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# **University Student Satisfaction in Shijiazhuang, China:**

## **An Empirical Analysis**

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**A thesis**  
**submitted in partial fulfilment**  
**of the requirements for the Degree of**  
**Master of Commerce and Management**

**At**  
**Lincoln University**

**By**  
**Yang Wang**

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for the Degree of M.C.M.

# **University Student Satisfaction in Shijiazhuang, China: An Empirical Analysis**

By Yang Wang

China's higher education sector has experienced political and economic reforms and social changes during the past decades. The shift of responsibility in higher education provision from the state to individuals, a reduction in regulations, restructured educational institutions, and dramatically increasing university enrolment rates indicate that higher education in China has been going through a process of marketisation. Mok (2000) suggests that adopting a market ideology and practice in education is a global trend. However, limited research on students' satisfaction with higher education in China exists in the literature.

Therefore, this study seeks to fill this gap by examining the relationship between students' overall satisfaction and its determinants, along with satisfaction's impact on favourable behavioural intentions. In particular, the study applies a hierarchical model to identify the dimensions of service quality as perceived by university students in China. In addition, students' perceptions of the dimensions of service quality, service quality, image, value, satisfaction and favourable behavioural intentions are compared based on students' demographics (gender, age, year of study, and major).

The analytic results of this research were based on a convenience sample of 350 students studying at a public university in China. Support was found for the use of a hierarchical factor structure consisting of three primary dimensions (interaction quality, physical environment quality, and outcome quality) to conceptualise and measure perceived service

quality. Thirteen sub-dimensions of service quality as perceived by university students in China were identified using factor analysis. These thirteen sub-dimensions are: Expertise, Personal Communication, Administration Staff, Attitudes and Behaviours, Course Content, Physical Facilities, University Accommodation, Library, Social Life, Safety, Social Factors, Personal Development and Academic Development. In addition, seven of the eight hypothesized paths between Service Quality, Image, Value, Satisfaction and Favourable Behavioural Intentions were confirmed. The results of this study also indicate that students' demographic characteristics (gender, age, year of study and major) influence their perceptions of several of the constructs.

This study contributes to the service marketing literature by empirically validating the applicability of the hierarchical modeling approach to conceptualise and measure higher educational service quality in China. This study also offers a valuable framework for understanding the interrelationships among service quality, image, value, satisfaction and favourable behavioural intentions in China's higher education sector.

**KEYWORDS:** Higher Education, China, Student Satisfaction, Service Quality, Hierarchical Model.

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# Table of Contents

<b>Abstract.....</b>	<b>i</b>
<b>Acknowledgements .....</b>	<b>iii</b>
<b>Table of Contents.....</b>	<b>iv</b>
<b>List of Tables.....</b>	<b>x</b>
<b>List of Figures.....</b>	<b>xii</b>
<b>Chapter 1: Introduction .....</b>	<b>1</b>
1.1 Problem Setting .....	1
1.2 China's Higher Education Sector .....	2
1.3 Research Purpose.....	5
1.4 Contribution of Research.....	6
1.5 Thesis Overview .....	6
<b>Chapter 2: Literature Review.....</b>	<b>8</b>
2.1 Chapter Introduction.....	8
2.2 Customer Satisfaction.....	8
2.3 An Overview of Services Marketing .....	10
2.3.1 The Foundation of Services .....	10
2.3.2 Conceptualisations of Service Quality .....	11
2.4 Service Quality Models .....	12
2.4.1 The Perceived Service Quality Model .....	12
2.4.2 The SERVQUAL Model .....	13
2.4.3 The Three-Component Model.....	14
2.4.4 The Retail Environment Multilevel Model .....	15
2.4.5 The Service Environment Hierarchical Model .....	15
2.4.6 A Higher Education Behavioural Intention Hierarchical Model.....	16
2.5 Service Quality Measurements .....	17

2.5.1 SERVQUAL.....	17
2.5.1.1 Critique of the SERVQUAL Scale.....	18
2.5.2 SERVPERF .....	20
2.6 Service Quality/Satisfaction Studies in Higher Education .....	21
2.6.1 Australasia .....	22
2.6.2 Europe .....	25
2.6.3 North America.....	26
2.6.4 Singapore, Malaysia and Japan.....	27
2.6.5 Indonesia, India, and Saudi Arabia .....	29
2.6.6 China .....	30
2.6.7 Cross-Cultural Research .....	31
2.7 Constructs Related to Satisfaction.....	32
2.7.1 The Relationship between Service Quality and Satisfaction .....	32
2.7.2 The Relationship between Perceived Value, Service Quality and Satisfaction .....	35
2.7.3 The Relationship between Image, Service quality and Satisfaction .....	35
2.7.4 The Relationship between Service Quality, Satisfaction and Favourable Behavioural Intentions .....	36
2.8 Chapter Summary .....	38
<b>Chapter 3: Conceptual Gaps and Hypotheses.....</b>	<b>39</b>
3.1 Chapter Introduction.....	39
3.2 Conceptual Research Gaps .....	39
3.3 Hypotheses Development.....	41
3.3.1 Hypotheses Relating to Research Objective 1 .....	44
3.3.1.1 Interaction Quality .....	44
3.3.1.2 Physical Environment Quality .....	45
3.3.1.3 Outcome Quality .....	46
3.3.2 Hypotheses Relating to Research Objective 2 .....	47
3.3.3 Hypotheses Relating to Research Objective 3 .....	48
3.3.4 Hypotheses Relating to Research Objective 4 .....	49
3.4 Chapter Summary .....	50
<b>Chapter 4: Research Design and Methodology .....</b>	<b>51</b>

4.1 Chapter Introduction.....	51
4.2 Sample Derivation .....	51
4.3 Sample Size .....	51
4.4 Data Collection Method .....	52
4.5 Questionnaire Design .....	53
4.5.1 Focus Group Interviews .....	53
4.5.2 Questionnaire Design and Layout.....	54
4.5.3 Pre-test .....	56
4.6 Data Analysis Methods .....	56
4.6.1 Factor Analysis.....	57
4.6.1.1 Factor Analytic Data Modes .....	57
4.6.1.2 Types of Factor Analysis .....	58
4.6.1.3 Assumptions in Factor Analysis .....	59
4.6.1.4 Tests for Determining Appropriateness of Factor Analysis .....	61
4.6.1.5 Factor Extraction in Principal Component Analysis .....	62
4.6.1.6 Factor Rotation.....	63
4.6.1.7 Interpretation of Factors.....	65
4.6.2 Summated Scales .....	67
4.6.2.1 Content Validity .....	67
4.6.2.2 Dimensionality .....	68
4.6.2.3 Reliability .....	68
4.6.3 Multiple Regression Analysis .....	69
4.6.3.1 Moderated Multiple Regression (MMR) .....	69
4.6.3.2 Coefficient of Determination .....	70
4.6.3.3 Test for the Significance of the Overall Regression Model .....	71
4.6.4 Analysis of Variance (ANOVA) .....	71
4.6.5 Assumptions for Regression Analysis and Analysis of Variance .....	72
4.6.5.1 Outliers.....	72
4.6.5.2 Multicollinearity.....	72
4.6.5.3 Linearity .....	74
4.6.5.4 Error Term Normality .....	74
4.6.5.5 Error Term Independence.....	75



4.6.5.6 Error Term Homoscedasticity .....	76
4.7 Chapter Summary .....	77
<b>Chapter 5: Results and Discussion .....</b>	<b>78</b>
5.1 Chapter Introduction.....	78
5.2 Sample and Response Rates .....	78
5.2.1 Non-response Bias .....	78
5.2.1.1 Early/Late Responses .....	78
5.2.1.2 Missing Data .....	80
5.3 Descriptive Statistics .....	80
5.4 Assessment for Factor Analysis .....	81
5.4.1 Statistical Assumptions for Factor Analysis .....	81
5.4.1.1 Examination of the Correlation Matrix .....	82
5.4.1.2 Inspection of Anti-Image Correlation Matrix .....	82
5.4.1.3 Bartlett's Test of Sphericity.....	82
5.4.1.4 Kaiser-Meyer-Olkin Measure of Sample Adequacy (MSA).....	83
5.4.2 Factor Analysis Results .....	83
5.4.2.1 Latent Root Criterion .....	83
5.4.2.2 The Scree Test .....	83
5.4.2.3 Factor Rotation.....	84
5.4.2.4 Factors Interpretation .....	85
5.4.3 Summated Scale .....	86
5.4.3.1 Content Validity .....	86
5.4.3.2 Dimensionality .....	86
5.4.3.3 Reliability .....	87
5.5 Assessment of Multiple Regression and ANOVA .....	90
5.5.1 Assumptions for Regression Analysis and ANOVA .....	90
5.5.1.1 Outliers.....	90
5.5.1.2 Multicollinearity.....	90
5.5.1.3 Linearity.....	91
5.5.1.4 Error Term Normality .....	92
5.5.1.5 Error Term Independence.....	92
5.5.1.6 Error Term Homoscedasticity .....	93

5.5.2 Results Pertaining to Research Objective 1 .....	94
5.5.2.1 Hypothesis 1 .....	94
5.5.2.2 Hypothesis 2 .....	95
5.5.2.3 Hypothesis 3 .....	96
5.5.2.4 Hypotheses 4, 5 and 6 .....	96
5.5.2.5 Discussion Regarding Research Objective 1 .....	97
5.5.3 Results Pertaining to Research Objective 2 .....	98
5.5.3.1 Hypothesis 7 .....	98
5.5.3.2 Hypothesis 8 .....	99
5.5.3.3 Hypothesis 9 .....	100
5.5.3.4 Hypotheses 10, 11, and 12 .....	100
5.5.3.5 Hypothesis 13 .....	101
5.5.3.6 Hypothesis 14 .....	102
5.5.3.7 Discussion Regarding Research Objective 2 .....	102
5.5.4 Results Pertaining to Research Objective 3 .....	103
5.5.4.1 Hypothesis 15 .....	103
5.5.4.2 Discussion Regarding Research Objective 3 .....	105
5.5.5 Results Pertaining to Research Objective 4 .....	106
5.5.5.1 Hypothesis 16a .....	107
5.5.5.2 Hypothesis 16b .....	108
5.5.5.3 Hypothesis 16c .....	109
5.5.5.4 Discussion Regarding Research Objective 4 .....	109
5.6 Chapter Summary .....	110
<b>Chapter 6: Conclusions and Implications .....</b>	<b>112</b>
6.1 Chapter Introduction .....	112
6.2 Summary of the Study .....	112
6.3 Conclusions Pertaining to Research Objective 1 .....	114
6.3.1 Service Quality .....	114
6.3.1.1 Interaction Quality .....	115
6.3.1.2 Physical Environment Quality .....	116
6.3.1.3 Outcome Quality .....	117
6.4 Conclusions Pertaining to Research Objective 2 .....	117

6.5 Conclusions Pertaining to Research Objective 3 .....	119
6.6 Conclusions Pertaining to Research Objective 4 .....	121
6.7 Contributions .....	123
6.7.1 Theoretical Implications .....	124
6.7.2 Managerial Implications .....	125
6.8 Limitations .....	127
6.9 Avenues for Future Research .....	128
<b>References:.....</b>	<b>130</b>
<b>Appendices.....</b>	<b>141</b>
Appendix 1: Cover Letter .....	141
Appendix 2: Questionnaire .....	142
Appendix 3: Data Imputation .....	148
Appendix 4: Correlation Matrix .....	149
Appendix 5: Anti-Image Correlation Matrix.....	153
Appendix 6: Factor Extraction Table.....	157
Appendix 7: Rotated Factor Table .....	158
Appendix 8: Questionnaire Items with Orthogonal (VARIMAX) Rotation .....	160
Appendix 9: Multicollinearity Statistics.....	162
Appendix 10: Scatter Plots .....	168
Appendix 11: Normality Plots .....	170
Appendix 12: Analysis of Variance Results .....	174

# List of Tables

Table 4.1: Modes of Factor Analysis (Stewart, 1981).....	58
Table 4.2: Guidelines for identifying significance factor loadings based on sample size (Hair et al., 2010).....	66
Table 5.1: Independent Sample Test for Non-Response Bias.....	79
Table 5.2: Gender, Age, and Year of Study Results.....	80
Table 5.3: Field of Study.....	81
Table 5.4: Reliability of Scaled Items for the Sub-dimensions for Interaction Quality.....	87
Table 5.5: Reliability of Scaled Items for the Sub-dimensions for Physical Environment Quality.....	88
Table 5.6: Reliability of Scaled Items for the Sub-dimensions for Outcome Quality.....	88
Table 5.7: Reliability of Scaled Items for Satisfaction and Related Constructs.....	89
Table 5.8: Durbin-Watson Test Statistics.....	92
Table 5.9: List of Hypotheses formulated from Chapter 3.....	93
Table 5.10: Model 1: Multiple Regression Results Relating to Hypothesis 1.....	94
Table 5.11: Model 2: Multiple Regression Results Relating to Hypothesis 2.....	95
Table 5.12: Model 3: Multiple Regression Results Relating to Hypothesis 3.....	96
Table 5.13: Model 4: Multiple Regression Results Relating to Hypotheses 4, 5 and 6.....	97
Table 5.14: Model 5: Multiple Regression Results Relating to Hypothesis 7.....	99
Table 5.15: Model 6: Multiple Regression Results Relating to Hypothesis 8.....	99
Table 5.16: Model 7: Multiple Regression Results Relating to Hypothesis 9.....	100
Table 5.17: Model 8: Multiple Regression Results Relating to Hypotheses 10, 11, and 12..	101
Table 5.18: Model 9: Multiple Regression Results Relating to Hypothesis 13.....	101
Table 5.19: Model 10: Multiple Regression Results Relating to Hypothesis 14.....	102
Table 5.20: ANOVA Results Relating to Hypothesis 16a.....	108
Table 5.21: ANOVA Results Relating to Hypothesis 16b.....	108
Table 5.22: ANOVA Results Relating to Hypothesis 16c.....	109
Table 25A: Summary Statistics of Missing Data for Original Sample.....	148
Table 26A: Correlation Matrix.....	149
Table 27A: Anti-Image Correlation Matrix.....	153

Table 28A: Eigenvalues and the Explained Percentage of Variance by the Factors.....	157
Table 29A: Rotated Component Matrices with VARIMAX Rotation.....	158
Table 30A: Pattern Matrix with OBLIMIN Rotation.....	159
Table 31A: VARIMAX Rotated Component Matrix with Variables.....	160
Table 32A: Pearson Correlation Matrix, Model 1.....	162
Table 33A: Pearson Correlation Matrix, Model 2.....	163
Table 34A: Pearson Correlation Matrix, Model 3.....	163
Table 35A: Pearson Correlation Matrix, Model 4.....	164
Table 36A: Pearson Correlation Matrix, Model 5 (a).....	164
Table 37A: Pearson Correlation Matrix, Model 5 (b).....	164
Table 38A: Pearson Correlation Matrix, Model 6.....	165
Table 39A: Pearson Correlation Matrix, Model 7.....	165
Table 40A: Pearson Correlation Matrix, Model 8.....	165
Table 41A: Pearson Correlation Matrix, Model 9.....	166
Table 42A: Pearson Correlation Matrix, Model 10.....	166
Table 43A: Multicollinearity Statistics.....	167
Table 44A: Students' Perceptions of Satisfaction and Pertaining Constructs.....	174
Table 45A: Students' Perceptions of the Primary Dimensions of Service Quality.....	177
Table 46A: Students' Perceptions of the Sub-dimensions of Service Quality.....	179

# List of Figures

Figure 2.1: Perceived Service Quality Model (Gronroos, 1984).....	13
Figure 2.2: Determinants of Perceived Service Quality (Parasuraman, et al., 1988).....	14
Figure 2.3: Three-Component Model (Rust and Oliver, 1994).....	14
Figure 2.4: Retail Environment Multilevel Model (Dabholkar, et al., 1996).....	15
Figure 2.5: Service Environment Hierarchical Model (Brady and Cronin, 2001).....	16
Figure 2.6: Higher Education Behavioural Intention Hierarchical Model (Clemes et al., 2007).....	17
Figure 3.1 Student Satisfaction in Higher Education: A Conceptual Model.....	43
Figure 5.1: The Scree Plot.....	84
Figure 5.2 Student Satisfaction in Higher Education: A Path Model.....	104
Figure 10A: Residual Scatter Plots.....	168
Figure 11 A: Histograms of the Standardised Residuals.....	170
Figure 12A: Normal P-P Plots of Regression Standardised Residual.....	172

# **Chapter 1: Introduction**

## **1.1 Problem Setting**

Understanding how the customer evaluates service quality is crucial in service industries as quality service offerings contribute to two key variables: customer satisfaction and favourable behavioural intentions. Studies have demonstrated that the customer who experiences high service quality is more satisfied and thus willing to maintain relationships with the same service provider (Cronin, Brady, & Hult, 2000; Cronin & Taylor, 1992; Olorunniwo, Hsu, & Udo, 2006). Therefore, service quality assessment can assist organizations in gaining competitive advantages, decrease costs, and generate profits (Bayraktaroglu & Atrek, 2010). Generally, higher education has been classified as part of the service sector because the distinctive characteristics of services can be identified in it (Mazzarol, 1998).

From the student's perspective, university educational quality is a function of many variables. These include the quality of teaching and opportunities for personal growth (Nauffal, 2009). However, in higher education institutions, the performance of education services will indeed determine the number of students enrolled in the university, because students tend to seek universities offering quality educational services that will yield higher satisfaction (Tahir, Bakar, & Ismail, 2010). Douglas, Douglas and Barnes (2006) suggest that universities should regularly undertake student satisfaction surveys and adapt service offerings accordingly in order to better compete for students, both nationally and internationally. This approach is even more important for China's higher education institutions, who are facing intense domestic (Mok, 2000) and international (Altbach, 2009) competition. Thus, China's

universities must understand students' needs and provide quality educational services to survive in the marketplace.

## **1.2 China's Higher Education Sector**

China's higher education sector has experienced political changes, social, and economic reforms (Duan, 2003). The establishment of modern universities in China can be traced to the end of the nineteenth century. From 1896 to 1949, China's higher educational sector was influenced largely by a Western view of the university. However, China's higher education sector copied the former Soviet Union's university model for political reasons after the establishment of the People's Republic of China's in 1949. One important consequence of the reconstruction of higher education was that comprehensive universities were broken down into single disciplinary universities. Therefore, real comprehensive universities in China were eliminated. However, China's higher education sector is once again paying attention to the West, after adopting a national open-door policy in 1978.

In 1985, the central government issued a policy document entitled *Decision of the Central Committee of Chinese Communist Party on Reform of the Education System*, in which the government delegated many powers to individual educational institutions (Ministry of Education of the People's Republic of China, 1985). This document symbolised the start of a new era of reforms in China's higher education sector (Zha, 2009). The full-scale restructuring of the higher education system was accelerated by a subsequent policy document-*Higher Education Law* in the late 1990's (Zha, 2009). The law details seven major domains within which universities were enabled, so to better enjoy enhanced autonomy (Ministry of Education of the People's Republic of China, 2009). Zha (2009) notes that "the



*Higher Education Law* institutionalizes, for the first time in the history of Chinese higher education, institutions' autonomy concerning their program offerings and curricular patterns" (pp. 45-46).

These recent changes in higher education have been accompanied by the economic modernization of the nation. The Chinese Communist Party has increasingly realized the significance of higher education. This awareness was largely reflected in a progressive changing of government regulations which aimed at adapting the education system to better correspond to national economic and social development goals (Ministry of Education of the People's Republic of China, 2009). These policy documents have made the government gradually withdraw from the detailed operation of higher education, emphasizing the expansion of university autonomy.

The establishment of a market economy in China has also contributed to the demand for different types of talents from the labor market (Zha, 2009). Higher education institutions in China are starting to consider students' choices in course designs (Mok, 2000). Disciplines and specializations have been designed according to the emerging needs of the market (Mok, 2000). Rearranging the disciplines and specializations and re-packaging courses has become a common phenomenon in China's higher education institutions (Mok, 2000).

At the same time, the growing income of many families has motivated them to seek opportunities for their children to access higher education (Zha, 2009). In response to the collective demand, the government started a student recruitment expansion plan in 1998 (Lai & Huang, 2009). Since that year, the gross participation rate of the 18-22 age group in higher education has significantly increased. In 2009, the gross enrolment rate of higher education

institutions for 18-22 year olds was 24.2%, compared to 3.5% in 1991 (Ministry of Education of the People's Republic of China, 2010a). The number of students enrolled in regular higher education institutions in 2009 was 21,446,570 (Ministry of Education of the People's Republic of China, 2010b). A total of 3,174,362 attended in 1997 (Ministry of Education of the People's Republic of China, 2005). In addition, the number of higher education institutions in China was 4297 in 2009 (Ministry of Education of the People's Republic of China, 2010c). This figure was 2731 in 2002 (Ministry of Education of the People's Republic of China, 2002).

The introduction of the market economy also created a favorable environment for the emergence of private education (Mok, 1996). Different to public educational institutions, which are owned by the Chinese government, private educational institutions are owned by social organization or citizens (Mok, 2000). Different types of private educational institutions have become popular in China (Mok, 2000). According to statistics from the Ministry of Education of the People's Republic of China (2002, 2010c), the number of non-state/private higher education institutions increased from 133 in 2002 to 1470 in 2009. Private higher education has become an important part of the educational system in China, competing with its state-funded counterparts (Mok, 2000).

Generally, higher education in China has been going through a process of marketisation (Mok, 2000). Marketisation can be detected from the adoption of a user pays philosophy, the diversification of educational services, market-orientated curriculum offerings, prevalent revenue generation activities, and the introduction of internal competition programs among state-funded higher education institutions (Mok, 2000). These changes in China's higher education sector have required the establishment of a direct relationship between educational

service providers and service receivers. Therefore, “students are no longer students but rather are clients or customers” (Mok, 1999, p. 134). Worldwide, marketing scholars have ardently applied service marketing concepts such as service quality and satisfaction to the higher education sector, aiming at helping higher education institutions succeed in the competitive marketplace (DeShields, Kara, & Kaynak, 2005; Hill, 1995; Russell, 2005). However, only a limited number of studies on students’ perceptions of service quality in China’s higher education have been published (e.g. Gao & Wei, 2007; Kwan & Ng, 1999).

### **1.3 Research Purpose**

The purpose of this study is to gain empirical insight into university students’ satisfaction in China. The study examines the relationship between students’ overall satisfaction and its determinants, along with satisfaction’s impact on favourable behavioural intentions. In particular, the study will apply a hierarchical model to identify the dimensions of service quality as perceived by university students in China. In addition, students’ perceptions of the dimensions of service quality, service quality, value, image, satisfaction, and favourable behavioural intentions will be compared using demographic characteristics such as age and gender.

Clemes, Gan and Kao (2007) developed a behavioural intention hierarchical model in the context of the university. The current study uses these authors’ model as a framework to investigate students’ behavioural intentions. This study has four objectives:

- (1) To identify the service quality dimensions as perceived by university students in China.
- (2) To identify the relationship among service quality, satisfaction, image, value, and favourable behavioural intentions in China’s higher education sector.

- (3) To identify the least and most important service quality dimensions as perceived by university students in China.
- (4) To identify the effects of demographic factors on students' perceptions of service quality, satisfaction and other related constructs.

## **1.4 Contribution of Research**

This study contributes to the service marketing literature from a theoretical and practical perspective. From the theoretical perspective, the study provides an empirical examination of the multidimensional nature of the service quality construct and the interrelationships among value, image, service quality, satisfaction, and favourable behavioural intentions.

From the practical perspective, the findings of this study will benefit practitioners in China's higher education institutions with information about how the relative importance of service attributes vary in terms of students' demographic characteristics and the effects that these demographics have on other important constructs. These findings are important to higher education practitioners and may assist managers and marketers to develop appropriate marketing strategies in order to provide high quality education services and enhance students' educational experience.

## **1.5 Thesis Overview**

The study consists of six chapters. Chapter 2 reviews the customer satisfaction and service quality literature, the empirical studies on the higher education sector, and the literature on the relationships among the higher-order constructs. Chapter 3 presents the conceptual model

generated from the literature review and develops sixteen testable hypotheses. Chapter 4 details the methodology applied to test the formulated hypotheses. Chapter 5 presents the data analysis and results of this study. Chapter 6 provides conclusions and recommendations.

# **Chapter 2: Literature Review**

## **2.1 Chapter Introduction**

This chapter reviews the literature on satisfaction and other related constructs such as service quality, value, image and behavioural intentions. This chapter starts with a review of customer satisfaction in Section 2.2. Sections 2.3, 2.4 and 2.5 examine the literature on the conceptualisation and measurement of service quality. Section 2.6 reviews the studies on service quality/satisfaction in higher education. Section 2.7 discusses the relationships among satisfaction, service quality, value, image and favourable behavioural intentions.

## **2.2 Customer Satisfaction**

Customer satisfaction is a central concept in the marketing discipline (Churchill and Suprenant, 1982; Peterson & Wilson, 1992; Siddiqi, 2011). Customer satisfaction has been widely embraced by practitioners and academics over the past decades since satisfaction is related to various other key marketing concepts. For example, a study conducted by Hu, Kandampully and Juwaheer (2009) on the hotel industry found that satisfaction had a substantial impact on the perceptions of corporate image. Ryu, Han and Kim (2008) also identified that satisfaction positively influenced the favorable behavioral intentions of quick-casual restaurant customers.

Even though customer satisfaction is vital in marketing, there still is not a consensus among academics about the nature of satisfaction (Giese & Cote, 2000; Peterson & Wilson, 1992). Generally, there were two approaches to define the satisfaction construct: cognitive and

emotional (Rojas & Camarero, 2008). The disconfirmation of expectations was the most widely recognized cognitive approach that has been used to explain satisfaction formation (Rojas & Camarero, 2008). For example, Churchill and Suprenant (1982) and Oliver (1980) suggested that satisfaction was a result of the comparison between expectations of a product/service and its actual performance. Walker (1995) applied the traditional disconfirmation model in a service context. The author contended that service encounters can be divided into three separate, yet integrated stages: peripheral service, core service, and post-core-service (Walker, 1995). Disconfirmations can occur at each stage and influence the overall level of satisfaction (Walker, 1995).

The use of expectations as a comparison standard has been criticized. Spreng and Olshavsky (1993) summarised four main conceptual problems with using expectations as the reference standard. The first problem was logical inconsistency. For example, even though a manufacturer had created unrealistic expectations about a new product in customers' minds, customers would still be satisfied if the newly launched product was better than any other one currently available in the market. In this situation, the expectancy disconfirmation model would predict that the customer would be dissatisfied. Another logical problem occurred when a customer anticipated that the performance of a product would be poor, but still bought the product for some reason. If the expectation was confirmed, the disconfirmation model would predict that the customer would be neutral or satisfied. However, poor product performance cannot satisfy the customer. The third problem was that using expectations as the reference standard constrained the feeling of satisfaction to the aspects that the customer had pre-consumption beliefs about. Finally, the disconfirmation paradigm limited satisfaction to a focal brand; however, the reality was far more complex than that. However, Spreng and Olshavsky (1993) noted that the disconfirmation of expectations was still the dominant theory

when researchers studied overall satisfaction.

However, the inadequacy of the pure cognitive approach to portray satisfaction has been recognized by scholars (Rojas & Camarero, 2008). For example, Mano and Oliver (1993) stated that “satisfaction has many antecedents and is a much more complex ‘emotion’ than many have suggested” (p. 464). After reviewing the literature, Giese and Cote (2000) also highlighted the important role of affect in the formation of satisfaction. They considered that the literature viewed satisfaction as:

(1) some type of affective, cognitive, and/or conative response. (2) based on an evaluation of product-related standards, product consumption experiences, and or purchase-related attributes (e.g., salesperson). (3) expressed before choice, after choice, after consumption, after extended experience, or just about any other time a researcher may query consumers about the product or related attributes (Giese & Cote, 2000, p. 14).

Many researchers agreed that satisfaction should consist of both cognitive and affective components (Homburg, Koschate, & Hoyer, 2006; Oliver, 1993; Schoefer, 2008).

## **2.3 An Overview of Services Marketing**

### **2.3.1 The Foundation of Services**

A distinction between services and goods cannot be found in the early marketing literature. Services were once thought to be intangible goods, and were thus included in a broadened definition of a product (Kotler & Levy, 1969). The mixed nature of services and goods also prevented differentiating them from one another. Most tangible goods involved services as



support and most intangible services required goods to make services easy to be conducted (Rathmell, 1966). Therefore, it was difficult to completely distinguish goods from services using most product categories.

Zeithaml, Parasuraman and Berry's (1985) review of the literature summarised four distinctive characteristics of services: intangibility, inseparability, heterogeneity and perishability. The four features identified were significant in the development of the service quality construct (Ladhari, 2009).

### **2.3.2 Conceptualisations of Service Quality**

Quality was extremely difficult to define in a few words because it was a shared trait in many businesses and social sciences (Gummesson, 1991). In the goods sector, quality meant tight conformance to requirements, or having zero defects (Parasuraman, Zeithaml, & Berry, 1985). Unfortunately, the existing knowledge about quality in the goods sector was not sufficient to understand service quality (Parasuraman et al., 1985). Gummesson (1991) suggested that customer utilities and satisfaction should be taken into account when defining customer perceived quality. Gummesson (1991) suggested that "customer perceived quality is a blend of objective facts and subjective judgments, of knowledge as well as of ignorance" (p. 4). Rust and Oliver (1994) argued that service quality was a subjective matter.

Taylor and Baker (1994) suggested that Parasuraman, Zeithaml and Berry's conceptualisation adequately represented the core meaning of service quality. Parasuraman et al. (1988) defined the notion of perceived service quality as a global attitude, resulting from a comparison between prior expectations and actual experiences.

