

Chapter 6

Measurement Model

6.1 Introduction

The demographic profiles of respondents and scale purification of total sample size ($N = 487$) are provided in this section. Confirmatory factor analysis is employed for scale purification on each latent construct and for measurement models for independent variables, mediating variables and dependent variables. Composite reliability and average variance extracted are computed to verify the internal consistency. Convergent and discriminant validity are assessed to identify that all measures are internally consistent, reliable and valid for the analysis of structural equation modeling. Multicollinearity is also identified to avoid any correlation problems between each variable in the conceptual model. Finally, the summary of measurement model results is provided.

6.2 Scale Purification: Main Study Construct Assessment

This section presents demographic profiles and confirmatory factor analysis (CFA) to analyze the scale purification of each latent construct. CFA is used to analyze the theoretical relationships between observable indicators and their theoretical constructs and how well a data set is suited to a hypothesized CFA model. In addition, this analysis is employed to assess the psychometric properties of measures. Convergent and discriminant validity and reliability properties are used to identify internal consistency and adequate fit of scale items. Measurement models of independent, mediating, and dependent variables are constructed to test the psychometric properties and unidimensionality of the measurement scale. The variables with low factor loadings (less than 0.40) and high residuals are deleted through an iterative process to receive a better model fit and more reliable constructs for further analysis of structural equation modeling. After the estimation of psychometric properties, the multicollinearity problem among the independent

variables is examined by employing the values of tolerance, variance factor analysis (VIF) and condition index.

6.2.1 Respondent Profile

Questionnaires are distributed to 520 hotel guests using judgmental and convenience samplings. The response rate of 94 percent yields 487 completed usable questionnaires. The results shows that the majority of the sample is male (53.4%), age between 35-44 years old (34.3%), holds a college degree (41.5%), is professional (23.2%), is married (55.2%), has an annual household income between US\$95,000-114,999, travels for leisure purposes (70.4%), is staying in this particular hotel for the first time (62%), is visiting on holiday (70.8%), makes their own decision to stay in the hotel (52.8%) and is a citizen of the USA (16.2%): refer Table 6.1.

Table 6.1: Respondents' Profile

Gender	Percentage (%)	Occupation	Percentage (%)
Male	53.4	Student	4.9
Female	46.6	Office worker	22.4
Total	100.0	Professional	23.2
Age	Percentage (%)	Tradesman	18.3
18-24 yrs. old	6.0	Government Official	12.5
25-34 yrs. Old	31.4	State enterprise	7.2
35-44 yrs. old	34.3	Home Duties	3.3
45-54 yrs. old	18.5	Retired	2.5
55-64 yrs. old	7.6	Others	5.7
Over 65 yrs. old	2.2	Total	100.0
Total	100.0	Marital Status	Percentage (%)
Education	Percentage (%)	Single	34.3
High School or less	5.7	Married	55.2
Some Degree	12.9	Divorced/Separated	8.4
College Degree	41.5	Widow/Widower	2.1
Graduate Degree (Master Degree)	33.3	Total	100.0
Doctoral Degree	6.6		
Total	100.0		
Annual household income (US\$)	Percentage (%)	Number of times to visit	Percentage (%)
Less than \$55,000	12.9	1 time (first time)	62.0
\$55,000-\$74,999	18.5	2-3 times	26.5
\$75,000-\$94,999	19.7	4-5 times	6.6
\$95,000-\$114,999	22.2	More than 5 times	4.9
\$115,000-\$134,999	12.7	Total	100.0
\$135,000 and over	14.0	Persons who make the	Percentage (%)
Total	100.0	decision on booking hotels	
		Yourself	52.8
Type of trip	Percentage (%)	Your Secretary	14.6
Business	29.6	Travel Agent	22.8
Leisure	70.4	Others	9.8
Total	100.0	Total	100.0

Purpose of trip		Percentage (%)	
Holiday		70.8	
Business		21.4	
Convention		5.3	
Others		2.5	
Total		100.0	
Country of citizenship		Percentage (%)	
1. U.S.		16.0	
2. German		7.8	
3. Chinese-Hong Kong		5.6	
4. Thai		5.6	
5. British		5.3	
6. Chinese-China		5.1	
7. Japanese		4.9	
8. Canadian		4.7	
9. Korean		4.5	
10. Singaporean		4.1	
11. Swedish		3.5	
12. Taiwanese		3.3	
13. Australian		2.7	
14. Dutch		2.5	
15. French		2.3	
16. Swiss		2.1	
17. Belgian		1.9	
18. Finnish		1.9	
19. Spanish		1.4	
20. Russian, Danish (each country has 1.3%)		2.6	
21. Austrian, Brazilian, Indian, Italian (each country has 1.0%)		4.0	
22. Greek, Irish, Mexican (each country has 0.8%)		2.4	
23. Indonesian, Panamanian, Malaysian (each country has 0.6%)		1.8	
24. Columbian, Dominican, Hungarian, Iranian, South African (each country has 0.4%)		2.0	
25. Chilean, Israel, Jordanian, Lao, Luxemburger, New Zealander, Norwegian, Peruvian, Polish, Ugandan (each country has 0.2%)		2.0	
Total (46 Nationalities)		100.0	
Country of residence		Percentage (%)	
1. USA		14.6	
2. Hong Kong		10.3	
3. Germany		7.4	
4. Japan		6.2	
5. Singapore		6.0	
6. Thailand		5.6	
7. U.K.		5.6	
8. Republic of China		5.1	
9. Korea		4.3	
10. Sweden		3.7	
11. Canada		3.5	
12. Australia		2.5	
13. Taiwan		2.3	
14. France		2.1	
15. Netherlands		2.1	
16. Finland		1.7	
17. Switzerland		1.7	
18. Belgium		1.4	
19. India		1.4	
20. Spain		1.3	
21. Austria, Brazil (each country has 1.0%)		2.0	
22. Denmark, Ireland, Malaysia, Russia (each country has 0.8%)		3.2	
23. Greece, Mexico, Panama (each country has 0.6%)		1.8	
24. Dominican Republic, Hungary, Indonesia, Italy, Laos (each country has 0.4%)		2.0	
25. Myanmar, Chili, Columbia, Iran, Luxemburg, Monaco, New Zealand, Norway, Peru, Poland, South Africa (each country has 0.2%)		2.2	
Total (45 countries of residence)		100.0	

6.2.2 Testing for Non-Response Bias

It is important to examine if there is a difference between respondents and non-respondents when the response rate is less than 85 percent (Lessler and Kalsbeek, 1992; Anuwichanon, 2003). The reason is that non-response adversely affects survey measurements and contribution to survey error. Non-response bias is defined as the systematic distortion in survey estimates occurring because of an inability to obtain a usable response from some members of the sample (Lessler and Kalsbeek, 1992). This bias is based on several reasons such as refusal or inability to locate the individual. In this dissertation, the response rate is 94%, which is above the minimum requirement level. Hence, the comparison between early and late respondents by employing one-way analysis of variance is not performed in this dissertation.

