the Varimax rotation analysis. Then, both the KMO and the BTS tests were carried out on the dimensions. In conjunction with this, Table 4.18 shows that the KMO value for the PEoU variables is 0.825, while the BTS value is very large (638.833). Additionally, its associated significance value is very low ($P<0.001$). These clearly indicate that the five items in the PEoU factor fulfil the conditions required and thus, are suitable for the subsequent factor analysis.

Table 4.18: The KMO and the Bartlett’s Tests for Perceived Ease of Use (PEoU)

KMO and Bartlett's Test			
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.			.825
Bartlett's Test of Sphericity	Approx. Chi Square		638.833
	df		10
	Sig.		.000

Further, Table 4.19 exhibits the results of extracted components for Perceived Ease of Use (PEoU) factor. It is seen that one factor has eigenvalue exceeding one. Hence, this one factor was employed utilizing the latent root criterion and it explains approximately more than half of the variance (58%).

Table 4.19: Extraction of Components for Perceived Ease of Use (PEoU)

Total Variance Explained						
Component	Total	Initial Eigenvalues		Extraction Sums of Squared Loadings		
		% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.920	58.402	58.402	2.920	58.402	58.402
2	.726	14.520	72.921			
3	.537	10.737	83.658			
4	.480	9.605	93.263			
5	.337	6.737	100.000			

In addition, all factors’ eigenvalues shown in the screen plot indicate further verification of the results of the extraction (refer to Figure 4.6). Here, the curve levels out from the factor one signifying that only one factor exists.

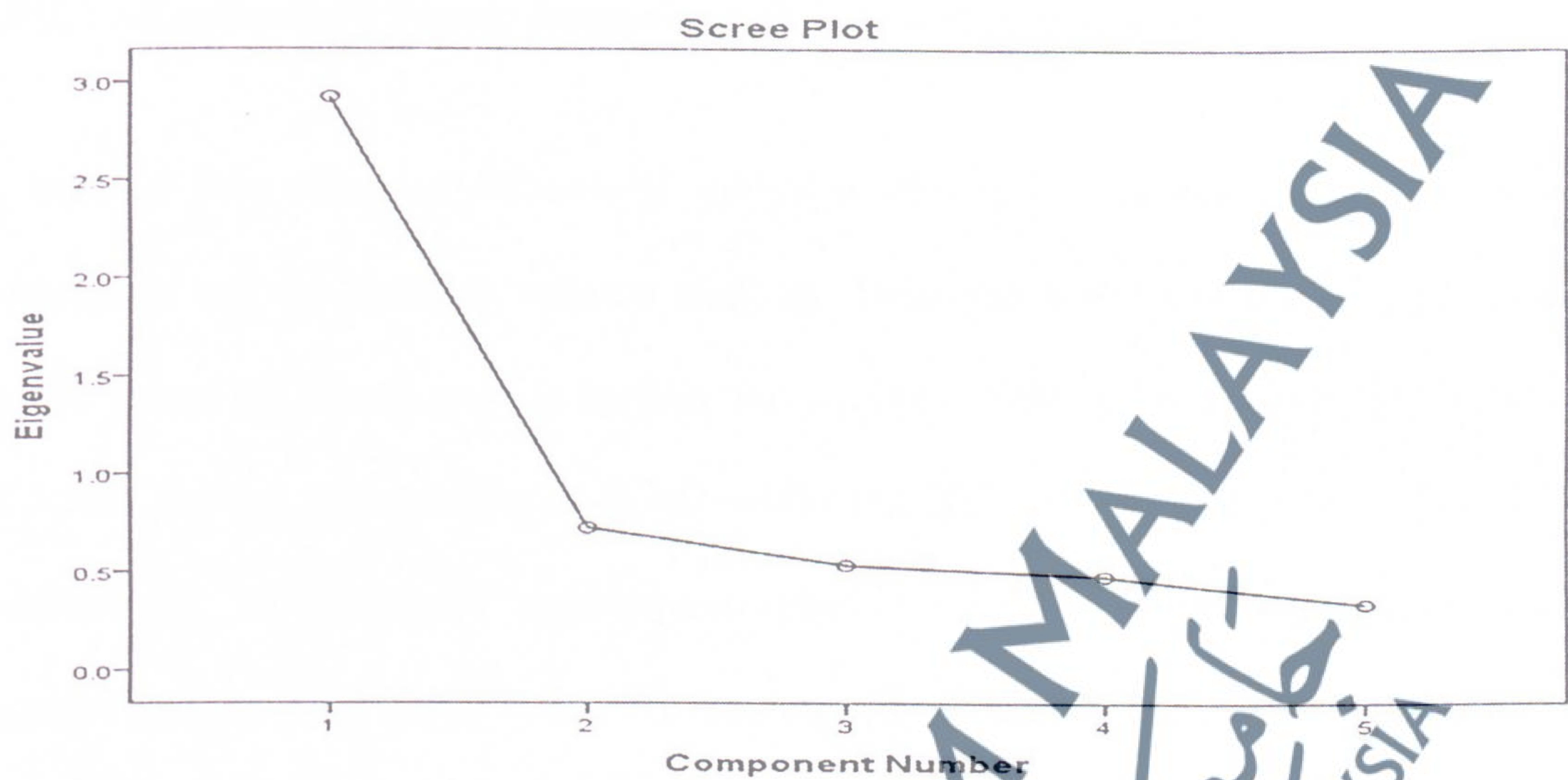


Figure 4.6: Screen Plot for Perceived Ease of Use (PEoU)

Final factor loadings of each of the Perceived Ease of Use (PEoU) factors and factor structures following the rotation are illustrated by Table 4.20. For these five items, the factor analysis has extracted one factor that explains 58.402% of the variance. As a result, all rotated items were retained, as there is no cross-loading of items of more than 0.5 observed. Overall, the results indicate a goodness of the factor scale and its validation.

Table 4.20: Factor Analysis Loadings of Perceived Ease of Use (PEoU) Using the Varimax Rotation

Component	
	1
PEOU 1	.813
PEOU 2	.834
PEOU 3	.796
PEOU 4	.720
PEOU 5	.641

4.4.2.7 Exploratory Factor Analysis on Behavioral Intention (BI)

A total of four items of Behavioral Intention (BI) were examined by the principle component and the Varimax rotation analysis. Then, the KMO and the BTS tests were carried out on the dimensions. In conjunction with this, Table 4.21 indicates that the value of KMO for the BI variables is 0.747 while the BTS value is very large (342.945). Additionally, its associated significance value is very low ($P < 0.001$). These clearly indicate that the four items in the BI factor fulfil the conditions required and thus are suitable for the subsequent factor analysis.

Table 4.21: The KMO and the Bartlett's Tests for Behavioral Intention (BI)

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.747
Bartlett's Test of Sphericity	Approx. Chi Square	342.945
	df	6
	Sig.	.000

Further, Table 4.22 exhibits the results of extracted components for Behavioral Intention (BI) factors. It is seen that one factor has eigenvalue higher than one. As such, this factor was employed via the use of the latent root criterion and it explains over half of the variance (57%).

Table 4.22: Extraction of Components for Behavioral Intention (BI)

Component	Total Variance Explained					
	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.275	56.881	56.881	2.275	56.881	56.881
2	.673	16.824	73.705			
3	.640	16.004	89.710			

In addition, each factor's eigenvalues shown in the screen plot provides further verification on the results of extraction (refer to Figure 4.7). Here, the curve levels out from the factor one and this signifies that only one factor exists.

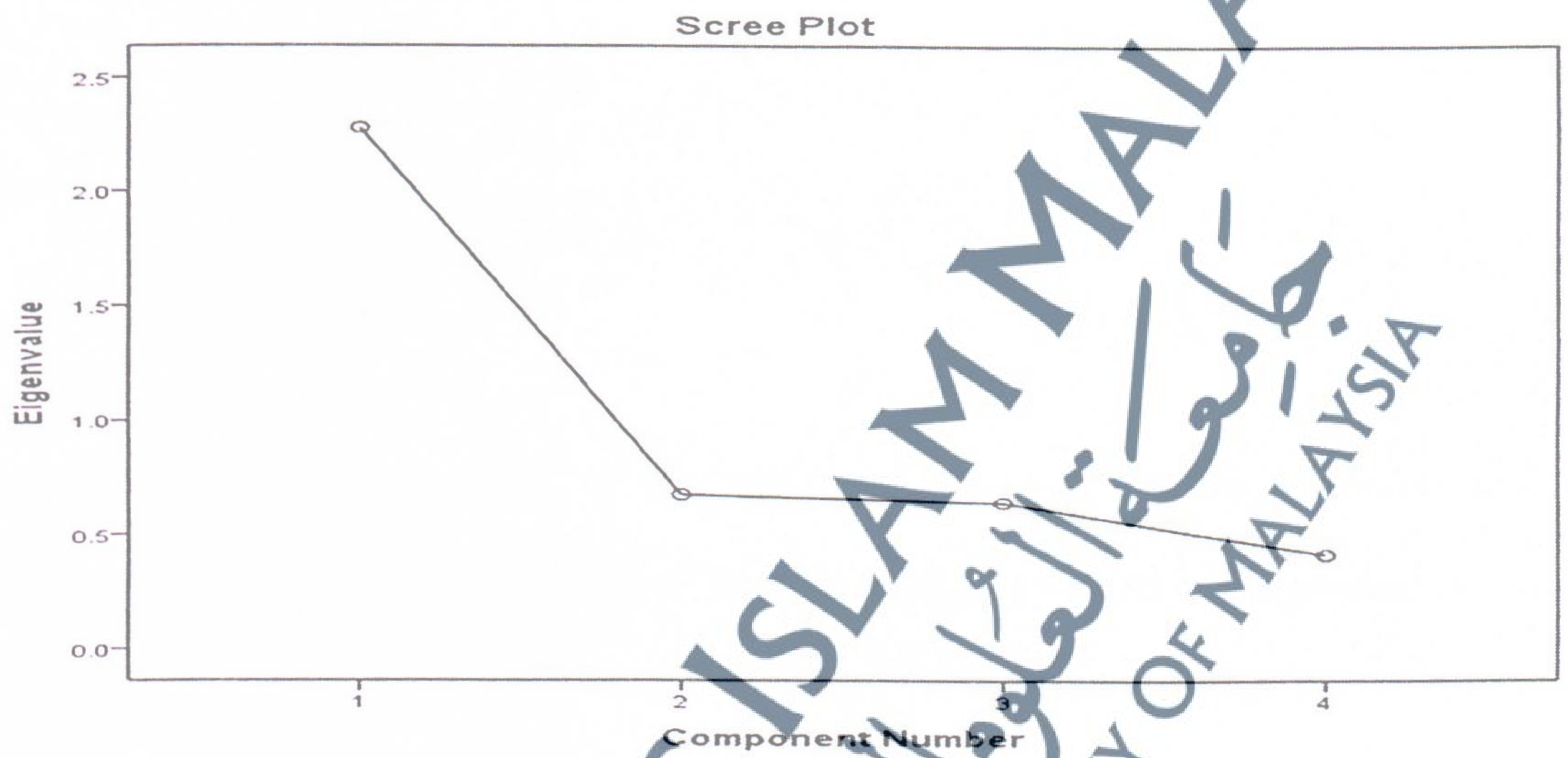


Figure 4.7: Screen Plot for Behavioral Intention (BI)

The final the factor loadings of each of the Behavioral Intention (BI) factors and factor structures after rotation are shown in Table 4.23. For the four items, the factor analysis has extracted one factor that explains 56.881% of the variance. As a result, the all rotated items were retained, as there is no cross-loading of items of more than 0.5 observed. On the whole, the results obtained demonstrate a goodness of the factor scale and its validation.

Table 4.23: Factor Analysis Loadings of Behavioral Intention (BI) Using the Varimax Rotation

Component	1
BI1	.701
BI2	.829
BI3	.687
BI4	.791

4.5 Reliability of Scale

The results of factor analysis as described and discussed in the previous section demonstrate the construct validity of all factors. Here, the sample is ascertained in terms of its reliability score scale. This is done by having the sample analysed and re-examined via the use of reliability test. Then, all factors are tested to ascertain their internal consistency by the use of the Cronbach's alpha. In terms of scale reliability indicated earlier, its determination can be done via an iterative process. In particular, it will be ascertained if removal of any items would increase the reliability of the scale. If so, the particular item will be removed and the analysis will be conducted again. On the other hand, as suggested by Nunnally (1978) if removal of items only results in small increases, then there will be no removal made. As for this study, no item is eliminated because the alpha values for all variables are greater than 0.7. Table 4.24 can be referred.

Table 4.24: Cronbach’s Alpha Test Results of the Study.