Moreover, in the service marketing literature, service quality had been described as an elusive and indistinct construct (Parasuraman et al., 1985). Therefore, the construct was difficult to grasp (Brady & Cronin, 2001). Considerable effort has been made on defining and measuring the dimensionality of service quality (Brady & Cronin, 2001; Dabholkar, Thorpe, & Rentz, 1996; Gronroos, 1984; Parasuraman et al., 1985, 1988). Brady and Cronin (2001) concluded that researchers generally adopted either a “Nordic” (i.e., Gronroos, 1984) or “American” perceptive (i.e., Parasuraman et al., 1985, 1988) to conceptualise and measure service quality.

## **2.4 Service Quality Models**

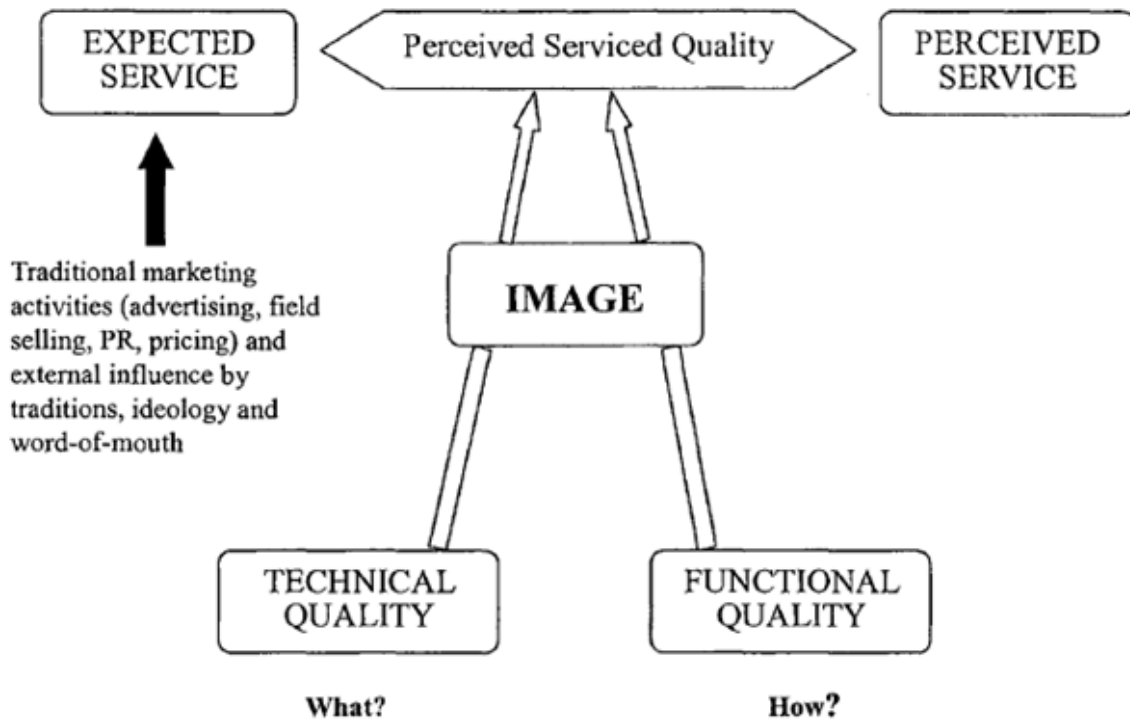
### **2.4.1 The Perceived Service Quality Model**

Gronroos (1984) employed a disconfirmation paradigm, in which expectations were used as standards of reference to conceptualise service quality (Figure 2.1). He considered that perceived service quality was the outcome of an evaluation process, where the perceived service and the expected service were compared. Two dimensions, technical quality and functional quality, composed the perceived service quality construct. Technical quality referred to actual outcomes that the customer received as a result of interactions with the service firm, while functional quality stressed the process used to deliver the service.

Gronroos also highlighted that image, which was mainly built up by technical quality and functional quality, was very important for service firms. Customers would bring their prior experiences and overall perceptions of the service firm to subsequent service encounters since customers often continuously interacted with the same service firm (Gronroos, 2001).

Therefore, a favorable image can affect the customer’s perceptions of the service firm in many respects (Kang & James, 2004). Minor mistakes were easy to forgive if a positive

image was held in the customer's mind; in contrast, mistakes would be magnified if a negative image about the service provider occupied the customer's mindset (Kang & James, 2004).

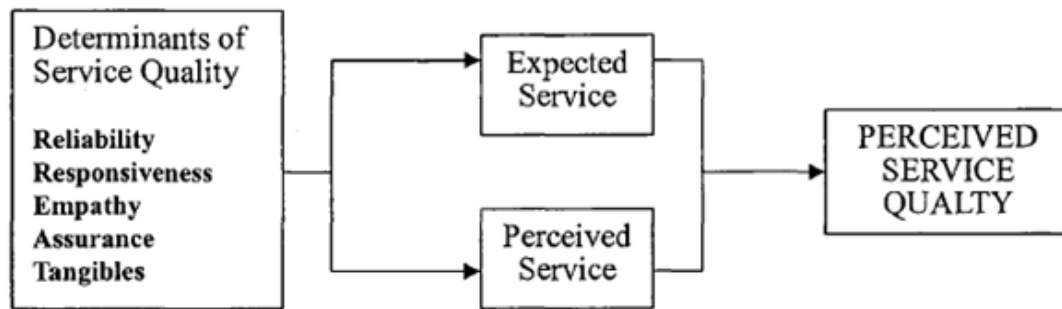


**Figure 2.1: Perceived Service Quality Model (Gronroos, 1984)**

## 2.4.2 The SERVQUAL Model

Parasuraman et al. (1985, 1988) contended that perceived service quality can be adequately captured by the differences between perceptions and expectations. The three authors proposed the SERVQUAL model, which was theoretically based on gap analysis to conceptualise service quality (Figure 2.2). The rationale was that the smaller the difference between perceptions and expectations, the higher the level of perceived service quality (Parasuraman et al., 1985). The exploratory research conducted by the three authors identified ten dimensions of service quality. The ten dimensions were refined to five in their subsequent study (Parasuraman et al., 1988). The authors labeled the five dimensions as tangibility,

reliability, assurance, empathy and responsiveness.



**Figure 2.2: Determinants of Perceived Service Quality (Parasuraman, et al., 1988)**

### 2.4.3 The Three-Component Model

Rust and Oliver (1994) offered a three-component model (Figure 2.3), which consisted of the service product (i.e., technical quality), the service delivery (i.e., functional quality), and the service environment. Although they did not test their proposed service quality model, support had been found for it in several service industries (Brady & Cronin, 2001).



**Figure 2.3: Three-Component Model (Rust and Oliver, 1994)**

## 2.4.4 The Retail Environment Multilevel Model

Dabholkar et al. (1996) recognized that customers may evaluate service quality at the individual attribute level as well as the integrated level. Therefore, the authors proposed and tested a hierarchical model in the retail environment (Figure 2.4). In the model, overall perceived service quality was the highest order factor. Under overall service quality, they proposed a level that consisted of five dimensions: physical aspects, reliability, personal interaction, problem-solving, and policy. On the next level, three of the five dimensions were made-up of more complex and relevant sub-dimensions.

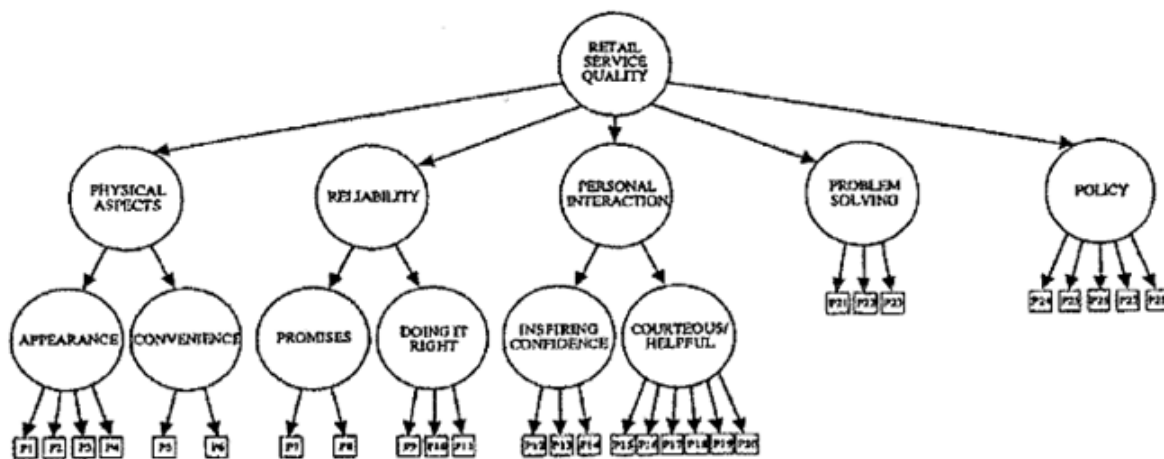


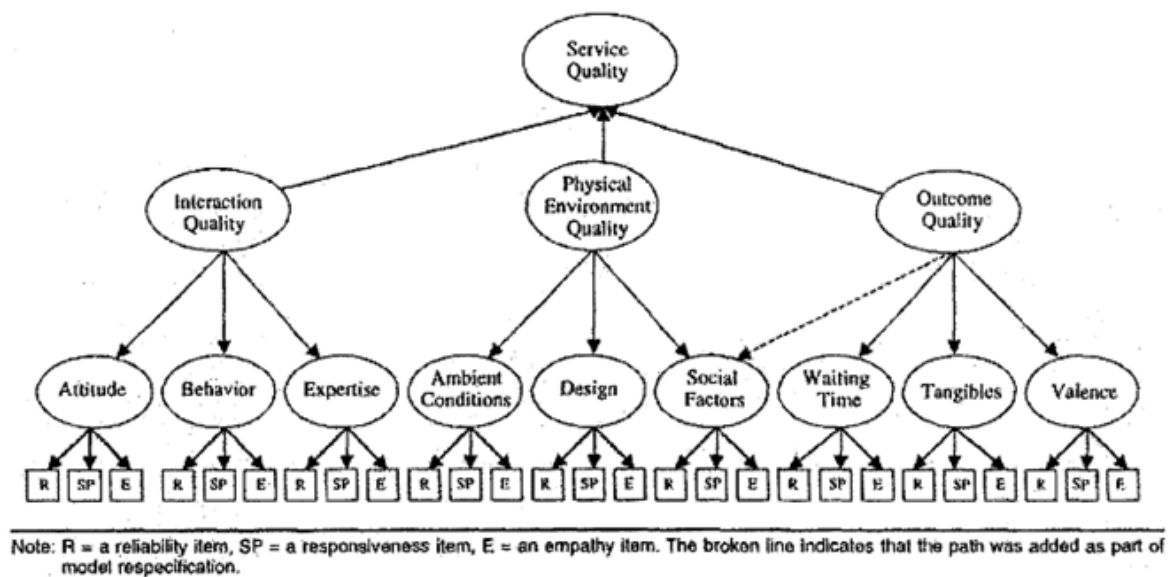
Figure 2.4: Retail Environment Multilevel Model (Dabholkar, et al., 1996)

## 2.4.5 The Service Environment Hierarchical Model

Combining the multidimensional approach with the multilevel approach to conceptualise service quality, Brady and Cronin (2001) suggested a third-order factor model (Figure 2.5). In their hierarchical model, service quality was explained by three primary dimensions: interaction quality, physical environment quality, and outcome quality. Each of the three primary dimensions was further represented by three relevant sub-dimensions. The hierarchical and multidimensional model offered an improved understanding of three basic

issues: “(1) what defines service quality perceptions, (2) how service quality perceptions are formed, and (3) how important it is where the service experience takes place” (p. 44).

Recently, support for Brady and Cronin’s hierarchical framework of service quality have been found in health care (Dagger, Sweeney, & Johnson, 2007), higher education (Clemes et al., 2007), the hair salon and phone service industries (Pollack, 2009), the motel industry (Clemes, Gan, & Ren, 2010), and the sports industry (Clemes, Brush, & Collins, 2011).

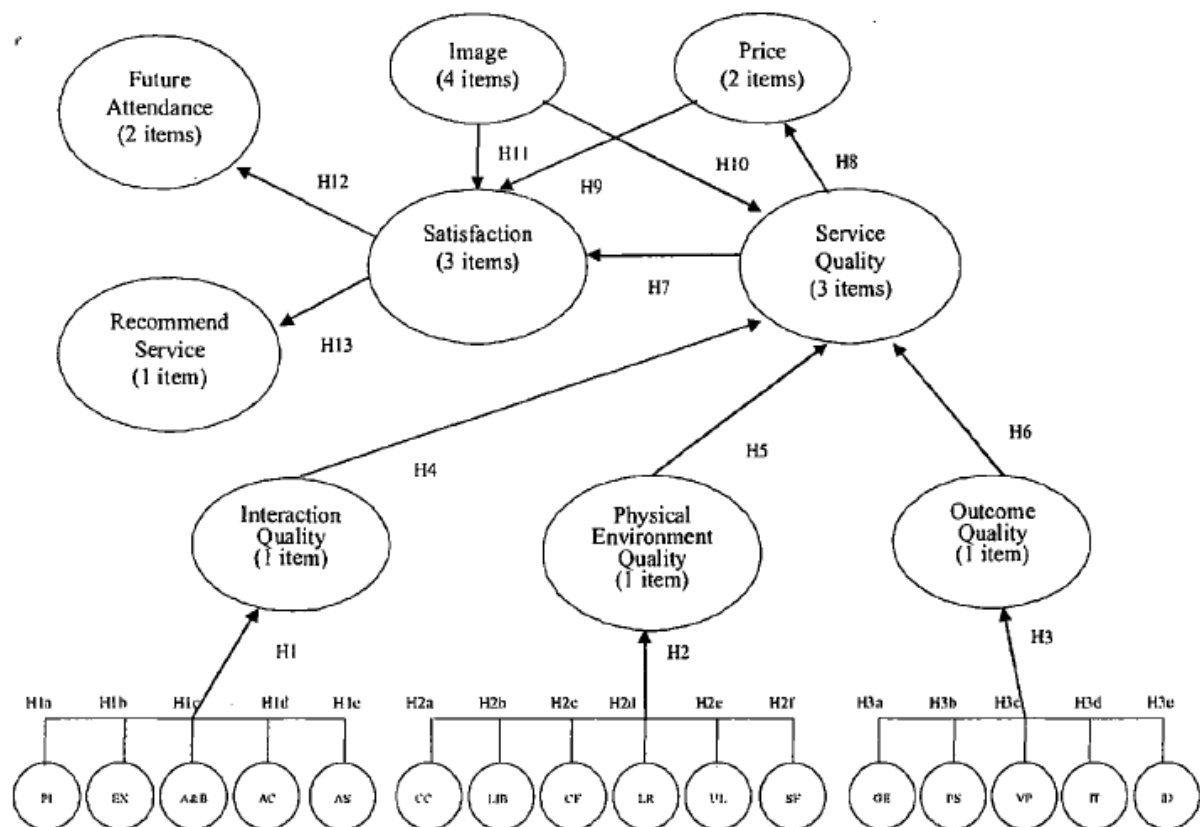


**Figure 2.5: Service Environment Hierarchical Model (Brady and Cronin, 2001)**

## 2.4.6 A Higher Education Behavioural Intention Hierarchical Model

Clemes et al. (2007) argued that students’ perceptions of their university experiences in New Zealand mainly focused on three aspects: interactions between teachers and students, physical facilities, and student learning outcomes. These were based on the factors identified in Brady and Cronin’s (2001) hierarchical model. Consequently, Clemes et al. (2007) suggested that a hierarchical model of service quality may be also applicable when assessing university students’ perceptions of service quality and proposed a higher education behavioural intention hierarchical model. In their model, the students’ global judgment of service quality

played a key role in linking students' perceptions of various service quality dimensions with higher order constructs (Figure 2.6). Thus, the model provided a framework to understand the factors that students used to form their service quality perceptions and the effects of the overall service quality perceptions on satisfaction, price, image, and favourable behavioural intentions.



**Figure 2.6: Higher Education Behavioural Intention Hierarchical Model (Clemes et al., 2007)**

## 2.5 Service Quality Measurements

### 2.5.1 SERVQUAL

SERVQUAL, originally developed by Parasuraman et al. (1985, 1988), was the most well

known and commonly used survey instrument when researchers studied service quality (Ladhari, 2009). The SERVQUAL scale included 22-paired items simultaneously measuring both customers' perceptions and expectations. Parasuraman and colleagues believed that the perception-minus-expectation gap scores obtained from the SERVQUAL scale would adequately capture their hypothesized five dimensions (i.e. tangibility, reliability, assurance, empathy and responsiveness). However, in a follow-up study, Parasuraman, Berry and Zeithaml (1991) recognized that in the original SERVQUAL scale, the "should" terminology may lead to unrealistic high expectation scores and the negative wordings in some items may also cause problems for respondents' interpretations. Thus, the authors refined the items by replacing "should" by "will" and changed all negatively worded items to a positive format. The dimensional structure of SERVQUAL remained the same.

#### **2.5.1.1 Critique of the SERVQUAL Scale**

The shortcomings of SERVQUAL have been noted by many scholars since the development of the scale (Carman, 1990; Newman, 2001; Teas, 1993). Problems associated with the use of SERVQUAL were summarised by Ladhari (2009) and Van Dyke, Kappelman and Prybutok (1997).

The most important conceptual criticism of SERVQUAL was directed at the use of gap scores. Rather than directly measuring perceptions of service quality, Parasuraman et al. (1988) operationalised perceived service quality as the differences between perceptions and expectations (Van Dyke et al., 1997). The method was known as the "disconfirmation paradigm", and was originally developed in the area of satisfaction research (Ladhari, 2009). However, it was overly simplistic to assume that the subtraction could accurately capture



perceived service quality, which was considered a complex cognitive process (Van Dyke et al., 1997).

Another problem was caused by the ambiguity of the expectation construct (Van Dyke et al., 1997). There were variously defined expectations in the SERVQUAL scale and the loosely defined expectation construct can result in a number of measurement problems (Van Dyke et al., 1997).

The applicability of the SERVQUAL scale across different industries and cultures was also questioned (Ladhari, 2009). Many researchers had to alter the SERVQUAL scale to make it fit either a certain service industry (Akbaba, 2006; Babakus, & Mangold, 1992; Carman, 1990), or a particular culture (Lai, Hutchinson, Li, & Bai, 2007).

In the marketing literature, it has been recognized that both the process and outcomes of the service are important in shaping customers' perceptions of service quality (Brady & Cronin, 2001; Gronroos, 1984; Rust & Oliver, 1994). However, it was apparent that the SERVQUAL model focused mainly on the service delivery process and failed to pay adequate attention to service outcomes (Ladhari, 2009).

Research also revealed that service quality was not only a multidimensional construct, but also a multilevel construct (Brady & Cronin, 2001; Dabholkar et al., 1996). However, the SERVQUAL model failed to reflect this hierarchical nature of service quality (Ladhari, 2009).

The SERVQUAL scale measured the service quality construct reflectively. Ladhari (2009) suggested the formative nature of the service quality construct. The author recommended that

researchers should also explore service quality as a formative construct.

There were also empirical difficulties with the SERVQUAL scale. A widely applied method to test the reliability of a scale instrument was Cronbach's alpha, but the method often overestimated the reliability of a difference score based scale. This effect was especially apparent when the component scores were highly correlated, such as in the case of SERVQUAL (Van Dyke et al., 1997). Ladhari (2009) also suggested the inappropriateness of Cronbach's alpha in measuring psychometric quality, suggesting a face validity problem.

The convergent and predictive validity of the SERVQUAL scale was also problematic (Van Dyke et al., 1997). The factor loadings of the SERVQUAL items did not reveal a consistent pattern across studies; some of the SERVQUAL items in several studies had higher loadings on dimensions that differed from those proposed by Parasuraman et al. (1988) (Ladhari, 2009). Cronin and Taylor (1992) demonstrated that perception-only measurements had superior predictive and convergent validity (Van Dyke et al., 1997).

Another worrying criticism of SERVQUAL was its unstable dimensionality (Van Dyke et al., 1997). The five hypothesized dimensions of SERVQUAL were not always supported empirically (Van Dyke et al., 1997).

### **2.5.2 SERVPERF**

Cronin and Taylor (1992) argued that when measuring service quality, the performance only approach (SERVPERF) was superior to the difference score based SERVQUAL. The underlying difference between SERVQUAL and SERVPERF was that SERVQUAL was

based on the disconfirmation paradigm, while SERVPERF was based on an attitudinal paradigm (Cronin & Taylor, 1992).

The empirical results supported the authors' contention. High correlations among SERVPERF, importance-weighted SERVPERF, and a direct measure of service quality indicated the convergent validity of SERVPERF (Cronin & Taylor, 1992). More importantly, scores obtained from SERVPERF explained more variation in service quality than difference scores obtained from SERVQUAL (Cronin & Taylor, 1992). This result provided evidence to support the superiority of SERVPERF. Furthermore, SERVPERF scores had higher correlations with scores of two conceptually correlated constructs, satisfaction and purchase intention, than did SERVQUAL scores, indicating a better predictive validity for SERVPERF (Cronin & Taylor, 1992).

SERVPERF has been deemed a superior measurement instrument when compared to SERVQUAL (Brady, Cronin, & Brand, 2002; Cronin & Taylor, 1992). This study excludes the expectation construct and uses a performance scale to measure students' perceptions of service quality.

## **2.6 Service Quality/Satisfaction Studies in Higher Education**

In higher education, there is consensus on the importance of service quality (Brochado, 2009). A number of higher education industry specific scales have been developed to capture students' perceptions of service quality. However, the most appropriate scale for measuring educational service quality has not been found in China. The following section reviews empirical studies on service quality and/or satisfaction in different higher education sectors.

### **2.6.1 Australasia**

Joseph and Joseph (1997) studied students' perceptions of service quality in New Zealand's higher education institutions. They identified seven determinants of service quality: "programme issues", "academic reputation", "physical aspects", "career opportunities", "location", "time" and "other". The factor "other" was used to measure the influence of word-of-mouth as well as the influence of family and peers on the student's choice of a university. Further, when comparing mean scores of each of the seven dimensions by gender, females thought "physical aspects", "location", and "other" more important than did males.

Clemes, Ozanne and Tram (2001) measured students' perceptions of service quality in a New Zealand university. The authors considered that the quality of education can be categorized into technical quality and functional quality. Seven dimensions pertaining to technical quality and functional quality were identified. These were library, quality of education, campus facilities and environment, laboratory, understand the student, accessibility, and course process. Two sub-dimensions of technical quality, quality of education and campus facilities and environment, were significant predictors of perceived service quality. Course process, which was considered as a sub-dimension of functional quality, was the only significant predictor of perceived service quality. Moreover, the authors found that students' perceptions of the dimensions of service quality differed according to age, course of study, and ethnicity.

Clemes et al. (2007) applied Brady and Cronin's (2001) hierarchical model of service quality to New Zealand's university setting. The authors argued that educational outcomes were a crucial aspect of service quality in higher education institutions. The estimate of gains measures in the College Student Experience Questionnaire (CSEQ), developed by Pace and Kuh (1998), can be viewed as educational outcomes (Clemes et al., 2007). Pace (1990) had

grouped the estimate of gains scales in the CSEQ into five factors: general education, personal-social development, intellectual skills, science and technology, and vocational preparation (as cited in Kuh, Pace, & Vesper, 1997).

Based on the literature review, Clemes et al. (2007) proposed sixteen sub-dimensions of service quality in a conceptual research model. The result of factor analysis revealed that ten factors adequately represented the proposed sixteen sub-dimensions. The ten sub-dimensions were academic staff, administration staff, academic staff availability, course content, library, physical appealing, social factors, personal development, academic development, and career opportunities. Perceptions of the ten sub-dimensions were then used as formative indicators of interaction quality, physical environment quality, and outcome quality. The results of regression analysis demonstrated that nine of the ten sub-dimensions had significant and positive influence on their pertaining primary dimensions which, in turn, affected students' overall perceptions of service quality.

Clemes et al. (2007) also examined the interrelationships among overall perceived service quality, price, image, satisfaction and favourable behavioural intentions. The authors demonstrated that students' price judgments can be enhanced by favourable perceptions of service quality. Their perceptions of their university's image and service quality were two significant predictors of satisfaction. The authors noted that a favourable image of the university can enhance overall perceived service quality. When a student was satisfied with the education services, they were willing to express favourable behavioural intentions. In addition, Clemes et al. (2007) compared students' perceptions of all the constructs based on demographics. Significant differences in perceptions of the sub-dimensions and primary dimensions of service quality, as well as overall service quality, satisfaction, price and

favourable behavioural intentions, were found within either ethnic groups or the year of study groups.

Peng (2008) examined the dimensions of service quality in an Australian tertiary institution from the Chinese student's perspective. International students from China were sampled in the study. Six factors that emerged from data analysis were administrative support, academic staff quality, campus quality, curriculum quality, qualification integrity, and personal compatibility. The factors related to interpersonal considerations (i.e. administrative support and academic staff quality) were regarded as more influential and important than the other factors. The author concluded that the identified factor structure and the relative importance of these factors reflected the concerns of young Chinese students. As the group of Chinese students moved away from their homes for the first time, they thought that their relationships with the university and its staff were more important than course content and quality of degree.

Arambewela and Hall (2009) sampled international postgraduate business students from four Asian countries studying at five universities in Australia. The results indicated that Asian students perceived services that were provided by their universities based on seven dimensions: economic considerations, education aspects, technology support, social aspects, accommodation, safety, and image. The seven dimensions covered both the educational and non-educational aspects of services and had a significant and positive impact on students' satisfaction. The education dimension, which included three items related to the performance of lecturers, was perceived to be the most important factor influencing student satisfaction. Further analysis revealed that Indian students had the highest expectations, while students from China had the lowest expectations when compared to students from India, Indonesia and

Thailand.

### **2.6.2 Europe**

Marzo-Navarro, Pedraja-Iglesias and Rivera-Torres (2005) pointed out that the quality of courses provided by universities was an important way for a higher education institution to differentiate itself from competitors. Students who attended the 2003 summer session in a Spanish public university were sampled for the study. The authors reported that teaching staff, enrolment, and course organization were the factors that had a positive and significant impact on students' satisfaction. Moreover, Marzo-Navarro et al. found that students who were satisfied with the course were willing to recommend the course to others.

Angell, Heffernan and Megicks (2008) measured educational service quality based on a sample of UK postgraduate students. Initially, the authors elicited twenty important service attributes from in-depth interviews. These service attributes were then grouped into four service factors (i.e. academic, leisure, industry links, and cost) by using exploratory factor analysis. The results of analysis suggested that academic and industry links were more important than leisure and cost. The authors contended that postgraduates viewed their postgraduate experiences as a critical step to a career. As a result, these students placed great importance on the academic aspects and industry links service factors.

Brochado (2009) reviewed several techniques used to measure service quality in the higher education sector. SERVQUAL, importance-weighted SERVQUAL, SERVPERF, importance-weighted SERVPERF, and HEdPERF<sup>1</sup> were the five main measurement models. In the first

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<sup>1</sup> HEdPERF is a new higher education industry specific scale developed by Firdaus (2006a, 2006b).

four, tangibles, reliability, responsiveness, assurance and empathy were the five broad dimensions of service quality that were frequently adopted by researchers. In the HEdPERF model, Firdaus (2006a, 2006b) considered that non-academic aspects, academic aspects, reputation, access, and programme issues underlaid the concept of service quality in higher education. In order to determine the superiority of each measure, Brochado (2009) examined the performance of the five models based on data collected from a Portuguese university in Lisbon. It is noteworthy that the multi-dimensional structures of all of the five measurement models were confirmed through empirical tests. However, SERVPERF and HEdPERF appeared to exhibit better measurement capabilities (Brochado, 2009).

### **2.6.3 North America**

LeBlanc and Nguyen (1997) examined the dimensions of service quality with data collected from business students in Canada. The authors identified seven service quality dimensions, labelling them as faculty, reputation, physical evidence, administrative personnel, curriculum, responsiveness, and access to facilities. They pointed out that students' perceptions of the seven dimensions all positively influenced their overall evaluation of the business school's quality. The authors also noted that, in terms of standard coefficients, reputation had the greatest impact on students' overall perceptions of service quality.

Letcher and Neves (2010) identified eight factors determining undergraduate business students' satisfaction in the United States. These were (1) self-confidence, (2) curriculum, instruction, and class, (3) teaching in the subject matter, (4) extra-curricular activities and career opportunities, (5) student advising, (6) quality of teaching and feedback, (7) computing facilities, and (8) fellow students. Because self-confidence explained the largest proportion of



total sample variance and had the greatest impact on satisfaction, Letcher and Neves concluded that students who were confident about their own knowledge, abilities and skills were generally satisfied with their academic experiences. The results of stepwise regression also revealed that advising students had little effect on students' satisfaction, and that the other seven factors each had a positive influence on students' overall satisfaction.

#### **2.6.4 Singapore, Malaysia and Japan**

Tan and Kek (2004) investigated students' perceptions of service quality at two universities in Singapore, using the same instrument. The authors labeled them University A and University B, with factor analysis performed separately. Results demonstrated that students at the different universities perceived service quality according to different dimensions. Workload, assessment, learning, university facilities, and social activities were the common dimensions of service quality for both universities. Stepwise regression was also conducted separately for both universities. For students studying at University A, factors labeled course, assessment, learning, communicating with university's management, and university facilities significantly contributed to overall students' satisfaction. For those studying at University B, the factors named course content, learning, school authority, university appearance, and university facilities were the significant predictors of overall students' satisfaction. Finally, Tan and Kek compared perceptions of service quality based on students' demographics and found that perceptual differences existed between the different year cohorts, graduates and undergraduates, and local and international students.