6.2.3 Independent Variables 1: Functional Performance

Confirmatory factor analysis is employed to assess the five items of functional performance. The model fit indices show that the model fits the data poorly ($\chi^2/\text{df} = 20.32$, $p\text{-value} = 0.00$, $\text{GFI} = 0.91$, $\text{AGFI} = 0.74$, $\text{RMR} = 0.04$, $\text{RMSEA} = 0.20$, $\text{SRMR} = 0.09$, $\text{CFI} = 0.88$, $\text{NFI} = 0.88$ and $\text{TLI} = 0.77$). To improve measurement model fit, some items with low squared multiple correlation (lower than 0.40) and high standardized residuals are eliminated. In the iteration process, two items (funcper3 and funcper5) are deleted from the construct. The model fit statistics are shown in Table 6.2 as follows:

Table 6.2: Model Fit Statistics: Single Factor-Functional Performance

Funcper	χ^2	df	χ^2/df	p-value	GFI	AGFI	RMR	RMSEA	SRMR	CFI	NFI	TLI
All five items	101.60	5	20.32	0.00	0.91	0.74	0.04	0.20	0.09	0.88	0.88	0.77
funcper5 excluded	25.31	2	12.65	0.00	0.97	0.87	0.03	0.16	0.05	0.97	0.96	0.90
funcper3 excluded	-	-	-	-	-	-	-	-	-	-	-	-

Note: - means unavailable due to lack of degree of freedom.

When three items are contained in a single-factor model, the overall fit can not be evaluated due to the lack of degrees of freedom. The t-values of the factor loadings range from 13.54 to 13.65, which are all significant at 0.05 level, implying the support of convergent validity. The three items of funcper1, funcper2 and funcper3 are used to construct the measurement model shown in Figure 6.1 as follows:

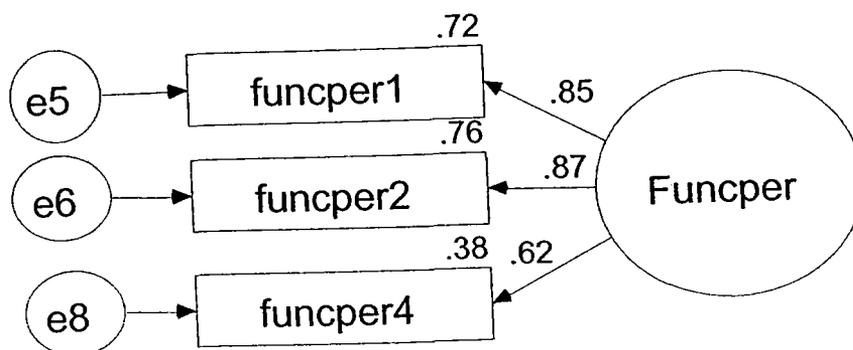


Figure 6.1: Measurement Model of Functional Performance

The composite reliability (0.83) and average variance extracted (0.62) are greater than the critical requirement of 0.70 and 0.50 respectively, indicating internal consistency and adequate fit of scale items (Bagozzi and Yi, 1988).

6.2.4 Independent Variables 2: Technical Performance

Confirmatory factor analysis is conducted on the four items of technical performance construct. All t-values of the loadings range from 8.66 to 11.04, which are all significant at 0.05 level. However, the model fits the data poorly according to the model fit indices (see Table 6.3). To improve the model fit, the item with low squared multiple correlations (0.25) and standardized regression weight (0.50) is eliminated (techper1). The model fit indices on technical performance construct are shown in Table 6.3 as follows:

Table 6.3: Model Fit Statistics: Single Factor-Technical Performance

Techper	χ^2	df	χ^2/df	p-value	GFI	AGFI	RMR	RMSEA	SRMR	CFI	NFI	TLI
All four items	49.02	2	24.50	0.00	0.95	0.75	0.03	0.22	0.06	0.90	0.89	0.69
techper1	-	-	-	-	-	-	-	-	-	-	-	-
excluded												

Note: - means unavailable due to lack of degree of freedom.

The measurement model is constructed by including three items in the latent technical performance construct. The model is shown in Figure 6.2 as follows:

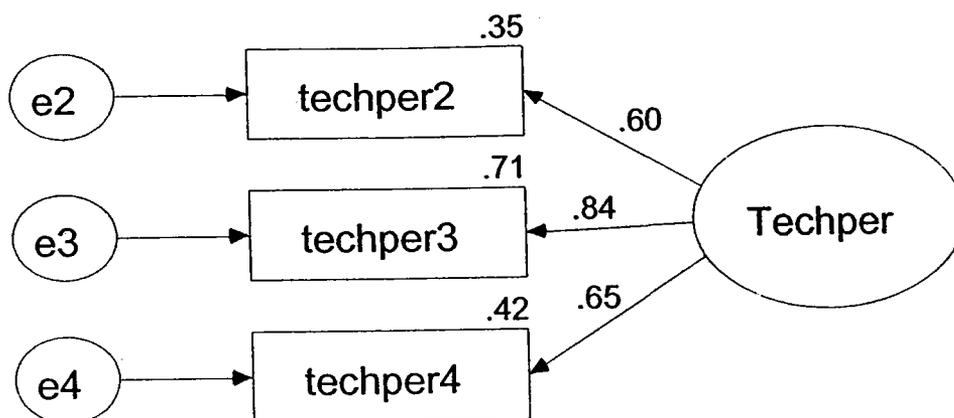


Figure 6.2: Technical performance measurement model

The overall fit can not be evaluated due to the lack of degrees of freedom. Factor loadings are all significant at 0.05 level with t-values ranging from 9.76 to 10.36. This implies that all three indicators of technical performance are related significantly to the construct and have low residuals. Square multiple correlations of these three items range from 0.35 to 0.71, which is close to and over the acceptable level (0.40). The composite reliability equals 0.74 and the average variance extracted is 0.50, with both values above the acceptable level.

6.2.5 Independent Variables 3: Brand Trust

Confirmatory factor analysis is conducted on the four items of brand trust construct. The model fits the data poorly according to the model fit indices (see Table 6.4). To improve the model fit, the item with high standardized residual covariance is eliminated (brandt2). The model fit indices on brand trust construct are shown in Table 6.4 as follows:

Table 6.4: Model Fit Statistics: Single Factor-Brand Trust

Brandt	χ^2	df	χ^2/df	p-value	GFI	AGFI	RMR	RMSEA	SRMR	CFI	NFI	TLI
All four items	61.61	2	30.80	0.00	0.95	0.74	0.04	0.25	0.04	0.94	0.94	0.83
Brandt2 excluded	-	-	-	-	-	-	-	-	-	-	-	-

Note: - means unavailable due to lack of degree of freedom.