Factor	Variable	N. of Items	Alpha (a)
Students' Awareness and Requirements	Awareness of mobile learning service aspects	6	.740
	Current access to learning resources	6	.722
	Mobile technologies for learning services	6	.720
	Limitations of mobile technologies	13	.713
	Suggested university mobile services	8	.723
Service Quality (SQ)	Personalization(P)	5	.879
	Accessibility (AC)	4	.821
	Interface Design (ID)	4	.723
	Content Quality (CQ)	3	.711
	Reliability & Response (RS)	2	.738
	Privacy & Security (PS)	2	.729
Social Influence (SI)	Subjective Norm (SN)	3	.797
	Image (IM)	2	.734
Culture Factor (CF)	Uncertainty Avoidance (UA)	3	.891
	Long term versus Short-term Orientation (LST)	3	.733
	Power Distance (PD)	3	.765
	Individualism/Collectivism (IC)	3	.710
	Masculinity/Femininity (MF)	3	.726
Compatibility (C)	Compatibility (C)	3	.704
Perceived Usefulness (PU)	Perceived usefulness	5	.792
Perceived Ease of Use (PEoU)	Perceived Ease of Use (PEOU)	5	.821
Behavioral Intention to Use (BI)	Behavioral Intention to Use (BI)	4	.803
Use Behavior (UB)	Use behavior (UB)	2	.734

The 23 variables that this study employed were placed under a number of continuous treatments of reliability testing. Additionally, the statistical figures for 23 variables indicate that the Cronbach’s alpha scores are at least 0.704 for Compatibility. This means that the entire construct is deemed to have good reliability.

4.6 Descriptive Analysis

In order to achieve the intent of descriptive analysis, the calculations for mean and standard deviation were made. Generally, as indicated by (Jennings, 2001), high mean value indicates that the statement has high agreement level, while small standard deviation value indicates that data are more clustered around the mean. Additionally, the five-point Likert-scale's range was divided into equivalent size, and there are three divisions namely, low, moderate and high. In particular, scores below 2.33 (4/3 + lowest value 1) are classified as low while scores above 3.67 (highest value (5) - 4/3) are classified as high whereas scores in between the aforementioned values are classified as moderate.

4.6.1 Descriptive Analysis of Awareness of Students of the Different Names of Mobile Technology

As indicated by Table 4.26, most participants have awareness of Wireless connection with 44.1% of them indicates that they were very aware of it (VA). Meanwhile, almost equivalent number of them (42.3%) indicates that they were aware of the term Wireless connection (A). As for the Laptop/Notebook, 32.0% of the respondents indicate that they were aware (A) while 44.6% of them indicate that they were very aware (VA). Where's, the rest of the participants indicate a highest level of awareness. On the other hand, more than half of the respondents indicate that they were aware (A) or very aware (VA) of all the names of mobile technology.

(Indicators: NA=Not Aware; SA=Somewhat Aware; NS=Not Sure; A=Aware; VA=Very Aware).

Table 4.25: Student’s Awareness of Mobile Technologies Names

Item	NA	SA	NS	A	VA	M	StdD
Mobile phone	2.9	8.4	23.9	37.3	27.6	3.78	.932
Smart phone	3.4	5.8	23.9	40.7	26.2	3.81	.802
Tablet PC	3.1	10.5	22.6	39.4	24.4	3.71	.997
Laptop/Notebook	1.8	3.4	18.1	44.6	32.0	4.02	.897
Personal Digital Assistant (PDA)	2.9	9.2	22.0	41.7	24.1	3.75	.966
Wireless connections such as Wi-Fi and GPRS	1.6	5.2	6.8	42.3	44.1	4.22	.902

4.6.2 Descriptive Analysis of Students’ Access to Learning Resources (Online Learning Care)

As demonstrated by Table 4.26 the participant and learning resources have correlation. In general, the majority of participants (74.0%) expressed agreement to the item “It is difficult for me to electronically access the University learning resources from my workplace.” Specifically, 35.2% of the participants expressed that they agree (A) while 38.8% expressed that they strongly agree (SA) with the statement. On the other hand, for the item “Having distance access to the University learning resources is important for learning,” less than half of the participants (40.9%) expressed that they agree (A) while 33.9% of them indicated that they strongly agree (SA) with the statement. Additionally, with respect to the barriers and obstacles that the respondents face in accessing the online learning resources, the results show that respondents have highest perceptions. Specifically, the mean values for items “I am not aware of how to access the University learning resources using the distance devices,” “It is difficult for me to visit the

University learning resources means,” “There is no distance access to University academic service” and “Having access to learning resources during placement is important to me” are at 3.96, 3.91, 3.74 and 3.69 respectively.

(Indicators: SD=Strongly Disagree; D=Disagree; N= Neutral; A=Agree; SA=Strongly Agree)

Table 4.26: Your Access to Learning Resources (Online Learning Care)

Item	SD	D	N	A	SA	M	StdD
Having access to learning resources during placement is important to me	.8	8.9	22.3	29.4	38.6	3.96	.919
Having distance access to the University learning resources is important for my studies. (e.g., Course Registration, Library services, Exam results...).	1.6	7.1	16.5	40.9	33.9	3.98	.965
It is difficult for me to visit the University learning resources	2.9	1.8	30.4	47.8	17.1	3.74	.863
I am not aware of how to access the University learning resources using the distance devices	1.3	4.5	36.2	39.6	18.4	3.69	.866
It is difficult for me to electronically access the University learning resources from my workplace.	2.9	1.3	21.8	35.2	38.8	4.06	.958
There is no distance access to University academic service	1.6	6.6	23.9	35.4	32.5	3.91	.981

4.6.3 Descriptive Analysis for students' Views on the Use of Mobile Technologies for Learning Services

Table 4.27 shows the investigation results of mobile technologies’ potential for learning services. On the whole, participants expressed high level of agreement to each potential of mobile technologies for learning services. In particular, the majority of the respondents (84.8 %) indicated agreement to the item “Improve my study ability” where 42.3 % of

them expressed that they agree (A) while 42.5 % of them indicated strongly agree (SA). Meanwhile over two third of the respondents (75.3%) expressed agreement for the item “Increase my contact with my learning place.” Specifically, 36.7 % of the respondents chose agree (A) and almost similar number of respondents (38.6 %) indicated strongly agree (SA). Moreover, the results show that the item “Receive the latest information” has the mean value of 3.99 and this is followed by the item “Increase my contact with my instructors/lecturers” with the mean value of 3.90. Meanwhile, for the item “Increase my contact with other learners” the mean value is also high at 3.86 whereas item “Have quick access to information” is valued at 3.81 (mean value). (Indicators: SD=Strongly Disagree; D=Disagree; N= Neutral; A= Agree; SA=Strongly Agree)

Table 4.27: Students' Views on the Use of Mobile Technologies for Learning Services

Item	SD	D	N	A	SA	M	StdD
Receive the latest information	3.1	1.3	24.1	36.0	35.4	3.99	.967
Increase my contact with my learning place	3.1	4.7	16.8	36.7	38.6	4.03	.914
Increase my contact with other learners	2.9	5.5	29.9	25.7	36.0	3.86	.960
Increase my contact with my instructors/lecturers	3.1	6.3	22.6	33.6	34.4	3.90	.948
Have quick access to information	2.6	3.7	36.2	24.9	32.5	3.81	.819
Improve my study ability	2.6	4.7	7.9	42.3	42.5	4.17	.949

4.6.4 Descriptive Analysis for Students’ Views on the Limitations of Mobile Technology for Learning

The limitation as perceived by students on mobile technologies for learning purposes was scrutinized and this is demonstrated by Table 4.28. Transaction and connection is costly (38.6%A, 36.7% SA) and Data exchange with networks is slow (38.3% A, 30.7% SA),

followed by I am worried about my personal information's confidentiality (34.4% A, 29.1% SA); Connection to networks is poor (39.4% A, 25.7% SA); There is problem with the physical security (e.g. Loss of device) (34.1% A, 24.1% SA); I need training to use this device (42.8% A, 19.4 SA); Laptops – the device has poor portability (35.2% A, 17.6% SA); Mobile phone or PAD: battery life is limited (43.8% A, 10.8 % SA); Mobile phone or PAD: memory is limited (32.5% A, 16.0%SA); Mobile phone or PAD: keyboard has limited use (39.1% A, 5.5% SA); Mobile phone or PAD: the keyboard is small (28.6% A, 13.4% SA); Mobile phone or PAD: the screen is small (29.9% A, 11.3% SA), and Laptop – the device is heavy (27.8% A, 8.1% SA) .

(Indicators: SD=Strongly Disagree; D=Disagree; N=Neutral; A=Agree; SA=Strongly Agree).

Table 4.28: Students' Views on the Limitations of Mobile Technology for Learning

Item	SD	D	N	A	SA	M	StdD
I need training to use this device	2.9	9.2	25.7	42.8	19.4	3.67	.985
There is problem with the physical security (e.g. Loss of device)	2.9	7.3	31.5	34.1	24.1	3.69	.900
I am worried about my personal information's confidentiality	1.0	5.0	30.4	34.4	29.1	3.86	.933
Connection to networks is poor	1.6	6.8	26.5	39.4	25.7	3.81	.950
Data exchange with networks is slow	2.6	3.4	24.9	38.3	30.7	3.91	.961
Transaction and connection is costly (e.g. GPRS download per Bytes)	2.1	5.0	17.6	38.6	36.7	4.03	.966
Laptop – the device is heavy	4.2	13.9	45.9	27.8	8.1	3.22	.930
Laptop – the device has poor portability	3.4	6.8	37.0	35.2	17.6	3.57	.970
Mobile phone or PAD: the screen is small	1.8	14.4	42.5	29.9	11.3	3.34	.923
Mobile phone or PAD: the keyboard is small	4.2	11.5	42.3	28.6	13.4	3.35	.991
Mobile phone or PAD: keyboard has limited use	3.9	6.0	45.4	39.1	5.5	3.36	.837
Mobile phone or PAD: memory is limited	3.9	1.0	37.5	32.5	16.0	3.47	.994
Mobile phone or PAD: battery life is limited	3.9	8.7	32.8	43.8	10.8	3.49	.936

4.6.5 Descriptive Analysis for Students Views on Important University Mobile Services

Participants were also asked about how often they use mobile learning service that is available at their university. Individually, as could be referred in Table 4.29, the Exam result (39.9% A, 46.7% SA) and Course Registration (44.4% A, 43.0% SA) were the highest rank, followed by Library services (52.2% A, 31.5 % SA), International students' services (41.5% A, 26.5% SA), the Calendar, Timetable, or Schedule services (36.2% A, 29.9% SA), Campus Facilities (34.4% A, 13.4% SA) Moreover, the lowest in ranking was the Treasury (33.1% A, 13.1% SA).

(Indicators: N=Never; S=seldom; SM= sometimes; O=often; A= always).

Table 4.29: The Important University Mobile Services

Item	N	S	SM	O	A	M	StdD
Admission status	3.9	5.0	39.9	33.3	17.8	3.56	.970
Course Registration	1.6	2.4	8.7	44.4	43.0	4.25	.832
Calendar, Timetable or Schedule Services	3.7	7.1	23.1	36.2	29.9	3.82	.955
Library Services (e.g. loans and searches)	2.1	2.9	11.3	52.2	31.5	4.08	.853
Exam or test results	2.4	2.9	8.1	39.9	46.7	4.26	.901
Campus Facilities	4.2	6.6	35.4	37.5	16.3	3.55	.979
Treasury (e.g. financial statement and balance)	2.9	3.7	47.2	33.1	13.1	3.50	.872
International students' services	2.1	7.3	22.6	41.5	26.5	3.83	.973

The m-learning services have been perceived as attractive by many. As such, this learning platform has become a new essential addition in the setting of higher education. As to ease the implementation process, the higher education nowadays is equipped with the mobile technology infrastructure necessitated for the adoption of m-learning. Moreover, the students are also readily equipped with sufficient know-hows of the said

technology in their learning process. Somehow, there are still limitations facing the use of m-learning in education but these obstacles would be eliminated by time. It should also be understood that, the growth of mobile wireless technology in the context of the higher education will continue and it will also be the chosen learning environment in the future.

4.6.6 Descriptive Analysis for Service Quality (SQ)

As illustrated by Table 4.30 the average mean value obtained for the factor of service quality (SQ) are high (m=3.74). Specifically, the mean value for Privacy and Security is 3.87; for Personalization 3.82; for Accessibility 3.73; for Interface Design 3.73; for Content Quality 3.66; for Reliability and Response 3.60; all of these are considered high values. On the other hand, the mean value for both content quality and privacy/security is moderate at 3.35.