Based on an extensive literature review, Ling, Chai and Piew (2010) found that the service quality of higher education institutions can be evaluated from the perspective of the customer

or the perspective of service provider, but most of researchers used only one focus in a single study. The authors argued that deriving determinants of service quality from a combination of the two approaches can provide university administrators with a full picture to better understand students' perceptions of service quality. The authors first identified nine determinants of students' perceived service quality from previous studies that had applied either of the two methods. These were contact personnel quality, quality of librarians, access to facilities, curriculum, physical facilities, staff responsiveness, reputation, recreational activities, and cost of courses. Then, students in a private tertiary institution in Malaysia were sampled. The results of regression analysis showed that eight of the nine determinants (except the physical facilities) had a positive and significant influence on students' overall perceptions of service quality. As the quality of librarians was an important human interaction component in the university context, the authors recommended that it should be included when assessing service quality in higher educational institutions.

In order to develop a comprehensive approach for higher education institutions to measure service quality, Sultan and Wong (2010) studied international students' perceptions of service quality in Japan. Their data were collected from 11 universities. Factor analysis revealed that dependability, effectiveness, capability, efficiency, competencies, assurance, unusual situation management, and semester and syllabus were the eight critical dimensions on which Japanese universities should concentrate their strategic efforts. Based on these findings, the authors also highlighted the central role of academics in the higher education sector. They suggested that universities should hire competent lecturers/professors and proactive staff as well as design academic programs, syllabus and course content according to international standards.

## **2.6.5 Indonesia, India, and Saudi Arabia**

Sohail and Shaikh (2004) conducted a survey in Saudi Arabia. Business students studying in a leading university were sampled. The survey instrument contained items that corresponded to the five dimensions of SERVQUAL. Principal component analysis identified six factors that influenced students' evaluation of service quality: contact personnel, physical evidence, reputation, responsiveness, access to facilities, and curriculum. Sohail and Shaikh argued that "contact personnel" and "physical evidence" were the two most important factors influencing students' evaluation of service quality.

Jain, Sinha and De (2010) investigated service quality in India. The authors sampled students from six technical institutions. Factor analysis revealed twelve interpretable factors: process, academic facilities, curriculum, interpersonal relationship, input quality (faculty), support facilities, industry interaction, input quality (student), reputation, campus, outcome, and visual appeal. Jain et al. recognized that educational service quality was clearly a multidimensional construct. However, the twelve dimensions did not conform to the five dimensions of SEVQUAL.

Sumaedi and Bakti (2011) studied the service quality perceptions of industrial engineering students in Indonesia. Factor analysis revealed that students formed their perceptions of service quality based on five dimensions: academic content and knowledge center, supporting facilities, lecture responsibilities, social activities, and class program and facilities. The researchers argued that the five dimensions may be specific for the Indonesian context because students studying in different country contexts might have different service quality needs and standards.

### **2.6.6 China**

Kwan and Ng (1999) conducted cross-cultural research in Hong Kong and Mainland China. The authors applied a modified SERVQUAL instrument, with the aim of identifying the quality indicators of higher education. The factor structures that emerged from the Hong Kong and Mainland China data were very similar. Four common factors that contributed to perceptions of service quality for the two groups of students were identified: course content, facilities, assessment and social activities. Further, stepwise regression analysis revealed that course content, assessment, concern for students, and facilities were significant predictors of overall satisfaction for students in Hong Kong. For students in Mainland China, course content, communication with university, and facilities were the significant determinants of overall satisfaction. Kwan and Ng argued that both of the groups of students considered studying at university to be an investment and therefore focused on course content and facilities.

Recently, scholars in Mainland China also began to investigate service quality in higher education, but few studies have been done in that context. Gao and Wei (2007) pointed out that SERVQUAL, a commonly used survey instrument to measure service quality in higher education, was a mature scale. The SERVQUAL instrument, tailored to the characteristics of China's higher education, may thus adequately capture Chinese students' perceptions of service quality. To investigate this contention, undergraduate students were sampled from two state-owned universities. SERVQUAL revealed that the empathy dimension had the largest gap score among the five dimensions of service quality. However, when regressing satisfaction on the five dimensions (tangibles, reliability, responsiveness, assurance and empathy), the regression model yielded only two significant variables (reliability and responsiveness) and explained only a small portion of variation in satisfaction. Gao and Wei

acknowledged, however, that some important factors contributing to satisfaction were not included in their study.

### **2.6.7 Cross-Cultural Research**

Ford, Joseph, and Joseph (1999) sampled undergraduate business students from New Zealand and the United States in order to identify criteria that students used to evaluate services of their universities. The authors separately analysed the New Zealand and the United States data through factor analysis. Students in New Zealand perceived educational service quality as having seven dimensions: programme issues, academic reputation, physical aspects/cost, career opportunities, location, time, and other. Students in the United States considered that academic reputation, cost/time issues, other, physical aspects, and choice influencers were the six important dimensions of educational service quality. However, Ford et al. noted that although the survey instruments used in New Zealand and the United States were very similar, significant differences in factor structures emerged. Therefore, Ford et al. (1999) suggested that the dimensional structure of university service quality depended on the specific cultural setting of the research.

Lagrosen, Seyyed-Hashemi and Leitner (2004) carried out cross-cultural research in which academic business students in Austria and Sweden were surveyed. The authors found eleven dimensions constituting quality in higher education. Further, when comparing the importance that students attached to each of the eleven dimensions, significant differences emerged in four dimensions (information and responsiveness, courses offered, computer facilities, and collaboration and comparisons) between Austrian students and Swedish students. Further, seven of the eleven dimensions were considered to be most important. They had significantly

higher mean values on the seven-point Likert scales. The seven dimensions were 1) corporate collaboration, 2) information and responsiveness, 3) courses offered, 4) internal evaluations, 5) computer facilities, 6) collaboration and comparisons, and 7) library resources.

Mai (2005) examined the differences in the perceptions of service quality between postgraduate students in the United States and the United Kingdom. Nineteen items were included in the questionnaire to measure both specific service attributes and the overall experience with education services. The results of t-tests revealed that, generally, students in the United States were more satisfied with educational services when compared with their United Kingdom counterparts. When using the nineteen items to predict overall satisfaction, Mai found that “the overall impression of the school” and “the overall impression of the quality of education” were more influential than any other variables. Further, Mai reported that students’ perceptions of “lecturers’ expertise on their subject area”, “lecturers’ interest in the subject matter”, “quality and accessibility of the IT facilities” and “the prospect of this degree furthering my career” were significant predictors of “the overall impression of education quality”.

## **2.7 Constructs Related to Satisfaction**

### **2.7.1 The Relationship between Service Quality and Satisfaction**

Spreng and Mackoy (1996) suggested that service quality and satisfaction were highly interrelated concepts. Service quality was defined as the customer’s global judgment of the superiority of the service and operationalised as subtracting expectations from perceptions (Parasuraman et al., 1988). However, confusion initially arose from the construct’s similarity to satisfaction (Gonzalez, Comesana, & Brea, 2007). Customer satisfaction or dissatisfaction

was also based on the paradigm of disconfirmation of expectations (Ladhari, 2009). Zeithaml, Berry and Parasuraman (1993) argued that service quality and satisfaction could be distinguished because the two constructs used different standards of comparison. These authors specified three different levels of customer expectations: “(1) desired service, which reflects what customers want; (2) adequate service, the standard that customers are willing to accept; and (3) predicted service, the level of service customers believe is likely to occur” (p. 10). Perceived service quality was defined as a result of the disconfirmation of desired service and/or adequate service, while satisfaction was resulted from the disconfirmation of predicted service. Gonzalez et al. (2007) noted the distinction between satisfaction and service quality: satisfaction referred to individual or global transactions, whereas service quality was the general impression of or attitude towards services.

The presumed causal relationship between service quality and satisfaction remains unsolved (Gonzalez et al., 2007). Brady et al. (2002) concluded that there were three perspectives about the direction of causality between service quality and satisfaction. First, some authors argued that satisfaction was an antecedent of service quality (Bitner, 1990; Bolton & Drew, 1991; Parasuraman et al., 1988). Basically, these authors suggested that an accumulation of transaction-specific satisfactions would develop or modify the customer’s global attitude towards a service in the long run (Gonzalez et al., 2007). However, this viewpoint was questioned by Cronin and Taylor (1992) who empirically demonstrated that service quality must be an antecedent of satisfaction. Recent studies also have offered support for this position (Brady et al., 2002; Gonzalez et al., 2007; Olorunniwo et al., 2006). Parasuraman, Zeithaml and Berry (1994) speculated that both service quality and satisfaction can be examined either transaction-specifically or globally. Thus, multiple transaction-specific satisfactions may lead to overall perceptions of service quality, and a transaction-specific

perception of service quality may contribute to the transaction-specific satisfaction which ultimately contributed to overall satisfaction (Parasuraman et al., 1994).

The third conceptualisation of the service quality and satisfaction relationship was that either construct can serve as both an antecedent and a consequence of the other (Gonzalez et al., 2007). Cronin and Taylor (1992) proposed “a nonrecursive (“two-way”) relationship between service quality and satisfaction” (p. 62) in a structural equation model, although the path from satisfaction to service quality was not supported. Iacobucci, Grayson and Ostrom (1994) replicated Cronin and Taylor’s (1992) study and came to the same conclusion. When both directions (the path from service quality to satisfaction and the path from satisfaction to service quality) were included in a single model, only the service quality to satisfaction path was significant. However, the authors warned that the result may be due to the inability of structural equation modeling to yield true causality between variables. To illustrate the problem, Iacobucci et al. (1994) examined two alternative models: one defined a single path from service quality to satisfaction, the other one specified a single reverse path. The two models fitted the data equally well when compared to the model that included both directions.

In summary, despite a lack of consensus regarding service quality and the construct’s relationship with satisfaction, Brady et al. (2002) suggested that the dominant view in the literature was that the customer’s evaluation of service quality was an important antecedent of satisfaction.



### **2.7.2 The Relationship between Perceived Value, Service Quality and Satisfaction**

Zeithaml (1988) defined perceived value as “the consumer’s overall assessment of the utility of a product based on perceptions of what is received and what is given” (p. 14). Choi, Cho, Lee, Lee, and Kim (2004) suggested that customers may cognitively integrate their perceptions of benefits and sacrifices to determine whether to purchase services. Further, Choi et al. (2004) considered that benefits largely resulted from the quality of services. Likewise, Tam (2004) argued that customers’ perceived value of a service was higher when the customer considered that service quality greatly exceeded the costs of obtaining the service. Tam (2004) also contended that perceived value was a determinant of satisfaction. Recently, many marketing scholars found that service quality had a significant impact on customers’ value assessment, which in turn positively influenced satisfaction (Choi et al., 2004; Cronin et al., 2000; Kuo, Wu, & Deng, 2009; Lai, Griffin, & Babin, 2009; Tam, 2004).

Moreover, Wang, Lo and Yang (2004) stated that customers did not always pursue the highest service quality. If the price was very competitive, the perceptions of value would be enhanced and thus a higher level of satisfaction could be achieved even with lower perceived service quality. Wang et al. tested this relationship and concluded a moderating role of value between service quality and satisfaction. Other researchers have confirmed that value does moderate the relationship between service quality and satisfaction (Caruana, Money, & Berthon, 2000; Clemes et al., 2010).

### **2.7.3 The Relationship between Image, Service quality and Satisfaction**

Bayton (1959), who first introduced the concept of corporate image, advocated looking at

corporations with a humanized view because customers often portrayed a corporation through personified descriptions (as cited in Kuo & Ye, 2009). Lai et al. (2009) argued that “corporate image is a perception of an organization held in consumer memory and works as a filter which influences the perception of the operation of the company” (pp. 981-982).

Corporate image has not been studied extensively in the university context (Sung & Yang, 2008). However, image has been identified as a critical component of the success of organisations (Kassima & Souiden, 2007). Gronroos (1984) suggested that corporate image was mainly established by technical quality and functional quality. Nguyen and LeBlanc (1998) found that customers had a favorable image of a company when they received high levels of service quality. Several studies have demonstrated that a company will have a strong image if customers perceive that they have received high quality services from the company (Cheng, Lai, & Yeung, 2008; Hu et al., 2009; Kandampully, Juwaheer, & Hu, 2011).

In addition, Kuo and Ye (2009) argued that customers would evaluate the services of an institution in a more affirmative way if the customer had favourable perceptions of the institution. Therefore, they proposed, tested and concluded that there was a positive relationship between institutional image and student satisfaction. In the higher education sector, several researchers have empirically validated the positive impact of image on student satisfaction (Alves & Raposo, 2010; Clemes et al., 2007; Palacio, Meneses, & Perez, 2002).

#### **2.7.4 The Relationship between Service Quality, Satisfaction and Favourable Behavioural Intentions**

Zeithaml, Berry and Parasuraman (1996) suggested that increasing customer retention rates

or lowering customer defection rates was the key for a service provider to generate profits. Certain behaviours signaled that a customer had positive perceptions towards the service provider. Specifically, indicators of customers' favorable behavioural intentions included 1) positive word-of-mouth communication, 2) recommendation of services, 3) willingness to pay price premiums, 4) spending more with the service provider, 5) loyalty to the service provider.

Considerable research has concentrated on identifying the relationship between service quality, satisfaction and behavioural intentions, but there is mixed evidence in the literature. According to Zeithaml et al. (1996), customers' behavioural intentions were mainly influenced by service quality. However, Chi, Yeh and Jang (2008) demonstrated that service quality appeared to have an insignificant influence on both of satisfaction and behavioural intentions, whereas satisfaction was a significant predictor of behavioural intentions. In an empirical study, Qin and Prybutok (2008) pointed out that both service quality and satisfaction directly linked to behavioural intentions, but satisfaction did not act as a mediator in the service quality-behavioural intentions relationship. However, Olorunniwo et al. (2006) reported that service quality had a significant direct effect as well as an indirect effect (via satisfaction) on behavioural intentions. Interestingly, the indirect effect of service quality (via satisfaction) on behavioural intentions was stronger than its direct effect.

A very different viewpoint regarding the relationship between service quality, satisfaction and behavioural intentions was provided by Taylor and Baker (1994). Rather than considering the linear relationship between service quality and behavioural intentions, Taylor and Baker suggested that satisfaction was best considered as a moderating, rather than a mediating, variable between the relationship between service quality and purchase intention.

To summarise, the divergence regarding the relationship between service quality, satisfaction and behavioural intentions mainly focused on whether the indirect effect of service quality on behavioural intentions (via satisfaction) was so significant that satisfaction needed to be treated as a mediator between service quality and behavioural intentions (Olorunniwo et al., 2006; Qin & Prybutok, 2008). However, Hurley and Estelami (1998) noted that the dominant view regarding the causality among the three variables follows a service quality, satisfaction and behavioural intentions sequence. Recently, Brady et al. (2002) and Olorunniwo et al. (2006) provided empirical evidence to support Hurley and Estelami's (1998) view of a sequenced effect.

## **2.8 Chapter Summary**

The chapter presented the literature regarding the service quality construct and discussed the relationships among service quality, satisfaction, value, image and behavioural intentions. The chapter also reviewed the literature on service quality and satisfaction in the higher education sector.

# **Chapter 3: Conceptual Gaps and Hypotheses**

## **3.1 Chapter Introduction**

This chapter discusses four conceptual research gaps identified in the literature review. A conceptual model of university student satisfaction is presented. Sixteen testable hypotheses are formulated to address the following four research objectives:

- (1) To identify the dimensions of service quality in China's higher education sector.
- (2) To identify the relationships among service quality, satisfaction, image, value and favourable behavioural intentions in China's higher education sector.
- (3) To identify the least and most important service quality dimensions in China's higher education sector.
- (4) To identify the effects of demographic factors on student's perceptions of service quality, value, image, satisfaction and favourable behavioural intentions.

## **3.2 Conceptual Research Gaps**

A review of the services marketing literature on higher education has identified four conceptual research gaps. The first conceptual research gap relates to a lack of published empirical research on students' perceptions of service quality in China. Although a number of studies on students' perceptions of service quality in higher education exist, few studies have been done in China. Cross-cultural research suggests that students studying in different countries, or regions, evaluate service quality using different dimensions (Ford et al., 1999; Kwan & Ng, 1999). Clemes et al. (2007) and Clemes et al. (2001) also report that students from different cultural environments have different perceptions of service quality.

The second conceptual research gap follows from the lack of published empirical research on China's higher education sector with regard to the higher-order constructs that are related to satisfaction: service quality, image, value and favourable behavioural intentions. Many researchers identify the important role of satisfaction in determining favourable behavioural intentions (Chen, 2008; Cronin et al., 2000; Cronin & Taylor, 1992; Spreng, Harrell & Mackoy, 1995). This relationship is attributed to customers' favourable behavioural intentions and their potential contribution to profits, which are the key to a service provider's success (Zeithaml et al., 1996). However, satisfaction is a complex construct that has many antecedents (Mano & Oliver, 1993). Lai et al. (2009) and Clemes et al. (2007) argue that service quality, value and image are the most important factors that impact on satisfaction. In addition to the direct effect of value on satisfaction, several researchers have also found a moderating effect of value on the relationship between service quality and satisfaction (Caruana et al., 2000; Clemes, et al., 2010; Wang et al., 2004). Moreover, many researchers find that higher perceptions of service quality contribute to favourable perceptions of value (Hu et al., 2009; Lai et al., 2009; Varki & Colgate, 2001) and image (Cheng et al., 2008; Hu et al., 2009; Lai et al., 2009; Kandampully et al., 2011).

Brady and Cronin (2001) recommend that a hierarchical model of service quality should be used to investigate the interrelationships between service quality and other service constructs. Cronin et al. (2000) suggest that service quality, value, satisfaction, behavioural intentions and other important variables should be included in the research model to better understand how services influence customers' behaviours. Clemes et al. (2010) also suggest that researchers should empirically examine the interrelationships between service quality, satisfaction, value, behavioural intentions and image. Therefore, this study attempts to fill this gap by examining the complex relationships among service quality, value, image, satisfaction

and favourable behavioural intentions in a higher educational context.

The third conceptual research gap is expressed in a lack of published empirical research on China's higher education sector with regard to the relative importance of the service quality dimensions. Clemes et al. (2007) suggest that the order of importance of the primary dimensions and sub-dimensions of service quality depends on the university under investigation, as might also the comparative importance of the service quality dimensions.

The fourth conceptual research gap relates to a limited understanding of the effects of demographic characteristics on students' perceptions of service quality, value, image, satisfaction and favourable behavioural intentions. The literature reveals that students' perceptions of service quality are affected by their social and personal backgrounds (Clemes et al., 2007; Clemes et al., 2001; Tan & Kek, 2004). However, the effects of the demographic variables on the perceptions of value, image, satisfaction, and favourable behavioural intentions have not been examined extensively in the Chinese higher education sector context.

### **3.3 Hypotheses Development**

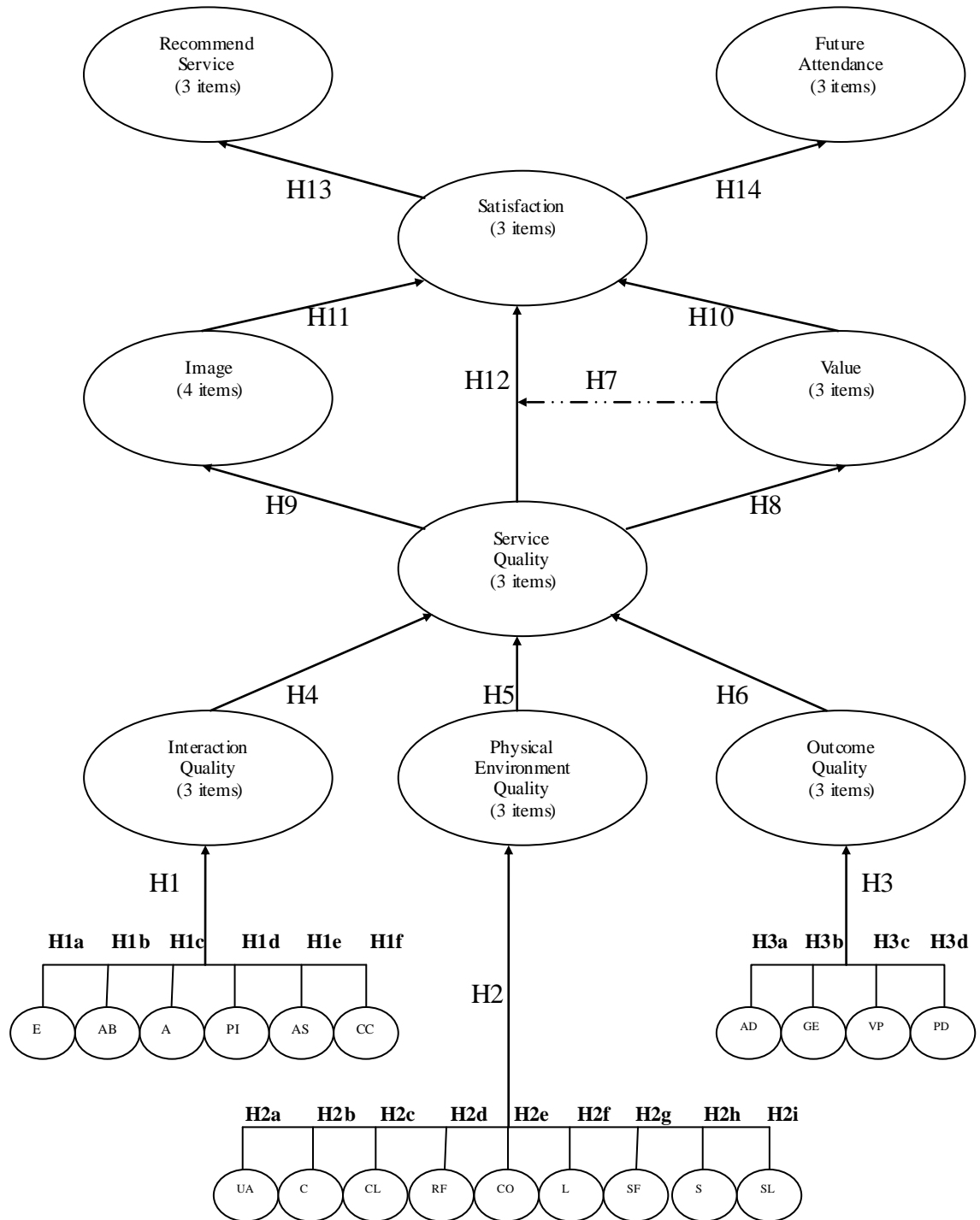
A conceptual research model for this study has been developed, based on Brady and Cronin's (2001) hierarchical model of service quality and Clemes et al.'s (2007) behavioural intentions hierarchical model.

The model presented in Figure 3.1 suggests that students are expected to form their overall service quality perceptions from their perceptions of each of the three primary dimensions: interaction quality, physical environment quality and outcome quality. Overall perceived

service quality is assumed to directly affect value and image. Then, students' overall perception of service quality, value and image are assumed to affect satisfaction. Besides the direct effects on satisfaction, students' perceptions of service quality are also assumed to have an impact on satisfaction through the moderating effect of value. Finally, satisfaction is expected to affect each of the two measures of favourable behavioural intentions: intentions to recommend the university to others, and intentions to attend the university in the future.

The model defines the first fourteen hypotheses, formulated to test each path in the conceptual model. The fifteenth hypothesis is formulated to test the comparative importance of the service quality dimensions. The last hypothesis will test the differences in students' perceptions of service quality, value, image, satisfaction, and favourable behavioural intentions, relative to their demographic characteristics.





**Figure 3.1 Student Satisfaction in Higher Education: A Conceptual Model**

**Note:** E= Expertise, AB= Attitudes and Behaviours, A= Accessibility, PI= Personal Interaction, AS= Administration Staff, CC= Course Content; UA= University Accommodation, C= Campus, CL= Class Room, RF= Recreational Facilities, CO= Computer Room, L= Library, SF= Social Factors, S= Safety, SL= Social Life; AD= Academic Development, GE= General Education, VP= Vocational Preparation, PD= Personal Development.

### **3.3.1 Hypotheses Relating to Research Objective 1**

Clemes et al. (2007) have demonstrated that the three primary dimensions (interaction quality, physical environment quality, and outcome quality) proposed by Brady and Cronin (2001) are appropriate for use in higher education. Therefore, this study uses these to measure students' perceived service quality.

#### **3.3.1.1 Interaction Quality**

A service encounter occurs whenever the customer contacts an employee of the service firm (Crosby, Evans, & Cowles, 1990). Therefore, attitudes and behaviours of customer-contact employees can positively or negatively influence customers' judgments of service quality (Hartline & Ferrell, 1996). As the nature of services is intangible and inseparable, interpersonal interactions often exert the greatest influence on customers' perceptions of service quality (Brady & Cronin, 2001). In a university context, many researchers think that student-contact persons such as lecturers and faculty administrators play a critical role in shaping students' perceptions of service quality (LeBlance & Nguyen, 1997; Ling et al., 2010; Mai, 2005). The literature identifies the following sub-dimensions of interaction quality:

- a) Expertise (LeBlanc & Nguyen, 1997; Peng, 2008);
- b) Attitudes and behaviours (Clemes, et al., 2001; Sohail & Shaikh, 2004);
- c) Accessibility (Clemes et al., 2007; Clemes, et al., 2001);
- d) Personal interaction (Jain et al, 2010);
- e) Administration staff (Clemes et al., 2007; LeBlanc & Nguyen, 1997); and
- f) Course content (Clemes et al., 2007; Kwan & Ng, 1999; Peng, 2008).

These sub-dimensions are presumed to positively influence interaction quality. The contribution of each can be examined, which leads to the first hypothesis of this study:

H1 : Perceptions of each of the interaction quality sub-dimensions (H1a, H1b, H1c, H1d, H1e, and H1f) will have a positive effect on interaction quality.

### **3.3.1.2 Physical Environment Quality**

Parasuraman et al. (1985, 1988) argue that tangible quality is an important dimension of overall service quality. Brady and Cronin (2001) also highlight that the quality of the physical environment has a significant influence on perceptions of service quality. Many researchers have included characteristics of the service environment when measuring university educational quality (see Section 2.6, Chapter 2). Moreover, researchers have found a positive relationship between perceptions of the physical surroundings and the overall perceived service quality in higher education institutions (Clemes et al., 2007; Clemes et al., 2001; LeBlanc & Nguyen, 1997). The literature identifies the nine sub-dimensions of physical environment quality:

- a) University accommodation (Arambewela & Hall, 2009; Lagrosen et al., 2004);
- b) Campus (Clemes et al., 2001; Jain et al., 2010; Peng, 2008);
- c) Class room (Sohail & Shaikh, 2004);
- d) Recreational facilities (focus group sessions);
- e) Computer room (Lagrosen et al., 2004; Letcher & Neves, 2010);
- f) Library (Clemes et al., 2007; Lagrosen et al., 2004);
- g) Social factors (Clemes et al., 2007);
- h) Safety (Arambewela & Hall, 2009); and
- i) Social life (Kwan & Ng, 1999; Sumaedi and Bakti, 2011; Tan & Kek, 2004).

These sub-dimensions are presumed to positively influence physical environment quality.

This leads to a second hypothesis:

H2: Perceptions of each of the physical environment quality sub-dimensions (H2a, H2b, H2c, H2d, H2e, H2f, H2g, H2h, and H2i) will have a positive effect on physical environment quality.

### **3.3.1.3 Outcome Quality**

Outcome quality refers to what a customer actually receives as a result of a service transaction (Chen & Kao, 2009). Powpaka (1996) believes that outcome quality plays an important role in determining perceptions of overall service quality. When measuring students' university experience, students' gains can be thought of as the outcome dimension of service quality (Clemes et al., 2007). Four sub-dimensions making up outcome quality have been presented in the literature:

- a) Academic development (Clemes et al., 2007);
- b) General education (Kuh et al., 1997; Tam, 2007);
- c) Vocational preparation (Clemes et al., 2007; Tam, 2007); and
- d) Personal development (Clemes et al., 2007; Kuh et al., 1997).

These sub-dimensions are presumed to positively influence outcome quality. Therefore, the third hypothesis is:

H3: Perceptions of each of the outcome quality sub-dimensions (H3a, H3b, H3c, and H3d) will have a positive effect on outcome quality.

Clemes et al. (2007) note that students' perceptions of interaction quality, physical environment quality, and outcome quality positively influence overall service quality. Three additional hypotheses can be formulated to test the effect of each of the primary dimensions on overall service quality:

H4: Perceptions of interaction quality will positively effect overall service quality.

H5: Perceptions of physical environment quality will positively effect overall service quality.

H6: Perceptions of outcome quality will positively effect overall service quality.

### **3.3.2 Hypotheses Relating to Research Objective 2**

Caruana et al. (2000), Clemes et al. (2010), and Wang et al. (2004) have tested and found a moderating effect of perceived value on the relationship between service quality and satisfaction. This contention will be tested in the Chinese university context by the following hypothesis:

H7: Perceptions of value will moderate the relationship between service quality and satisfaction.

Service quality is an important factor influencing perceptions of value and image (see Section 2.7 above for a discussion of the literature on this relationship). From this relationship, the following two hypotheses regarding the impact of service quality are proposed:

H8: Higher perceptions of overall service quality will have a positive effect on value.

H9: Higher perceptions of overall service quality will have a positive effect on image.