The measurement model is constructed by including three items in the latent brand trust construct. The model is shown in Figure 6.3 as follows:

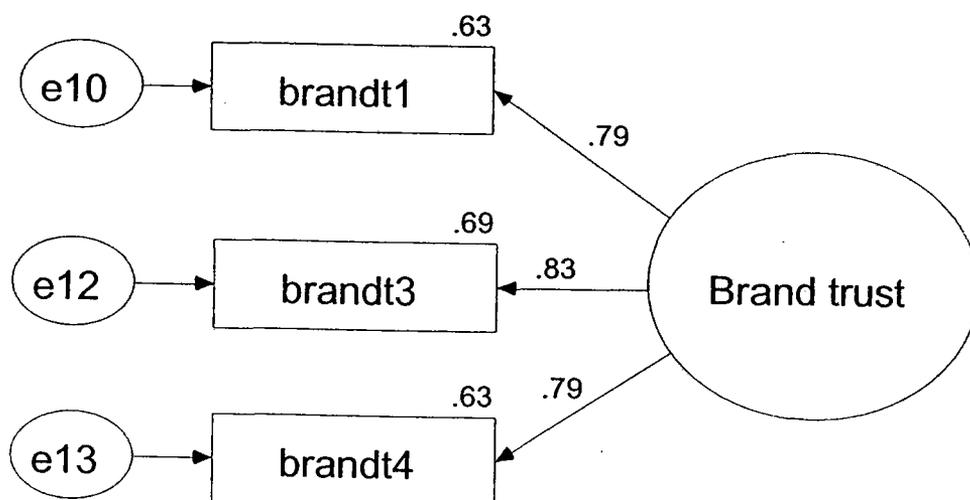


Figure 6.3: Brand trust measurement model

The overall fit can not be evaluated due to the lack of degrees of freedom. In addition, the factor loadings are all significant at 0.05 levels with t-values ranging from 16.71 to 16.99. Square multiple correlations of these three items range from 0.63 to 0.69, which are over the acceptable level (0.40). The high factor loadings (0.79 to 0.83) satisfy the criteria of convergent validity of the indicators. The composite reliability (0.85) and average variance extracted (0.65) in this construct are above the acceptable level.

6.2.6 Independent Variables 4: Brand Affect

Three items were used in this construct in a single-factor model. Therefore, the overall fit can not be evaluated due to the lack of degrees of freedom. The t-values of the factor loadings range from 23.33 to 23.88, which are all significant at 0.05 level, implying the support of convergent validity. Figure 6.4 illustrates the brand affect measurement model.

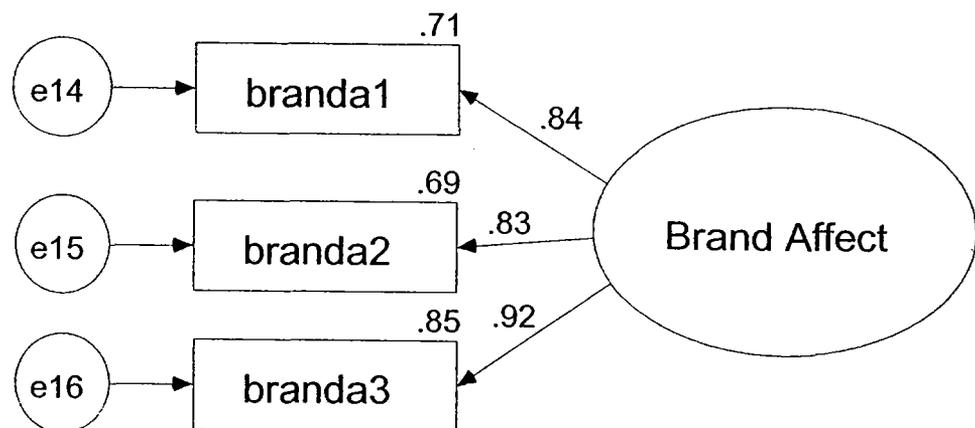


Figure 6.4: Brand affect measurement model

The overall fit can not be evaluated due to the lack of degrees of freedom. Square multiple correlations of these three items range from 0.69 to 0.85, which are over the acceptable level (0.40). The high factor loadings (0.83 to 0.92) satisfy the criteria of convergent validity of the indicators. The composite reliability (0.90) and average variance extracted (0.75) are above the acceptable level.

6.2.7 Mediating Variables 1: Attitudinal Loyalty

Confirmatory factor analysis is conducted on the four items of attitudinal loyalty construct. The data fits the model perfectly according to the measurement model fit indices (see Table 6.5). However, attloy3 and attloy4 indicate low squared multiple correlations (0.07 and 0.01, respectively). CFA can not evaluate the overall fit with only two items. At least three items for one construct are required to avoid the

lack of degree of freedom. Hence, the measurement model of the attitudinal loyalty is not performed in this construct. The model fit indices on attitudinal loyalty construct are shown in Table 6.5 as follows:

Table 6.5: Model Fit Statistics: Single Factor-Attitudinal Loyalty

Attloy	χ^2	df	χ^2/df	p-value	GFI	AGFI	RMR	RMSEA	SRMR	CFI	NFI	TLI
All four items	1.13	2	0.56	0.57	0.99	0.99	0.01	0.22	0.01	1.00	0.99	1.00
attloy3 and attloy4 excluded	-	-	-	-	-	-	-	-	-	-	-	-

Note: - means unavailable due to lack of degree of freedom.

The composite reliability and average extracted variances are not available. However, mean of these two items and standard variation are equal to 3.74 and 0.89, respectively.

6.2.8 Mediating Variables 2: Behavioral Loyalty

Confirmatory factor analysis is performed on the seven items of behavioral loyalty construct. Even though all t-values of the loadings (ranging from 15.12 to 17.14) and the squared multiple correlations (ranging from 0.45 to 0.85) exceed the critical level, the model fits the data poorly (see Table 6.6). To improve the model fit, the items with high standardized residual covariance are eliminated. By the iteration process, two items (behloy5 and behloy7) are deleted and the over fit of the model on five items is acceptable based on the criteria in Table 5.2. The model fit indices on behavioral loyalty construct are shown in Table 6.6 as follows:

Table 6.6: Model Fit Statistics: Single Factor-Behavioral Loyalty

Behloy	χ^2	df	χ^2/df	p-value	GFI	AGFI	RMR	RMSEA	SRMR	CFI	NFI	TLI
All seven items	233.55	14	16.68	0.00	0.87	0.74	0.07	0.18	0.05	0.92	0.92	0.88
behloy7 excluded	142.17	9	15.80	0.00	0.91	0.79	0.05	0.17	0.04	0.95	0.94	0.91
behloy5 excluded	20.55	5	4.11	0.00	0.98	0.95	0.03	0.08	0.02	0.99	0.99	0.98

The t-values of the factor loadings range from 16.53 to 22.14, which are all significant at 0.05 level, implying the support of convergent validity. The five items of behavioral loyalty are shown in Figure 6.5 below.