Table 4.30: Descriptive Statistics for Service Quality (SQ)

N.	Statement	N	Mean	Std.D
Personalization (P)				
P1	M-learning services should be personalized to control my learning progress	381	3.75	.949
P2	M-learning services should be personalized so I could choose what I want to learn.	381	3.72	.914
P3	M-learning services should be personalized so I could record my learning progress and performance.	381	3.80	.923
P4	M-learning services should be personalized to provide learning support.	381	3.89	.966
P5	M-learning services should be personalized to understand my needs.	381	3.94	.993
Overall Personalization (P)		381	3.82	.779
Accessibility (A)				
AC1	M-learning services will be effective if I could accomplish my studies at my own convenient time (quickly).	381	3.80	.915

AC2	M-learning services will be effective if I could do my studies anywhere (whenever I need).	381	3.79	.996
AC3	M-learning services will be effective if I could do my studies conveniently (does not crash with other tasks)	381	3.61	.995
AC4	M-learning services will be effective if they could increase access to learning and education.	381	3.74	.901
Overall Accessibility (A)		381	3.73	.769
Interface Design (ID)				
ID1	M-learning system will be effective if the interface design provides me with visually appealing features.	381	3.66	.842
ID2	M-learning services will be effective if interface design provides site colours, graphics, and fonts.	381	3.69	.851
ID3	M-learning services will be effective if the interface design provides a good page layout.	381	3.63	.925
ID4	M-learning services will be effective if the interface design provides well-designed site menus.	381	3.96	.918
Overall Interface Design (ID)		381	3.73	.654
Content Quality				
CQ1	M-learning services will be effective if the content is easy to navigate.	381	3.70	.785
CQ2	M-learning services will be effective if the content can be understood	381	3.75	.987
CQ3	M-learning services will be effective if the content is current (up to date).	381	3.52	.980
Overall Content Quality		381	3.66	.734
Privacy and Security				
PS1	I would not likely to worry about security when using m-learning services.	381	3.69	.849
PS2	I trust that the university could protect my privacy.	381	4.05	.988
Overall Privacy and Security		381	3.87	.820
Reliability and Response				
RS1	M-learning services will be effective if it is accurate (error free).	381	3.55	.765
RS2	M-learning services will be effective if it is reliable.	381	3.65	.816
Overall Reliability and Response		381	3.60	.701
Overall Service Quality Factor		381	3.74	.602

4.6.7 Descriptive Analysis for Social Influence (SI)

Table 4.31 illustrates the distribution and measurements of frequency distribution of the two Social Influence variables in the means and standard deviations forms. Here, it can be observed that the mean scores for Image and Subjective Norm are very high at 3.70 and 3.66 respectively. On the whole, the results obtained for Social Influence (SI), are very high which is at 3.69 (mean score).

Table 4.31: Descriptive Statistics for Social Influence (SI)

N.	Statement	N	Mean	Std.Deviation
Overall Image (IM)				
IM1	Students in my university those who use the m-learning services are more successful than do not.	381	3.53	.947
IM2	Students in my university who use the m-learning services have a high profile.	381	3.76	.990
IM3	The m-learning method is a symbol of status in my university.	381	3.82	.993
Overall Image (IM)		381	3.70	.795
Subjective Norm (SN)				
SN1	People who influence my behavior believe that I should use m-learning services in my studies.	381	3.71	.910
SN2	People who are important to me believe that I should use m-learning services in my studies.	381	3.62	.880
Overall Subjective Norm (SN)		381	3.66	.795
Overall Social Influence (SI)		381	3.69	.637

4.6.8 Descriptive Analysis for Culture Factor (CF)

Table 4.32 illustrates the measurements as well as distribution of frequency for the five variables of culture in the means and standard deviations' form. Here, the Table 4.32 indicates that the mean values obtained for Individualism and Collectivism (3.93), Uncertainty Avoidance (3.77), Masculinity and Femininity (3.75), Power Distance (3.74) and Long term versus Short-term Orientation (3.72) are very high. Overall, the results are high for the culture factor (CF) with the average mean score of 3.78.

Table 4.32: Descriptive Statistics for Culture Factor (CF)

N.	Statement	N	Mean	Std.D
Uncertainty Avoidance				
UA1	When I use the m-learning services, I prefer to use it just like the way I make changes in my study.	381	3.76	.996
UA2	When I am using the m-learning services, I depend on someone who is well-versed about the services if I am in a situation where I don't know how to use it.	381	3.71	.996
UA3	When I use the m-learning services, I tend to avoid the functions that I am not familiar with.	381	3.84	.996
Overall Uncertainty Avoidance		381	3.77	.902
Long term versus Short-term Orientation (LST)				
LST1	M-learning services are important to learning conscience.	381	3.64	.885
LST2	The success of m-learning services is critically affected by personal stability.	381	3.60	.951
LST3	Reverence for tradition impedes the m-learning services performance.	381	3.91	.943
Overall Long term versus Short-term Orientation		381	3.72	.748
Power Distance (PD)				
PD1	I think that using m-learning services will upgrade my study status.	381	3.80	.984
PD2	Using the m-learning services that are similar to those used by the seniors makes me feel that my study status is enhanced.	381	3.66	.939
PD3	I am not willing to use the m-learning services that are not better than those offered by my university.	381	3.77	.786
Overall Power Distance		381	3.74	.748
Individualism & Collectivism (IC)				
IC1	In my opinion, the benefits that I individually gained from the m-learning services use are more important than the benefits that are gained in groups.	381	4.10	.996
IC2	In the use of m-learning services, I am not affected by the	381	3.82	.988

IC3	opinion of other students. I often use the m-learning services in my own way and I don't depend on other students' opinion.	381	3.86	.977
Overall Individualism and Collectivism		381	3.92	.786
Masculinity & Femininity (MF)				
MF1	In my opinion, unlike female, male prefer using m-learning services that have better functions and specifications.	381	3.87	.973
MF2	In my opinion, male are more capable in using the functions of the m-learning services compared to female.	381	3.76	.988
MF3	In my opinion, compared to female, male prefer the m-learning services that have professional functions.	381	3.62	.994
Overall Masculinity and Femininity		381	3.75	.792
Overall culture Factor		381	3.78	.629

4.6.9 Descriptive Analysis for Compatibility (C)

Table 4.33 illustrates the distribution and measurements of frequency for the 3 items representing the factor of Compatibility (C) in the means and standard deviations' form. Here, it shows that the factor of Compatibility obtained the highest mean values (3.73).

Table 4.33: Descriptive Statistics for Compatibility (C)

N.	Statement	N	Mean	Std.Deviation
C1	The use of m-learning services is well-matched with most factors of my educations environment.	381	3.82	.942
C2	The use of m-learning services is compatible my lifestyle.	381	3.57	.891
C3	The use of m-learning services matches well with the way I like to engage in education environment.	381	3.79	.928
Overall Compatibility (C)		381	3.73	.730

4.6.10 Descriptive Analysis for Perceived Usefulness (PU)

The distribution and measurements of frequency for the five items representing the factor of Perceived Usefulness (PU) are illustrated in Table 4.34 in the means and standard

deviations’ form. Here, it appears that the highest mean score obtained for Perceived Usefulness is 3.79.

Table 4.34: Descriptive Statistics for Perceived Usefulness (PU)

N.	Statement	N	Mean	Std.Deviation
PU1	I could complete my tasks more quickly with m-learning services	381	3.77	.889
PU2	I could improve my performance in education environment with m-learning services	381	3.72	.825
PU3	I could engage in education environment easier with m-learning services	381	3.79	.931
PU4	M-learning services are useful in my education environment.	381	3.80	.909
PU5	I could improve my effectiveness in education environment with m-learning services	381	3.86	.985
Overall Perceived Usefulness (PU)		381	3.79	.672

4.6.11 Descriptive Analysis for Perceived Ease of Use (PEoU)

Table 4.35 illustrates the distribution and measurements of frequency for the five items representing the factor of Perceived Ease of Use (PEoU) in the means and standard deviations’ form. Here, it appears that the highest mean score obtained by PEoU is 3.72.

Table 4.35: Descriptive Statistics for Perceived Ease of Use (PEoU)

N.	Statement	N	Mean	Std.Deviation
PEoU1	I find it easy to get what I want with the m-learning services	381	3.74	.953
PEoU2	I find the m-learning services to be a flexible system to interact with.	381	3.76	.922
PEoU3	It is easy for me to be the m-learning services expert.	381	3.75	.941
PEoU4	It is easy for me to learn how to use the m-learning services.	381	3.76	.907
PEoU5	Overall, I find that m-learning services are easy to use.	381	3.58	.825
Overall	Perceived Ease of Use (PEoU)	381	3.72	.695

4.6.12 Descriptive Analysis for Behavioral Intention (BI)

The distribution and measurements of frequency for the four items representing the factor of Behavioral Intention (BI) are illustrated in Table 4.36 in the means and standard deviations' form. Here, it appears that the highest mean score obtained for BI is 3.74.

Table 4.36: Descriptive Statistics for Behavioral Intention (BI)

N.	Statement	N	Mean	Std.Deviation
BI 1	I intend to use the m-learning services	381	3.60	.824
BI 2	I plan to use the m-learning services	381	3.71	.940
BI 3	I think I would use the m-learning services	381	3.72	.939
BI 4	I will definitely use the m-learning services	381	3.74	.925
Overall Behavioral Intention (BI)		381	3.72	.677

4.6.13 Descriptive Analysis for Use behavior (UB)

The distribution and measurements of frequency for the two items representing the factor of Use Behavior (UB) are illustrated in Table 4.37 in the means and standard deviations' form. Here, it appears that the highest mean score obtained for UB is 3.61.

Table 4.37: Descriptive Statistics for Use Behavior (UB)

N.	Statement	N	Mean	Std.Deviation
UB1	I frequently use the m-learning services	381	3.66	.855
UB2	How often do you use the m-learning services?	381	3.57	.702
Overall Use behavior (UB)		381	3.61	.695

4.7 Research Model Evaluation

In this study, the model evaluation is a way to ensure a clear understanding of the determinants of the acceptance of m-learning service among students in Malaysia in the context of higher education institutions. In order to evaluate the model, three research questions were asked. In order to address the first research question (What are the user requirements towards the use of m-learning services in the higher education environment?) Further, in answering the first research question, nine hypotheses were tested through Pearson correlation matrix and multiple regression analysis.

As for the second research question, (What are the factors and variables that could influence the acceptance of m-learning services among the students?) Further, in answering the third research question, two hypotheses were tested through Pearson correlation matrix and multiple regression analysis.

Finally, the third research question, (What is the relationship between compatibility and perceived ease of use on perceived usefulness?) Further, in answering the second research question a stepwise regression was performed to attain the most significant predictor variables that impart strong influence with respect to the acceptance of m-learning services.

4.7.1 Hypotheses Testing – Correlation

In this study, ten hypotheses have been proposed in an attempt to analyse the relationships between the factors in the model proposed. Here, the variables' mean scores

within the factors or constructs were computed. Then, the obtained values underwent the correlation analysis.

All tests on hypotheses indicate that a positive relationship exists between constructs. As such, a positive correlation different from zero and meeting the minimum criterion stated earlier indicates support to both the hypothesis and the relationship. Then, the next step was to perform the simple correlation hypotheses tests (zero-order). The detailed results of the hypothesis tests are illustrated next.

4.7.1.1 Behavioral Intention (BI)

The first hypothesis (H1) illustrates that the relationship between behavioral intention (BI) and Use behavior (UB) of m-learning is positive. In conjunction to this, Table 4.38 presents the correlation coefficient between both variables which is at 0.400 suggesting that the existence of a significant positive relationship. As such, at zero-order level, H1 is supported.

Table 4.38: Hypothesis H1 Correlation

		BI	UB
BI	Pearson Correlation		.400**
	Sig. (2-tailed)		.000
	N		381
UB	Pearson Correlation	.400**	
	Sig. (2-tailed)	.000	
	N	381	

** . Correlation is significant at the 0.01 level (2-tailed).

4.7.1.2 Service Quality (SQ)

The second hypothesis (H2) states a positive relationship between service quality (SQ) and behavioral intention (BI) of m-learning. In conjunction with this, as presented by Table 4.39 below, the correlation coefficient between the two variables is 0.308 signifying the existence of a significant positive relationship exists. As such, at zero-order level, H2 is supported.

Table 4.39: Hypothesis H2 Correlation

		BI	SQ
BI	Pearson Correlation		.308**
	Sig. (2-tailed)		.000
	N		381
SQ	Pearson Correlation	.308**	
	Sig. (2-tailed)	.000	
	N	381	

** . Correlation is significant at the 0.01 level (2-tailed).

4.7.1.3 Social Influence (SI)

The third hypothesis (H2) states a positive relationship between social influence (SI) and behavioral intention (BI) of m-learning. In conjunction with this, Table 4.40 below demonstrates that the correlation coefficient between the two variables is 0.327, suggesting the existence of a significant positive relationship. As such, at zero-order level, H3 is supported.