The literature reviewed in Section 2.7 has indicated that satisfaction is a construct that has many antecedents. Several researchers point out that service quality and value have positive and significant effects on satisfaction (Brady, Robertson, & Cronin, 2001; Kuo et al., 2009; Wang et al., 2004). Clemes et al. (2007) also reveal that, in addition to the effects of service quality on satisfaction, image is another important determinant of satisfaction. Recently, Lai

et al. (2009) investigate the relationship among service quality, value, image, satisfaction and loyalty. The authors report that value and image are two critical factors significantly influencing satisfaction. To test these ideas, three hypotheses regarding satisfaction are:

H10: Higher perception of value will have a positive effect on satisfaction.

H11: Higher perception of image will have a positive effect on satisfaction.

H12: Higher perception of overall service quality will have a positive effect on satisfaction.

Studies on the relationship between satisfaction and behavioural intentions show that satisfaction is a strong driver of behavioural intentions (Cronin & Taylor, 1992; Olorunniwo et al., 2006). Therefore, two hypotheses on favourable behavioural intentions can be suggested:

H13: A higher level of satisfaction will have a positive effect on recommending the university to others.

H14: A higher level of satisfaction will have a positive effect on intentions to attend the university in the future.

### **3.3.3 Hypotheses Relating to Research Objective 3**

Clemes et al. (2007) demonstrate that students perceive the dimensions of service quality as not equally important, and that some service quality dimensions are more or less important than others. The following hypothesis is designed to measure the comparative importance of the service quality dimensions.

H15: Students' perceptions of (a) each of the primary dimensions and (b) each of the sub-dimensions will differ in their importance.

### **3.3.4 Hypotheses Relating to Research Objective 4**

Clemes et al. (2007) suggest that students' perceptions of service quality, image, value, satisfaction, and favourable behavioural intentions may vary according to students' social and personal backgrounds. To determine the effects of the demographic characteristics on the perceptions of the five constructs, the following hypothesis is offered:

H16a: Students' perceptions of service quality, value, image, satisfaction and favourable behavioural intentions will differ in terms of their demographics (gender, age, year of study, and major).

Clemes et al. (2007) found significant differences in the perceptions of the primary dimensions and the sub-dimensions of service quality, based on students' demographic characteristics. Clemes et al. (2001) suggest that to develop appropriate strategies for specific student segments, researchers must identify the service quality dimensions that can be used to discriminate different student segments. Two hypotheses can be formulated to test for relationships among the demographics:

H16b: Students' perceptions of the primary dimensions of service quality will differ in terms of their demographics (gender, age, year of study, and major).

H16c: Students' perceptions of the sub-dimensions of service quality will differ in terms of their demographics (gender, age, year of study, and major).

### **3.4 Chapter Summary**

It is clear that satisfaction is a complicated and potentially powerful concept, with many possible precursors. The impact of these influences, however, can be investigated. A research model incorporating these variables leads to a number of hypotheses that are amenable to empirical tests. The current study examines a series of simple and compound hypotheses in service to this goal.



# **Chapter 4: Research Design and Methodology**

## **4.1 Chapter Introduction**

This chapter presents the research plan and methodology used to test the sixteen hypotheses formulated in Section 3.3, to satisfy the four research objectives stated in Section 3.1. This chapter discusses the sample derivation, the estimation of sample size, the data collection method, the questionnaire design, and the data analysis techniques.

## **4.2 Sample Derivation**

For this study, university students' perceptions of service quality, value, image, satisfaction and favourable behavioural intentions were examined. The data were collected using a systematic intercept method at He Bei Normal University, Shijiazhuang, China during the period December 15<sup>th</sup>, 2010 to January 5<sup>th</sup>, 2011. He Bei Normal University is 100 years old and is representative of Chinese universities, offering degrees on several disciplines. The target population was second, third and fourth year university students who were 18 years of age and older. First year students and students who were younger than 18 were not surveyed, as they may not have had sufficient university experience to answer all questions in the questionnaire.

## **4.3 Sample Size**

Hair, Black, Babin and Anderson (2010) recommend that when conducting factor analysis, the desired observations to variables ratio is 5 to 1. In this study, the factors are extracted

from 61 variables. Therefore, at least 305 completed questionnaires are required for factor analysis. To conduct multiple regression analysis, Hair et al. (2010) suggest that the minimum observations to variables ratio is 5 to 1, and the preferred ratio is 15: 1 or 20: 1. There are 9 independent variables in this study. Therefore, the minimum preferred sample size is 180. Moreover, Garson (2010) recommends that, for testing regression coefficients, the sample size should be equal to, or larger than, the number of independent variables plus 104. For testing the R square, the number of observations is at least 8 times the number of independent variables plus 50 (Garson, 2010). Therefore, 113 completed questionnaires are needed to test the regression coefficients, and 122 completed questionnaires are required to test the R square. However, the exact number of independent variables depends on the results of the factor analysis (Hair et al., 2010).

#### **4.4 Data Collection Method**

A self-administered questionnaire was used as the survey instrument. The survey included a cover letter, with three additional pages to collect the data. The researcher was responsible for distributing the questionnaires and collecting completed questionnaires. Taking a convenience approach, potential respondents were intercepted at a central location on He Bei Normal University campus. The researcher invited every fifth student who passed by the researcher to participate the survey. The criteria for selecting participants were verified by asking students whether they were 18 years old and whether they were first year students.

## **4.5 Questionnaire Design**

### **4.5.1 Focus Group Interviews**

The literature review presented in Chapter 2 identified the primary dimensions and the sub-dimensions of service quality that might have an impact on the perceptions of Chinese university students. The interrelationships among service quality, value, image, satisfaction and favourable behavioural intentions were also discussed in Chapter 2. All of these constructs are critical for understanding students' university experience. However, to gain additional insight into each of the constructs from students' perspectives, as well as developing a questionnaire specific for Chinese students, focus group interviews were conducted.

Zikmund, Ward, Lowe, and Winzar (2007) suggest that a typical focus group should consist of one interviewer and six to ten participants. Following this recommendation, the researcher conducted two focus group interviews. The first consisted of eight Chinese students studying in their second or third year at Lincoln University, chosen because they were very similar to the research population. This group was used to develop the English language questionnaire. The second group consisted of eight students studying in their second, third, or fourth year at He Bei Normal University. This group was used to identify service attributes specific to He Bei Normal University. The two groups of students were considered to have sufficient university experience to provide the necessary background information, to investigate the range of attributes influencing students' university experience.

At the beginning of the focus group interviews, the researcher provided an overview of this study. The researcher also explained the domain of each of the constructs in this study so that

participants were aware of what should be included and excluded in defining the constructs, following a procedure recommended by Churchill (1979). Then, participants were asked to define factors shaping their university experience based on the three domains of staff-student interactions, physical facilities, and learning outcomes. Participants were also asked to indicate the factors they considered to be more important in determining perceptions of each of the three domains. During the focus group interviews, the researcher encouraged interaction between participants in order to detect any ignored or unidentified factors. The interviews were recorded by hand and interpreted. The final questionnaire consisted of 89 items which were used to measure the constructs identified from the literature and focus group interviews (see Figure 3.1).

#### **4.5.2 Questionnaire Design and Layout**

The questionnaire consisted of five sections. Section A was composed of 22 Interaction Quality items. Section B presented 30 Physical Environment Quality items. Section C consisted of 18 Outcome Quality items. Section D contained items used to measure the higher-order constructs: Service Quality, Satisfaction, Image, Value and Favourable Behavioural Intentions. Section E measured standard demographic items.

As the performance based SERVPERF provides a superior measurement over the difference scores based SERVQUAL instrument (Cronin & Taylor, 1992), this study used a performance based scale to measure students' perceptions of educational service quality. Moreover, Malhotra (2006) suggests that, when using Likert scales, researchers should strive to establish a consistent scoring procedure in which the respondent's favorable attitude towards a subject is consistently reflected by high (or low) scores. Therefore, all of the items in the

questionnaire were positively worded except for one item (No. 20 in Section B), so that agreement with each of the statements represented a favourable response.

The Likert scale, which is typically treated as an interval scale, is a commonly used scale in marketing (Malhotra, 2006). The scale is easy for researchers to construct and administer, and for respondents to understand (Malhotra, 2006). Schall (2003) notes that the seven-point Likert scale is the optimum form of the scale that produces the best response distribution when compared to the five or ten point scale. Therefore, a seven-point Likert scale was used to measure all of the performance-only items included in the questionnaire. The bipolar end-points were labeled with “Strongly Disagree (1)” and “Strongly Agree (7)”. No verbal labels accompanied the points from two to six. Respondents were asked to indicate their degree of agreement with each statement by selecting one of the seven response categories.

Hair et al. (2010) recommend that, as a rule of thumb, a construct should be reflected by at least three items. Compared to a single-item measurement, the superiority of a multi-item measurement includes diminishing the uniqueness of each individual item, providing better distinctions among respondents, increasing the reliability and decreasing measurement error (Churchill, 1979). Therefore, each of the constructs involved in this study was measured by at least three items.

The English version of the questionnaire, which was developed based on the literature and discussions from the first focus group, was first translated into Chinese by the researcher. The translated version was then thoroughly examined by a marketing scholar, who was fluent in Chinese and English. The second focus group interview revealed that the service attributes identified by Chinese students studying at Lincoln University were appropriate for use at He

Bei Normal University. Two marketing academics reviewed the English version to ensure its content validity. Finally, two Chinese marketing scholars reviewed the Chinese questionnaire to ensure its content validity.

### **4.5.3 Pre-test**

Malhotra (2006) suggests that all aspects of a questionnaire, including the question content, sequence and instruction, should be examined through a pre-test procedure. He also recommends that a pre-test should be conducted on a small sample of respondents, ranging from 15 to 30 people. Respondents selected for the pre-test must be similar to the research population. Further, Malhotra advises that the pre-test is best done by personal interviews, because researchers can observe attitudes and reactions of respondents. A convenience sample of thirty students studying at He Bei Normal University was conducted. These students were asked to read the questions and give comments on ambiguous statements. Responses from the pre-test were used to make minor modifications in the questionnaire. The cover letter and the final version of the questionnaire are presented as Appendix 1 and Appendix 2 respectively.

## **4.6 Data Analysis Methods**

Data collected from the survey were recorded and coded in SPSS 17. Factor analysis, multiple regression analysis, and analysis of variance (ANOVA) were the three statistical techniques applied to satisfy the four research objectives. Factor analysis was used to identify the dimensions of service quality. Multiple regression analysis was used to test each path in the conceptual model (see Figure 3.1). Finally, analysis of variance (ANOVA) was used to

identify the effects of the demographic factors.

#### **4.6.1 Factor Analysis**

Factor analysis is an interdependence technique in which no single variable or group is classified as being independent or dependent (Hair et al., 2010). All variables in factor analysis are simultaneously analyzed to find the latent structure of the set of variables (Hair et al., 2010; Tabachnick & Fidell, 2007). The purpose of factor analysis is to summarise the information that is contained in a large number of variables into a small number of composite components with a minimum loss of information (Hair et al., 2010, Janssens, Wijnen, De Pelsmacker, & Van Kenhove, 2008). Therefore, this study used factor analysis to identify the optimal number of factors to represent information contained in the interaction quality sub-dimension items, physical environment quality sub-dimension items and outcome quality sub-dimension items.

The following sections provide a discussion of the modes and types of factor analysis, the assumptions of factor analysis, tests for the appropriateness of the technique, factor extraction, rotation, and interpretation methods.

##### **4.6.1.1 Factor Analytic Data Modes**

Stewart (1981) suggests that the appropriate use of the factor analysis mode depends on if the objective is to examine relationships among variables, respondents, or occasions (see Table 4.1). The first research objective of this study is to identify the dimensions of service quality based on a number of variable scores collected from a number of respondents at a point in time. Therefore, R factor analysis was used in this study.

**Table 4.1: Modes of factor analysis (Stewart, 1981, p. 53)**

<b>Technique</b>	<b>Factors are loaded by</b>	<b>Indices of association are computed across</b>	<b>Data are collected on</b>
R	Variables	Persons	One occasion
Q	Persons	Variables	One occasion
S	Persons	Occasions	One variable
T	Occasions	Persons	One variable
P	Variables	Occasions	One person
O	Occasions	Variables	One person

#### **4.6.1.2 Types of Factor Analysis**

Factor analysis can be applied from either an exploratory perspective or confirmatory perspective, depending on the purpose of the research (Hair et al., 2010). Exploratory factor analysis can be conducted with little prior knowledge about the factor structure in the data set (Hair et al., 2010). Confirmatory factor analysis is used as a tool to confirm or reject the preconceived theory (Hair et al., 2010). As the instability of the dimensional structure of service quality across different cultures and industries is noted (Ladhari, 2009), and there is limited knowledge about the dimensional structure of service quality in China's higher education sector, this study used exploratory factor analysis.

There are two methods for factoring: component factor analysis and common factor analysis (Aaker, Kumar, Day, & Lawley, 2005; Hair et al, 2010). Component factor analysis focuses on the total variance and extracts factors that contain small proportions of unique variance (Costello & Osborne, 2005; Hair et al, 2010). Specifically, the technique analyzes a correlation matrix in which the values of diagonal elements are equal to 1 (Aaker et al., 2005; Hair et al., 2010). Hair et al. (2010) suggest that component factor analysis is most



appropriate when (1) primary concern is data reduction (2) the amount of specific variance and error variance is relatively small in the total variance.

Common factor analysis focuses on the common variance, only employing common variance to extract factors (Costello & Osborne, 2005; Hair et al., 2010). Specifically, the technique analyzes a correlation matrix in which the values of diagonal elements are equal to communalities (Aaker et al., 2005; Hair et al., 2010). Hair et al. (2010) suggest that common factor analysis is most appropriate when (1) the primary concern is to identify latent constructs in original variables (2) the amount of specific variance and error variance is not well known.

Hair et al. (2010) suggest that component factor analysis and common factor analysis produce similar results. However, common factor analysis has more restrictive assumptions, and is more problematic and complicated when compared to component factor analysis (Hair et al., 2010). Therefore, this study used component factor analysis to analyze the data.

#### **4.6.1.3 Assumptions in Factor Analysis**

Hair et al. (2010) note that researchers should be aware of several critical conceptual and statistical assumptions in factor analysis. Satisfying these assumptions is important for this current study to produce reliable results.

The conceptual assumptions are as follows:

- (1) *No selection bias/proper specification.* A researcher should strive to select most relevant variables and exclude irrelevant variables in the correlation matrix, because the selected

variables will substantially affect the uncovered factor structure (Garson, 2010). The presence of correlations among variables and the subsequent factor structure do not guarantee relevance (Hair et al., 2010). Researchers must ensure the conceptual validation of the observed patterns and their appropriateness with the use of factor analysis (Hair et al., 2010).

- (2) *Homogeneity of the sample*. The researcher must select a homogenous sample to identify a unique factor structure. When the subsamples differ in responses to some items, the calculated correlations and the factor structure poorly represent the underlying structure of each subgroup (Hair et al., 2010).

The statistical assumptions are as follows:

- (3) *Linearity*. Factor analysis assumes linear relationships among variables (Garson, 2010). The technique estimates latent factors which are also linear combinations of several variables (Garson, 2010). Therefore, screening data for linearity is necessary, especially when the sample size is relatively small (Garson, 2010).
- (4) *Normality*. Stewart (1981) suggests that departure from normality can affect correlation coefficients on which factor analysis is based. Garson (2010) considers that normality is not one of the critical assumptions in factor analysis. However, Garson (2010) notes that, if the selected variables in factor analysis have substantially different distributions, both correlation and covariance will be attenuated.
- (5) *Homoscedasticity*. Factors are linear combinations of variables (Garson, 2010). Therefore, homoscedasticity is assumed (Garson, 2010). However, the assumption is not critical in

factor analysis (Garson, 2010).

#### **4.6.1.4 Tests for Determining Appropriateness of Factor Analysis**

Hair et al. (2010) suggest several steps that are used to ensure the appropriateness of a data set for factor analysis. These procedures were adopted in this study.

- (1) *Visual Examination of the Correlation Matrix*. Factor analysis is used to examine the homogeneity of a set of items (Stewart, 1981). A lack of relatively high correlations between variables indicates heterogeneity of the set of items (Stewart, 1981). Hair et al. (2010) suggest that, if a substantial number of correlations are greater than 0.30, factor analysis probably is appropriate.
- (2) *Inspection of the Anti-image Correlation Matrix*. The appropriateness of a correlations matrix for factor analysis can be examined by inspecting anti-image correlation matrix (Stewart, 1981). The partial correlation is the part that cannot be explained by the effects of other variables (Hair et al., 2010). The off-diagonal elements in the anti-image correlation matrix represent these partial correlations (Field, 2005). For a good factor analysis, Field (2005) suggests that the value of diagonal elements should be above 0.5, and the value of off-diagonal elements should be very small.
- (3) *Bartlett's Test of Sphericity*. Bartlett's test examines the entire correlation matrix to determine the appropriateness for factoring (Hair et al., 2010). The null hypothesis of Bartlett's test is that the correlation matrix derived from a population of independent variables (Stewart, 1981). Hence, rejection of the null hypothesis indicates the

appropriateness for factor analysis (Stewart, 1981). Barlett's Test of Sphericity is calculated as follows:

$$-\left[(N-1)-\left(\frac{2p+5}{6}\right)\right] \text{Log}_e |R|$$

Where: N is the sample size; P is the number of variables;  
 $|R|$  is the determinant of the correlation matrix.

(4) *Kaiser-Meyer-Olkin Measure of Sampling Adequacy (MSA)*. MSA is a considerable method to measure appropriateness for factor analysis (Stewart, 1981). Stewart (1981) suggests that MSA can be obtained for the entire correlation matrix or for each individual variable. The value of MSA ranges from 0 to 1, reaching 1 means each variable can be perfectly predicted by other variables (Hair et al., 2010). The overall MSA is calculated as follows:

$$MSA = \frac{\sum \sum_{j \neq k} r_{jk}^2}{\sum \sum_{j \neq k} r_{jk}^2 + \sum \sum_{j \neq k} q_{jk}^2}$$

Where:  $q_{jk}^2$  is the square of the off-diagonal elements of the anti-image correlation matrix;  
 $r_{jk}^2$  is the square of the off-diagonal elements of the original correlations.

Hair et al. (2010) provide the following guidelines for interpretation of MSA index: "0.80 or above, meritorious; 0.70 or above, middling; 0.60 or above, mediocre; 0.50 or above, miserable; and below 0.50, unacceptable" (p. 104).

#### 4.6.1.5 Factor Extraction in Principal Component Analysis

Both component factor analysis and common factor analysis continue to extract factors until all the variance is explained (Hair et al., 2010). The researcher must decide the number of extracted factors based on the conceptual foundation and the empirical evidence (Hair et al.,

2010). Stewart (1981) recommends using the latent root and the scree test to decide the number of factors to extract. The two methods were used to determine the number of extracted factors in this study.

*Latent Root Criterion* is the most commonly used technique to determine the number of factors to extract (Hair et al., 2010). Aaker et al. (2005) recommend that all factors having eigenvalue greater than 1 should be retained. The rationale is that the eigenvalue indicates the amount of variation explained by a factor, and a factor with an eigenvalue of 1 indicates that a substantial amount of variation is explained by that factor (Field, 2005).

*Scree Test Criterion* is another technique to determine the number of factor to extract (Field, 2005). By plotting each of eigenvalues against its associated factor, there will be a few factors having high quite eigenvalues and many factors having relatively low eigenvalues (Field, 2005). The plotted curve will demonstrate a sharp descent with a tail off (Field, 2005). Field (2005) suggests that the cut-off point for selecting factors to extract should be at the point of inflexion of the curve.

#### **4.6.1.6 Factor Rotation**

Tabachnick and Fidell (2007) argue that most unrotated factor solutions are not sufficient. Therefore, factor rotation is the most important tool for interpreting factors (Hair et al., 2010). By redistributing the variance among factors, factor rotation may provide a theoretically meaningful factor solution as well as simplify the factor structure (Hair et al., 2010). In practice, the goal of all rotation methods is to simplify the rows and columns of the factor matrix to obtain an interpretable solution (Hair et al., 2010). Orthogonal rotation and oblique

rotation are two types of rotation (Hair et al., 2010).

*Orthogonal rotation*, in which the axes are maintained at 90 degrees, is the simplest type of rotation (Hair et al., 2010). In an orthogonal rotation, factors are mathematically independent and the rotation is orthogonal (Hair et al., 2010). As the correlations between any pair of factors are 0, no factor correlation matrix is produced after an orthogonal rotation (Garson, 2010). VARIMAX is the most common orthogonal rotation method (Costello & Osborne, 2005; Tabachnick & Fidell, 2007). The rotation method focuses on simplifying the columns of the factor matrix (Tabachnick & Fidell, 2007). In the VARIMAX rotation, each factor may have both large and small factor loadings (Hair et al., 2010). A factor loading close to either +1 or -1 indicates a strong correlation between the variable and the factor, and a factor loading close to 0 indicates a lack of association (Hair et al., 2010). Stewart (1981) considers that VARIMAX is one of the best orthogonal rotation methods.

*Oblique rotation* is another type of factor rotation (Hair et al., 2010). The type of rotation allows factors to be correlated (Garson, 2010). Hair et al. (2010) and Ford, MacCallum and Tait (1986) suggest that oblique rotations are more realistic because few theoretically meaningful factors in the real world are independent with each other. OBLIMIN is the standard non-orthogonal (oblique) rotation method (Garson, 2010). Garson (2010) suggests that the use of OBLIMIN will result in high eigenvalues and diminish the interpretability of factors (Garson, 2010).

However, no specific rules guide researchers to choose a particular orthogonal or oblique rotation method (Hair et al., 2010). Garson (2010) recommends that researchers should experiment with different rotation methods to find the most interpretable factor solution.

Stewart (1981) recommends that researchers should use an orthogonal rotation as well as an oblique rotation to identify the optimal factor solution. Therefore, this study used both VARIMAX and OBLIMIN to identify the dimensions of service quality.

#### **4.6.1.7 Interpretation of Factors**

When interpreting factors, a researcher must make decisions regarding the significance of factor loadings (Hair et al., 2010). The reason for this is that factor loadings represent the correlation between variables and associated factors (Aaker et al., 2005), with the squared factor loading representing the amount of the variable's variance explained by the factor (Hair et al., 2010). Thus, a larger absolute value of the factor loading indicates that it is more important for interpreting the factor matrix (Hair et al., 2010).

Hair et al. (2010, p. 117) provide the following guidelines to assess practical significance of factor loadings:

- *Factor loadings in the range of  $\pm 0.30$  to  $\pm 0.40$  are considered to meet minimal level for interpretation of structure.*
- *Loadings  $\pm 0.50$  or greater are considered practically significant.*
- *Loadings exceeding  $+0.70$  are considered indicative of well-defined structure and are the goal of any factor analysis.*

Further, Hair et al. (2010) provide guidelines to assess statistical significance of factor loadings.

**Table 4.2: Guidelines for identifying significance factor loadings based on sample size (Hair et al., 2010, p. 117)**

Factor Loading	Sample Size Needed for Significance*
0.30	350
0.35	250
0.40	200
0.45	150
0.50	120
0.55	100
0.60	85
0.65	70
0.70	60
0.75	50

\*Significance is based on a .05 significance level ( $\alpha$ ), a power level of 80 percent, and standard errors assumed to be twice of conventional coefficients.

Moreover, Hair et al. (2010) recommend that researchers should use both objective and subjective judgments when interpreting factors. Four general principles are as follows (Hair et al., 2010, p. 122):

- *An optimal structure exists when all variables have high loadings only on a single factor.*
- *Variables that cross-load (load highly on two or more factors) are usually deleted unless theoretically justified or the objective is strictly data reduction.*
- *Variables should generally have communalities of greater than 0.50 to be retained in the analysis.*
- *Respecification of a factor analysis can include such options as the following:*
  - *Deleting a variable(s)*
  - *Changing rotation methods*
  - *Increasing or decreasing the number of factors*



### **4.6.2 Summated Scales**

The summated scale combines all variables highly loading on a factor, and uses the sum or the average score of these variables as a replacement variable (Hair et al., 2010). Hair et al. (2010) note two specific benefits of using summated scales. First, the use of multiple variables in the summated scale can reduce the reliance on a single item (Hair et al., 2010). Therefore, the technique can reduce the measurement error (Hair et al., 2010). Second, the summated scale has the ability to combine multiple aspects of a concept into a single measure (Hair et al., 2010).

Hair et al. (2010) recommend that, when the result of factor analysis is used for other subsequent statistical techniques, the summated scale is the preferred form of data reduction. Following this recommendation, in this study, the summated scales were calculated based on the factor solution that was used in regression analysis and analysis of variance. However, Hair et al. (2010) warn that a researcher should not create a summated scale without assessing its content validity, dimensionality and reliability.

#### **4.6.2.1 Content Validity**

Malhotra, Hall, Shaw and Oppenheim (2002) define content validity, or face validity as “a subjective but systematic evaluation of how well the content of a scale represents the measurement task at hand” (p. 311). The form of validity is concerned with whether items measure what they intend to measure, and whether these items measure the full domain of a concept (Garson, 2010). Hair et al. (2010) suggest that content validity can be subjectively assessed by experts or pretest.

#### **4.6.2.2 Dimensionality**

Unidimensionality is the basic assumption of the summated scale (Hair et al., 2010). The assumption requires that multiple items in a summated scale should strongly associate with each other to represent a single construct (Hair et al., 2010). The unidimensionality can be tested by using factor analysis (Hair et al., 2010). Each summated scale should comprise items highly loading on a single factor (Hair et al., 2010). This study formed the summated scale for each service quality sub-dimension by including items having high loadings on the same extracted factor. Therefore, the unidimensionality of each of the summated scales was ensured.

#### **4.6.2.3 Reliability**

Reliability is concerned with the consistency between multiple measurements of variables (Hair et al., 2010; Malhotra et al., 2002). A common form of reliability is internal consistency (Hair et al., 2010). This measure of reliability is based on the correlation among variables consisting of the scale (Bearden & Netemeyer, 1999; Garson, 2010). The rationale is that items in a summated scale intend to measure the same construct (Hair et al., 2010; Malhotra et al., 2002). Therefore, these items should be highly intercorrelated (Hair et al., 2010).

The internal consistency of an entire scale is typically estimated with Cronbach's alpha (Bearden, & Netemeyer, 1999; Garson, 2010). Hair et al. (2010) suggest that the general agreed lower limit for Cronbach's alpha is 0.70. However, the value of alpha can be decreased to 0.6 in exploratory research (Hair et al., 2010). This threshold was adopted in this study.

### 4.6.3 Multiple Regression Analysis

Multiple regression analysis is used to examine the relationship between a single dependent variable and a set of independent variables (Tabachnick & Fidell, 2007). The weights denote the relative importance of the independent variables in predicting the dependent variable (Hair et al., 2010). The form of multiple regression equation is as follows:

$$y = b_1X_1 + b_2X_2 + \dots b_nX_n + c + e$$

Where:  $y$  is the dependent variable;  
 $X$  s are independent variables;  
 $b$  s are coefficients of  $X$  terms;  
 $c$  is the constant term;  
 $e$  is the error term.

The  $b$  coefficient represents the amount of change in the dependent variable for a unit change in the independent variable (Garson, 2010).  $c$  is the constant or intercept of regression line, representing the predicted value of dependent variable when all the independent variables equal 0 (Garson, 2010).  $e$  is the error term, representing residuals between observed values and predicted values of the dependent variable (Garson, 2010).

In this study, the direct relationships between the constructs were examined using the regression analysis. The relative importance of the primary dimensions and sub-dimensions of service quality were compared based on the standardised beta coefficients.

#### 4.6.3.1 Moderated Multiple Regression (MMR)

A moderator effect, appearing in regression analysis as an interaction, occurs when a second independent variable (the moderator) affects the form of the relationship between another independent variable and the dependent variable (Hair et al., 2010). Villa, Howell, Dorfman and Daniel (2003) recommend that the moderated multiple regression is a preferred statistical

technique for identifying the presence of moderating effects. This technique was applied in this study to examine the moderating effect of value.

To test whether a variable  $Z$  moderates the relationship between a predictor  $X$  and a criterion variable  $Y$ , an interaction term, which is the product of the predictor  $X$  and the moderator  $Z$ , is added into the main effects model (Villa et al., 2003). The moderated multiple regression equation takes the form of:

$$Y = \alpha + \beta_1 X + \beta_2 Z + \beta_3 XZ$$

If the interaction term ( $\beta_3$ ) is significant, the moderating effects of  $Z$  are indicated (Villa et al., 2003).

#### **4.6.3.2 Coefficient of Determination**

The coefficient of determination ( $R^2$ ) is an important tool to measure the predictive accuracy of the overall regression model (Hair, Black, Babin, Anderson, & Tatham, 2006).  $R^2$  is calculated as follows:

$$R^2 = \frac{SS_R}{SS_T}$$

Where:  $SS_R$  is the sum of squares regression;  
 $SS_T$  is the total sum of squares.

$R^2$  represents the proportion of the total variance in dependent variable that is accounted for by all the independent variables (Berenson, Levine, & Krehbiel, 2006).  $R^2$  is equal to 1, representing that the regression line perfectly fits the data; however,  $R^2$  is equal to 0, representing that the regression model provides no better predictions than using the average observed value of the dependent variable (Hair et al., 2006).

#### 4.6.3.3 Test for the Significance of the Overall Regression Model

F test is used to determine whether  $R^2$  is significantly higher than 0 (Hair et al., 2010). The F statistics is calculated as follows:

$$F \text{ ratio} = \frac{\frac{SS_{\text{regression}}}{df_{\text{regression}}}}{\frac{SS_{\text{residual}}}{df_{\text{residual}}}}$$

Where:  $df_{\text{regression}}$  = Number of estimated coefficients (including intercept) - 1;  
 $df_{\text{residual}}$  = Sample size - Number of estimated coefficients (including intercept).