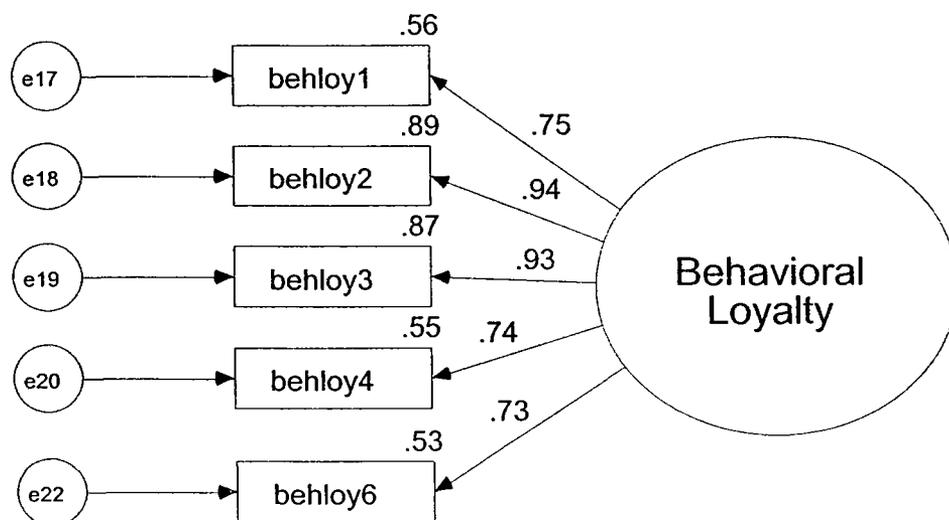


Figure 6.5: Behavioral loyalty measurement model

Square multiple correlations range from 0.53 to 0.89, which are above the acceptable level (0.40). The high factor loadings (0.73 to 0.94) satisfy the criteria of convergent validity of the indicators. The composite reliability is 0.91. Additionally, average variance extracted is 0.68, with both values above the critical level.

6.2.9 Mediating Variables 3: Perceived Value

Confirmatory factor analysis is conducted on four items of perceived value construct. The overall fit of the model is acceptable. The chi-square value is insignificant ($\chi^2/df = 2.53$, p-value >0.05), which indicates the good fit of the model. All other fit indices are at the acceptable level (GFI = 0.99, AGFI = 0.98, CFI = 0.99, NFI = 0.99, TLI = 0.99, which are close to 1). Furthermore, root mean square residual (RMR), root mean square error of approximation and standardized root mean square residual (SRMR) are less than 0.80. The results are shown in Table 6.7 as follows:

Table 6.7: Model Fit Statistics: Single Factor-Perceived Value

Pvalue	χ^2	df	χ^2/df	p-value	GFI	AGFI	RMR	RMSEA	SRMR	CFI	NFI	TLI
All four items	5.06	2	2.53	0.08	0.99	0.98	0.01	0.06	0.01	0.99	0.99	0.99

The four items of perceived value construct are shown in the measurement model in Figure 6.6 as follows:

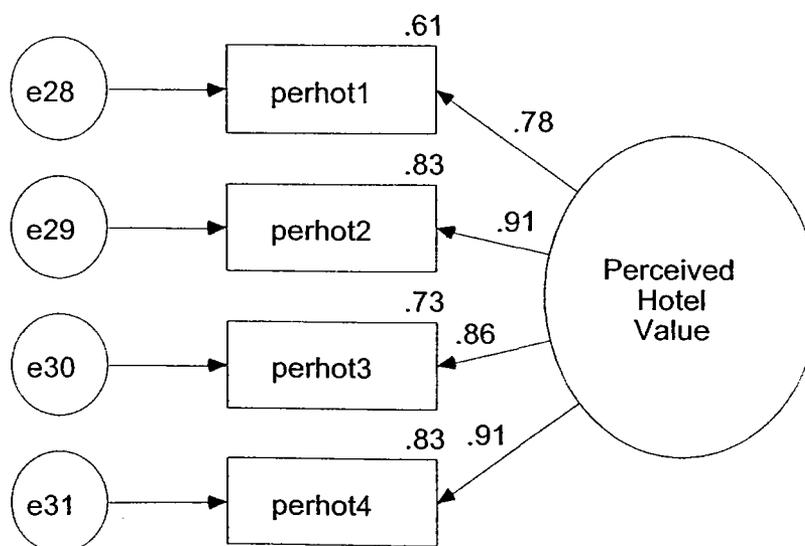


Figure 6.6: Perceived value measurement model

Square multiple correlations range from 0.61 to 0.83, which are over the acceptable level (0.40). The high factor loadings (0.78 to 0.91) satisfy the criteria of

convergent validity of the indicators. The composite reliability (0.92) and the average variance extracted (0.75) are above the acceptable level.

6.2.10 Dependent Variables 1: Positive Word-of-Mouth

Confirmatory factor analysis is conducted on the three items of positive word-of-mouth construct. When three items contained in a single-factor model, the overall fit can not be evaluated due to lack of degree of freedom. The t-values of the factor loadings range from 23.76 to 27.48, which are all significant at 0.05 level, implying the support of convergent validity. The three items of positive word-of-mouth are shown in Figure 6.7 below.

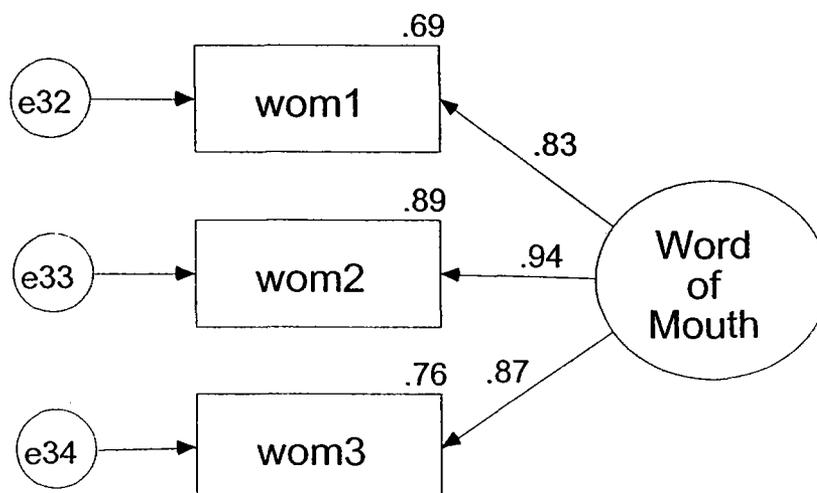


Figure 6.7: Positive-word-of-mouth measurement model

Square multiple correlations range from 0.69 to 0.89, which are over the acceptable level (0.40). The high factor loadings (0.83 to 0.94) satisfy the criteria of convergent validity of the indicators. The composite reliability (0.91) and average variance extracted (0.78) are above the acceptable level.

6.2.11 Dependent Variables 2: Price Insensitivity

As a single-item scale, an independent estimate of the error variance of the single indicator is set at 10 percent of the variance and factor loading is also set at .95 (Anderson and Gerbing, 1988). Hence, the variance of price insensitivity is set at 0.16. The mean of this construct is 2.76, whereas the standard deviation is 1.25.