Table 4.40: Hypothesis H3 Correlation

		BI	SI
BI	Pearson Correlation		.327**
	Sig. (2-tailed)		.000
	N		381
SI	Pearson Correlation	.327**	
	Sig. (2-tailed)	.000	
	N	381	

** . Correlation is significant at the 0.01 level (2-tailed).

4.7.1.4 Culture Factors (CF)

The fourth hypothesis (H4) states a positive relationship between culture factors (CF) and behavioral intention (BI) of m-learning. In conjunction with that, the correlation coefficient between the two variables is 0.367 as can be referred in Table 4.41. The obtained value signifies that there exists a significant positive relationship. As such, at zero-order level, H4 is supported.

Table 4.41: Hypothesis H4 Correlation

		BI	CF
BI	Pearson Correlation		.367**
	Sig. (2-tailed)		.000
	N		381
CF	Pearson Correlation	.367**	
	Sig. (2-tailed)	.000	
	N	381	

** . Correlation is significant at the 0.01 level (2-tailed).

4.7.1.5 Compatibility (C)

The fifth hypothesis (H5) states a positive relationship between compatibility (C) and behavioral intention (BI) of m-learning. As can be referred from Table 4.42, the

correlation coefficient between the two variables is 0.750 suggesting the existence of a significant positive relationship. As such, at zero-order level, H5 is supported.

Table 4.42: Hypothesis H5 Correlation

		BI	C
BI	Pearson Correlation		.750**
	Sig. (2-tailed)		.000
	N		381
C	Pearson Correlation	.750**	
	Sig. (2-tailed)	.000	
	N	381	

Meanwhile, hypothesis six (H6) demonstrates a positive relationship between compatibility (C) and Perceived Usefulness (PU) of m-learning. Thus, as can be referred from Table 4.43, the correlation coefficient between the (C) and (PU) variables is 0.761 demonstrating the existence of a significant positive relationship. As such, at zero-order level, H6 is supported.

Table 4.43: Hypothesis H6 Correlation

		C	PU
C	Pearson Correlation		.761**
	Sig. (2-tailed)		.000
	N		381
PU	Pearson Correlation	.761**	
	Sig. (2-tailed)	.000	
	N	381	

**, Correlation is significant at the 0.01 level (2-tailed).

4.7.1.6 Perceived Ease of Use (PEoU)

Hypothesis seven (H7) demonstrates a positive relationship between perceived ease of use (PEoU) and behavioral intention (BI) of m-learning. As can be referred from Table 4.44 the correlation coefficient between the two variables is 0.761 signifying the

existence of a significant positive relationship. As such, at zero-order, level H7 is supported.

Table 4.44: Hypothesis H7 Correlation

		BI	PEOU
BI	Pearson Correlation		.761**
	Sig. (2-tailed)		.000
	N		381
PEOU	Pearson Correlation	.761**	
	Sig. (2-tailed)	.000	
	N	381	

** . Correlation is significant at the 0.01 level (2-tailed).

Meanwhile, hypothesis eight (H8) demonstrates a positive relationship between perceived ease of use (PEOU) and perceived usefulness (PU) of m-learning. As can be viewed in Table 4.45, the correlation coefficient between the (PEOU) and (PU) variables is 0.726 indicating the existence of a significant positive relationship. As such, at zero-order level, H8 is supported.

Table 4.45: Hypothesis H8 Correlation

		PEOU	PU
PEoU	Pearson Correlation		.726**
	Sig. (2-tailed)		.000
	N		381
PU	Pearson Correlation	.726**	
	Sig. (2-tailed)	.000	
	N	381	

** . Correlation is significant at the 0.01 level (2-tailed).

4.7.1.7 Perceived Usefulness (PU)

The ninth hypothesis (H9) states a positive relationship between perceived usefulness (PU) and behavioral intention (BI) of m-learning. As exhibited in Table 4.46 the correlation coefficient between the two variables is 0.658 demonstrating the existence of a significant positive relationship. As such, at zero-order level, H9 is supported.

Table 4.46: Hypothesis H9 Correlation

		BI	PU
BI	Pearson Correlation		.658**
	Sig. (2-tailed)		.000
	N		381
PU	Pearson Correlation	.658**	
	Sig. (2-tailed)	.000	
	N	381	

**. Correlation is significant at the 0.01 level (2-tailed).

4.7.1.8 Summary of Hypotheses Testing – Correlation

As a summary, each zero-order correlation test of each of the hypotheses demonstrates significance. As such, all the hypotheses are supported at this level. It has been that behavioral intention to use demonstrates positive indirect relationships with the Use behavior. Also, social influence, service quality, culture, compatibility perceived usefulness, and perceived ease of use factors demonstrate positive indirect relationships with the behavioral intention to use of m-learning. Aside from that, compatibility and perceived ease of use have positive indirect relationships with the perceived usefulness. Having obtained the results (previous section) the correlations amongst all factors in the proposed model are illustrated in Figure 4.8.

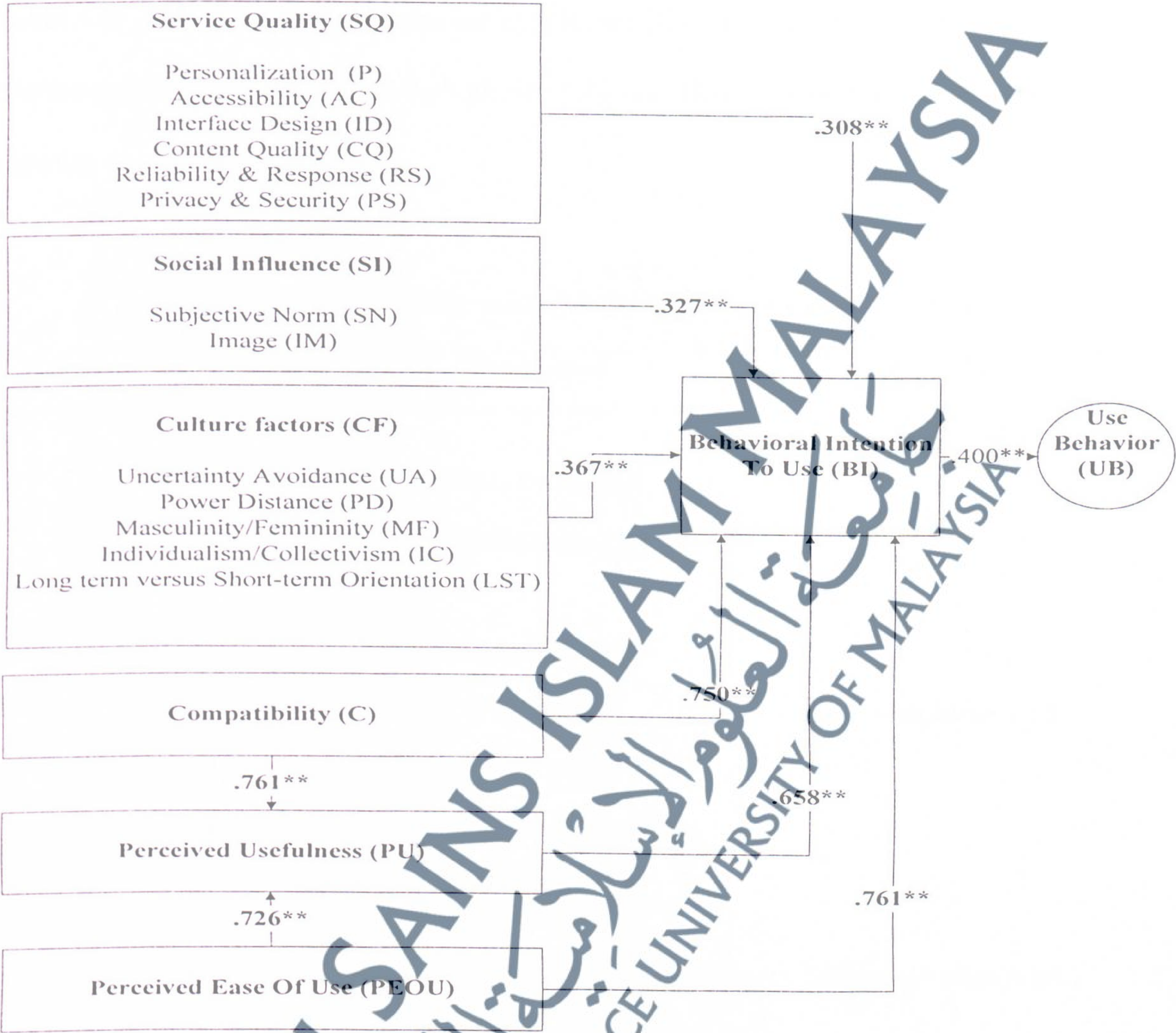


Figure 4.8: Correlational Model

4.7.2 Hypotheses Tests - Regression Model

A multiple regression analysis is performed in order to assess the influences between the factors in the proposed research model. All hypotheses test indicate some influences between constructs. The analysis is conducted in three regression models, as shown in

Table 4.47. The first model contains six hypotheses (H2, H3, H4, H5, H9 and H7), while, the second model contains two hypotheses (H6 and H8). In addition, the third model contains one hypothesis (H1).

Table 4.47: Regression Model and Hypotheses

Model	Hypotheses	Independent	Dependent
1	H2	Service Quality(SQ)	Behavioral Intention (BI)
	H3	Social Influence (SP)	
	H4	Culture Factor (CF)	
	H5	Compatibility (C)	
	H9	Perceived Usefulness (PU)	
	H7	Perceived Ease of Use (PEOU)	
2	H6	Compatibility (C)	Perceived Usefulness (PU)
	H8	Perceived Ease of Use (PEoU)	
3	H1	Behavioral Intention (BI)	Use Behavior(UB)

4.7.2.1 Hypotheses Test in Regression Model for Behavioral Intention (BI)

Model 1, with behavioral intention as the dependent variable together with service quality, social influence, culture factor, compatibility, perceived usefulness and perceived

ease of use as the independent variables, was analysed using the multiple regression analysis. The results can be referred in Table 4.48.

As indicated by (Hair et al., 1998), the coefficient of determination (R^2) is employed when the researcher wishes to measure the fraction of the total variance of the dependent variable with respect to its mean described by the independent variables or the predictor variables. If the R^2 value obtained is high, then, the regression model's explanatory power will be good. In this study, the regression model R^2 value obtained for the dependent variable behavioral intention (BI) is 0.653. This indicates that 65.3 percent of the total variance in behavioral Intention (BI) of students is described by the regression model. Additionally, the value obtained (0.653) is regarded as high. As such, the regression model's power is considered as good. This implies that the model is significant statistics-wise ($F=117.269$, $p<0.001$). Further, the regression coefficients' values as well as their significance, establishes the factors comprised in the model.

Simply put, as illustrated by Table 4.48, the regression model validates the hypotheses below:

- H2: SQ---BI there is a positive relationship between service quality and behavioral Intention of m-learning ($\beta=0.085$, $P<0.05$).
- H3: SI-----BI there is a positive relationship between Social Influence and behavioral Intention of m-learning ($\beta=0.132$, $P<0.001$).

- H4: CF-----BI there is a positive relationship between culture factor and behavioral Intention of m-learning ($\beta=0.101$, $P<0.001$).
- H5: C-----BI there is a positive relationship between compatibility, and behavioral Intention of m-learning ($\beta=0.331$, $P<0.001$).
- H9: PU-----BI there is a positive relationship between perceived usefulness and behavioral Intention of m-learning ($\beta=0.136$, $P<0.001$).
- H7: PEOU---BI there is a positive relationship between perceived Ease of Use and behavioral Intention of m-learning ($\beta=0.456$, $P<0.001$).

Table 4.48: Regression Results for Dependent Variable Behavioral Intention (BI)

ANOVA (b)						
Model		Sum of Squares	df	Mean Square	F	p..
1	Regression	113.652	6	18.942	117.269	.000 ^a
	Residual	60.411	374	.162		
	Total	174.063	380			

Coefficients (a)						
Model		Unstandardized		S.zed		
		B	Std. Error	Beta	t	P.
1	(Constant)	.928	.243		3.820	.000
	SQ	.163	.070	.085	2.322	.021
	SI	.140	.039	.132	3.582	.000

CF	.160	.055	.101	2.883	.004
C	.307	.056	.331	5.499	.000
PU	.137	.050	.136	2.732	.007
PEOU	.445	.056	.456	7.914	.000

4.7.2.2 Hypotheses Test in Regression Model for Perceived Usefulness (PU)

The multiple regression analysis was used in testing Model 2 with perceived usefulness (PU) as the dependent variable, and together with external factors (Compatibility (C) and perceived ease of use (PEoU)) as the independent variables. Table 4.49 presents the obtained results.