The null hypothesis of the test is that all the regression coefficients are equal to 0 (Black, Asafu-Adjaye, Khan, Perera, Edwards, & Harris, 2007). An acceptance of the null hypothesis indicates that the regression model has no significant predictability for the dependent variable (Black et al., 2007). However, a rejection of the null hypothesis indicates that at least one of the independent variables has significant predictability for the dependent variable (Black et al., 2007).

#### 4.6.4 Analysis of Variance (ANOVA)

Analysis of variance (ANOVA) is used to compare the means of the groups (Lee, Lee, & Lee, 2000). The statistical technique examines whether the groups are sampled from populations with equal means (Lee et al., 2000). This study grouped students based on their gender, age, year of study and major. ANOVA was used to examine students' perceptual differences of service quality, value, image, satisfaction and favourable behavioural intentions in terms of these four demographic characteristics.

ANOVA calculates the F statistic, in which the between-groups estimate of variance ( $MS_B$ ) and the within-group estimate of variance ( $MS_W$ ) are compared (Hair et al., 2006; Zikmund et

al., 2007). If the value of F is large, the null hypothesis is rejected, indicating significant difference in means across groups (Hair et al., 2006; Zikmund et al., 2007). The F statistics is calculated as follows:

$$F \text{ statistic} = \frac{MS_B}{MS_W}$$

#### **4.6.5 Assumptions for Regression Analysis and Analysis of Variance**

As the statistical assumptions of regression analysis and ANOVA are critical for producing accurate results, the following tests must be conducted before applying the two statistical analysis techniques.

##### **4.6.5.1 Outliers**

An outlier is an observation that substantially departs from the main trend of the entire data (Field, 2005). Outliers can lead to a biased regression model because they affect the estimated regression coefficients (Field, 2005). Outliers can be identified by the standardised residuals (Field, 2005). Sample cases with a standardised residual greater than 3.29 (usually 3) are cause for concern (Field, 2005). Likewise, Garson (2010) suggests that, as a rule of thumb, an outlier is the observation whose standardised residual is greater than 3.3.

##### **4.6.5.2 Multicollinearity**

Garson (2010) defines multicollinearity as excessive correlations among the independent variables. Multicollinearity can effect on both estimation and explanation (Hair et al., 2010). In terms of estimation, multicollinearity does not only decrease the predictive ability of regression model, but also have substantive effects on estimated regression coefficients and

their significant tests (Hair et al., 2010). In the extreme case, perfectly correlated variables prevent the estimation of any coefficient (Hair et al., 2010). In terms of explanation, multicollinearity makes it difficult or impossible to understand the effects of each independent variable (Hair et al., 2010).

To detect multicollinearity, the simplest method is to examine the correlation matrix for independent variables (Hair et al., 2010). The presence of high correlations, generally 0.90 or higher, indicates colinearity problems (Hair et al., 2010). Likewise, a high value of  $R^2$  and a significant F test in combination with insignificant t-tests of coefficients signal substantive effects of multicollinearity on the regression model (Garson, 2010).

Garson (2010) recommends that tolerance, variance inflation factor (VIF), and condition indices are the three methods to measure the degree of multicollinearity. Tolerance is defined as “the amount of variability of the selected independent variable not explained by the other independent variables” (Hair et al., 2006, p. 227). Tolerance is calculated as:

$Tolerance = 1 - R^{2*}$  Where:  $R^{2*}$  is the amount of the independent variable that is explained by all of the other independent variables in the regression model.

The second measure of multicollinearity is VIF, which is the inverse of the tolerance (Hair et al., 2010). Since the relationship between tolerance and VIF is simply reciprocal, a large value of VIF or a small value of tolerance denotes high collinearity (Hair et al., 2010). Hair et al. (2010) suggest that the generally accepted level of multicollinearity is a tolerance value of 0.10, which corresponds to a VIF value of 10. Moreover, Dielman (2001) recommends that the VIF values should be evaluated based on the coefficient of determination ( $R^2$ ) of the overall regression model. VIF values lower than  $1/(1-R^2)$  indicate that multicollinearity is not

a serious problem (Dielman, 2001).

The final measure of multicollinearity is condition indices. Garson (2010) suggests that a condition index greater than 30 denotes serious collinearity problems, and a condition index above 15 signals possible collinearity problems.

#### **4.6.5.3 Linearity**

The linear relationship between the dependent variable and independent variable(s) requires that mean values of the dependent variable for each increment of the independent variable(s) lie along a straight line (Field, 2005). Since the linearity is assumed in the concept of correlation on which regression analysis is based, the assumption is regarded as a critical issue in regression analysis (Hair et al., 2010).

Hair et al. (2010) suggest that linearity of any bivariate relationship can be easily detected from the residual plot. Moreover, the residual plot can be also used to examine the combined effects of all independent variables in the multiple regression model (Hair et al., 2010). Field (2005) recommends that the linearity assumption can be checked through the \*ZRESID (the standardised residuals) against \*ZPRED (the standardised predicted values of the dependent variable) plot in SPSS. Dots in the graph should be randomly arrayed and evenly dispersed around zero (Field, 2005). The presence of any sort of curve in the graph suggests the potential violation of the linearity assumption (Field, 2005).

#### **4.6.5.4 Error Term Normality**

Normality assumes that residuals are randomly and normally distributed, with a mean value



of 0 (Field, 2005). The assumption means that the differences between the regression model and observed data are zero or very close to zero, and that differences occur only by chance (Field, 2005).

Field (2005) recommends the use of both the histogram and the normal probability plot to check the normality of residuals. In the histogram, the distribution of standardised residuals should approximate the normal distribution (Garson, 2010). In the P-P plot, the straight diagonal line represents the normal distribution and the plotted points are the observed residuals (Field, 2005). If the data set is perfectly normally distributed, all the points should lie on the straight line (Field, 2005). Any distance from the point to the straight line indicates the deviation from normality (Field, 2005).

#### **4.6.5.5 Error Term Independence**

Independent errors mean that the residuals should be uncorrelated for any pair of observations (Field, 2005). Maddala (2001) suggests that autocorrelations lead to unbiased but inefficient ordinary least squares estimators as well as exaggerated F and t statistics (Maddala, 2001). Since the least squares estimation heavily relies on the independence assumption, statistical conclusions cannot be trusted in the case of autocorrelation (Nieuwenhuis, 2009).

The Durbin-Watson test is the common method for testing the dependence of the error terms (Nieuwenhuis, 2009). The test statistic, D statistic, is calculated as follows:

$$D = \frac{\sum_{t=2}^n (e_t - e_{t-1})^2}{\sum_{t=1}^n e_t^2} \quad \text{Where: } e_t \text{ is the residual for period } t.$$

Nieuwenhuis (2009) summarises four principles for understanding the D statistic:

- (1) The D statistic can only take the value in the range from 0 to 4.
- (2) If the D statistic is close to 0 (respectively, 4), there is positive (respectively, negative) first-order autocorrelation.
- (3) The closer the D statistic equals 0 (respectively, 4), the stronger the degree of positive (respectively, negative) first-order autocorrelation is.
- (4) A D statistic close to 2 supports the validity of no first-order autocorrelation.

The tested null hypothesis is that there is no autocorrelation (Maddala, 2001). The decision rule for Durbin-Watson test is (Maddala, 2001):

- (1) If  $d < d_L$ , reject the null hypothesis;
- (2) If  $d > d_U$ , do not reject the null hypothesis;
- (3) If  $d_L < d < d_U$ , the test is inclusive.

#### **4.6.5.6 Error Term Homoscedasticity**

Homoscedasticity means that the variance of error term is constant for all values of the independent variable(s) (Garson, 2010). Maddala (2001) demonstrates that two consequences of heteroskedasticity are: (1) unbiased but inefficient least squares estimators, and (2) biased estimates of the variances. In the case of heteroskedasticity, conclusions of statistical tests cannot be trusted (Nieuwenhuis, 2009).

Field (2005) recommends that diagnosis can be made with standardised residual plots.

Residuals, represented by dots, should disperse randomly throughout the range of the estimated values of dependent variable to indicate that the homoscedasticity assumption is

satisfied (Garson, 2010). If a triangle-shaped pattern or a diamond-shaped pattern is present, there is heteroskedasticity in data (Hair et al., 2010).

## **4.7 Chapter Summary**

This chapter has outlined the research plan and methodology. The sample size selection, data collection method, questionnaire design and the statistical techniques used in this study, such as factor analysis, regression analysis and analysis of variance were discussed.

# **Chapter 5: Results and Discussion**

## **5.1 Chapter Introduction**

This Chapter presents the results of data analysis and discusses the research findings. The appropriateness of the data set for factor analysis is examined. The statistical assumptions of factor analysis, multiple regression, and ANOVA are tested. The sixteen hypotheses proposed in Chapter 3 are tested. The results are discussed in terms of the four research objectives.

## **5.2 Sample and Response Rates**

Using a convenience system, the questionnaires were distributed in He Bei Normal University. A total of 446 university students were asked to participate the survey; 371 respondents filled out the questionnaires. This resulted in an 83.2% response rate. Of these, 21 questionnaires were incomplete or were unsuitable for data analysis. This resulted in 350 usable responses, and a 78.5% usable response rate. The number of suitable questionnaires was above the minimum sample size of 305, calculated by the process suggested by Hair et al. (2010). Therefore, the sample size was appropriate for factor analysis.

### **5.2.1 Non-response Bias**

#### **5.2.1.1 Early/Late Responses**

Armstrong and Overton (1977) note that non-response bias can impact on the generalizability of the research results. They suggest that this type of bias can be estimated by using the

extrapolation method. The assumption of the extrapolation method is that “subjects who respond less readily are more like nonrespondents”. “Less readily’ has been defined as answering later, or as requiring more prodding to answer” (p. 397).

In this study, 163 questionnaires were collected between 15<sup>th</sup> 2010 to 25<sup>th</sup> December 2010, and the other 187 questionnaires were collected between 26<sup>th</sup> December 2010 to 5<sup>th</sup> January 2011. The mean scores for the sum of the sub-dimensions, the Service Quality items, the Satisfaction items, the Image items, the Value items, the Future Attendance items and the Recommendation items of the two groups were calculated. Independent t-tests were then conducted to determine if there was any significant difference in the group means. The results are shown in Table 5.1. The results indicated that the two groups had equal variances and means, thus providing no evidence of non-response bias in this study.

**Table 5.1: Independent Sample Test for Non-Response Bias.**

Equal Variance Assumed

Construct	Levene’s Test for Equality of Variance		t-test for Equality of Means Significant at 5% level				
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std.Error Difference
Interaction Quality	0.273	0.602	-0.042	348	0.967	-0.071	1.713
Physical Environment Quality	1.164	0.281	-0.230	348	0.818	-0.622	2.700
Outcome Quality	0.194	0.660	-0.806	348	0.421	-1.168	1.450
Service Quality	2.070	0.151	0.365	348	0.715	0.146	0.400
Satisfaction	0.342	0.559	0.245	348	0.807	0.094	0.386
Image	0.481	0.489	-0.657	348	0.511	-0.314	0.478
Value	0.593	0.442	-0.004	348	0.997	-0.002	0.426
Future Attendance	0.007	0.933	-1.151	348	0.250	-0.467	0.405
Recommendation	0.000	0.994	-0.505	348	0.614	-0.205	0.405

### 5.2.1.2 Missing Data

Missing data, or item nonresponse, implies that valid values on some variables are not available for analysis (Hair et al., 2010; Vriens, & Sinharay, 2006). In this study, items a5, a19, b9, b21, b24, c9, c14, d9 and d15 had missing values. However, all of the frequencies of missing items were less than 1 % of the useable responses (see Appendix 3, Table 25A). Therefore, the means of each item were substituted for the missing values, as recommended by Hair et al. (2010).

## 5.3 Descriptive Statistics

In the questionnaire, Section E contains items that were designed to obtain information on the demographic characteristics of students. The summary results are presented in Tables 5.2 and 5.3. The percentage of male respondents (48.9%) is slightly less than the percentage of female respondents (51.1%). Respondents aged 18-22 are the largest age group, accounting for 76.9% of the sample. In terms of the year of study, third year students account for 41.4% of the sample, followed by second year students (36.9%) and fourth year students (21.7%).

**Table 5.2: Gender, Age, and Year of Study Results.**

Gender	Frequency	Percentage	Age	Frequency	Percentage	Year of Study	Frequency	Percentage
Male	171	48.9	18-22	269	76.9	Year 2	129	36.9
Female	179	51.1	23-27	80	22.9	Year 3	145	41.4
			27+	1	0.3	Year 4	76	21.7
Total	350	100	Total	350	100	Total	350	100

The results for students' majors are in Table 5.3. The respondents were studying in 33 different fields. The Tourism Management major is the largest group (11.4%), followed by International Economics and Trade (10.0%) and Economics (9.4%).

**Table 5.3: Field of Study.**

<b>Major</b>	<b>Frequency</b>	<b>Percentage</b>	<b>Major</b>	<b>Frequency</b>	<b>Percentage</b>
Accounting	26	7.4	Geography	1	0.3
Administration Management	1	0.3	Human Resource Management	18	5.1
Advertising	1	0.3	Information and Computational Science	9	2.6
Automobile Service Engineering	1	0.3	Information Management and Information System	4	1.1
Biological Science	29	8.3	Information Resource Management	2	0.6
Business Administration	1	0.3	International Economics and Trade	35	10.0
Chinese Language Literature	2	0.6	Japanese	1	0.3
Computer Network	3	0.9	Journalism	5	1.4
Computer Science and Technology	8	2.3	Law	22	6.3
E-Commerce	11	3.1	Logistics Management	4	1.1
Economics	33	9.4	Marketing	19	5.4
Electronic Information Engineering	1	0.3	Mathematics and Applied Mathematics	14	4.0
English	15	4.3	Mechanics	1	0.3
Environmental Science	2	0.6	Psychology	2	0.6
Finance	20	5.7	Public Administration	17	4.9
Food Science and Engineering	1	0.3	Tourism Management	40	11.4
Foreign Languages and Literatures	1	0.3	<b>Total</b>	350	100

## 5.4 Assessment for Factor Analysis

### 5.4.1 Statistical Assumptions for Factor Analysis

Hair et al. (2010) and Janssens et al. (2008) recommend that visual inspection of the correlation matrix, the examination of the anti-image correlation matrix, Bartlett's test of sphericity, and the Kaiser-Meyer-Olkin measure of sampling adequacy should be used to

diagnose the factorability of the correlation matrix. The data were subjected to each of these tests.

#### **5.4.1.1 Examination of the Correlation Matrix**

The visual examination of the correlation matrix (Appendix 4, Table 26A) revealed that there were a substantial number of correlations above 0.30. Therefore, factor analysis was appropriate, as qualified by Hair et al. (2010) and Janssens et al. (2008).

#### **5.4.1.2 Inspection of Anti-Image Correlation Matrix**

Inspection of the anti-image correlation matrix (Appendix 5, Table 27A) showed that the majority of the off-diagonal elements were small. This also indicated that factor analysis was appropriate, as suggested by Hair et al. (2010) and Janssens et al. (2008).

#### **5.4.1.3 Bartlett's Test of Sphericity**

Bartlett's test of sphericity is used to examine the null hypothesis that the correlation matrix derives from a population of independent variables (Stewart, 1981). Therefore, rejection of the null hypothesis indicates the appropriateness of the correlation matrix for factor analysis (Stewart, 1981). In the correlation matrix, the test value was 13819.580, significant at 0.000. Therefore, the null hypothesis was rejected, again indicating that the data set was appropriate for factor analysis.



#### **5.4.1.4 Kaiser-Meyer-Olkin Measure of Sample Adequacy (MSA)**

The MSA index can have a value ranging from 0 to 1. A value less than 0.50 is unacceptable (Janssens et al., 2008). In this study, the MSA index was 0.935. According to Hair et al. (2010), this value was meritorious. This result, taken with those reported above, confirmed that the application of factor analysis was appropriate.

### **5.4.2 Factor Analysis Results**

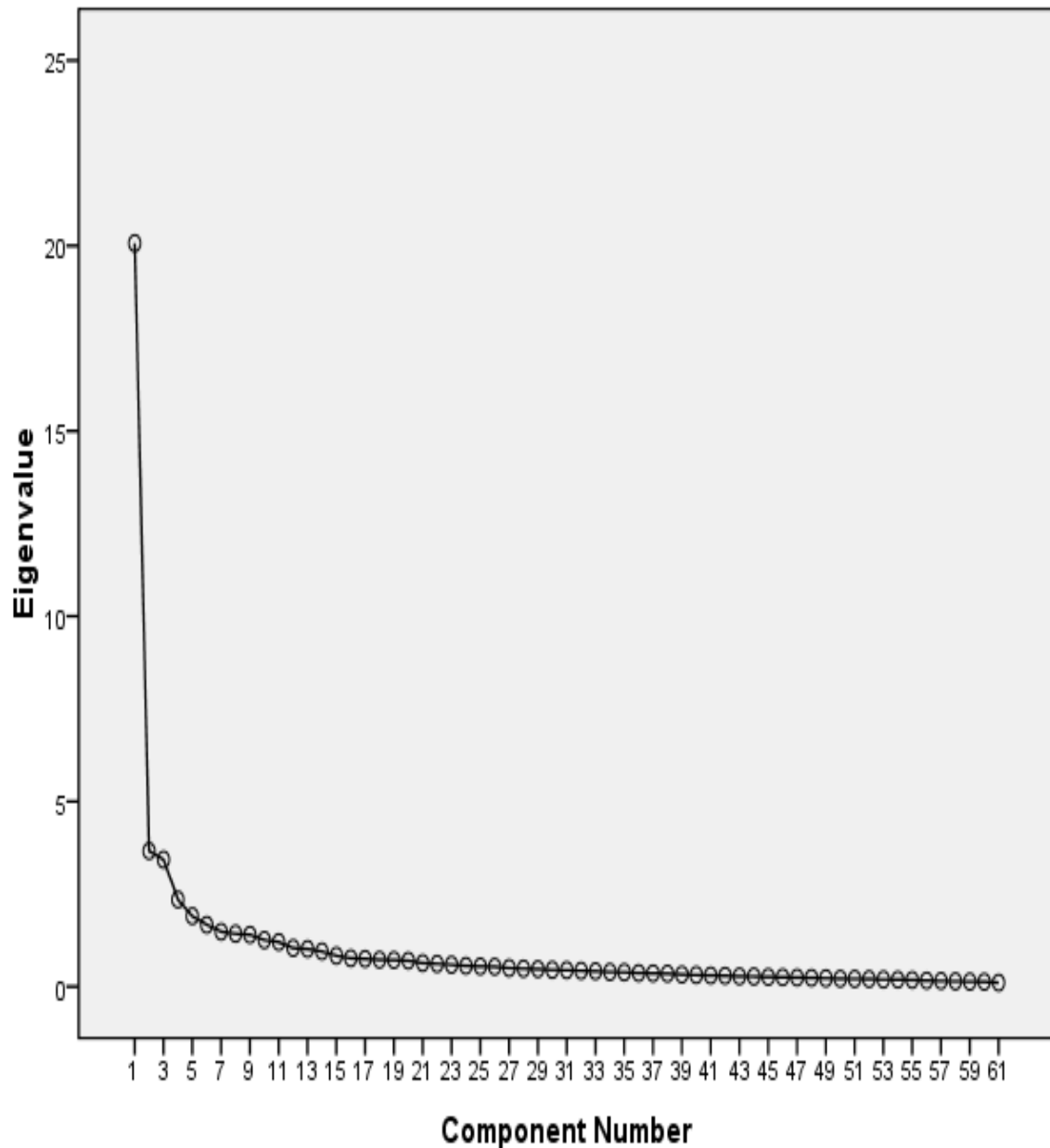
Principle component factor analysis was applied to all of the sub-dimension items. The results of these procedures are discussed in the following sections.

#### **5.4.2.1 Latent Root Criterion**

The latent root criterion dictates that all factors with eigenvalues greater than 1 are significant. Factors with eigenvalues less than 1 should be disregarded (Hair et al., 2010; Janssens et al., 2008). Results of the latent root criterion analysis revealed that thirteen factors should be extracted from the 61 variables (Appendix 6, Table 28A). These thirteen factors explained 68.72% of the total variation in the data set.

#### **5.4.2.2 The Scree Test**

Graphing the eigenvalues against the factors shows a sharp descent and approximates a straight line at the bottom of the resulting curve. There are thirteen factors before the point of inflexion (see Figure 5.1), indicating that the extraction of thirteen factors was appropriate.



**Figure 5.1: The Scree Plot**

#### 5.4.2.3 Factor Rotation

The unrotated factor matrix revealed that 58 variables highly loaded on the first extracted factor. 18 of these variables had moderate cross loadings on other factors. One variable (a18) had moderate loading on the first factor and higher loading on the eighth factor. Moreover, a8

only highly loaded on the fifth factor, while a9 did not have any significant factor loading on any factor. The unrotated factor matrix thus did not provide an interpretable solution.

Orthogonal rotation (VARIMAX) and oblique rotation (OBLIMIN) were conducted to identify the optimal factor structure, as recommended by Stewart (1981).

The VARIMAX and OBLIMIN rotations (Appendix 7, Table 29A and 30A) displayed a similar factor structure. Most of variables had similar factor loadings in both rotation methods. However, the VARIMAX rotation reported three variables (a13, b19 and b23) as insignificant. The OBLIMIN rotation reported four variables (a13, b5, b6 and b19) as insignificant. There were slight differences between the two rotated solutions. However, the majority of the variables consistently loaded on the same factors. As the factors were considered independent of each other, the analysis was based on the VARIMAX rotation.

#### **5.4.2.4 Factors Interpretation**

Hair et al. (2010) argue that for a sample size of 350, factor loadings greater than  $\pm 0.30$  should be considered as significant. However, in practice, factor loadings ranging from  $\pm 0.30$  to  $\pm 0.40$  only meet the minimal level of significance (Hair et al., 2010). Therefore, this study used  $\pm 0.40$  as the cut-off point.

In the VARIMAX rotated solution, a total of 61 variables were submitted for factor analysis. Fifty-eight of these had significant factor loadings greater than 0.40. However, three of the 58 variables, b5, c8 and c9, had significant cross-loadings on two factors. Moreover, three variables (a13, b19 and b23) had no significant loading on any factor. Therefore, a13, b19 and b23 were excluded from the subsequent analysis (See Appendix 8 for details). The 13

extracted factors were labeled as: (1) Physical Facilities; (2) Personal Development; (3) Academic Development; (4) University Accommodation; (5) Expertise; (6) Personal Communication (7) Administration Staff; (8) Attitudes and Behaviours; (9) Course Content; (10) Library; (11) Social Life; (12) Safety; (13) Social Factors.

### **5.4.3 Summated Scale**

Subsequent analysis of the data will utilise summated scales. In order to create these, the content validity, dimensionality and reliability of the calculated scales must be assessed.

#### **5.4.3.1 Content Validity**

The correspondence between each construct and its composite items was assessed by the researcher and two marketing academics to ensure that the items accurately and adequately represented the construct under investigation. In the VARIMAX rotation, all of the items did not load exactly on the proposed sub-dimensions. However, these items did load on the primary dimensions that they were presumed to represent. This was taken to signify that the set of items demonstrated adequate content validity.

#### **5.4.3.2 Dimensionality**

Three of the 58 variables, b5, c8 and c9, had significant loadings on two factors, meaning that the three variables correlated with two factors. However, each of the variables had a higher loading on one factor, and only moderately loaded on another (Appendix 7, Table 29A). Thus, the three variables were categorized to represent the factors with the higher loadings.

### 5.4.3.3 Reliability

All of the 58 variables were submitted for reliability tests. This was measured by Cronbach's Alpha. The tests yielded Cronbach's Alpha values above 0.6 for all factors, suggested by Hair et al. (2010) and Churchill (1979) as threshold values. The Cronbach's Alpha value and composite items of each of the summated scales are summarised in Tables 5.4, 5.5, 5.6.

**Table 5.4: Reliability of Scaled Items for the Sub-dimensions for Interaction Quality**

Sub-Dimension	Cronbach's Alpha	Item No	Items	Rotation Loading
Expertise	0.829	a3	Lecturers deliver theoretical and practical mixed subjects.	0.730
		a2	Lecturers have extensive knowledge about their subjects.	0.653
		a1	Lecturers have good communication skills.	0.640
		a4	Classes are well prepared and organized.	0.581
Personal Communication	0.775	a8	I can contact my lecturers with a minimum effort.	0.723
		a9	I can find my lecturers in their offices most of the time.	0.697
		a11	I feel comfortable when talking with lecturers.	0.662
		a10	My lecturers are ready to solve my problems.	0.572
		a12	My lecturers deal with my problem in a concerned fashion.	0.521
Administration Staff	0.811	a15	Faculty administrators are courteous and polite.	0.711
		a16	Faculty administrators perform their duties properly.	0.664
		a14	The appearance of faculty administrators is neat and clean.	0.616
Attitudes and Behaviours	0.792	a5	The appearance of lecturers is neat and clean.	0.677
		a6	Lecturers are courteous and respectful.	0.673
		a7	Lecturers are friendly and helpful.	0.603
Course Content	0.846	a18	The course materials are relevant to the subjects.	0.853
		a17	The course materials (e.g. textbooks) are useful.	0.783
		a19	The course materials make complicated subjects understandable.	0.709

**Table 5.5: Reliability of Scaled Items for the Sub-dimensions for Physical Environment Quality**

Sub-Dimension	Cronbach's Alpha	Item No	Items	Rotation Loading
Physical Facilities	0.929	b11	Recreational facilities are easy to access.	0.830
		b12	Recreational facilities are well maintained.	0.803
		b10	Recreational facilities are offered to students.	0.772
		b13	Computers are well maintained.	0.671
		b14	Computer software is updated regularly.	0.661
		b15	Computers are accessible for students.	0.627
		b6	The appearance of the campus and its buildings is attractive.	0.589
		b8	Classrooms have quality equipment.	0.578
		b5	The campus has excellent supporting facilities (e.g. canteen).	0.525
		b9	Classrooms are always neat and clean.	0.508
		b7	Classrooms are comfortable and bright.	0.507
University Accommodation	0.823	b2	University residential accommodation provides good living conditions.	0.770
		b3	Living on campus is convenient	0.659
		b1	University residential accommodation is charged at a reasonable price.	0.602
		b4	The campus is neat and clean.	0.575
Library	0.798	b16	The library is a good place to study.	0.808
		b17	The library has an attractive layout and design.	0.727
		b18	The library provides an extensive collection of learning materials.	0.656
Social Life	0.822	b26	I am offered an opportunity to participate in a variety of sports and recreational programs.	0.720
		b27	I am offered extra-curricular activities to share my own interest with others.	0.701
		b25	I enjoy my social life on campus.	0.548
Safety	0.691	b22	Criminal activity rarely happens around campus.	0.754
		b24	I feel safe in the university.	0.668
Social Factors	0.634	b21	I am impressed with the attitudes and behavior of my classmates.	0.460
		b20	I am not disturbed by noise during lectures (e.g. mobile phones ringing, construction noise).	0.454

**Table 5.6: Reliability of Scaled Items for the Sub-dimensions for Outcome Quality**

Sub-Dimension	Cronbach's Alpha	Item No	Items	Rotation Loading
Personal Development	0.902	c15	I have developed personal qualities (e.g. problem solving, initiative, time management).	0.771
		c12	I have gained the ability to work in a team.	0.769
		c13	I have developed communication skills (e.g. oral presentation, report writing).	0.747
		c11	I understand ethical codes, responsibilities and norms in my area of study.	0.714
		c14	I have developed technical skill (e.g. use of software).	0.697
		c10	I have gained knowledge and skills applicable to a specific career.	0.649
		c7	I have developed my personal values and ethics.	0.627
		c9	I have developed the ability to apply theory to practice.	0.559

Academic Development	0.904	c3	I have gained a background and specialization for further education in a professional discipline.	0.772
		c2	I have gained some deep and detailed knowledge of the subjects I study.	0.726
		c1	I understand the conceptual framework, major theories, and basic formulae in the subjects I study.	0.700
		c5	I have gained a broad knowledge of different fields.	0.693
		c4	I have developed critical thinking and reasoning skills.	0.646
		c8	I have developed competency in my field of study.	0.544
		c6	I have learned how to learn.	0.544

In addition, Cronbach's Alpha was also used to test the reliability of the Service Quality Satisfaction, Image, Value, Recommendation to Others, and Future Attendance scales. All of the high order constructs were measured using three items, except for Image, which was measured using four items. The reliability of these higher order constructs are shown in Table 5.7. The Cronbach's Alpha values of these constructs were all above the 0.60 threshold, affirming that the measures of these higher order constructs had adequate reliability.

**Table 5.7: Reliability of Scaled Items for Satisfaction and Related Constructs**

Construct	Cronbach's Alpha	Item No	Items
Service Quality	0.930	d1	The university provides excellent service quality.
		d2	Overall, the service quality of the university is high.
		d3	Overall, I think that the service quality offered by the university is excellent.
Satisfaction	0.910	d4	I have had a satisfying experience at the university.
		d5	I am satisfied with my university experience.
		d6	The university provides a satisfying learning experience.
Image	0.893	d7	I have a good impression of the university.
		d8	I believe that the university has a good image in the minds of students.
		d9	Generally, the university always fulfills its promises.
		d10	The university has a good reputation.
Value	0.883	d11	The tuition fee charged is reasonable.
		d12	The miscellaneous fees charged are reasonable.
		d13	The university provides good value for money.
Recommendation to Others	0.856	d14	I would recommend the university to someone who seeks my advice.
		d15	I say positive things about the university to other people.
		d16	I would encourage friends and relatives to go to the university.
Future Attendance	0.640	d17	I would still consider this university as my first choice if I could start over again.
		d18	I would choose this university for my further education.
		d19	I will complete my bachelor degree at the university.