6.2.12 Dependent Variables 3: Perceived Brand Image

Confirmatory factor analysis is conducted on the five items of perceived brand image construct. Even though all t-values of the loadings (ranging from 9.72 to 15.01) exceed the critical level, the model fits the data poorly (see Table 6.8). To improve the model fit, the items with low squared multiple correlations are eliminated. By the iteration process, two items (brandi1 and brandi3) are deleted resulting in not being able to calculate the overall fit of the model. The model fit indices on Perceived brand image construct are shown in Table 6.8 as follows:

Table 6.8: Model Fit Statistics: Single Factor-Perceived Brand Image

Brandi	χ^2	df	χ^2/df	p-value	GFI	AGFI	RMR	RMSEA	SRMR	CFI	NFI	TLI
All five items	32.45	5	6.49	0.00	0.97	0.92	0.04	0.11	0.04	0.99	0.99	0.92
Brandi3 excluded	9.21	2	4.61	0.10	0.99	0.95	0.01	0.09	0.03	0.99	0.98	0.96

Note: - means unavailable due to lack of degree of freedom.

Three items of perceived brand image were presented in Figure 6.8 below.

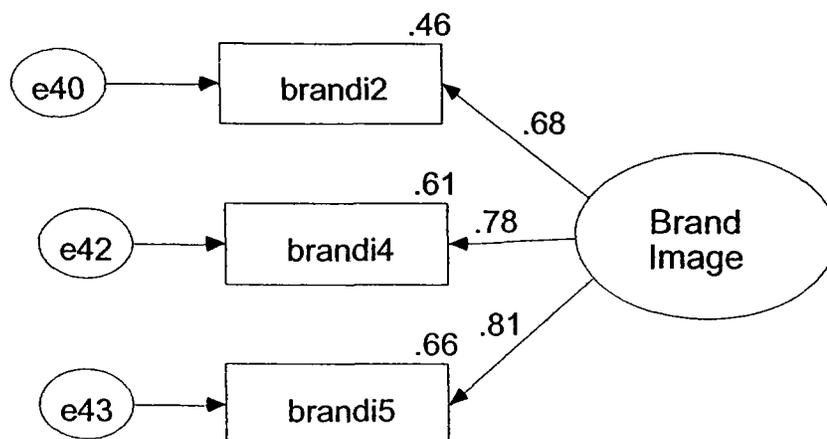


Figure 6.8: Perceived brand image measurement model

Square multiple correlations range from 0.46 to 0.66, which are over the acceptable level (0.40). The factor loadings (0.68 to 0.81) satisfy the criteria of convergent validity of the indicators. The composite reliability (0.80) and the average variance extracted (0.58) are above the critical level.

6.2.13 Moderating Variable: Collectivism/Individualism

Confirmatory factor analysis was conducted on the six items of collectivism/individualism construct. Even though all t-values of the loadings (ranging from 10.66 to 12.71) are all significant at 0.05 level, the model fits the data poorly (see Table 6.9). To improve the model fit, the items with high standardized residual covariance are eliminated. By the iteration process, three items (collec2, collec5, collec6) are deleted and the overall fit of the model with three items can not be evaluated due to lack of degree of freedom. The model fit indices on collectivism/individualism construct are shown in Table 6.9 as follows:

Table 6.9: Model Fit Statistics: Single Factor- Collectivism/individualism

Collec	χ^2	df	χ^2/df	p-value	GFI	AGFI	RMR	RMSEA	SRMR	CFI	NFI	TLI
All six items	111.15	9	12.35	0.00	0.93	0.83	0.04	0.15	0.05	0.94	0.93	0.89
collec2 excluded	44.34	5	8.87	0.00	0.97	0.90	0.03	0.13	0.03	0.97	0.97	0.94
collec5 excluded	9.11	2	4.55	0.01	0.99	0.95	0.02	0.09	0.02	0.99	0.99	0.98
collec6 excluded	-	-	-	-	-	-	-	-	-	-	-	-

Note: - means unavailable due to lack of degree of freedom.

Three items of individual/collectivism are used to construct the measurement model in Figure 6.9 as follows:

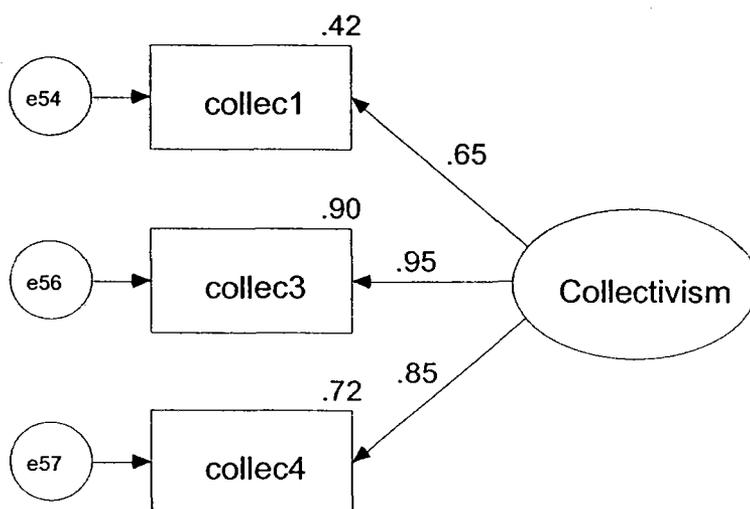


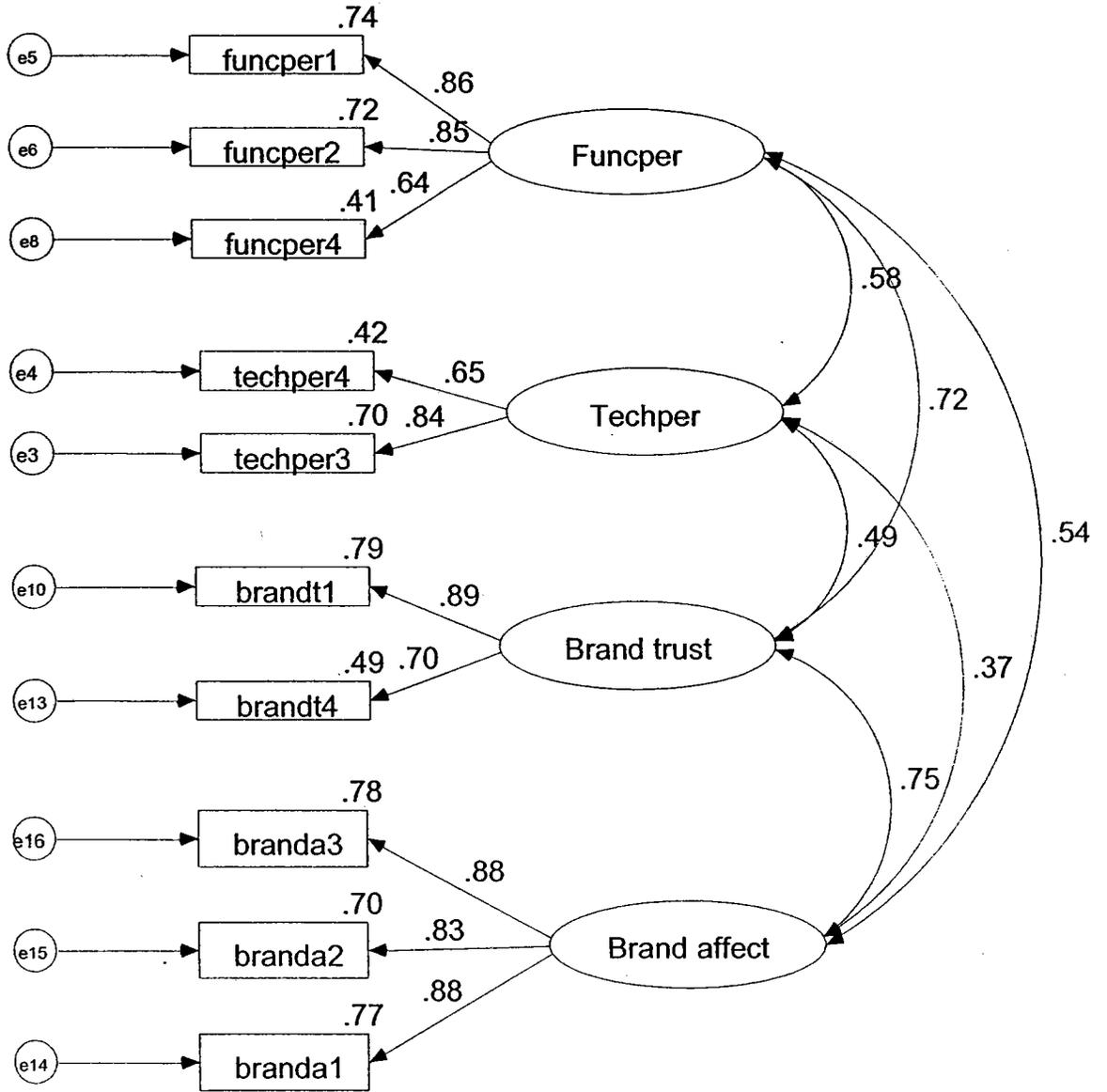
Figure 6.9: Collectivism/Individualism measurement model