The Table 4.49 demonstrates that the external factors elucidate a significant variance percentage in perceived usefulness (PU) ($R^2 = 0.609$, $F=293.937$, $P<0.001$). Therefore, Compatibility (C) and perceived ease of use (PEoU) factors explain 60.9 percent of the total variance in students' perceived usefulness. Additionally, all hypotheses are supported. Table 4.49 specifically exhibits that the regression model supports the hypotheses presented below:

- H1: C---PU there is a positive relationship between Compatibility and perceived usefulness of m-learning ($\beta=0.509$, $P<0.001$).
- H1: PEoU---PU there is a positive relationship between perceived ease of use and perceived usefulness of m-learning ($\beta=0.304$, $P<0.001$).

Table 4.49: Results of Regression for Dependent Variable of Perceived Usefulness (PU)

Model	R	R ²	Adjusted R ²	Std. Error of the Estimate	
2	.780 ^a	.609	.607	.422	

ANOVA (b)					
Model	Sum of Squares	df	Mean Square	F	P.
2	104.470	2	52.235	293.937	.000 ^a
	67.174	378	.178		
	171.643	380			

Coefficients (a)					
Model	Unstandardized Coefficients		Standardized Coefficients		P.
	B	Std. Error	Beta	t	
2 (Constant)	.943	.121		7.825	.000
C	.469	.053	.509	8.865	.000
PEOU	.294	.056	.304	5.295	.000

4.7.2.3 Hypotheses Test in Regression Model for Use Behavior (UB)

The multiple regression analysis was employed when Model 3 was tested, with perceived Use behaviour (UB) as the dependent variable, and together with external factor (behavioral Intention (BI) as the independent variable. Table 4.50 presents the results obtained. The results obtained show that the external factors elucidate a significant percentage of variance in Use behavior (UB) ($R^2 = 0.160$, $F=72.360$, $P<0.001$). Therefore, the factor of behavioral Intention (BI) explains 16.00% of the total variance in students' Use behavior (UB) of m-learning. Additionally, all hypotheses are supported. Specifically, Table 4.50 highlights that the regression model supports the following formulated hypotheses:

- H1: BI--- there is a positive relationship between behavioral Intention (BI) and Use behavior (UB) of m-learning ($\beta=0.400$, $P<0.001$).

Table 4.50: Regression Results for Dependent Variable Use Behavior (UB)

Model	R	R ²	Adjusted R ²	Std. Error of the Estimate
3	.400 ^a	.160	.158	.638

ANOVA (b)					
Model		Sum of Squares	df	Mean Square	F
3	Regression	29.463	1	29.463	72.360
	Residual	154.320	379	.407	
	Total	183.783	380		

Coefficients ^a					
Model	Unstandardized Coefficients		Standardized Coefficients		P.
	B	Std. Error	Beta	t	
3 (Constant)	1.943	.176		11.054	.000
BI	.453	.047	.445	9.669	.000

Additionally, multiple regression assumptions were analysed for each test of regression. In relation to this, the complete SPSS for regression assumptions outputs can be referred in Appendix C. Further, it should be noted that the testing assumptions are based on Hair et al., (1998) guidelines and they are, in no particular order, as below:

- Error term (residuals) distribution's normality is conducted via by visual assessment of histograms.
- Homoscedasticity or constant variance of the error terms or residuals is conducted by examining a plot of the standardized residuals against predicted values. If there is no pattern detected on the plot (usually a random pattern), then, the residuals are regarded as are homoscedastic.

- Multicollinearity or the correlation amongst independent variables which are at least three in number. Multicollinearity can impart significant impact on the regression model's outcomes and thus, each independent variable's contribution is difficult to ascertain. As such, non-collinearity is preferred. The two tests conducted for multicollinearity are the tolerance value, which entails the variability sum of the independent variable unexplained by other independent variables, and the variance inflation factor (VIF) which entails the opposite of tolerance. High collinearity is signified by values of tolerance that are small or of VIF that are large. Additionally, tolerance has a general cut-off threshold value of 0.10 while VIF, of 10.
- Observations that have a large residual value, i.e., discrepancy between the real and approximated value, are called the outliers. Outliers can only be ascertained based on a particular regression model. It should be noted that outliers do not always affect the regression model. As such, careful management of outliers is advised. A standard score of $\geq \pm 3.0$ is one of the criteria for testing outliers. In order to test the degree of outlier's influence, the leverage statistic and Cook's distance are employed and outliers that are found to impart influence must be eliminated. Leverage statistics determine the cases that affect the model of regression more than others, while Cook's distance assesses the effect of eliminating a particular observation. Cook's distance values that are larger demonstrate that leverage is unusual. For leverage, the rule-of-thumb value is ≤ 0.20 while for Cook's distance, the value is ≥ 1.0 .
- The assumption of linearity between dependent and independent variables is analysed via the residuals' normal probability plot (P-P).

In this study, the researcher has the assumptions tested and found no blatant violations. The tests were done repetitively in all of this study's regression analyses. The normality, linearity, multicollinearity, and homoscedasticity's outcomes were all acceptable i.e., blatant violations were not found.

4.7.2.4 Summary of Hypotheses Testing – Regression

In summary, the predictive model entails 65.3% of the variance in behavioral intention (BI) which is directly explained by service quality, social influence, culture, compatibility, perceived usefulness and perceived Ease of Use. Additionally, the model accounts for 60.9% of the variance in perceived usefulness (PU) which is directly elucidated by compatibility and perceived Ease of Use. The total variance (16.00%) explained in Use behavior (UB) is directly explained by behavioral intention (BI). The predictive models with R^2 and path coefficients in the research model are illustrated in Figure 4.9. The next section probes into each factor's variables that are deemed as having the most capacity of significantly predicting m-learning acceptance amongst students.

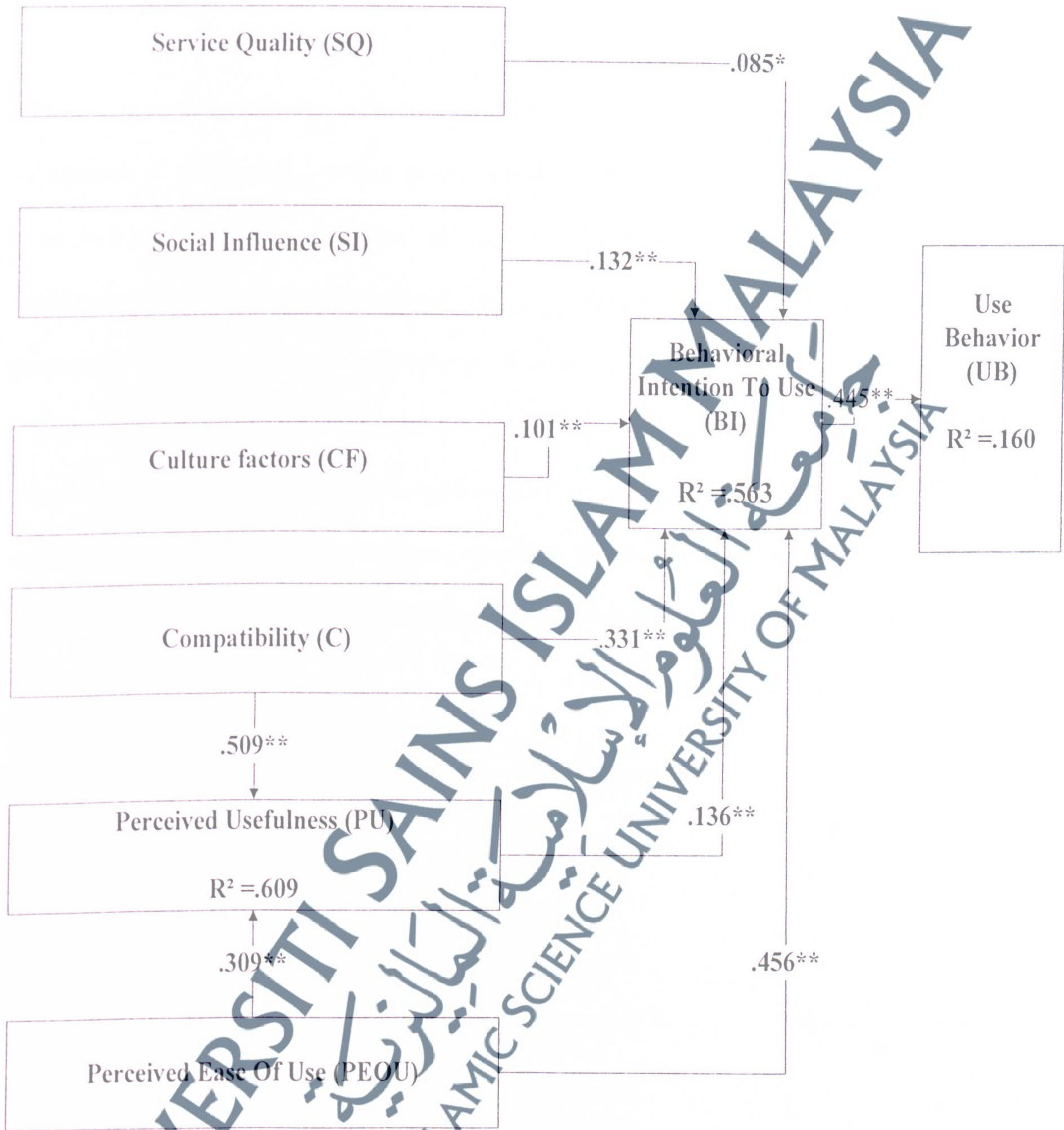


Figure 4.9: Predictive Model with R² and Path Coefficients

4.7.3 Critical Variables

The second research question (What are the factors and variables that could influence the acceptance of m-learning services among the students?) was addressed using a stepwise regression analysis. The use of this instrument helps in identifying the most influential variables under the factors of social influence, service quality and culture that could form prediction on the acceptance of students of m-learning. Here, via stepwise regression analysis, the information on the relationship between the independent variables and the dependent variable can be obtained. Additionally, as articulated by (Hair et al., 1998), the instrument can also present the degree to which the dependent variables can elucidate variation in the dependent variable. The analysis was conducted in three models, as simplified in Table 4.51.

Table 4.51: Stepwise Regression Models

Model	External factor	Independent	Dependent
Model 1	Service Quality	Accessibility (AC) Interface design(ID) Reliability and response (RS) Content quality(CQ) Personalization(P) Privacy/Security(PS)	Behavioral Intention (BI)
Model 2	Social Influence	Subjective Norm (SN) Image (IM)	Behavioral Intention (BI)

Model 3	Culture factor	Uncertainty Avoidance (UA)	Behavioral Intention (BI)
		Power Distance(PD)	
		Masculinity and Femininity (MF)	
		Individualism and Collectivism (IC)	
		Long term versus Short-term Orientation (LST)	

Table 4.52 the stepwise regression analysis for the dependent variable is highlighted where behavioral intention (BI) and service quality make up the independent variables (accessibility (AC), interface design (ID), reliability and response (RS), content quality (CQ), personalization (P), and privacy/security (PS)). Change in r^2 that δr^2 is analysed to ascertain the contribution of each predictor (Hayes, 1998).

Similarly, the regression model was employed to predict the service quality. It is found that the ΔR^2 for personalization is 0.395 at $p<0.001$. At similar significant level ($p<0.001$), Meanwhile, the reliability and response was tested at $p<0.05$. It was found that the ΔR^2 is 0.008. Hence, this study deduced that personalization, and reliability and response are the most important or influential variables for service quality factor in predicting behavioral intention and thus, indirectly, contribute to the acceptance of m-learning.

Table 4.52: Stepwise Regression Model Summary: Service Quality Variables as Predictors of Behavioral Intention (BI)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change
						F Change	df1	df2	
1	.628 ^a	.395	.393	.527	.395	247.358	1	379	.000
2	.635 ^b	.403	.399	.524	.008	4.860	1	378	.028

a. Predictors: (Constant), P
b. Predictors: (Constant), P, RS
c. Dependent Variable: BI

Table 4.53: Summaries of the Results for Stepwise Regression Analysis

External factor	Independent	Dependent	Significant / Not Significant
Service Quality (SQ)	Personalization(P)		Significant
	Reliability and response (RS)	Behavioral Intention (BI)	Significant
	Interface design(ID)		Not Significant
	Accessibility (AC)		Not Significant
	Privacy/Security(PS)		Not Significant
	Content quality (CQ)		Not Significant

In Table 4.54 indicates the dependent variable’s stepwise regression analysis in which behavioral intention (BI) and social influence make up the independent variables namely subjective norm and image. Change in R² that ΔR² is investigated so that each contribution of predictor can be ascertained (Hayes, 1998). For behavioral intention, the ΔR² for subjective norm (SN) is 0.202, at p<0.001 significant level. Also, image (IM) entails the value of 0.018, p<0.05 significant level. Hence, it could be deduced that

subjective norm and image are the most important or influential variables for social influence in predicting behavioral intention and thus, indirectly, signifies the acceptance of m-learning.