In summary, all of the summated scales demonstrated sufficient content validity, unidimensionality, and reliability. Hence, using the sum of each of the scales to represent each of the dimensions in the subsequent analysis was appropriate, as recommended by Hair et al. (2010).

## **5.5 Assessment of Multiple Regression and ANOVA**

### **5.5.1 Assumptions for Regression Analysis and ANOVA**

It was necessary to examine each of the ten multiple regression models that contribute to the theory. Six separate statistical tests were utilised to determine the suitability of regression for assessing the overall theoretical design. These tests were used to detect any violation of the regression technique's statistical assumptions.

#### **5.5.1.1 Outliers**

Maddala (2001) warns that the presence of outliers will bias the estimated regression parameters. The observations with standardised residuals greater than three were identified as outliers, as a value this high is rarely caused by chance (Field, 2005). Outliers were omitted before conducting regression analysis, as suggested by Maddala (2001).

#### **5.5.1.2 Multicollinearity**

The degree of multicollinearity was assessed for each of the ten regression models. The Pearson Correlation Matrix (see Appendix 9, Table 32A-42A) for each model revealed that the correlation between any pair of independent variables was less than 0.80. The values of



$R^2$  for the ten regression models were not extremely high. Moreover, the F-values for the ten regression models were highly significant at 1 % level. The t-values for the independent variables were also significant except for one variable (Social Factors) in Model 2, and one variable (Value) in Model 8.

Collinearity statistics (see Appendix 9, Table 43A) also were used to assess the impact of collinearity on the ten regression models. The tolerance values for all of the independent variables in the ten regression models were greater than 0.3. In addition, the Variance Inflation Factor (VIF) values for the independent variables in the ten regression models were lower than 4. These tolerance values and VIF values indicated that there were no multicollinearity problems in the regression models (Field, 2005; Garson, 2010; Hair et al., 2010). Furthermore, the VIF values in each of the regression models were less than  $1/(1-R^2)$ , suggesting that no serious multicollinearity problems exist (Dielman, 2001). However, the condition indices were greater than 15 in three models, though none of these values was above 30. The condition indices for the three models indicated that collinearity may exist (Garson, 2010). However, the degree of collinearity was not deemed a serious problem in the three models (Garson, 2010). In summary, potential multicollinearity may exist in some of the models, but it did not appear to seriously bias the results of regression analysis.

### **5.5.1.3 Linearity**

The scatter plots of the standardised residuals versus the standardised predicted values of the dependent variable (see Appendix 10, Figure 10A) for all of the regression models were visually examined to detect any systematic pattern. The residuals in the scatter plots fluctuated whimsically around zero. This pattern indicated that the assumption of the

specified linear relationship had been met (Field, 2005).

#### 5.5.1.4 Error Term Normality

To test the assumption of normality, both the histogram and the normality probability plot (P-P) were selected (see Appendix 11, Figure 11A and 12A). The histogram plots revealed that the distribution of residuals in the ten regression models approximated the normal distribution. The P-P plots also showed that the residuals in the regression models lie roughly on the straight diagonal line which represented the normal distribution. Therefore, the residuals did not deviate significantly from normal distribution, indicating that the assumption of normality had been met.

#### 5.5.1.5 Error Term Independence

The Durbin-Watson test was used to determine if the assumption of independent errors had been satisfied. The tested results are summarised in Table 5.8. The Durbin-Watson statistics for all regression models are above their corresponding  $D_U$ , satisfying the assumption of independent errors.

**Table 5.8: Durbin-Watson Test Statistics**

Model	Dependent Variables	Durbin-Watson	Critical Value (at 1% level)	
			$D_L$	$D_U$
1	Interaction Quality	2.028	1.724	1.781
2	Physical Environment Quality	2.064	1.718	1.787
3	Outcome Quality	1.942	1.741	1.764
4	Service Quality	2.000	1.735	1.770
5	Satisfaction	Step 1: 1.885	1.741	1.764
		Step 2: 2.004	1.747	1.758
6	Value	1.908	1.747	1.758
7	Image	2.002	1.747	1.758
8	Satisfaction	2.032	1.735	1.770
9	Recommendation	1.986	1.747	1.758
10	Future Attendance	2.029	1.747	1.758

### 5.5.1.6 Error Term Homoscedasticity

In the scatter plots (see Appendix 10, Figure 10A), the dots randomly dispersed around zero.

A shape of funnel, or any other patterns, did not exist in all graphs. Therefore, the assumption of homoscedasticity was satisfied.

The results of statistical testing appear in the following sections. To provide clarity as to the relationships they test, a summary table listing the sixteen hypotheses is presented in Table 5.9.

**Table 5.9: List of Hypotheses formulated from Chapter 3**

H1	Perceptions of each of the interaction quality sub-dimensions (H1a, H1b, H1c, H1d, H1e, and H1f) will have a positive effect on interaction quality.	H9	Higher perceptions of overall service quality will have a positive effect on image.
H2	Perceptions of each of the physical environment quality sub-dimensions (H2a, H2b, H2c, H2d, H2e, H2f, H2g, H2h, and H2i) will have a positive effect on physical environment quality.	H10	Higher perception of value will have a positive effect on satisfaction.
H3	Perceptions of each of the outcome quality sub-dimensions (H3a, H3b, H3c, and H3d) will have a positive effect on outcome quality.	H11	Higher perception of image will have a positive effect on satisfaction.
H4	Perceptions of interaction quality will positively effect overall service quality.	H12	Higher perception of overall service quality will have a positive effect on satisfaction.
H5	Perceptions of physical environment quality will positively effect overall service quality.	H13	A higher level of satisfaction will have a positive effect on recommending the university to others.
H6	Perceptions of outcome quality will positively effect overall service quality.	H14	A higher level of satisfaction will have a positive effect on intentions to attend the university in the future.
H7	Perceptions of value will moderate the relationship between service quality and satisfaction.	H15	Students' perceptions of (a) each of the primary dimensions and (b) each of the sub-dimensions will differ in their importance.
H8	Higher perceptions of overall service quality will have a positive effect on value.	H16	Students' perceptions of (a) service quality, value, image, satisfaction and favourable behavioural intentions, (b) the primary dimensions of service quality, and (c) the sub-dimensions of service quality will differ in terms of their demographics (gender, age, year of study, and major).

## 5.5.2 Results Pertaining to Research Objective 1

Research Objective 1 is to identify the dimensions of service quality in China's higher education sector. Hypotheses 1 to 6 were proposed to satisfy this objective. Hypotheses 1, 2, and 3 were formulated to test the paths between the sub-dimensions and their associated primary dimensions. Hypotheses 4, 5, and 6 were formulated to test the paths between primary dimensions and overall service quality. The results of regression analysis are presented in this section.

### 5.5.2.1 Hypothesis 1

The first regression model used Interaction Quality as the dependent variable. The five independent variables were Expertise, Personal Communication, Administration Staff, Attitudes and Behaviours, and Course Content. The results of the analysis are presented in Table 5.10.

**Table 5.10: Model 1: Multiple Regression Results Relating to Hypothesis 1**

Model 1	Unstandardised		Standardised Coefficient Beta	t	Sig.	
	Coefficient B	Std. Error				
<b>Interaction Quality</b> (Constant)	-0.349	0.687		-0.508	0.612	
Expertise	0.212	0.035	0.288	6.028	0.000	***
Personal Communication	0.110	0.028	0.173	3.881	0.000	***
Administration Staff	0.208	0.044	0.220	4.783	0.000	***
Attitudes and Behaviours	0.089	0.051	0.081	1.764	0.079	*
Course Content	0.191	0.037	0.218	5.119	0.000	***

**Adjusted R<sup>2</sup>=0.574**      \*\*\*Significant at 1% level

**F=93.827\*\*\***      \*\*Significant at 5% level

\*Significant at 10% level

The F statistic is 93.827, significant at the 1% level. Therefore, the model is useful in

predicting Interaction Quality. The adjusted coefficient of determination demonstrates that the regression model explains 57.4% of the variation in Interaction Quality. Moreover, the t statistics of Expertise, Personal Communication, Administration Staff, and Course Content are significant at the 1% level. The t statistics of Attitudes and Behaviours is significant at the 10% level. Therefore, the results support Hypothesis 1.

### 5.5.2.2 Hypothesis 2

The second regression model used Physical Environment Quality as the dependent variable. The six independent variables were Physical Facilities, University Accommodation, Library, Social Life, Safety, and Social Factors. The results are presented in Table 5.11.

**Table 5.11: Model 2: Multiple Regression Results Relating to Hypothesis 2**

Model 2	Unstandardised		Standardised Coefficient Beta	t	Sig.	
	Coefficient B	Std. Error				
<b>Physical Environment Quality</b> (Constant)	-0.696	0.648		-1.072	0.284	
Physical Facilities	0.118	0.014	0.406	8.395	0.000	***
University Accommodation	0.098	0.034	0.128	2.905	0.004	***
Library	0.134	0.038	0.141	3.491	0.001	***
Social Life	0.179	0.045	0.176	4.017	0.000	***
Safety	0.194	0.057	0.137	3.388	0.001	***
Social Factors	0.028	0.063	0.018	0.455	0.650	
<b>Adjusted R<sup>2</sup>=0.624</b>						
***Significant at 1% level						
<b>F=96.846***</b>						
**Significant at 5% level						
*Significant at 10% level						

The F statistic is 96.846, significant at the 1% level. Therefore, the model is useful in predicting Physical Environment Quality. The adjusted coefficient of determination demonstrates that the regression model explains 62.4% of the variation in Physical Environment Quality. The t statistics of Physical Facilities, University Accommodation,

Library, Social Life and Safety are significant at the 1% level. However, the t statistic of Social Factors is insignificant. Therefore, the results partially support Hypothesis 2.

### 5.5.2.3 Hypothesis 3

The third regression model used Outcome Quality as the dependent variable. The two independent variables were Personal Development and Academic Development. The results are presented in Table 5.12.

**Table 5.12: Model 3: Multiple Regression Results Relating to Hypothesis 3**

Model 3	Unstandardised		Standardised Coefficient Beta	t	Sig.	
	Coefficient B	Std. Error				
<b>Outcome Quality</b>						
(Constant)	-0.016	0.644		-0.024	0.981	
Personal Development	0.196	0.021	0.442	9.414	0.000	***
Academic Development	0.193	0.023	0.396	8.435	0.000	***
<b>Adjusted R<sup>2</sup>=0.585</b>						
***Significant at 1% level						
<b>F=242.424***</b>						
**Significant at 5% level						
*Significant at 10% level						

The F statistic is 242.424, significant at the 1% level. Therefore, the model is useful in predicting Outcome Quality. The adjusted coefficient of determination demonstrates that the regression model explains 58.5% of the variation in Outcome Quality. Moreover, the t statistics of Personal Development and Academic Development are significant at the 1% level. Therefore, the results support Hypothesis 3.

### 5.5.2.4 Hypotheses 4, 5 and 6

The fourth regression model tested Hypotheses 4, 5 and 6. The regression model used Service Quality as the dependent variable. The three independent variables were Interaction Quality,

Physical Environment Quality and Outcome Quality. The results are presented in Table 5.13.

**Table 5.13: Model 4: Multiple Regression Results Relating to Hypotheses 4, 5 and 6**

Model 4	Unstandardised		Standardised Coefficient Beta	t	Sig.	
	Coefficient B	Std. Error				
<b>Service Quality</b> (Constant)	-0.415	0.485		-0.855	0.393	
Interaction Quality	0.153	0.039	0.138	3.886	0.000	***
Physical Environment Quality	0.361	0.040	0.359	8.977	0.000	***
Outcome Quality	0.487	0.041	0.474	11.997	0.000	***
<b>Adjusted R<sup>2</sup>=0.720</b> ***Significant at 1% level						
<b>F=296.869***</b> **Significant at 5% level						
*Significant at 10% level						

The F statistic is 296.869, significant at the 1% level. Therefore, the regression model is useful in explaining the variation in Service Quality. The adjusted coefficient of determination shows that Interaction Quality, Physical Environment Quality and Outcome Quality explain 72.0% of the variation in Service Quality. Moreover, the t statistics of the three independent variables are all significant at the 1% level. Therefore, the results support Hypotheses 4, 5 and 6.

#### 5.5.2.5 Discussion Regarding Research Objective 1

The regression analysis reveals 12 significant sub-dimensions and one insignificant sub-dimension of service quality. The 12 significant sub-dimensions are Expertise, Personal Communication, Administration Staff, Attitudes and Behaviours, Course Content, Physical Facilities, University Accommodation, Library, Social Life, Safety, Personal Development, and Academic Development. Social Factors is the only insignificant sub-dimension.

Model 4 examined Hypotheses 4, 5 and 6, proposed to test paths from each primary

dimension to Service Quality. Hypotheses 4, 5 and 6 are supported. Service Quality is positively and significantly affected by the three primary dimensions: Interaction Quality, Physical Environment Quality and Outcome Quality. Therefore, the results for Hypotheses 1 to 6 support the use of a hierarchical model of service quality in China's higher education sector.

### **5.5.3 Results Pertaining to Research Objective 2**

Research Objective 2 is to investigate the relationship among service quality, satisfaction, image, value and favourable behavioural intentions in China's higher education sector. Regression analysis was used to test Hypotheses 7 to 14, which were proposed to satisfy Research Objective 2. The statistical results are presented in this section.

#### **5.5.3.1 Hypothesis 7**

Hypothesis 7 proposed that Value moderated the relationship between Service Quality and Satisfaction. The hypothesis was tested in two steps. The results are presented in Table 5.14.

In Step 1, the F statistic is 488.326, significant at the 1% level. The adjusted coefficient of determination shows that the regression model explains 73.9% of the variation in Satisfaction. The t statistics of Service Quality and Value are significant at the 1% level.

In Step 2, the F statistic is 548.944, at the 1% level of significance. The adjusted coefficient of determination demonstrates that 61.2% of the variation in Satisfaction is explained by the regression model. Moreover, the t statistic of Service Quality  $\times$  Value is significant at the 1% level. Therefore, Hypothesis 7 is supported.



**Table 5.14: Model 5: Multiple Regression Results Relating to Hypothesis 7**

Model 5	Unstandardised		Standardised Coefficient Beta	t	Sig.	
	Coefficient B	Std. Error				
<b>Step 1</b>						
<b>Satisfaction</b>						
(constant)	2.069	0.389		5.322	0.000	
Service Quality	0.719	0.032	0.744	21.143	0.000	***
Value	0.163	0.030	0.180	5.356	0.000	***
<b>Step 2</b>						
<b>Satisfaction</b>						
(constant)	7.841	0.269		29.124	0.000	
(Moderating)						
Service Quality × Value	0.032	0.001	0.783	23.430	0.000	***

**Step 1****Adjusted R<sup>2</sup>=0.739****F=488.326\*\*\*****Step 2****Adjusted R<sup>2</sup>=0.612****F=548.944\*\*\***

\*\*\*Significant at 1% level

\*\*Significant at 5% level

\*Significant at 10% level

### 5.5.3.2 Hypothesis 8

The regression model tested the relationship between Service Quality and Value. The results are presented in Table 5.15.

**Table 5.15: Model 6: Multiple Regression Results Relating to Hypothesis 8**

Model 6	Unstandardised		Standardised Coefficient Beta	t	Sig.	
	Coefficient B	Std. Error				
<b>Value</b>						
(Constant)	4.910	0.611		8.033	0.000	
Service Quality	0.628	0.046	0.596	13.794	0.000	***

**Adjusted R<sup>2</sup>=0.354****F=190.280\*\*\***

\*\*\*Significant at 1% level

\*\*Significant at 5% level

\*Significant at 10% level

The F statistic is 190.280, at the 1% level of significance. The adjusted coefficient of determination shows that 35.4% of the variation in Value is explained by the regression model. The t statistic of Service Quality is significant at 1% level, indicating the variable

helps to explain the variation in Value. Therefore, Hypothesis 8 is supported.

### 5.5.3.3 Hypothesis 9

The regression model tested the relationship between Service Quality and Image. The results are presented in Table 5.16.

**Table 5.16: Model 7: Multiple Regression Results Relating to Hypothesis 9**

Model 7	Unstandardised		Standardised Coefficient Beta	t	Sig.
	Coefficient B	Std. Error			
<b>Image</b> (Constant)	6.421	0.507		12.673	0.000
Service Quality	0.931	0.038	0.800	24.768	0.000

Adjusted R<sup>2</sup>=0.639      \*\*\*Significant at 1% level  
F=613.430\*\*\*      \*\*Significant at 5% level  
                             \*Significant at 10% level

The F statistic is 613.430, at the 1% level of significance. Further, the adjusted coefficient of determination reveals that 63.9% of the variation in Image is explained by the regression model. The t statistic of Service Quality is significant at the 1% level, indicating the independent variable helps to explain variation in the dependent variable. Therefore, Hypothesis 9 is supported.

### 5.5.3.4 Hypotheses 10, 11, and 12

Model 8 tested the relationship between Satisfaction and its three influential factors: Value, Image and Service Quality. The results are summarised in Table 5.17.

**Table 5.17: Model 8: Multiple Regression Results Relating to Hypotheses 10, 11, and 12**

Model 8	Unstandardised		Standardised Coefficient Beta	t	Sig.	
	Coefficient B	Std. Error				
<b>Satisfaction</b> (Constant)	0.719	0.386		1.861	0.064	
Value	0.044	0.031	0.049	1.441	0.150	
Image	0.332	0.037	0.414	9.066	0.000	***
Service Quality	0.471	0.040	0.487	11.747	0.000	***

**Adjusted R<sup>2</sup>=0.783**

\*\*\*Significant at 1% level

**F=416.642\*\*\***

\*\*Significant at 5% level

\*Significant at 10% level

The F statistics is 416.642, significant at the 1% level, indicating that at least one of the three independent variables helps to explain the variation in Satisfaction. The adjusted coefficient of determination reveals that 78.3% of the variation in Satisfaction is explained by the regression model. The t statistics of Service Quality and Image are significant at the 1% level. However, Value is an insignificant predictor of Satisfaction. Therefore, Hypotheses 11 and 12 are supported. Hypothesis 10 is not supported.

### 5.5.3.5 Hypothesis 13

The regression model tested the relationship between Satisfaction and Recommendation. The results are presented in Table 5.18.

**Table 5.18: Model 9: Multiple Regression Results Relating to Hypothesis 13**

Model 9	Unstandardised		Standardised Coefficient Beta	t	Sig.	
	Coefficient B	Std. Error				
<b>Recommendation</b> (Constant)	2.760	0.538		5.133	0.000	
Satisfaction	0.768	0.039	0.731	19.937	0.000	***

**Adjusted R<sup>2</sup>=0.533**

\*\*\*Significant at 1% level

**F=397.504\*\*\***

\*\*Significant at 5% level

\*Significant at 10% level

The F statistic is 397.504, at the 1% level of significance. Further, the adjusted coefficient of determination shows 53.3% of the variation in Recommendation is explained by the regression model. The t statistic of Satisfaction is significant at the 1% level. Therefore, the statistical results support Hypothesis 13.

#### 5.5.3.6 Hypothesis 14

The regression model tested the relationship between Satisfaction and Future Attendance. The results are presented in Table 5.19.

**Table 5.19: Model 10: Multiple Regression Results Relating to Hypothesis 14**

Model 10	Unstandardised		Standardised Coefficient Beta	t	Sig.	
	Coefficient B	Std. Error				
<b>Future Attendance</b>						
(Constant)	3.604	0.584		6.173	0.000	
Satisfaction	0.691	0.042	0.665	16.530	0.000	***
<b>Adjusted R<sup>2</sup>=0.441</b>						
***Significant at 1% level						
<b>F=273.257***</b>						
**Significant at 5% level						
*Significant at 10% level						

The F statistic is 273.257, at the 1% level of significance. The adjusted coefficient of determination reveals that 44.1 % of the variation in Future Attendance is explained by the regression model. The t statistic of Satisfaction is significant at the 1% level. Therefore, Hypothesis 14 is statistically supported.

#### 5.5.3.7 Discussion Regarding Research Objective 2

To satisfy Research Objective 2, the relationships among Service Quality, Satisfaction, Image, Value, Recommendation and Future Attendance were examined using regression analysis.

The analytical results demonstrate that Value is a moderator between Service Quality and Satisfaction. Service Quality positively influences students' perceptions of Value and Image. When the effects of Service Quality, Value and Image are taken into account simultaneously, Service Quality and Image have significant and positive effects on Satisfaction. However, Value does not exert significant impact on Satisfaction. The standardised coefficients show that Service Quality is the strongest driver of Satisfaction. Satisfaction, in turn, positively affects Recommendation and Future Attendance.

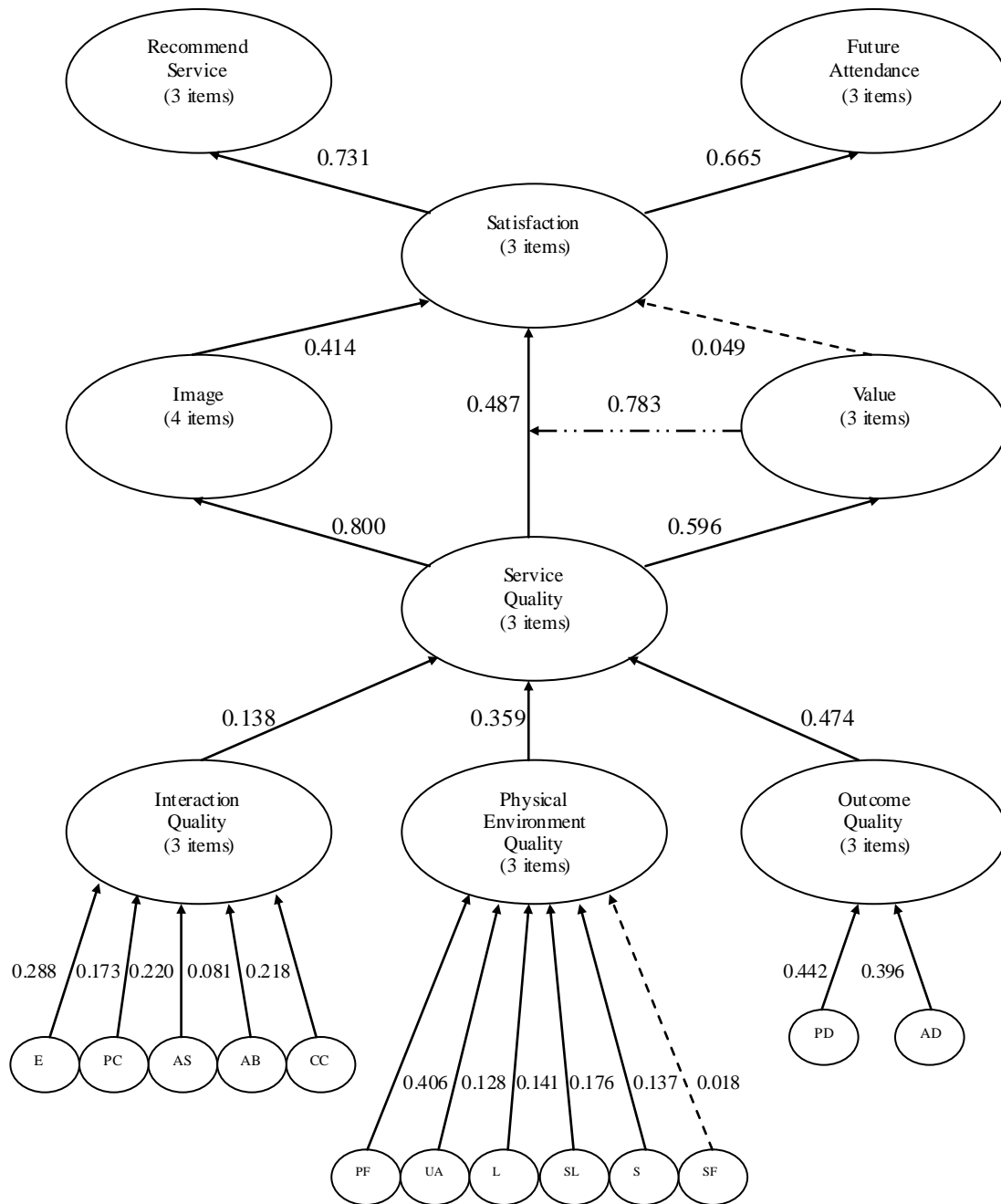
### **5.5.4 Results Pertaining to Research Objective 3**

To satisfy Research Objective 3, Multiple Regression Models 1, 2, 3, and 4 were conducted to identify the comparative importance of the service quality dimensions. The results utilised to make this assessment were presented in Tables 5.10, 5.11, 5.12, and 5.13 above.

#### **5.5.4.1 Hypothesis 15**

Hypothesis 15a proposed that students did not perceive each of the primary dimensions of service quality to be equally important. The statistical results summarised in Table 5.13 shows that Outcome Quality ( $\beta=0.474$ ) is the most important primary dimension, followed by Physical Environment Quality ( $\beta=0.359$ ) and Interaction Quality ( $\beta=0.138$ ). These differing levels of  $\beta$  document their differing contributions, therefore supporting Hypothesis 15a.

Hypothesis 15b proposed that students did not perceive each of the sub-dimensions to be equally important to their associated primary dimensions. The varied standardised coefficients of the sub-dimensions in Models 1, 2 and 3 support Hypothesis 15b. The standardised coefficients of all the regression models are listed in Figure 5.2.



**Note:** E= Expertise, PC= Personal Communication, AS= Administration Staff, AB= Attitudes and Behaviours, CC= Course Content; PF= Physical Facilities, UA= University Accommodation, L= Library, SL= Social Life, S= Safety, SF= Social Factors; PD= Personal Development, AD= Academic Development.

#### 5.5.4.2 Discussion Regarding Research Objective 3

The comparative importance of each of the three primary dimensions (Interaction Quality, Physical Environment Quality, and Outcome Quality) and each of the sub-dimensions were examined to satisfy Research Objective 3. The statistical results demonstrate that students perceive the three primary dimensions as not equally important. Further, the regression results also show that the sub-dimensions also vary in importance to their associated primary dimensions (See Figure 5.2).

The most important primary dimension is Outcome Quality ( $\beta=0.47$ ). The primary dimension has two significant sub-dimensions: Personal Development and Academic Development. Personal Development ( $\beta=0.44$ ) is perceived as the more important sub-dimension. Although Academic Development ( $\beta=0.40$ ) is perceived to be slightly less important, the standardised coefficient of the sub-dimension approximates the standardised coefficient of Personal Development.

Physical Environment Quality ( $\beta=0.36$ ) is perceived as the second most important primary dimension. This has five significant sub-dimensions and one insignificant sub-dimension. The most important of the sub-dimensions is Physical Facilities ( $\beta=0.41$ ), followed by Social Life ( $\beta=0.18$ ). Three of the five significant sub-dimensions, University Accommodation ( $\beta=0.13$ ), Library ( $\beta=0.14$ ), and Safety ( $\beta=0.14$ ), have similar standardised coefficients. Social Factors is an insignificant sub-dimension. The sub-dimension does not appreciably contribute to perceptions of Physical Environment Quality ( $\beta=0.02$ ).

Interaction Quality ( $\beta=0.14$ ) is perceived as the least important primary dimension when students evaluate Overall Service Quality. The primary dimension has five significant sub-

dimensions. Expertise ( $\beta=0.29$ ) is the most important sub-dimension. Two sub-dimensions, Administration Staff ( $\beta=0.220$ ) and Course Content ( $\beta=0.218$ ), have a similar standardised coefficient. Personal Communication ( $\beta=0.17$ ) and Attitudes and Behaviours ( $\beta=0.08$ ) are less important than Expertise, Administration Staff, and Course Content.

### **5.5.5 Results Pertaining to Research Objective 4**

Research Objective 4 is to identify the effects of demographic factors on service quality, value, image, satisfaction and favourable behavioural intentions. Hypotheses 16a, 16b and 16c were proposed to satisfy Research Objective 4. Analysis of variance (ANOVA) was used to test these hypotheses.

Field (2005) recommends that researchers should make an attempt to collect data from groups that have an equal sample size in order to obtain a robust ANOVA result. The examination of students' demographics reveals that the Gender and Year of Study Groups have roughly equal sample sizes. However, students had to be regrouped in terms of their ages and majors, as the groups were of quite different sizes. The three Age Groups were combined into two groups: 18-22 and 23<sup>+</sup>. The original 33 Major Groups were combined into 13 groups according to the similarity between the majors. There were no changes required for the Accounting, Biological Science, Economics, Finance, International Economics and Trade, Law, and Tourism Management Groups, as these groups had similar sample sizes. Students that majored in English, Japanese, Chinese Language Literature, and Foreign Languages and Literature were combined into one group, labeled Language. Students that majored in Information and Computational Science, and Mathematics and Applied Mathematics were combined and labeled as Math. The student whose major was Advertising was placed in the



Marketing Group. Students that majored in Administration Management, Business Administration, Human Resource Management, Information Resource Management, Logistics Management, and Public Administration were combined and labeled as Management. Students that majored in Computer Network, Computer Science and Technology, E-Commerce, Electronic Information Engineering, and Information Management and Information System were combined and labeled as Information Science. Students that majored in Automobile Service Engineering, Environmental Science, Food Science and Engineering, Geography, Journalism, Mechanics, and Psychology were combined into one group, labeled Others. The statistical results and discussion of the ANOVA appear below, summarised in Appendix 12.