Square multiple correlations of these three items range from 0.42 to 0.90, which are over the acceptable level (0.40). The factor loadings (0.65 to 0.95) satisfy the criteria of convergent validity. The composite reliability (0.86) and the average variance extracted (0.68) are above the critical level of 0.70 and 0.50 respectively.

6.3 Measurement Model

6.3.1 Independent Variables Construct Measurement Model

An independent variables construct is conducted to assess the psychometric properties and unidimensionality of the measures. As mentioned before, CFA represents the measure model part of structural equation modeling (SEM) and through one or more overall goodness-of-fit indices evaluates how well the specified measurement model fits the data. Additionally, composite reliability and average variance extracted are computed to verify the internal consistency. Convergent and discriminant validity are evaluated to identify that all measures are internally consistent, reliable and valid for the analysis of SEM. For twelve measures to evaluate four latent constructs, techper2 and brandt3 are deleted due to low square multiple correlation (less than 0.40) and high standardized residual covariance. Therefore, the measurement model is run for 10 measures to evaluate four latent constructs, which are functional performance, technical performance, brand trust and brand affect. Each individual variables construct is correlated with each other. The individual variable construct measurement model along with model fit statistics are shown in Figure 6.10 as follows:



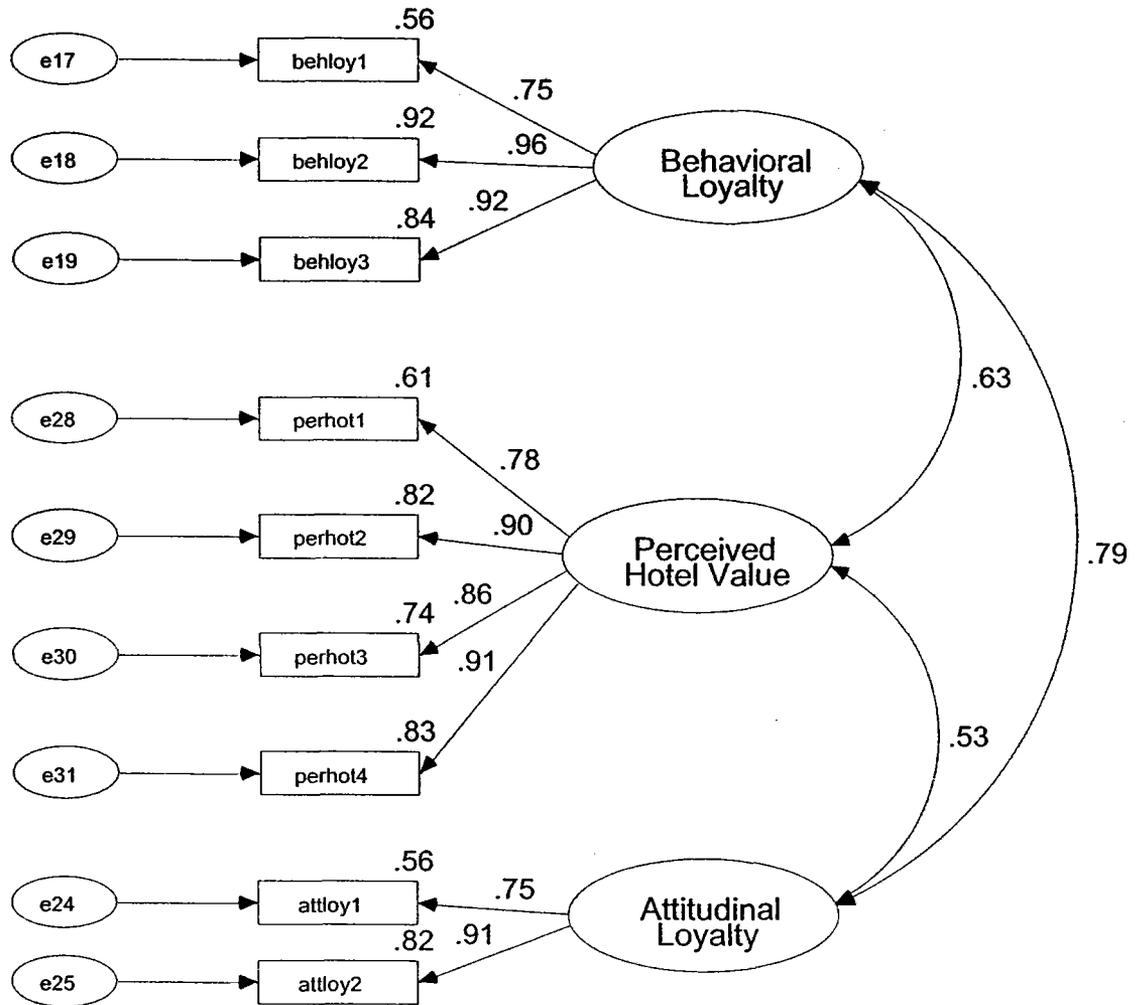
Chi-Square value	88.45	RMR	0.026
Degree of freedom	52	TLI	0.966
Chi-Square/df	3.05	CFI	0.978
p-value	0.000	NFI	0.968
GFI	0.965	RMSEA	0.065
AGFI	0.934	SRMR	0.037