Table 4.54: Stepwise Regression Model Summary: Social Influence Variables as Predictors of Behavioral Intention (BI)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change
						F	df1	df2	
1	.450 ^a	.202	.200	.605	.202	96.067	1	379	.000
2	.469 ^b	.220	.216	.599	.018	8.486	1	378	.004

a. Predictors: (Constant), SN
b. Predictors: (Constant), SN, MI
c. Dependent Variable: behavioral intention (BI)

Table 4.55: Summaries of the Results for Stepwise Regression Analysis

External factor	Independent	Dependent	Significant / Not Significant
Social Influence	Subjective Norm (SN)	Behavioral Intention (BI)	Significant
	Image (IM)		Significant

The analysis of stepwise regression for the dependent variable can be referred in Table 4.56. Here, behavioral intention (BI) and culture make up the independent variables (Uncertainty Avoidance, Power Distance, Masculinity and Femininity, Individualism and Collectivism, Long term versus Short-term Orientation). Change in R² that ΔR^2 is investigated to ascertain the contribution of each predictor (Hayes, 1998). For behavioral intention, the ΔR^2 for uncertainty avoidance (UA) is 0.396 at $p < 0.001$ significant level. Also, the ΔR^2 for power distance is 0.008, at $p < 0.05$ Hence, it could be deduced that

uncertainty avoidance (UA) and power distance (PD) are the most important or influential variables for culture factor in predicting behavioral intention (BI) and thus, indirectly, contribute to the acceptance of m-learning.

Table 4.56: Stepwise Regression Model Summary: Culture Factor Variables as Predictors of Behavioral Intention (BI)

Model	R	R Square		Adjusted R Square	Std. Error of the Estimate	Change Statistics				
						R Square Change	F Change	df1	df2	Sig. F Change
1	.629 ^a	.396		.395	.527	.396	248.668	1	379	.000
2	.636 ^b	.404		.401	.524	.008	4.949	1	378	.027
a. Predictors: (Constant), UA										
b. Predictors: (Constant), UA, PD										
c. Dependent Variable: BI										

Table 4.57: Summaries of the Results for Stepwise Regression Analysis

External factor	Independent	Dependent	Significant / Not Significant
Culture Factor (CF)	Uncertainty Avoidance (UA)		Significant
	Power Distance (PD)	Behavioral Intention (BI)	Significant
	Individualism and Collectivism (IC).		Not Significant
	Masculinity and Femininity (MF)		Not Significant
	Long term versus Short-term Orientation (LST)		Not Significant

4.8 Group Analysis

Probing into the level each variable of m-learning services, namely, service quality, social influence, culture, compatibility, perceived usefulness, perceived ease of use, behavioral intention to use and use behaviour, to see if differences exist across the respondents' profile even though not part of the study's objectives is indeed an interesting task. As much as it is interesting, the task is undertaken to provide further comprehension on the use behaviour adoption among the students in higher education institutions in Malaysia. Then, a one-way ANOVA was performed to probe into the impact of age, gender and background of education on the levels of service quality, social influence, culture, compatibility, perceived usefulness, perceived ease of use, behavior intention to use and use behavior. This task is detailed in the next section.

4.8.1 Level of All Variables by Age

The test was performed on 4 age groups: under 20 years, between 20-24 years, between 25-30 years and above 31 years. The outcome of the test demonstrate no statistically significant difference for the factor of service quality ($F = .574$; $p = .682$), social influence ($F = .705$; $p = .589$), culture ($F = .951$; $p = .435$), compatibility ($F = 1.499$; $p = .202$), perceived usefulness ($F = 2.201$; $p = .068$), perceived Ease of Use ($F = .727$; $p = .574$), behavior intention to Use ($F = .880$; $p = .476$), and use behavior ($F = .729$; $p = .573$). The results of the test are summarised in Table 4.58.

Table 4.58: All Variables by Age

Variable	Age	N	Mean	Std. Deviation	F Value	Sig. (P value)
Service Quality	18-24	324	3.74	.368	.574	.682
	25-29	32	3.78	.233		
	30-34	12	3.79	.224		
	35-39	9	3.79	.352		
	More than 40	4	3.53	.299		
Social Influence	18-24	324	3.67	.665	.705	.589
	25-29	32	3.76	.445		
	30-34	12	3.85	.383		
	35-39	9	3.93	.332		
	More than 40	4	3.65	.755		
Culture	18-24	324	3.78	.442	.951	.435
	25-29	32	3.81	.317		
	30-34	12	3.94	.390		
	35-39	9	3.71	.343		
	More than 40	4	3.50	.451		
Compatibility	18-24	324	3.69	.743	1.499	.202
	25-29	32	3.85	.633		
	30-34	12	3.83	.718		
	35-39	9	4.07	.364		
	More than 40	4	4.25	.739		
Perceived Usefulness	18-24	324	3.74	.690	2.201	.068
	25-29	32	4.03	.551		
	30-34	12	4.03	.489		
	35-39	9	3.96	.410		
	More than 40	4	4.15	.443		
Perceived Ease Of Use	18-24	324	3.70	.706	.727	.574
	25-29	32	3.83	.618		
	30-34	12	3.92	.556		
	35-39	9	3.91	.459		
	More than 40	4	3.65	1.170		
Behavior Intention	18-24	324	3.70	.663	.880	.476
	25-29	32	3.75	.796		
	30-34	12	3.98	.719		
	35-39	9	4.00	.468		
	More than 40	4	3.75	1.041		
Use Behavior	18-24	324	3.59	.718	.729	.573
	25-29	32	3.75	.508		
	30-34	12	3.79	.582		
	35-39	9	3.61	.601		
	More than 40	4	3.88	.629		

4.8.2 Level of All Variables by Education Background

The test was run on 4 Education Background groups: art studies, science and business. The test outcomes demonstrate that the mean for each of the variables (service quality, social influence, culture, compatibility, perceived usefulness, perceived ease of use, behavioral intention to use and use behavior) indicates no statistically significant difference by education backgrounds for respondents. The results of the test are summarised in Table 4.59.

Table 4.59: All Variables by Education Background

Variable	Education	N	Mean	Std. Deviation	F Value	Sig. (P value)
Service Quality	Arts	27	3.76	.313	.404	.668
	Sciences	194	3.73	.363		
	Business	160	3.76	.351		
Social Influence	Arts	27	3.81	.587	1.657	.192
	Sciences	194	3.63	.678		
	Business	160	3.73	.590		
Culture	Arts	27	3.76	.313	1.365	.257
	Sciences	194	3.73	.363		
	Business	160	3.76	.351		
Compatibility	Arts	27	3.81	.802	.256	.775
	Sciences	194	3.71	.716		
	Business	160	3.73	.737		
Perceived Usefulness	Arts	27	3.78	.751	.033	.968
	Sciences	194	3.78	.694		
	Business	160	3.80	.635		
Perceived Ease of Use	Arts	27	3.79	.721	.148	.862
	Sciences	194	3.72	.689		
	Business	160	3.71	.702		
Behavior Intention	Arts	27	3.72	.602	.014	.986
	Sciences	194	3.72	.667		
	Business	160	3.73	.704		
Use Behavior	Arts	27	3.69	.695	.151	.860
	Sciences	194	3.61	.665		
	Business	160	3.61	.735		

4.8.3 Level of All Variables by Gender

With respect to gender, the independent t-test was employed to ascertain its differences with the level of service quality, social influence, culture, compatibility, perceived usefulness, perceived ease of use, behavioral intention to use and use behavior. The test outcomes suggest that at the level of $p < .05$, no variable showed statistically significant difference. The results of the test are summarised in Table 4.60.

Table 4.60: Group Statistics in Terms of Gender

Variable	Gender	N	Mean	Std. Deviation	F Value	Sig. (P value)
Service Quality	Male	137	3.77	.422	1.581	.209
	Female	244	3.73	.309		
Social Influence	Male	137	3.70	.605	.050	.824
	Female	244	3.68	.656		
Culture	Male	137	3.84	.351	3.409	.066
	Female	244	3.75	.466		
Compatibility	Male	137	3.73	.703	.024	.877
	Female	244	3.72	.746		
Perceived Usefulness	Male	137	3.73	.703	.952	.330
	Female	244	3.72	.746		
Perceived Ease of Use	Male	137	3.75	.652	.344	.558
	Female	244	3.70	.719		
Behavioral Intention	Male	137	3.79	.658	2.256	.134
	Female	244	3.69	.685		
Use Behavior	Male	137	3.59	.654	.232	.630
	Female	244	3.63	.719		

The level of service quality, social influence, culture, compatibility, perceived usefulness, perceived ease of use, behavioral intention to use and use behavior among the

students of the higher education setting in Malaysia is summarised. The study found that each variable does not indicate a statistically significant difference at the $p < .05$ level.

4.9 Summary of Research Achievements

This study is commenced by an exploration of the research problem, research questions, research objectives, and the study's significance. Then, a comprehensive review on the body of literature on the relevant field is presented to anchor the research. Afterwards, the researcher establishes the model of research model as well as the relevant hypotheses in accordance with the inputs obtained from preliminary study, past researches and relevant theories. After that, research methodology is illustrated which leads to data collection and series of analyses via selected statistical instruments.

Eventually, this chapter recaps the obtained results as well as the achievements of this study, together with the outcomes of hypotheses testing and research questions. Additionally, this chapter also concludes the study by addressing its implications, describing limitations, and mentioning the opportunities for future research.

Briefly, this concluding chapter reflects on the findings of the following research objectives as stated in Chapter 1.

1. To investigate students' awareness and requirements regarding mobile learning services in the higher education environment.

2. To identify the factors and variables that influence the acceptance of m-learning services among students.
3. To identify the relationship between compatibility and perceived ease of use and perceived usefulness.

As indicated previously, this study probes into the students' acceptance of behavior intention to use m-learning and its impact on usage behavior in the higher education setting. In particular, this section deliberates the achievements of the study based on the research questions.

4.9.1 Research Question One (RQ 1)

A preliminary survey was done to address the first research question. The use of survey was to explore awareness and requirements of students with respect to m-learning services in the higher education setting.

The study established the foundation of knowledge with respect to the current condition of students' awareness as far as m-learning services are concerned. It was discovered that the infrastructure of mobile technology that is required for the effective adoption of m-learning is already available in the higher education setting. Additionally, the data obtained from the survey demonstrate that students do have sufficient awareness and understanding in the utilization of the said technology in their learning environment. Further, in terms of the mobile applications (in the context of the university) that students

also in agreement with Kuruuzum and Koksai (2010) who documented that perceived service quality within the hospitality industry impacts behavioral intention.

Thus, owing to its significant effect being widely supported in the literature available, the influence imparted by this factor (the service quality factor) is anticipated. Therefore, it is anticipated that a student who viewed the system of m-learning as functioning, interactive, and responsive will be positively encouraged to effectually involve him/herself in his/her mobile device which will ultimately improve his/her acceptance level.

Further, as indicated by the findings, the factor of social influence appears to be positively and significantly linked with the behavioral Intention to Use. This finding is in support to the findings of (Mardikyan et al., 2012; Al-matari et al., 2013; Dhaha and Ali 2014). In particular, Mardikyan et al., (2012) recent research has demonstrated that the factor of social influence has significant and positive linkage with behavioral Intention to Use and owing to this, the aforesaid factor should be regarded as vital in the domain of mobile advertising. Likewise, the findings of Venkatesh et al., (2005) have demonstrated that the factor of social influence has significant effect on the acceptance of consumer and information technology use, and it also directly impacts their behavioral intention to use towards the use of consumer. Additionally, the findings demonstrate that the factor of culture which comprises of uncertainty avoidance, power distance, masculinity/femininity, and long-term versus short-term orientation, is significantly and positively linked with behavioral Intention to Use. In fact, numerous scholars have collectively established the status of these variables as the positive fundamental variables

in the domain of technology acceptance (Al-Khaldi & Wallace, 1999; Srite, 2000, 2006; Al-Sukkar, 2005; Al-Qasa et al., 2013). In actuality, the findings were also in line with Hofstede's (1991) original dimensions as well as with Alamri et al., (2005) which demonstrate that the factor of culture possesses strong and positive association with behavioral Intention to Use internet in the context of personalised web-based education.