#### **5.5.5.1 Hypothesis 16a**

Hypothesis 16a proposes that students' perceptions of Service Quality, Value, Image, Satisfaction and Favourable Behavioural Intentions (composed of Recommendation and Future Attendance) will vary in terms of gender, age, year of study, and major. The means of Value, Image, Recommendation, and Future Attendance are significantly different between the Age Groups. Moreover, the means of Recommendation and Future Attendance are also significantly different between the Year of Study Groups. However, the analysis indicates that there are no perceptual differences in the performance measures on Service Quality, Value, Image, Satisfaction, Recommendation, and Future Attendance among the Gender Groups and Major Groups. These results only partially support Hypothesis 16a. Results of the ANOVA are summarised in Table 5.20 (see Appendix 12, Table 44A for details).

**Table 5.20: ANOVA Results Relating to Hypothesis 16a**

<b>Constructs</b>	<b>Gender</b>	<b>Age</b>	<b>Year of Study</b>	<b>Major</b>
<b>Service Quality</b>				
<b>Value</b>		**		
<b>Image</b>		*		
<b>Satisfaction</b>				
<b>Recommendation</b>		*	**	
<b>Future Attendance</b>		*	*	

\*\*\* Significant at 1% level

\*\* Significant at 5% level

\* Significant at 10% level

**5.5.5.2 Hypothesis 16b**

Hypothesis 16b proposes that students' perceptions of the primary dimensions (Interaction Quality, Physical Environment Quality and Outcome Quality) will vary in terms of gender, age, year of study, and major. Significant perceptual differences in the performance measure on Interaction Quality are present between the Age Groups. Moreover, the means of Physical Environment Quality are significantly different between the Major Groups. However, the F statistics indicate that there are no perceptual differences in the performance measures on Interaction Quality, Physical Environment Quality and Outcome Quality among the Gender Groups and Year of Study Groups. These results partially support Hypothesis 16b. The results are summarised in Table 5.21 (see Appendix 12, Table 45 A for details).

**Table 5.21: ANOVA Results Relating to Hypothesis 16b**

<b>Constructs</b>	<b>Gender</b>	<b>Age</b>	<b>Year of Study</b>	<b>Major</b>
<b>Interaction Quality</b>		**		
<b>Physical Environment Quality</b>				**
<b>Outcome Quality</b>				

\*\*\* Significant at 1% level

\*\* Significant at 5% level

\* Significant at 10% level

### 5.5.5.3 Hypothesis 16c

Hypothesis 16c proposes that students' perceptions of the sub-dimensions of service quality will vary in terms of gender, age, year of study, and major. Analysis of the data indicates that the means of Expertise, Social Life and Safety are significantly different between the Gender Groups. Perceptual differences in the performance measures on Expertise and Social Life are also present between the Age Groups. Moreover, students in different years of study perceive the performance on three sub-dimensions (Expertise, Course Content and University Accommodation) differently. Furthermore, students in different Major Groups perceive the performance on four sub-dimensions (Course Content, Physical Facilities, University Accommodation, and Safety) differently. Hypothesis 16c is thereby partially supported. The results are summarised in Table 5.22 (see Appendix 12, Table 46A for details).

**Table 5.22: ANOVA Results Relating to Hypothesis 16c**

<b>Constructs</b>	<b>Gender</b>	<b>Age</b>	<b>Year of Study</b>	<b>Major</b>
<b>Expertise</b>	*	***	**	
<b>Personal Communication</b>				
<b>Administration Staff</b>				
<b>Attitudes and Behaviours</b>				
<b>Course Content</b>			**	**
<b>Physical Facilities</b>				***
<b>University Accommodation</b>			***	***
<b>Library</b>				
<b>Social Life</b>	***	**		
<b>Safety</b>	**			**
<b>Social Factors</b>				
<b>Personal Development</b>				
<b>Academic Development</b>				

\*\*\* Significant at 1% level

\*\* Significant at 5% level

\* Significant at 10% level

### 5.5.5.4 Discussion Regarding Research Objective 4

To satisfy Research Objective 4, analysis of variance was applied to examine the effects of

four demographic factors (gender, age, year of study, and major.) on students' perceptions of the sub-dimensions and Primary Dimensions of Service Quality, Service Quality, Value, Image, Satisfaction, Recommendation, and Future Attendance.

For Gender Groups, analysis does not demonstrate perceptual differences in the performance measures for all of the higher order constructs nor on the three primary dimensions of service quality. However, there are significant perceptual differences between male and female students in the performance measures on Expertise, Social Life and Safety. The means of four higher order constructs (Value, Image, Recommendation and Future Attendance), one primary dimension (Interaction Quality) and two sub-dimensions (Expertise and Social Life) are significantly different between the two Age Groups. Moreover, students from different years perceive the performance on two higher order constructs (Recommendation and Future Attendance) and three sub-dimensions (Expertise, Course Content and University Accommodation) differently. In addition, the Major Groups perceive no differences on the performance on the higher order constructs. However, the performance on Physical Environment Quality, Course Content, Physical Facilities, University Accommodation, and Safety are perceived differently by the Major Groups.

## **5.6 Chapter Summary**

This Chapter presented the results of data analysis according to the research methodology outlined in Chapter 4. The reliability and validity of the newly developed questionnaire was examined using a preliminary test. The results of a series of statistical tests indicated that the data set was appropriate for performing factor analysis, regression analysis and analysis of variance.

Principle component factor analysis reduced the originally proposed sub-dimensions from nineteen to thirteen to represent students' perceived service quality. Each path in the conceptual model (presented in Section 3.3) was tested by ten regression models. Hypothesis 2 was partially supported, and Hypothesis 10 was not supported. The other thirteen hypotheses were all supported. Hypotheses 16a, 16b and 16c were proposed to determine if perceptual differences existed among each of the four demographic groups (gender, age, year of study and major). The results of ANOVA demonstrate that the Gender Groups have the smallest number of perceptual differences (3 out of 22 measured constructs), and that the Age Groups have the greatest number of perceptual differences (7 out of 22 measured constructs) on all of the measured constructs.

# **Chapter 6: Conclusions and Implications**

## **6.1 Chapter Introduction**

This chapter summarises this current study and draws several conclusions based on the research findings presented in Chapter 5. This chapter also discusses the theoretical and managerial implications and limitations of this study. Finally, this chapter points out directions for future research.

## **6.2 Summary of the Study**

The literature review presented in Chapter 2 suggests that Brady and Cronin's (2001) hierarchical model of service quality may be appropriate for application in China's higher educational sector. The results of focus group interviews and statistical analysis add support for applying a hierarchical modeling approach and using interaction quality, physical environment quality and outcome quality as the three primary dimensions to measure higher educational service quality in China. However, Clemes et al. (2007) warned that the service quality sub-dimensions that were significant in the New Zealand university sector may vary across cultures. Therefore, this study identifies thirteen service quality sub-dimensions as perceived specifically by Chinese university students. The thirteen sub-dimensions are Expertise, Personal Communication, Administration Staff, Attitudes and Behaviours, Course Content, Physical Facilities, University Accommodation, Library, Social Life, Safety, Social Factors, Personal Development and Academic Development.

In the literature, the service quality construct is frequently studied along with the other four

higher order constructs: satisfaction, value, image, and favourable behavioural intentions (See Section 2.7). Therefore, this study examines the relationships among service quality and these four constructs in a Chinese university setting.

Moreover, Clemes et al. (2007) suggest that in a university context, students' perceptions of the sub-dimensions and primary dimensions of service quality, service quality, value, image, satisfaction and favourable behavioural intentions are not independent of students' demographic characteristics. To investigate the Clemes et al. (2007) contention, this study examines students' perceptions of these constructs based on their demographic characteristics (gender, age, year of study and major).

Four research objectives were proposed to gain an understanding of students' perceptions of service quality, and the relationships among service quality, satisfaction, image, value and favourable behavioural intentions in China's higher education context:

- (1) To identify the dimensions of service quality.
- (2) To identify the relationships among service quality, satisfaction, image, value and favourable behavioural intentions.
- (3) To identify the least and most important service quality dimensions.
- (4) To identify the effects of demographic factors on student's perceptions of service quality, value, image, satisfaction and favourable behavioural intentions.

Sixteen testable hypotheses were formulated to satisfy the four research objectives. Research Objective 1 was addressed by testing Hypotheses 1 to 6. Research Objective 2 was addressed by testing Hypotheses 7 to 14. Hypothesis 15 was proposed to satisfy Research Objective 3. Research Objective 4 was addressed by testing Hypothesis 16.

## **6.3 Conclusions Pertaining to Research Objective 1**

Identifying the main components of service quality is central to understanding how people make assessments of service performance. This was the focus of Research Objective 1. This goal was accomplished, as the dimensions of service quality as perceived by students in He Bei Normal University were identified. The statistical results support the presence of a hierarchical factor structure of the dimensions at the university. Results could possibly generalise to China's higher education sector. Specifically, the hierarchical factor structure of service quality documented here consists of thirteen sub-dimensions, three primary dimensions (Interaction Quality, Physical Environment Quality and Outcome Quality) and one higher order construct (Service Quality). Results support Clemes et al.'s (2007) contention that using Brady and Cronin's (2001) hierarchical approach to conceptualise and measure service quality in the higher education sector is appropriate.

### **6.3.1 Service Quality**

In this study, positive relationships between each of the three Primary Dimensions (Interaction Quality, Physical Environment Quality and Outcome Quality) and Service Quality were confirmed. This result suggests that students evaluate their overall perceptions of service quality based on these primary dimensions. This finding is consistent with Clemes et al.'s (2007) empirical results that students' perceptions of them have positive and significant impacts on their overall perceptions of service quality.



### **6.3.1.1 Interaction Quality**

Interaction Quality was found to have five significant sub-dimensions: Expertise, Administration Staff, Course Content, Personal Communication, and Attitudes and Behaviours. Positive relationships between these five sub-dimensions and Interaction Quality were confirmed in this study. This result suggests that students evaluate Interaction Quality by how well or poorly communication between them and those delivering the educational services is perceived.

Expertise was the most important sub-dimension of Interaction Quality in this study. The expertise sub-dimension is similar to “academic staff quality”, which was identified in Peng’s (2008) study as an important dimension of educational service quality. Administration Staff was the second most important sub-dimension of Interaction Quality. This result is supported by Clemes et al.’s (2007) empirical findings that the performance of administrative staff significantly influences students’ perceptions of interaction quality. This result is also supported by LeBlanc & Nguyen (1997) who demonstrated that a positive relationship exists between the performance of administration staff and students’ overall perceptions of service quality. Course Content was the third most important sub-dimension of Interaction Quality. This result is supported by Clemes et al. (2007) who found that course content was an important factor influencing students’ perceptions of interaction quality. This study also confirms Personal Communication as a sub-dimension of Interaction Quality. The personal communication sub-dimension is similar to the factors identified in previous studies that have been conducted in the higher education sector. For example, Clemes et al. (2007) identified academic staff availability as a sub-dimension of interaction quality. In an earlier study, Clemes et al. (2001) also found that accessibility to lecturers was a sub-dimension of functional quality (e.g. interaction quality). Finally, the sub-dimension Attitudes and

Behaviours positively and significantly influenced Interaction Quality. This result is again supported by Clemes et al. (2001) and Sohail and Shaikh's (2004) findings that attitudes and behaviours of university staff are important dimensions of educational service quality.

#### **6.3.1.2 Physical Environment Quality**

Physical Environment Quality has five significant sub-dimensions: Physical Facilities, Social Life, Library, Safety and University Accommodation. The results of this study confirm that these five sub-dimensions have positive impacts on Physical Environment Quality. This indicates that students are well-aware of the importance of Physical Environment Quality and its makeup, at least as it is defined here.

Physical Facilities was the most important sub-dimension of Physical Environment Quality in this study. This result agrees with Clemes et al. (2007) who reported that the physical appeal of a university has a significant effect on students' perceptions of physical environment quality. Several researchers have noted that University Facilities is one critical dimension underlying students' perceptions of service quality (Clemes et al., 2001; Jain et al., 2010; Tan & Kek, 2004). Social Life was found to be the second most important sub-dimension of Physical Environment Quality. This result is supported by Sumaedi and Bakti (2011) and Tan and Kek (2004) who documented that the activities a university provides to fulfill students' social needs are an important dimension of students' perceived service quality. Library was the third most important sub-dimension of Physical Environment Quality. This result is also consistent with Clemes et al. (2007), who identified that the library in a university is a critical factor influencing students' perceptions of physical environment quality. In addition, both Safety and University Accommodation were significant sub-dimensions of Physical

Environment Quality. This result is supported by the Arambewela and Hall (2009) finding that safety and university accommodation contribute to students' perceptions of service quality.

Social Factors is the only sub-dimension found to be insignificant as a component of Physical Environment Quality. However, a positive relationship between Social Factors and Physical Environment Quality was highly significant in Clemes et al.'s (2007) study. This inconsistency may be attributed to the contention that students in China may consider the social factors sub-dimension as beyond the control of the university. Students in New Zealand appeared to think that the social factors sub-dimension was within the control of their university.

#### **6.3.1.3 Outcome Quality**

The analysis documented that Outcome Quality has two significant sub-dimensions: Personal Development and Academic Development. This study confirms that these two sub-dimensions positively influence Outcome Quality and indicates that students do evaluate Outcome Quality. This finding is supported by Clemes et al.'s (2007) study that identified these sub-dimensions as the two most important contributors to learning outcomes.

### **6.4 Conclusions Pertaining to Research Objective 2**

Research Objective 2 was to identify the relationships among service quality, satisfaction, image, value and favourable behavioural intentions. It was partially satisfied by the results of testing Hypotheses 7, 8, 9, 11, 12, 13, and 14. However, testing of Hypothesis 10 did not yield significant results and therefore did not contribute to the objective.

The result for Hypothesis 7 indicates that Value moderates the relationship between Service Quality and Satisfaction. This result concurs with Caruana et al.'s (2000) contention that in addition to the direct effect on satisfaction, service quality affects satisfaction through the moderating effect of perceived value. This result is consistent with several recent studies that confirm value as a moderator of the relationship between service quality and satisfaction (Caruana et al., 2000; Clemes et al., 2010; Wang et al., 2004).

The result of testing Hypothesis 8 indicates that students' overall perceptions of service quality positively contribute to their value assessment. This finding is supported by the studies of Choi et al. (2004), Clemes et al. (2011) and Cronin et al. (2000) that identify service quality as an important antecedent of value.

The confirmation of Hypothesis 9 indicates that Service Quality positively affects Image. This result suggests that a university's image is enhanced when students perceive that they receive a higher level of service quality. This result is supported by Cheng et al. (2008), Lai et al. (2009) and Nguyen and LeBlanc's (1998) empirical findings that service quality is a significant predictor of image.

Testing of Hypotheses 10 indicates that there is no statistically significant relationship between Value and Satisfaction. This is consistent with Clemes et al.'s (2007) findings that when the effects of service quality, image and value on New Zealand students' satisfaction are taken into account simultaneously, the positive relationship between value and satisfaction is not significant.

Confirmation of both Hypotheses 11 and 12 indicate that higher perceptions of Image and

Service Quality positively contribute to Satisfaction. These results suggest that in China's higher education sector, university image and service quality are two key drivers of students' satisfaction. These results agree with Brady et al. (2002) and Cronin and Taylor's (1992) contention that service quality is an important antecedent of satisfaction. They are also supported by Clemen et al. (2007) and Kuo and Ye's (2009) findings that image has a positive relationship with students' satisfaction.

Statistical support for Hypotheses 13 and 14 indicates that Satisfaction positively affects Recommending the University to Others and Future Attendance, respectively. These results suggest that the likelihood that a student would recommend the university, or continue to study in the same university, is increased when a higher level of satisfaction is achieved. These results are supported by several researchers' empirical findings that satisfaction is a main driver of favourable behavioural intentions (Brady et al., 2002; Clemen et al. 2007; Clemen et al., 2010; Cronin & Taylor, 1992).

## **6.5 Conclusions Pertaining to Research Objective 3**

Identifying the least and most important service quality dimensions was Research Objective 3. This objective was satisfied, as the least and most important service quality dimensions as perceived by university students in China were empirically documented.

Analysis of Hypothesis 15a indicates that Outcome Quality is perceived as the most important primary dimension, followed by Physical Environment Quality and Interaction Quality. This result is supported by Powpaka's (1996) contention that outcome quality is a key determinant of overall service quality for services in general. This result is also supported by three recent studies conducted in different service industries. It agrees with Clemen et al.'s

(2011) findings on the sports industry, that outcome quality has a greater effect on overall perceived service quality than interaction quality and physical environment quality. This result is also consistent with Pollack (2009) who demonstrates that outcome quality is more important than interaction quality and physical environment quality in the hair salon and phone service industries. It is again consistent with Clemes et al.'s (2010) study on behavioural intentions in the motel industry. These authors demonstrate that, when comparing the effects of the three primary dimensions on overall perceived service quality, the order of importance of the three primary dimensions follows an outcome quality-physical environment quality-interaction quality sequence.

Moreover, the results for Hypothesis 15a are also supported by Clewes's (2003) contention that outcome quality is a key component of service quality in higher education. However, this result does not concur with Clemes et al.'s (2007) empirical findings that, when measuring the effects of the three primary dimensions on students' overall perceived service quality, interaction quality overrides physical environment quality and outcome quality. This inconsistency may be attributed to the contention that it is difficult for graduates to obtain jobs in China (Kwan & Ng, 1999). As a consequence, Chinese students place importance on the development of personal abilities, skills and knowledge, as these competencies are likely seen as making them more attractive to future employers.

The confirmation of Hypothesis 15b indicates that each of the sub-dimensions also differs in their importance to their related primary dimensions. These results are consistent with Clemes et al. (2007), who demonstrated that students do not perceive the sub-dimensions under each of the primary dimension to be equally important; some sub-dimensions are thus more important than others.

## 6.6 Conclusions Pertaining to Research Objective 4

The effect of demographic factors on students' perceptions was Research Objective 4. This Objective was partially satisfied by examining the means of several constructs among each of the four demographic groups (Gender, Age, Year of Study and Major). The following sections discuss the results pertaining to Hypotheses 16a, 16b and 16c.

The results regarding Hypothesis 16a indicate that the performance on each of the higher order constructs (Service Quality, Value, Image, Satisfaction, Recommendation and Future Attendance) is perceived to be similar among the Gender Groups and Major Groups, and that the means of Recommendation and Future Attendance are significantly different between the Year of Study Groups. These results are consistent with the empirical findings of Clemes et al. (2007). However, the current study demonstrates that the means of Value, Image, Recommendation and Future Attendance are significantly different between the two Age Groups. This result, however, does not agree with Clemes et al. (2007) in that Value, Image, Recommendation and Future Attendance were perceived similarly between the different age groups of students. This inconsistency may be attributed to the observation that "by increasing sample size, smaller and smaller effects (e.g., correlations) will be found to be statistically significant, until at very large sample sizes almost any effect is significant" (Hair et al., 2010, p. 10). The sample size of Clemes et al.'s (2007) study is 223, while the sample size of this study is 350.

The results regarding Hypothesis 16b indicate that males and females perceive the performance on Interaction Quality, Physical Environment Quality and Outcome Quality similarly. This result is consistent with Clemes et al.'s (2007) results. However, this study indicates that the two Age Groups perceive the performance on Interaction Quality differently.

This result is inconsistent with Clemes et al. (2007), who found that the means of Interaction Quality, Physical Environment Quality and Outcome Quality were similar between the different age groups of students. The inconsistency may be also attributed to the different sample sizes between this study and Clemes et al.'s (2007) study. The larger sample size of this study may result in more of the statistical tests being significant. Moreover, this study demonstrates that the means of Interaction Quality, Physical Environment Quality and Outcome Quality are similar between the Year of Study Groups. This result also does not agree with Clemes et al.'s (2007) findings that students from different year levels perceived the performance on Interaction Quality and Outcome Quality differently. This inconsistency may possibly be due to the differences between the sampled students for this study and Clemes et al.'s (2007) study. In that study, respondents consisted of students from diverse cultural backgrounds. The distribution of the students from varying cultural backgrounds within different year levels may have resulted in the significant perceptual differences in performance measures on Interaction Quality and Outcome Quality. However, all the respondents in the current study are Chinese. As a consequence, students from different year levels may perceive the performance on the three primary dimensions similarly.

In addition, this study finds that the Major Groups perceive the performance on Physical Environment Quality differently, a result inconsistent with Clemes et al. (2007) who found no perceptual differences in the performance measures on Interaction Quality, Physical Environment Quality and Outcome Quality among different major groups. This inconsistency might be explained by the fact that Clemes et al. (2007) sampled students from a small university in New Zealand (approximately 3000 students), with the majority of the students in the sample being commerce students. However, they did have different majors within commerce. Thus, in the Clemes et al. (2007) study, those students taking different majors



within commerce were more likely to share the same university facilities. This may have resulted in students that took different majors (e.g., Accounting and Marketing) having similar perceptions of Physical Environment Quality. However, the respondents for this study were sampled from a large university in China (approximately 30,000 students). Moreover, the group of Chinese students included commerce, science and engineering students. These students belong to different departments and only study in their faculties' buildings. This may result in different perceptions of Physical Environment Quality among the students with different fields of study (e.g., Accounting versus Biological Science).

The results regarding Hypothesis 16c demonstrate that the performance on several service quality sub-dimensions is perceived differently among each of the four demographic groups (Gender, Age, Year of Study and Major). These results are supported by the contention of several researchers that students' perceptions of various aspects of educational services will differ in terms of students' demographic characteristics. (Clemes et al., 2001; Clemes et al., 2007; Tan & Kek, 2004). In particular, this study documents that students from different year levels have different perceptions of their course content. This is supported by the findings of Clemes et al. (2007).

## **6.7 Contributions**

This study has provided evidence of differences in how Chinese students perceive service quality. As a consequence, by satisfying the four research objectives, it contributes to the service marketing literature both theoretically and practically.

### **6.7.1 Theoretical Implications**

This research empirically tests and verifies the applicability of Brady and Cronin's (2001) hierarchical approach to conceptualising and measuring service quality in China's higher education sector. Several researchers demonstrate that three primary dimensions hypothesized here (interaction quality, physical environment quality and outcome quality) are applicable across different service industries (Brady & Cronin, 2001; Clemes et al., 2007; Clemes et al. 2010; Clemes et al., 2011; Pollack, 2009). This study also confirms that university students in China can evaluate the service quality provided by their university based on these dimensions. Further, this study identifies 13 sub-dimensions pertaining to the three primary dimensions. These sub-dimensions are important, as they are the basis on which students form their perceptions of the three primary dimensions. The hierarchical factor structure of service quality identified in this study provides support for the contention that the nature of service quality is both multilevel and multidimensional (Brady & Cronin, 2001, Dabholkar et al, 1996).

This study also provides a framework for understanding the interrelationships among Service Quality and several important constructs (Value, Image, Satisfaction, and Favourable Behavioural Intentions) in the higher education sector. Results indicate that in China's higher education sector, Service Quality is an important determinant of Image and Value. Service Quality and Image are also two key constructs contributing to Satisfaction. The direct effect of Value on Satisfaction is insignificant. Satisfaction is a main driver of Recommendation and Future Attendance. Moreover, the moderating effect of Value on the relationship between Service Quality and Satisfaction is confirmed in this study.

### **6.7.2 Managerial Implications**

The hierarchical factor structure of service quality identified here (Research Objective 1) provides practitioners with insights into how university students in China form their perceptions of service quality. From a practical perspective, the measurement scale for service quality developed in this study provides university management with a method to evaluate students' perceptions of service delivery on several indicators of quality. Universities can thereby measure students' perceptions of service quality at a global level, at the primary dimension level, at the sub-dimension level or at all the three levels according to need. For example, university managers interested in students' general attitude towards the university's services can use the three global measures to determine students' overall perceptions of service quality. However, to identify a university's core competency or any service deficiencies, university managers can measure students' perceptions of service quality at the sub-dimension level.

With regard to Research Objective 2, this study also provides practitioners with valuable information about the complex relationships among service quality, image, value, satisfaction and favourable behavioural intentions in China's higher education sector. The information will assist university management to develop successful marketing strategies. For example, universities should make continuous efforts to improve service quality, as quality service offerings will result in favourable perceptions of university image and value. Students' favourable perceptions of university image and service quality will contribute to an increased level of satisfaction, which ultimately leads to favourable behavioural intentions. Moreover, university management should carefully formulate their pricing strategies, as the extent to which the student's level of satisfaction is increased as a result of an improved level of service quality is largely influenced by the moderating effect of value.

In service to Research Objective 3, Outcome Quality emerged as the most important primary dimension. This result suggests that Chinese students view studying in a university as an opportunity to improve personal abilities and gain academic knowledge. Thus, universities should offer courses that can improve students' abilities and skills both practically and theoretically. Physical Environment Quality is the second most important primary dimension. This result may be attributed to the fact that the majority of Chinese university students are required to live in the university's accommodation. Therefore, students may consider the facilities and environment of the campus to be an important part of their university experience. Thus, universities should provide a well designed campus with excellent facilities to satisfy students' living and learning needs. Interaction Quality is the least important primary dimension. This result may be attributed to the large number of students enrolled in the university and a high student to staff ratio. Thus, students do not have many opportunities to interact with university staff. However, many researchers note that the interactions between students and university staff play an important role in determining students' perceptions of service quality (Clemes et al., 2007; LeBlanc & Nguyen, 1997; Ling et al., 2010). Therefore, university management should make an effort to increase communication between students and their lecturers. One strategy is to hire more qualified academic staff. This allows each lecturer to be responsible for a relatively smaller number of students. Another strategy is encouraging academic staff to provide more office hours to students. This makes students feel that their lecturers are easy to access and that they care more about them. Thus, students may be willing to discuss academic as well as personal issues with their lecturers.

Moreover, the most and least important sub-dimensions pertaining to each of three primary dimensions identified in this study also provides valuable information for universities in China. When a university is intent on maintaining or improving its performance on one of the

three primary dimensions, the university should allocate financial and human resources according to the relative importance of the sub-dimensions under the primary dimension. For example, this study reveals that students perceive Physical Facilities as a more important sub-dimension of Physical Environment Quality when compared to the library facilities. Therefore, universities should allocate more resources to maintain the campus environment and facilities than to update the library.

With regard to Research Objective 4, this study demonstrates that the performance of several constructs is perceived differently among each of the four demographic groups (Gender, Age, Year of Study, and Major). These results suggest that university management should design different strategies for specific student segments. For example, students from different years perceive the university's performance on Course Content differently. This result may be attributed to the belief that students gain more and more knowledge in their fields of study from year one to their final year. In the first year of study, students may think that everything they learn will be useful. As they mature as students, however, they develop judgments about what may or may not be relevant to their post university employment. Therefore, students studying at higher year levels may think that the contents of some courses may not be applicable to their actual jobs after graduation. This requires universities to continuously adjust the content of their courses to more accurately reflect the changes that are occurring in the business environment, particularly for students' final year of study.

## **6.8 Limitations**

This study has three main limitations that should be considered when interpreting its findings. Firstly, the results are based on a convenience sample that was drawn from a single university

in one city (Shijiazhuang) in China. However, given that the number of students enrolled in China's numerous and diverse higher education institutions is large, the sample cannot represent all of the university students in China. This limits generalisability of the research results.

Secondly, the majority of respondents in this study are business and management students, though the sample does include a small portion of engineering and science students. Results are thus likely to over-represent perceptions of service quality from the perspective of business and management students.

Finally, this study identifies several important factors that impact on students' perceptions of service quality. However, other potentially important factors contributing to students' perceptions are not included. For example, with the exception of social life, interaction between students is not included in this study, nor are measures of interaction with the external community.

## **6.9 Avenues for Future Research**

This study was exploratory in nature in a Chinese culture setting. This is because research has demonstrated that the dimensions of service quality are not universal, but vary by industry and culture. Thus, future research may investigate if the three primary dimensions have additional sub-dimensions at universities of different types and in different cultural settings. For example, students at universities that emphasise research over teaching may view service quality from different perspectives.

Analysis focused on the perceptions of service quality only from the perspective of students at one Chinese university. However, any single stakeholder perspective cannot provide a full picture to completely understand the service quality construct. Lagrosen et al. (2004), Clemes et al. (2007), and Jain et al. (2010) recommend that researchers should explore service quality in higher education from the point of view of others, such as university staff. Therefore, future research should examine perceptions of service quality by other stakeholders, rather than just students.

Finally, this study concentrated on the dimensional structure of service quality as perceived by university students in China. Marketing researchers should conduct cross-cultural research to examine the changes in the comparative importance of the primary dimensions and sub-dimensions. This may provide university management with valuable information about the influence of culture on students' perceptions of service quality.