Figure 6.10: Independent Variables Construct Measurement Model

The measurement model in Figure 6.10 indicates the standardized path coefficients on casual paths, square multiple correlations and correlations between all independent variables. All measures of the overall fit are above the required critical level (mentioned in figure 5.2), except the chi-square goodness of fit (p -value = 0.00). Even though the chi-square goodness of fit is significant, the model still provides acceptable fit due to the large sample size. The normed chi-square (chi-square/df) is less than 5, which is in the range of acceptability (Carmines and McIver, 1981). The t -values range from 9.18 to 25.70, which are significant at 0.05 level which supports convergent validity. Composite reliability of functional performance, technical performance, brand trust and brand affect are 0.83, 0.72, 0.76 and 0.90, respectively. Furthermore, average variance extracted from functional performance, technical performance, brand trust and brand affect are 0.63, 0.57, 0.62 and 0.75, successively. The composite reliability and average variance extracted are above the critical level of 0.70 and 0.50, respectively. Moreover, average variance extracted for each dimension exceeds the square of the structural link between the constructs, which supports the test for discriminant validity (Fornell and Larcker, 1981).

6.3.2 Mediating Variables Construct Measurement Model

In this dissertation, the mediating variables include three constructs (attitudinal loyalty, behavioral loyalty and perceived value) with nine measures. The measurement model of the mediating variables construct is employed to assess psychometric properties and unidimensionality. The measurement model is analyzed on the criteria of the overall model fit to the data. Later on, convergent and discriminant validity along with reliability are assessed. Each mediating variables construct is also applied to correlate with each other. The mediating variable construct measurement model along with model fit statistics are shown in Figure 6.11 as follows:



Chi-Square value	73.52	RMR	0.044
Degree of freedom	24	TLI	0.979
Chi-Square/df	3.06	CFI	0.986
p-value	0.000	NFI	0.979
GFI	0.966	RMSEA	0.065
AGFI	0.936	SRMR	0.030

Figure 6.11: Mediating Variables Construct Measurement Model

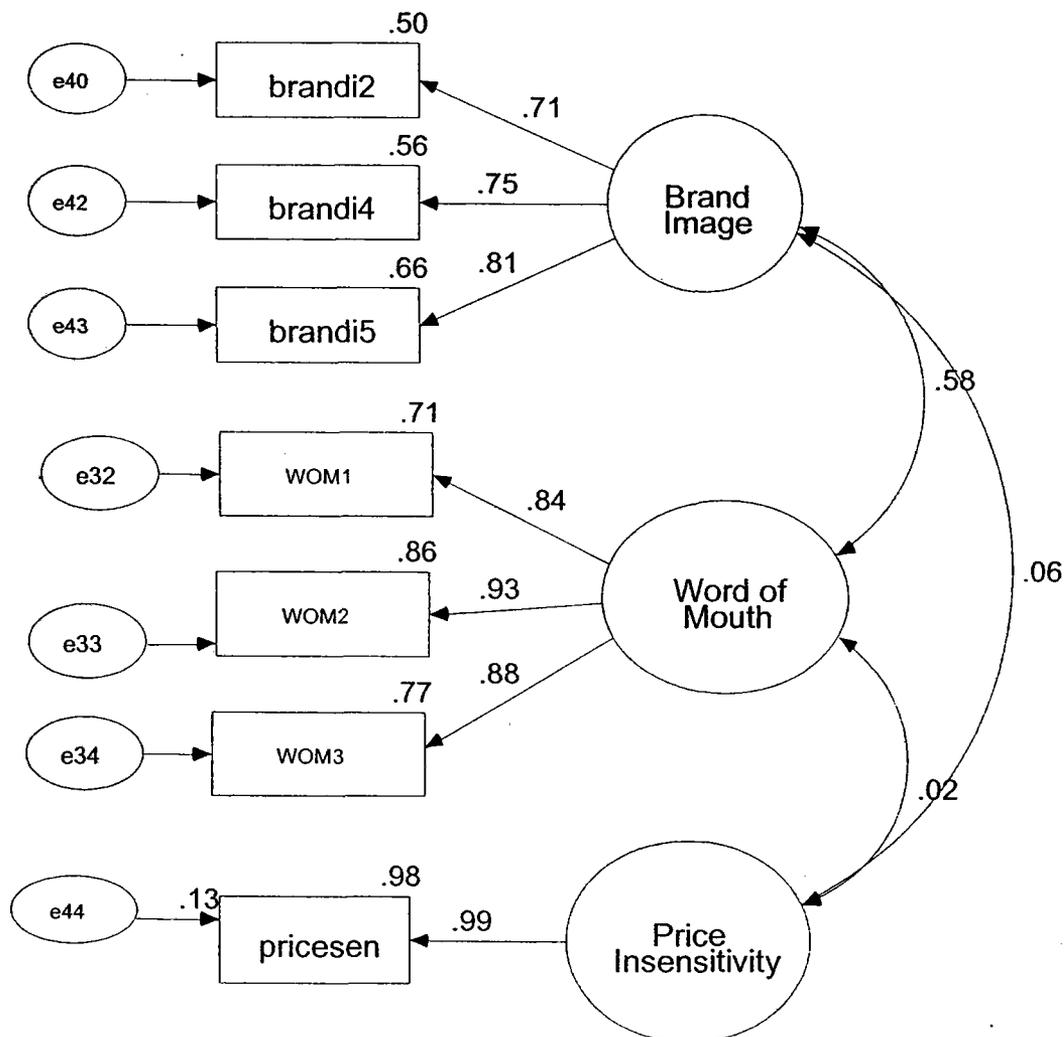
The measurement model in Figure 6.11 also performs the standardized path coefficients on casual paths, square multiple correlations and correlations between all independent variables. All measures of the overall fit are within the acceptable level, except the chi-square goodness of fit (p-value = 0.00). Even though

the chi-square goodness of fit is significant, the model still provides acceptable fit due to the large sample size. The factor loadings are all significant at 0.05 level with t-values ranging from 16.84 to 30.97 to meet the criteria of the convergent validity. In addition, the composite reliability (ranging from 0.82 to 0.92) and average variance extracted (ranging from 0.69 to 0.78) exceed the threshold level.

For mediating variables construct, the average variance extracted for all constructs exceed the square of the link between the two constructs, which implies that these results support discriminant validity.