Similarly, the dimensions of culture shows a strong and positive associations with the design of web and interface acceptance of users (Myers & Tan, 2002). Additionally, a study by (Srite 2000), had concluded that the dimensions of culture appear to be significantly positively linked with users' acceptance or resistance to employ the system proposed. Lastly, the findings obtained by the current study are also in support of Kovačić's (2005) investigation on the influence of the dimensions of national culture on the readiness of web E-government. In particular, the author had discovered that countries with high level of uncertainty avoidance appear to demonstrate lower level of acceptance and readiness in taking in new ICTs, while the counterparts with low level of uncertainty avoidance appear to demonstrate higher level of willingness to take in the new ICTs owing to their capacity in enduring the risk of failed implementation.

With regard to compatibility, the findings attained demonstrate that this factor is positively and significantly linked with behavioral Intention to Use. This is in support of the past works by (Chemingui and Ben 2013; Assibey 2015). In particular, Assibey's (2015) study has demonstrated that compatibility imparts significant influences on the mobile money and information technology use and directly impacts users' behavioral intention to use towards the use of consumer. (Likewise et al., 2013) had demonstrated

that compatibility has significant and positive relationship with behavioral Intention to Use and thus, this factor should be treated as a key factor in paying mobile. In terms of the factor of the perceived ease of use, the findings attained demonstrate that it is positively and significantly linked with behavioral Intention to Use. This is in support to the past works by (Ramayah and Ignatius 2005; Jeon et al., 2015). In particular, Ramayah and Ignatius's (2005) investigation found that the factor of Perceived Ease of Use has significant and positive relationship with behavioral Intention to Use, which means that this factor should be regarded as an important factor in online shopping. Likewise, Jeon et al., (2015) documented that the factor of Perceived Ease of Use imparts significant impact on the Smartphone Application Acceptance, and directly influences users' behavioral intention to use towards the use.

With respect to the factor of the perceived usefulness, the findings attained demonstrate that the aforesaid factor has positive and significant association with behavioral Intention to Use. This finding is in agreement with those by (Tajudeen et al., 2013) and Jeon et al., (2015). In particular, the findings by (Tajudeen et al., 2013) demonstrate that the factor of perceived usefulness significantly affects the acceptance of student towards mobile learning and it also directly impacts students' behavioral intention to utilise mobile learning. Jeon et al., (2015) support these findings when their recent investigation demonstrates that the factor of Perceived Ease of Use factor is significantly and positively linked with behavioral Intention to Use and therefore should be treated as a vital factor in the Acceptance of Smartphone Application.

Thus, as demonstrated by the results, the external factors which comprise of service quality, social influence, culture factors, compatibility, perceived usefulness, and perceived ease of use, determine m-learning acceptance. Apart from that, the findings also show that the factors of compatibility and perceived ease of use are the determiners of the perceived usefulness factor. Therefore, this study recommends that the model investigating the m-learning acceptance among students of higher education institutions in Malaysia should be as illustrated in Figure 4.10 and Figure 4.11.

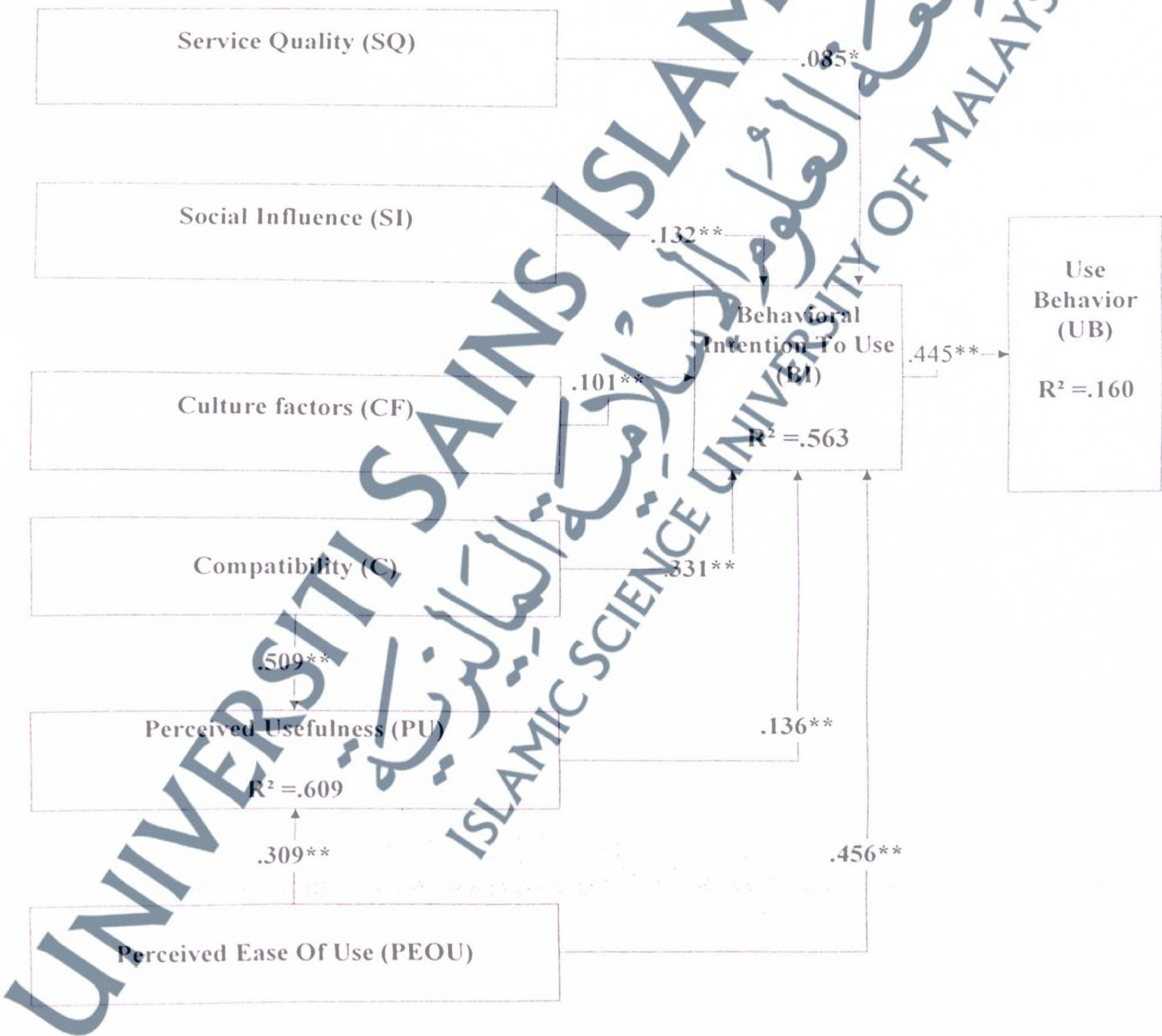


Figure 4.10: Regression Model

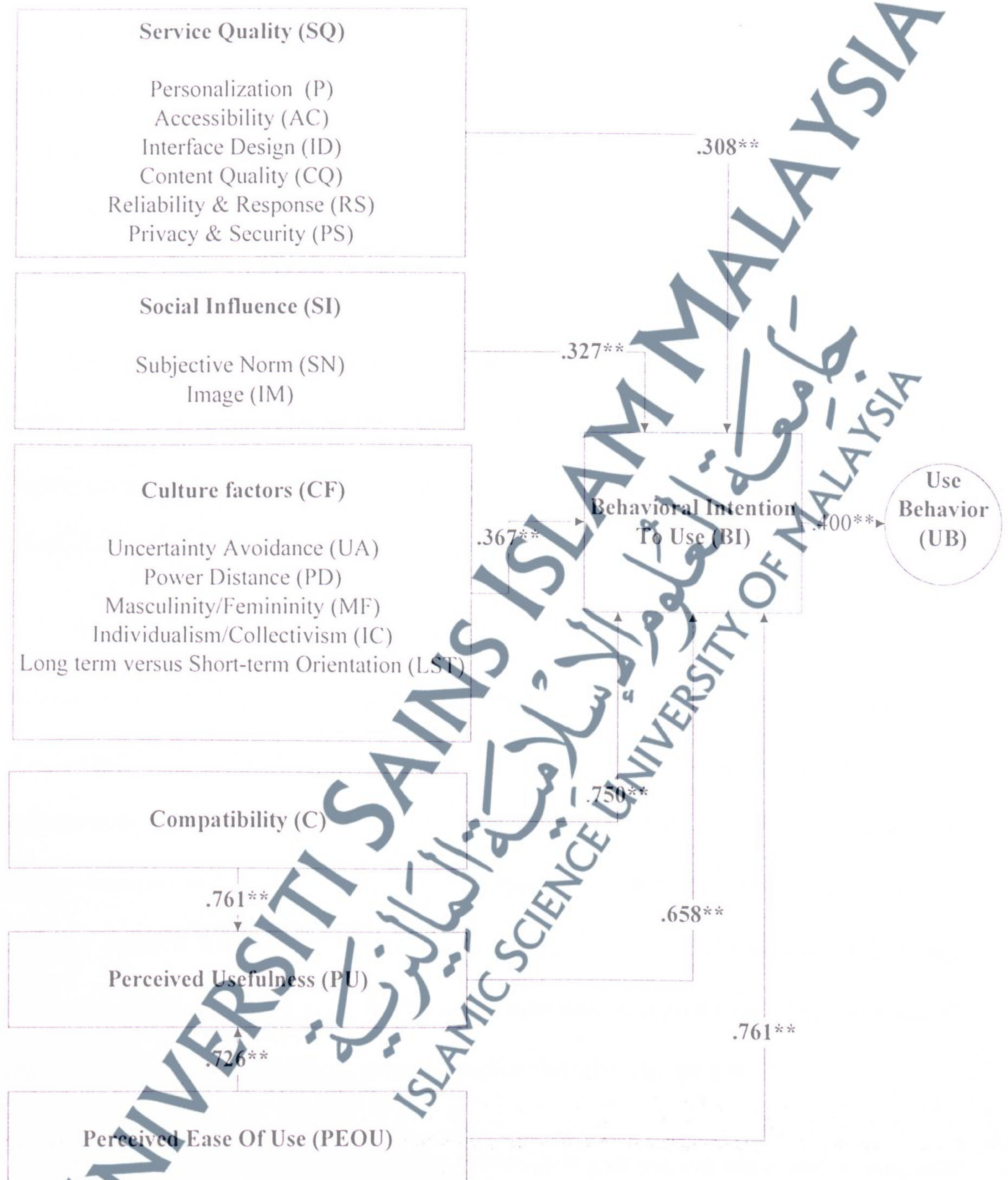


Figure 4.11: Correlational Model

Also, research question two number entails the exploration of the variables that are the most influential to each external factor that would significantly foretell the acceptance of students towards m-learning by way of Behavioral intention to use. Specifically, RQ three was developed to find out the variables that are the most influential to the factors of service quality, social influence and culture.

The service quality variables' last variables are: accessibility, interface design, reliability/response, content quality, personalization, and privacy/security. Based on the findings, personalization and reliability/response are the best predictors of behavioral intention to use under this factor (Service Quality factor).

On the other hand, results on reliability/response and privacy/security appear to contradict the findings of Lin and Wu (2002) who had expanded the Technology Acceptance Model by adding the constructs of online service quality. These contradicting outcomes could be caused by the decreased focus on the system accessibility, interface design content quality, and privacy/security problems after the birth of the new m-learning systems which are improved and updated offered by the national E-learning centre. Meanwhile, the students may have the intention to evaluate the characteristics of the newly offered system such as personalization and reliability/response.

Meanwhile, the variables of social influence are subjective norm and image, and they are found to significantly affect the behavioral intention to use and hence, the m-learning acceptance. In relation to this, numerous scholars in the pertinent field are in agreement that this variable is a positive significant variable in technology acceptance

domain (Ong et al., 2006; Chi Lee, 2010; Punnoose, 2012). In particular, the findings from study demonstrate that both subjective norm and image are strongly linked with behavioral intention to use. One probable rationale for this is that students in Malaysia have a decent mobile device use experience.

In terms of the culture variables, it is found that power distance and uncertainty avoidance significantly affect behavioral intention to use, and hence, the m-learning acceptance. These results are in agreement with those by Ammar and Hamad (2008) who came to a conclusion that uncertainty avoidance and power distance are crucial determiners of the reactions of individual towards e-learning adoption. In relation to this, Azam and Quaddus (2012) delved into the effects of internal and external factors of SMEs' internet-based digital technology use in developing nation to ascertain the factors that may influence SMEs in developing country. Based on the outcomes, the authors came to a conclusion that power distance and uncertainty avoidance impart significant effect on the behavioral intention to use.