6.3.3 Dependent Variables Construct Measurement Model

The measurement model of the dependent variables construct is employed to evaluate psychometric properties and unidimensionality. The dependent variables construct includes seven measures to assess three latent constructs, which are positive-word-of-mouth, price insensitivity and perceived brand image. The measurement model is evaluated on the criteria of the overall model fit to the data. Additionally, convergent validity, discriminant validity and reliability are examined. Each dependent variables construct is also applied to correlate with each other. The dependent variable construct measurement model along with model fit statistics are shown in Figure 6.12 as follows:



Chi-Square value	52.00	RMR	0.030
Degree of freedom	12	TLI	0.958
Chi-Square/df	4.335	CFI	0.976
p-value	0.000	NFI	0.969
GFI	0.971	RMSEA	0.083
AGFI	0.933	SRMR	0.040

Figure 6.12: Dependent Variables Construct Measurement Model

All measures of the overall fit are close to or within the acceptable level, except the chi-square goodness of fit ($p\text{-value} = 0.00$). The chi-square goodness of fit is significant; however, the model still provides acceptable fit due to the large sample

size. The factor loadings are all significant at 0.05 level with t-values ranging from 14.39 to 28.00 to satisfy the criteria of the convergent validity. In addition, the composite reliability (ranging from 0.80 to 0.91) and average variance extracted (ranging from 0.58 to 0.78) exceed the acceptable level. To test the discriminant validity, the average variance extracted for each construct still exceed the squared correlation between the constructs.

6.4 Multicollinearity Analysis

Before testing the hypothesized conceptual model, the collinearity or multicollinearity problem should be addressed. Collinearity is the association between two independent variables, whereas multicollinearity is the correlation among three or more independent variables (Hair, Black et al., 2006). The examination of multicollinearity is taken by two steps: (1) identification of the extent of collinearity and (2) assessment of the degree to which the estimated coefficients are affected. The easiest way to identify bivariate multicollinearity is an examination of the correlation matrix for the independent variables. The correlation values between independent variables over 0.90 and above is the first indication of multicollinearity (Hair, Black et al., 2006). There are three measures for examining the multicollinearity, which include the tolerance value, variance inflation factor (VIF) and condition index. The tolerance value ($1-R^2$) is the amount of variability of the selected independent variable not explained by the other independent variables. VIF is the inverse of the tolerance value. The cut-off point for the tolerance value is 0.10, which implies that the VIF value is 10. Hence, very small tolerance value and large VIF values are considered as high collinearity. In addition, condition index is used to identify the multicollinearity problem. This index represents the collinearity of combinations of the variables in the data set. The threshold value is in a range of 15 to 30, while 30 is the most commonly used value (Hair, Black et al., 2006). When all condition indices above the critical value (30), the requirements of at least two variables with variance proportions above 50 percent indicating the multicollinearity problem.

To assess the multicollinearity problem, the correlation matrix is shown in Table 6.10. In this table, all correlations between independent variables are lower than 0.90. Additionally, the tolerance values and VIF values from the multiple regression analyses are within the threshold level, which imply the low multicollinearity problem. The tolerance values and the VIF values range from 0.39 to 0.78 and from 1.28 to 2.35, which imply that both values are within the acceptable level. In addition, only one variance proportion of an independent variable is over 50 percent at the condition index of 37.40, while the condition index of all other measures is less than 30. Therefore, the multicollinearity is not a serious problem in this model.

To analyze discriminant validity, average variance extracted must exceed squared correlation between the construct and other constructs in the model. The square root of the AVE is shown on the diagonal of the correlation matrix in Table 6.10. This value is performed to compare with the correlation coefficient between constructs (Green, Barclay, and Ryans, 1995). In Table 6.10, the result indicates that the diagonal elements (bold type) are higher than the other elements in every row and column.

Table 6.10: Descriptive Statistics, Cronbach's Alpha and Correlations on Each Variable

Variable	Mean	S.D.	Alpha	X ₁	X ₂	X ₃	X ₄	Y ₁	Y ₂	Y ₃	Z ₁	Z ₂	Z ₃	Z ₄
Functional Performance (X ₁)	4.07	0.72	0.83	.79										
Technical Performance (X ₂)	3.65	0.71	0.72	.45**	.76									
Brand Trust (X ₃)	6.10	0.80	0.76	.59**	.37**	.79								
Brand Affect (X ₄)	6.21	0.77	0.90	.51**	.31**	.73**	.87							
Attitudinal Loyalty (Y ₁)	3.74	0.89	0.82	.56**	.42**	.54**	.47**	.83						
Behavioral Loyalty (Y ₂)	5.36	1.24	0.91	.61**	.36**	.55**	.51**	.71**	.88					
Perceived Value (Y ₃)	8.19	1.12	0.92	.50**	.27**	.53**	.62**	.48**	.58**	.87				
Positive Word-of-Mouth (Z ₁)	5.85	1.03	0.91	.52**	.36**	.47**	.54**	.60**	.66**	.64**	.88			
Perceived Brand Image (Z ₂)	4.39	0.54	0.80	.46**	.22**	.57**	.60**	.46**	.51**	.55**	.52**	.76		
Price Insensitivity (Z ₃)	2.76	1.25	-	.02	.11*	.06	.14**	-.09	-.04	.13**	.02	.06	-	
Collectivism/Individualism (Z ₄)	3.86	0.83	0.86	.33**	.17**	.25**	.23**	.46**	.46	.31**	.45**	.30**	-.08	.83

Note: * means Significant at 0.05 level (p<.05).

** means Significant at 0.01 level (p<.01).

a. Price Insensitivity is a single- item construct, which Cronbach's alpha and average variance extracted are not available.

Diagonal (bold type) is the square root of average variance extracted.

X₁, X₂, X₃, X₄ stand for all independent variables, which are functional performance, technical performance, brand trust and brand affect.

Y₁, Y₂, Y₃ stand for all mediating variables, which are attitudinal loyalty, behavioral loyalty and perceived value.

Z₁, Z₂, Z₃ stand for all dependent variables, which are positive word-of-mouth, perceived brand image and price insensitivity.

6.5 Summary

In this dissertation, CFA is employed to assess the scale purification on each construct and the measurement model for independent variables, mediating variables and dependent variables. In the iterative process, the items with low factor loading, low square multiple correlation and high residuals are eliminated from the construct. Three measurement models of independent variables, mediating variables and dependent variables are constructed. Each construct retains at least two items and identifies the overall goodness of fit. Even though the chi-squares are significant in each model due to the large sample size, all other model fit indices such as goodness-of-fit indices, adjusted goodness-of-fit indices, root mean squared residuals, comparative fit index, Tucker-Lewis index and normalized index, etc. show a good fit between the model and the data. Convergent and discriminate validity along with reliability are examined in this dissertation. All factor loadings are high and statistically significant at 0.05 level with no near-zero standard errors to support the convergent validity of the indicators. Furthermore, AVE on each construct exceeds the squared correlation between the constructs and any other constructs to support the discriminant validity of all measures (Fornell and Larcker, 1981). The composite reliability ranges from 0.72 to 0.92, which exceed the threshold level at 0.70 in every construct. Additionally, the average variance extracted ranges from 0.57 to 0.78, which is also above the critical level at 0.50 in all constructs. Both values support internal consistency. The multicollinearity problem is also assessed in this dissertation. The results show that the correlation values between independent variables is less than 0.90 and the tolerance value is above 0.10. This along with variance inflation factor (VIF) is lower than 10 by employing the multiple regression analysis, which implies that multicollinearity is not a serious problem in this dissertation. Hence, all measures appear to be unidimensional, reliable, valid and have internal consistency for further analysis in the structural equation modeling to test the hypothesized conceptual model in the next chapter.