Contrariwise, in their study, Azam and Quaddus (2012) found that the variables of masculinity/femininity, individualism/collectivism and long-term versus short-term orientation are not significantly influencing behavioral intention to use. Thus, this research proposes that the model for examining the acceptance of m-learning amongst higher education institutions' students in Malaysia be developed as in Figure 4.12.

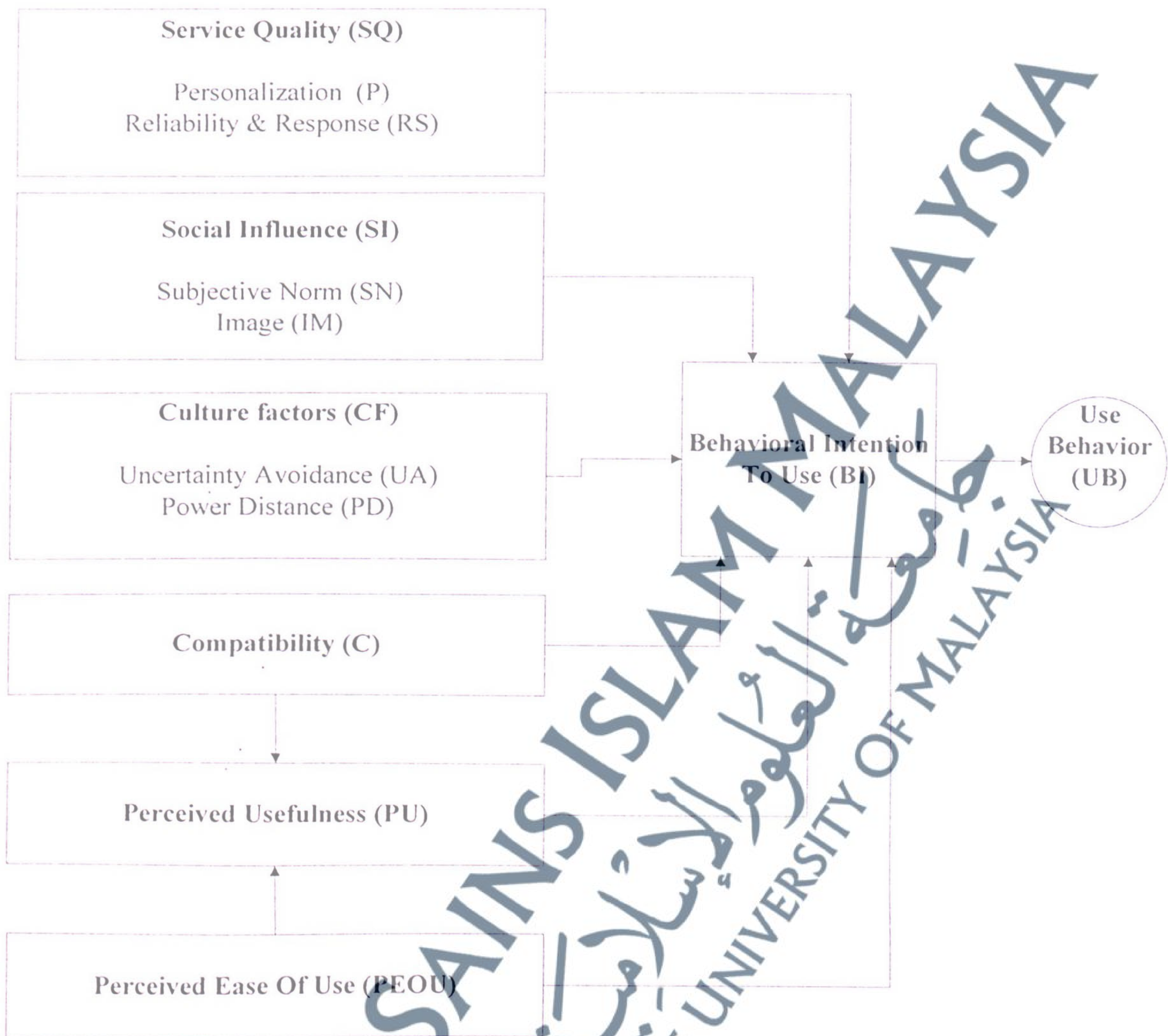


Figure 4.12: The Critical Variables Model

4.9.3 Research Question Three (RQ 3)

Research question number three (RQ 3) entails the exploration of the association between compatibility and perceived ease of use on perceived usefulness. Data analysis included two proposed hypotheses and the main research question was answered by the outcomes.

Amongst the differences factors of students, the factors of compatibility and perceived ease of use appear to be the most significant determiner to perceived usefulness, and therefore the finding is in line with the combination of the models of TAM and IDT, and some past researches (Lee & Suh, 2013; Tung et al., 2014). The models are shown in Figure 4.13 and Figure 4.14.

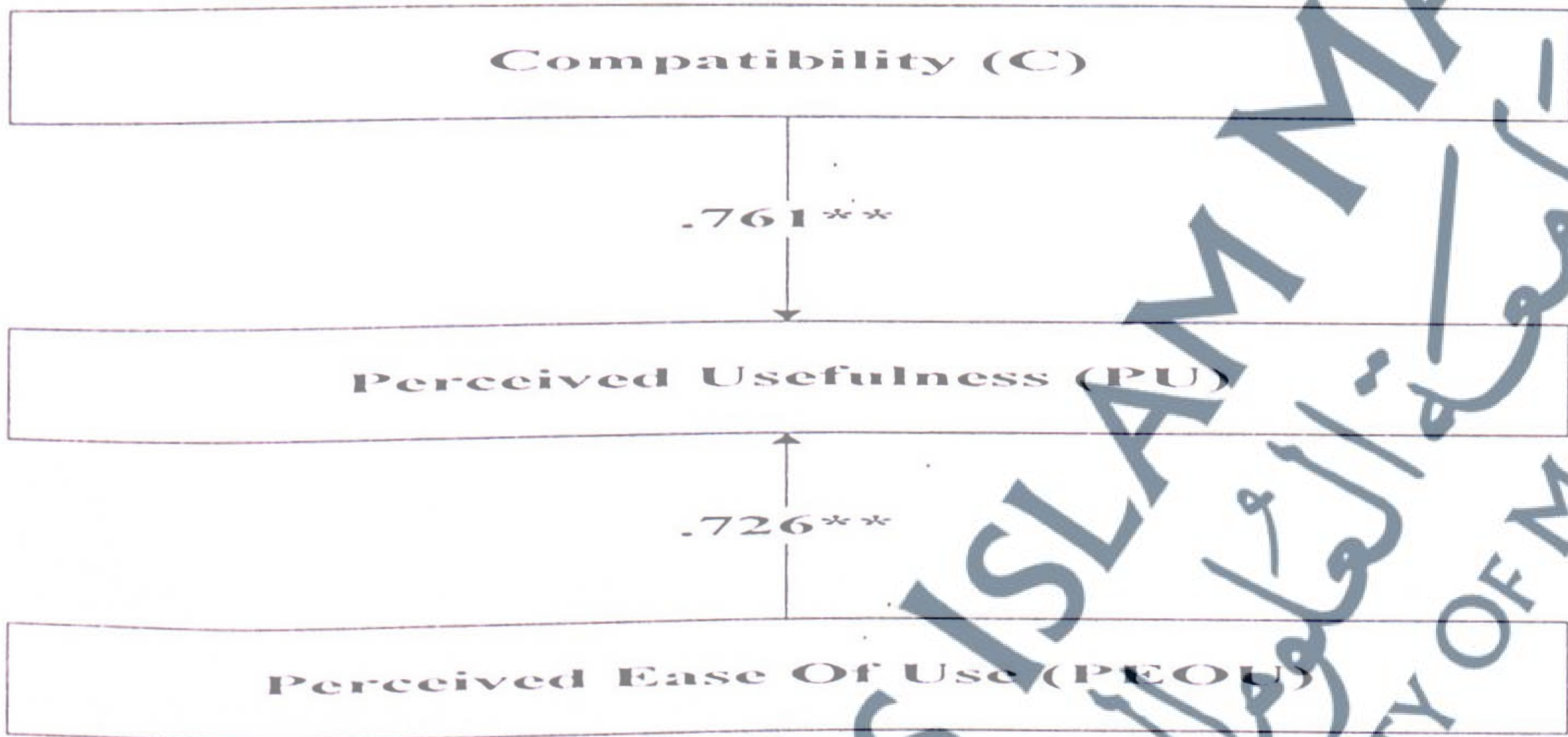


Figure 4.13: Research Hypothesis Correlation

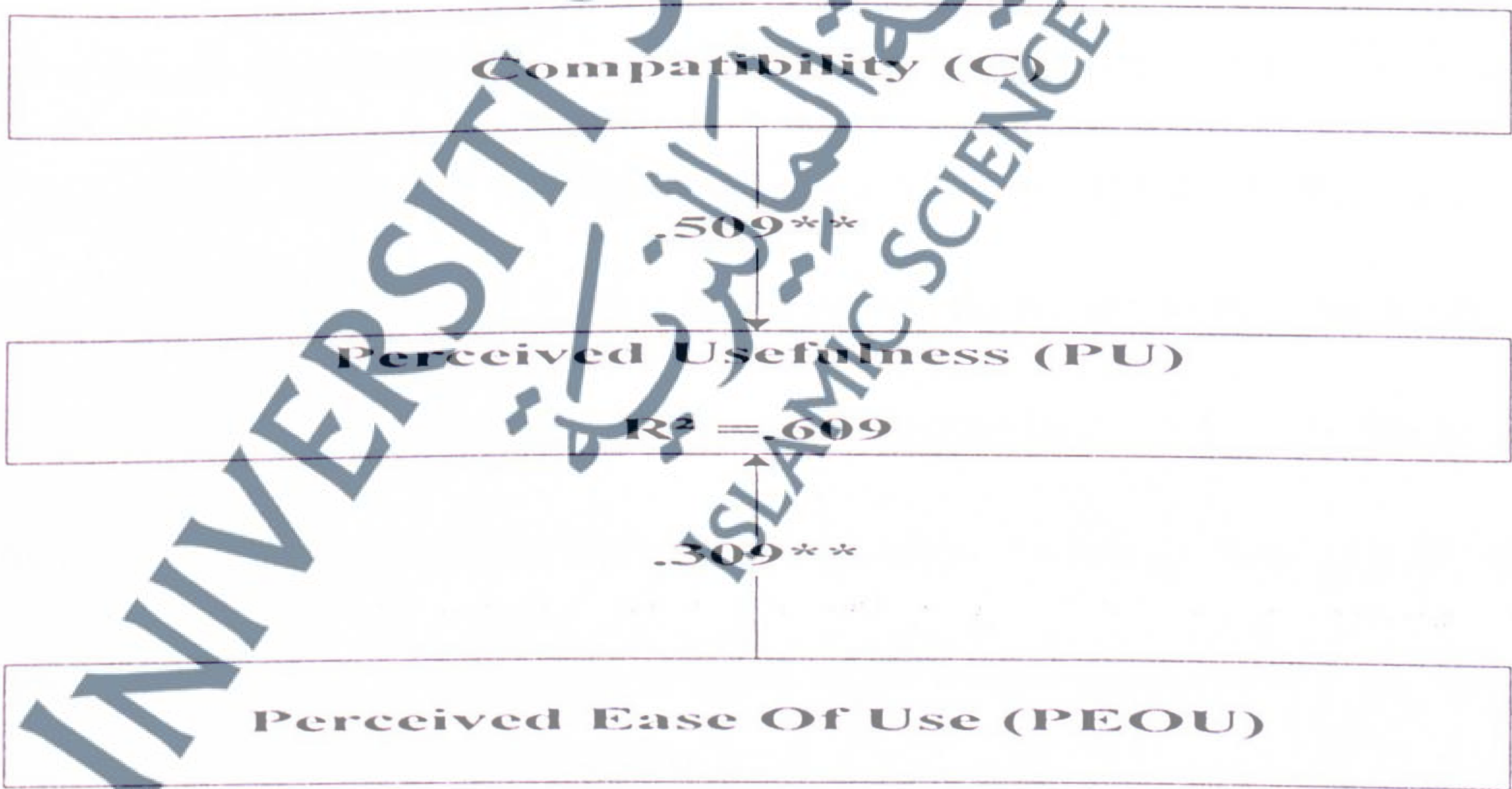


Figure 4.14: Research Hypothesis Regression