# References:

- Aaker, D. A., Kumar, V., Day, G. S., & Lawley, M. (2005). *Marketing research: The pacific rim edition*. Queensland, Australia: John Wiley & Sons Australia.
- Akbaba, A. (2006). Measuring service quality in the hotel industry: A study in a business hotel in Turkey. *International Journal of Hospitality Management*, 25(2), 170-192.
- Altbach, P. G. (2009). One-third of the globe: The future of higher education in China and India. *Prospects*, 39(1), 11-31.
- Alves, H., & Raposo, M. (2010). The influence of university image on student behaviour. *International Journal of Educational Management*, 24(1), 73-85.
- Angell, R. J., Heffernan, T. W., & Megicks, P. (2008). Service quality in postgraduate education. *Quality Assurance in Education*, 16(3), 236-254.
- Arambewela, R., & Hall, J. (2009). An empirical model of international student satisfaction. *Asia Pacific Journal of Marketing and Logistics*, 21(4), 555-569.
- Armstrong, S. J., & Overton, T. S. (1977). Estimating response bias in mail surveys. *Journal of Marketing Research*, 14(3), 396-402.
- Babakus, M., & Mangold, W. G. (1992). Adapting the SERVQUAL scale to hospital services: An empirical investigation. *Health Services Research*, 26(6), 767-786.
- Bayraktaroglu, G., & Atrek, B. (2010). Testing the superiority and dimensionality of SERVQUAL vs. SERVPERF in higher education. *The Quality Management Journal*, 17(1), 47-59.
- Bearden, W. O., & Netemeyer, R. G. (1999). *Handbook of marketing scales: Multi-item measures for marketing and consumer behavior research*. Thousand Oaks, California: Sage Publications.
- Berenson, M. L., Levine, D. M., & Krehbiel, T. C. (2006). *Basic business statistics: Concepts and applications* (10th ed.). Upper Saddle River, NJ: Pearson Prentice Hall.
- Bitner, M. J. (1990). Evaluating service encounters: The effects of physical surroundings and employee responses. *Journal of Marketing*, 54(2), 69-82.
- Black, K., Asafu-Adjaye, J., Khan, N., Perera, N., Edwards, P., & Harris, M. (2007). *Australasian business statistics*. Milton, Australia: John Wiley & Sons Australia.
- Bolton, R. N., & Drew, J. H. (1991). A multistage model of customers' assessment of service quality and value. *Journal of Consumer Research*, 17(4), 375-384.



- Brady, M. K., & Cronin, J. J. (2001). Some new thoughts on conceptualizing perceived service quality: A hierarchical approach. *Journal of Marketing*, 65(3), 34-50.
- Brady, M. K., Cronin, J. J., & Brand, R. R. (2002). Performance-only measurement of service quality: A replication and extension. *Journal of Business Research*, 55(1), 17-31.
- Brady, M. K., Robertson, C. J., & Cronin, J. J. (2001). Managing behavioral intentions in diverse cultural environments: An investigation of service quality, service value, and satisfaction for American and Ecuadorian fast-food customers. *Journal of International Management*, 7(2), 129-149.
- Brochado, A. (2009). Comparing alternative instruments to measure service quality in higher education. *Quality Assurance in Education*, 17(2), 174-190.
- Carman, J. M. (1990). Consumer perceptions of service quality: An assessment of the SERVQUAL dimensions. *Journal of Retailing*, 66(1), 33-55.
- Caruana, A., Money, A. H., & Berthon, P. R. (2000). Service quality and satisfaction: The moderating role of value. *European Journal of Marketing*, 34(11/12), 1338-1353.
- Chen, C. (2008). Investigating structural relationships between service quality, perceived value, satisfaction, and behavioral intentions for air passengers: Evidence from Taiwan. *Transportation Research Part A: Policy and Practice*, 42(4), 709-717.
- Chen, C., & Kao, Y. (2009). Relationships between process quality, outcome quality, satisfaction, and behavioural intentions for online travel agencies – evidence from Taiwan. *The Service Industries Journal*, 30(12), 2081-2092.
- Cheng, T. C. E., Lai, L., C. F., & Yeung, A. C. L. (2008). The driving forces of customer loyalty: A study of internet service providers in Hong Kong. *International Journal of E-Business Research*, 4(4), 26-42.
- Chi, H. K., Yeh, H. R., & Jang, B. F. (2008). The effects of service quality, customer perceived value, customer satisfaction on behavioral intentions: A study of mobile value-added services in Taiwan. *The Business Review, Cambridge*, 10(1), 129-135.
- Choi, K., Cho, W., Lee, S., Lee, H., & Kim, C. (2004). The relationships among quality, value, satisfaction, behavioral intention in health care provider choice: A South Korean study. *Journal of Business Research*, 57(8), 913-921.
- Churchill, G. A. (1979). A paradigm for developing better measures of marketing constructs. *Journal of Marketing Research*, 16(1), 64-73.
- Churchill, G., & Surprenant, C. (1982). An investigation into the determinants of customer satisfaction. *Journal of Marketing Research*, 19(4), 491-504.
- Clemes, M. D., Brush, G. J., & Collins, M. J., (2011). Analysing the professional sport experience: A hierarchical approach. *Sport Management Review*. Advance online publication. doi:10.1016/j.smr.2010.12.004

- Clemes, M. D., Gan, C. E. C., & Kao, T. (2007). University student satisfaction: An empirical analysis. *Journal of Marketing for Higher Education*, 17(2), 292-325.
- Clemes, M. D., Gan, C., & Ren, M. (2010). Synthesizing the effects of service quality, value, and customer satisfaction on behavioral intentions in the motel industry: An empirical analysis. *Journal of Hospitality & Tourism Research*. Advance online publication. doi: 10.1177/1096348010382239
- Clemes, M. D., Ozanne, L. K., & Tram, L. (2001). An examination of students' perceptions of service quality in higher education. *Journal of Marketing for Higher Education*, 10(3), 1-19.
- Clewes, D. (2003). A student-centred conceptual model of service quality in higher education. *Quality in Higher Education*, 9(1), 69-85.
- Costello, A. B., & Osborne, J. W. (2005). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical Assessment Research & Evaluation*, 10(7), 1-9.
- Cronin, J. J., Brady, M. K., & Hult, G. T. M. (2000). Assessing the effects of quality, value, and customer satisfaction on consumer behavioral intentions in service environments. *Journal of Retailing*, 76(2), 193-218.
- Cronin, J. J., & Taylor, S. A. (1992). Measuring service quality: A reexamination and extension. *Journal of Marketing*, 56(3), 55-68.
- Crosby, L. A., Evans, K. R., & Cowles, D. (1990). Relationship quality in services selling: An interpersonal influence perspective. *Journal of Marketing*, 54(3), 68-81.
- Dabholkar, P. A., Thorpe, D. I., & Rentz, J. O. (1996). A measure of service quality for retail stores: Scale development and validation. *Journal of the Academy of Marketing Science*, 24(1), 3-16.
- Dagger, T. S., Sweeney, J. C., & Johnson, L. W. (2007). A hierarchical model of health service quality: Scale development and investigation of an integrated model. *Journal of Service Research*, 10(2), 123-142.
- DeShields, O. W. J., Kara, A., & Kaynak, E. (2005). Determinants of business student satisfaction and retention in higher education: Applying Herzberg's two-factor theory. *International Journal of Educational Management*, 19(2/3), 128-139.
- Dielman, T. E. (2001). *Applied regression analysis for business and economics* (3rd ed.). Belmont, CA: Duxbury Press.
- Douglas, J., Douglas, A., & Barnes, B. (2006). Measuring student satisfaction at a UK university. *Quality Assurance in Education*, 14(3), 251-267.
- Duan, X. (2003). Chinese higher education enters a new era. *Academe*, 89(6), 22-27.
- Field, A. (2005). *Discovering statistics using SPSS: And sex, drugs and rock 'n' roll* (2nd ed.).

London, England: SAGE Publication Ltd.

- Firdaus, A. (2006a). The development of HEdPERF: A new measuring instrument of service quality for the higher education sector. *International Journal of Consumer Studies*, 30(6), 569-581.
- Firdaus, A. (2006b). Measuring service quality in higher education: Three instruments compared. *International Journal of Research and Method in Education*, 29(1), 71-89.
- Ford, J. B., Joseph, M., & Joseph, B. (1999). Importance-performance analysis as a strategic tool for service marketers: The case of service quality perceptions of business students in New Zealand and the USA. *Journal of Services Marketing*, 13(2), 171-184.
- Ford, J. K., MacCallum, R. C., & Tait, M. (1986). The application of exploratory factor analysis in applied psychology: A critical review and analysis. *Personnel Psychology*, 39(2), 291-314.
- Gao, Y., & Wei, W. (2007). Measuring service quality and satisfaction of student in Chinese business education. In Alfred University Press (Eds.), *Management challenges in global word: Proceedings of the Sixth Wuhan International Conference on E-Business, Wuhan, 26-27 May 2007* (pp. 2329-2336). Wuhan, China: China University of Geosciences.
- Garson, G. D. (2010). *Statnotes: Topics in Multivariate Analysis*. Retrieved August 14, 2010 from <http://faculty.chass.ncsu.edu/garson/pa765/statnote.htm>.
- Giese, J. L., & Cote, J. A. (2000). Defining consumer satisfaction. *Academy of Marketing Science Review*, 1(1), 1-27.
- Gonzalez, M. E. A., Comesana, L. R., & Brea, J. A. F. (2007). Assessing tourist behavioral intentions through perceived service quality and customer satisfaction. *Journal of Business Research*, 60(2), 153-160.
- Gronroos, C. (1984). A service quality model and its marketing implications. *European Journal of Marketing*, 18(4), 36-44.
- Gronroos, C. (2001). The perceived service quality concept - a mistake? *Managing Service Quality*, 11(3), 150-152.
- Gummesson, E. (1991). Service quality: A holistic view. In S. W. Brown, E. Gummesson, B. Edvardsson & B. Gustavsson (Eds.), *Service quality: Multidisciplinary and multinational perspectives* (pp. 3-22). New York: Lexington Books.
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis: A global perspective* (7th ed.). Upper Saddle River, NJ: Pearson Prentice Hall.
- Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2006). *Multivariate data analysis* (6th ed.). Upper Saddle River, NJ: Prentice Hall.
- Hartline, M. D., & Ferrell, O. C. (1996). The management of customer-contact service employees: An empirical investigation. *Journal of Marketing*, 60(4), 52-70.

- Hill, F. M. (1995). Managing service quality in higher education: The role of the students as primary consumer. *Quality Assurance in Education*, 3(3), 10-21.
- Homburg, C., Koschate, N., & Hoyer, W. D. (2006). The role of cognition and affect in the formation of customer satisfaction: A dynamic perspective. *Journal of Marketing*, 70(3), 21-31.
- Hu, H., Kandampully, J., & Juwaheer, T. D. (2009) Relationships and impacts of service quality, perceived value, customer satisfaction, and image: An empirical study. *The Service Industries Journal*, 29(2), 111-125.
- Hurley, R., & Estelami, H. (1998). Alternative indexes for monitoring customer perceptions of service quality: A comparative evaluation in a retail context. *Journal of the Academy of Marketing Science*, 26(3), 209-221.
- Iacobucci, D., Grayson, K. A., & Ostrom, A. L. (1994). The calculus of service quality and customer satisfaction: Theoretical and empirical differentiation and integration. In T. A. Swartz, D. E. Bowen & S. W. Brown (Eds.), *Advances in services marketing and management: Research and practice* (pp. 1 - 67). Greenwich, CT: JAI Press.
- Jain, G., Sinha, G., & De, S. K. (2010). Service quality in Higher education: An exploratory study. *Asia Journal of Marketing*, 4(3), 144-154.
- Janssens, W., Wijnen, K., De Pelsmacker, P., & Van Kenhove, P. (2008). *Marketing research with SPSS*. Harlow, England: Pearson Education.
- Joseph, M., & Joseph, B. (1997). Service quality in education: A student perspective. *Quality Assurance in Education*, 5(1), 15-21.
- Kandampully, J., Juwaheer, T. D., & Hu, H. (2011). The influence of a hotel firm's quality of service and image and its effect on tourism customer loyalty. *International Journal of Hospitality & Tourism Administration*, 12(1), 21-42.
- Kang, G., & James, J. (2004). Service quality dimensions: An examination of Gronroos's service quality model. *Managing Service Quality*, 14(4), 266-277.
- Kassima, N. M., & Souiden, N. (2007). Customer retention measurement in the UAE banking sector. *Journal of Financial Services Marketing*, 11(3), 217-228.
- Kotler, P., & Levy, S. J., (1969). Broadening the concept of marketing. *Journal of Marketing*, 33(1), 10-15.
- Kuh, G. D., Pace, C. R., & Vesper, N. (1997). The development of process indicators to estimate student gains associated with good practices in undergraduate education. *Research in Higher Education*, 38(4), 435-454.
- Kuo, Y., Wu, C., & Deng, W. (2009). The relationships among service quality, perceived value, customer satisfaction, and post-purchase intention in mobile value-added services. *Computers in Human Behavior*, 25(4), 887-896.

- Kuo, Y., & Ye, K. (2009). The causal relationship between service quality, corporate image and adults' learning satisfaction and loyalty: A study of professional training programmes in a Taiwanese vocational institute. *Total Quality Management & Business Excellence*, 20(7), 749-762.
- Kwan, P. Y. K., & Ng, P. W. K. (1999). Quality indicators in higher education - comparing Hong Kong and China's students. *Managerial Auditing Journal*, 14(1/2), 20-27.
- Ladhari, R. (2009). A review of twenty years of SERVQUAL research. *International Journal of Quality and Service Science*, 1(2), 172-198.
- Lagrosen, S., Seyyed-Hashemi, R., & Leitner, M. (2004). Examination of the dimensions of quality in higher education. *Quality Assurance in Education*, 12(2), 61-69.
- Lai, F., Griffin, M., & Babin, B. J. (2009). How quality, value, image, and satisfaction create loyalty at a Chinese telecom. *Journal of Business Research*, 62(10), 980-986.
- Lai, F., Hutchinson, J., Li, D., & Bai, C. (2007). An empirical assessment and application of SERVQUAL in mainland China's mobile communications industry. *International Journal of Quality & Reliability Management*, 24(3), 244-262.
- Lai, H., & Huang, T. (2009). Characteristics of the higher education in Mainland China and Taiwan. *International Journal of Organizational Innovation*, 2(2), 307-320.
- LeBlanc, G., & Nguyen, N. (1997). Searching for excellence in business education: An exploratory study of customer impressions of service quality. *International Journal of Educational Management*, 11(2), 72-79.
- Lee, C. F., Lee, J., & Lee, A. (2000). *Statistics for business and financial economics* (2nd ed.). Singapore: World Scientific.
- Letcher, D. W., & Neves, J. S. (2010). Determinants of undergraduate business student satisfaction. *Research in Higher Education Journal*, 6(1), 1-26.
- Ling, K. C., Chai, L. T., & Piew, T. H. (2010). The "inside-out" and "outside-in" approach on students' perceived service quality: An empirical evaluation. *Management Science and Engineering*, 4(2), 1-26.
- Maddala, G. S. (2001). *Introduction to econometrics* (3rd ed.). New York, NY: John Wiley & Sons.
- Mai, L. (2005). A comparative study between UK and US: The student satisfaction in higher education and its influential factors. *Journal of Marketing Management*, 21(7), 859-878.
- Malhotra, N. K. (2006). Questionnaire design and scale development. In R. Grover & M. Vriens (Eds.), *The hand book of marketing research: Uses, misuses, and future advances*. (pp. 83-94). Thousand Oaks, California: Sage Publication.
- Malhotra, N. K., Hall, J., Shaw, M., & Oppenheim, P. (2002). *Marketing research: An applied orientation* (2nd ed.). French Forest, Australia: Prentice Hall.

- Mano, H., & Oliver, R. L. (1993) Assessing the dimensionality and structure of the consumption experience: Evaluation, feeling, and satisfaction. *Journal of Consumer Research*, 20(3), 451-466.
- Marzo-Navarro, M., Pedraja-Iglesias, M., & Rivera-Torres, M. P. (2005). Measuring customer satisfaction in summer courses. *Quality Assurance in Education*, 13(1), 53-65.
- Mazzarol, T. (1998). Critical success factors for international education marketing. *International Journal of Educational Management*, 12(4), 163-175.
- Ministry of Education of the People's Republic of China. (1985). *Decision of the Central Committee of Chinese Communist Party on reform of the education system*. Retrieved April 19, 2011, from [http://www.moe.edu.cn/publicfiles/business/htmlfiles/moe/moe\\_177/200407/2482.html](http://www.moe.edu.cn/publicfiles/business/htmlfiles/moe/moe_177/200407/2482.html).
- Ministry of Education of the People's Republic of China. (2002). *Number of higher education institutions*. Retrieved April 19, 2011, from <http://www.moe.edu.cn/publicfiles/business/htmlfiles/moe/s3458/200507/10559.html>
- Ministry of Education of the People's Republic of China. (2005). *Number of students by field of study in regular higher educational institutions*. Retrieved April 19, 2011, from <http://www.moe.edu.cn/publicfiles/business/htmlfiles/moe/s3483/200505/3117.html>
- Ministry of Education of the People's Republic of China. (2009). *Higher Education Law of the People's Republic of China*. Retrieved April 19, 2011, from [http://www.moe.gov.cn/publicfiles/business/htmlfiles/moe/moe\\_2803/200905/48454.html](http://www.moe.gov.cn/publicfiles/business/htmlfiles/moe/moe_2803/200905/48454.html)
- Ministry of Education of the People's Republic of China. (2010a). *Gross enrolment rate of schools by level*. Retrieved April 19, 2011, from <http://www.moe.edu.cn/publicfiles/business/htmlfiles/moe/s4969/201012/113470.html>
- Ministry of Education of the People's Republic of China. (2010b). *Number of students in regular HEIs by field of study*. Retrieved April 19, 2011, from <http://www.moe.edu.cn/publicfiles/business/htmlfiles/moe/s4971/201012/113569.html>
- Ministry of Education of the People's Republic of China. (2010c). *Number of higher education institutions*. Retrieved April 19, 2011, from <http://www.moe.edu.cn/publicfiles/business/htmlfiles/moe/s4971/201012/113595.html>
- Mok, K. H. (1996) Marketization and decentralization: development of education and paradigm shift in social policy. *Hong Kong Public Administration*, 5(1), 35-56.
- Mok, K. H. (1999). Education and the market place in Hong Kong and Mainland China. *Higher Education*, 37(2), 133-158.
- Mok, K. H. (2000). Marketizing higher education in post-Mao China. *International Journal of Educational Development*, 20(2), 109-126.
- Nauffal, D. I. (2009). Do educational outcomes in Lebanese universities differ based on the

academic model? *Education, Business and Society: Contemporary Middle Eastern Issues*, 2(1), 6-19.

- Newman, K. (2001). Interrogating SERVQUAL: A critical assessment of service quality measurement in a high street retail bank. *International Journal of Bank Marketing*, 19(3), 126-139.
- Nguyen, N., & LeBlanc, G. (1998). The mediating role of corporate image on customers' retention decisions: An investigation in financial services. *International Journal of Bank Marketing*, 16(2), 52-65.
- Nieuwenhuis, G. (2009). *Statistical methods for business and economics*. Maidenhead, England: McGraw-Hill Education.
- Oliver, R. L. (1980). A cognitive model of the antecedents and consequences of satisfaction decisions. *Journal of Marketing Research*, 17(4), 460-469.
- Oliver, R. L. (1993) Cognitive, affective, and attribute bases of the satisfaction response. *Journal of Consumer Research*, 20(3), 418-430.
- Olorunniwo, F., Hsu, M. K., & Udo, G. J. (2006). Service quality, customer satisfaction, and behavioral intentions in the service factory. *Journal of Services Marketing*, 20(1), 59-72.
- Pace, C. R., & Kur, G. D. (1998). College student experiences questionnaire (4th ed.). Centre for Postsecondary Research and Planning, Indiana University School of Education: Bloomington.
- Palacio, A. B., Meneses, G. D., & Perez, P. J. P. (2002). The configuration of the university image and its relationship with the satisfaction of students. *Journal of Educational Administration*, 40(4/5), 486-505.
- Parasuraman, A., Berry, L.L., & Zeithaml, V. A. (1991). Refinement and reassessment of the SERVQUAL scale. *Journal of Retailing*, 67(4), 420-450.
- Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1985). A conceptual model of service quality and its implications for future research. *Journal of Marketing*, 49(4), 41-50.
- Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1988). SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality. *Journal of Retailing*, 64(1), 12-37.
- Parasuraman, A., Zeithaml, V. A. & Berry, L.L. (1994). Reassessment of expectations as a comparison standard in measuring service quality: Implications for further research. *Journal of Marketing*, 58(1), 111-124.
- Peng, C. (2008). Chinese adolescent student service quality and experience in an international tertiary education system. *Adolescence*, 43(171), 661-680.
- Peterson, R. A., & Wilson, W. R. (1992). Measuring customer satisfaction: Fact and artifact. *Journal of the Academy of Marketing Science*, 20(1), 61-71.

- Pollack, B. L. (2009). Linking the hierarchical service quality model to customer satisfaction and loyalty. *Journal of Services Marketing*, 23(1), 42-50.
- Powpaka, S. (1996). The role of outcome quality as a determinant of overall service quality in different categories of services industries: An empirical investigation. *Journal of Services Marketing*, 10(2), 5-25.
- Qin, H., & Prybutok, V. R. (2008). Determinants of customer-perceived service quality in fast-food restaurants and their relationship to customer satisfaction and behavioral intentions. *The Quality Management Journal*, 15(2), 35-50.
- Rathmell, J. M. (1966). What is meant by services? *Journal of Marketing*, 30(4), 32-36.
- Rojas, C. D., & Camarero, C. (2008). Visitors' experience, mood and satisfaction in a heritage context: Evidence from an interpretation center. *Tourism Management*, 29(3), 525-537.
- Russell, M. (2005). Marketing education: A review of service quality perceptions among international students. *International Journal of Contemporary Hospitality Management*, 17(1), 65-77.
- Rust, R. T., & Oliver, R. L. (1994). Service quality: Insights and managerial implications from the frontier. In R. T. Rust & R. L. Oliver (Eds.), *Service quality: New directions in theory and practice* (pp. 1-19). Thousand Oaks, CA: Sage Publications.
- Ryu, K., Han, H., & Kim, T. (2008). The relationships among overall quick-casual restaurant image, perceived value, customer satisfaction, and behavioral intentions. *International Journal of Hospitality Management*, 27(3), 459-469.
- Schall, M. (2003). Best practice in the assessment of hotel-guest attitudes. *Cornell Hotel and Restaurant Administration Quarterly*, 44(2), 51-65.
- Schoefer, K. (2008). The role of cognition and affect in the formation of customer satisfaction judgments concerning service recovery encounters. *Journal of Consumer Behaviour*, 7(3), 210-221.
- Siddiqi, K. O. (2011). Interrelations between service quality attributes, customer satisfaction and customer loyalty in the retail banking sector in Bangladesh. *International Journal of Business and Management*, 6(3), 12-36.
- Sohail, M. S. & Shaikh, N. M. (2004). Quest for excellence in business education: A study of student impressions of service quality. *International Journal of Educational Management*, 18(1), 58-65.
- Spreng, R. A., Harrell, G. D., & Mackoy, R. D. (1995). Service recovery: Impact on satisfaction and intentions. *Journal of Services Marketing*, 9(1), 15-23.
- Spreng, R. A., & Mackoy, R. D. (1996). An empirical examination of a model of perceived service quality and satisfaction. *Journal of Retailing*, 72(2), 201-214.



- Spreng, R. A., & Olshavsky, R. W. (1993). A desires congruency model of consumer satisfaction. *Journal of the Academy of Marketing Science*, 21(3), 169-177.
- Stewart, D. W. (1981). The application and misapplication of factor analysis in marketing research. *Journal of Marketing Research*, 18(1), 51-62.
- Sultan, P., & Wong, H. (2010). Performance-based service quality model: An empirical study on Japanese universities. *Quality Assurance in Education*, 18(2), 126-143.
- Sumaedi, S., & Bakti, I. G. M. Y. (2011). The exploratory study of industrial engineering students' perceived quality dimension. *International Journal of Basic & Applied Sciences*, 11(1), 74-80.
- Sung, M., & Yang, S. (2008). Toward the model of university image: The influence of brand personality, external prestige, and reputation. *Journal of Public Relations Research*, 20(4), 357-376.
- Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Boston, the United States: Pearson/Allyn & Bacon.
- Tahir, I. M., Bakar, N. M. A., & Ismail, W. Z. W. (2010). Importance-performance analysis of service quality among business students: An exploratory study. *Interdisciplinary Journal of Contemporary Research in Business*, 2(1), 132-141.
- Tam, J. L. M. (2004). Customer satisfaction, service quality and perceived value: An integrative model. *Journal of Marketing Management*, 20(7), 897-917.
- Tam, M. (2007). Assessing quality experience and learning outcomes Part II: Findings and discussion. *Quality Assurance in Education*, 15(1), 61-76.
- Tan, K. C., & Kek, S. W. (2004). Service quality in higher education using an enhanced SERVQUAL approach. *Quality in Higher Education*, 10(1), 17-24.
- Taylor, S. A., & Baker, T. L. (1994). An assessment of the relationship between service quality and customer satisfaction in formation of consumers' purchase intention. *Journal of Retailing*, 70(2), 163-178.
- Teas, R. K. (1993). Expectations, performance evaluation, and consumer's perceptions of quality. *Journal of Marketing*, 57(4), 18-34.
- Van Dyke, T. P., Kappelman L. A., & Prybutok V. R. (1997). Measuring information systems service quality: Concerns on the use of the SERVQUAL questionnaire. *MIS Quarterly*, 21(2), 195-208.
- Varki, S., & Colgate, M. (2001). The role of price perceptions in an integrated model of behavioral intentions. *Journal of Service Research*, 3(3), 232-241.
- Villa, J. R., Howell, J. P., Dorfman, P. W., & Daniel, D. L. (2003). Problems with detecting moderators in leadership research using moderated multiple regression. *The Leadership Quarterly*, 14(1), 3-23.

- Vriens, M., & Sinharay, S. (2006). Dealing with missing data in surveys and databases. In R. Grover & M. Vriens (Eds.), *The hand book of marketing research: Uses, misuses, and future advances*. (pp. 83-94). Thousand Oaks, California: Sage Publication.
- Walker, J. L. (1995). Service encounter satisfaction: Conceptualization. *Journal of Services Marketing*, 9(1), 5-14.
- Wang, Y., Lo, H., & Yang, Y. (2004). An integrated framework for service quality, customer value, satisfaction: Evidence from China's telecommunication industry. *Information Systems Frontiers*, 6(4), 325-340.
- Zeithaml, V. A. (1988). Consumer perceptions of price, quality and value: A means-end model and synthesis of evidence. *Journal of Marketing*, 52(3), 2-22.
- Zeithaml, V. A., Berry, L. L., & Parasuraman, A. (1993). The nature and determinants of customer expectations of service. *Journal of the Academy of Marketing Science*, 21(1), 1-12.
- Zeithaml, V. A., Berry, L. L., & Parasuraman, A. (1996). The behavioral consequences of service quality. *Journal of Marketing*, 60(2), 31-46.
- Zeithaml, V. A., Parasuraman, A., & Berry, L. L. (1985). Problems and strategies in services Marketing. *Journal of Marketing*, 49(2), 33-46.
- Zha, Q. (2009). Diversification or homogenization: How governments and markets have combined to (re)shape Chinese higher education in its recent massification process. *Higher Education*, 58(1), 41-58.
- Zikmund, W. G., Ward, S., Lowe, B., & Winzar, H. (2007). *Marketing research: Asia Pacific edition*. South Melbourne, Australia: Thomson.

# Appendices

## Appendix 1: Cover Letter



Commerce Division

PO Box 84, Lincoln University,  
Canterbury 7647, New Zealand

Telephone 64 3 325-2811  
Facsimile 64 3 325-3847

[www.lincoln.ac.nz](http://www.lincoln.ac.nz)

Dear student,

I am a Master's Degree student at Lincoln University in Christchurch, New Zealand. My research project involves asking students about their perceptions of their university experience in China. You are invited to participate in this study.

I ask your help with my project. Attached is a brief questionnaire, which should only take about 10 to 15 minutes to complete. Your answers will be **completely anonymous**. No questions are asked which would identify you as an individual. All responses will be aggregated for analysis only, and no personal details will be reported in the thesis or any resulting publication. This research is completely voluntary in nature and you are free to decide not to participate at any time during the process of completing the questionnaire. However, in order to qualify for this research, you must be at least a second, third, or fourth year student and 18 years old or older so that you have sufficient university experience to answer all of the questions. This research is for my postgraduate research only; and it does not relate to He Bei Normal University's subject or lecturer evaluations. The research findings will benefit marketers and practitioners (i.e. university management). Finally, the aggregate results of this study may be used for future academic publications. If you choose to complete the survey, it will be understood that you have consented to participate in the research project and to publication of the results of the research project. This research has been reviewed and approved by the Lincoln University Human Ethics Committee.

Please return the completed questionnaire to me. I will be pleased to discuss any concerns you have on the research. I can be contacted by telephoning (0086)31182972372, or by emailing [Yang.Wang@lincolnuni.ac.nz](mailto:Yang.Wang@lincolnuni.ac.nz). You can also contact my supervisors Mr. Michael D. Clemes and /or Dr. David Cohen. Mr. Clemes can be contacted at (064)33218292 or [clemes@lincoln.ac.nz](mailto:clemes@lincoln.ac.nz) and Dr. Cohen can be contacted at (064)33218320 or [cohen@lincoln.ac.nz](mailto:cohen@lincoln.ac.nz).

Each and every response is important and I deeply appreciate your valuable participation.

Yours Sincerely,

Yang Wang  
Commerce Division  
Master Student  
Lincoln University

### Research Supervisors:

Michael D. Clemes  
Senior Lecturer  
Commerce Division  
Lincoln University

Dr. David A. Cohen  
Senior Lecturer  
Commerce Division  
Lincoln University

## Appendix 2: Questionnaire

### A SURVEY OF UNIVERSITY STUDENTS' ACADEMIC EXPERIENCES IN CHINA'S HIGHER EDUCATION SECTOR

This questionnaire is for postgraduate research only; and it does not relate to He Bei Normal University's subject or lecturer evaluations. This questionnaire contains Section A to E. Please answer all the questions in each section and state your level of agreement and disagreement with each statement. Please indicate how strongly agree or disagree with each of the following statement. On a scale of 1 (strongly disagree) to 7 (strongly agree), please circle the number to indicate your response.

Section A (Interaction Quality)							
		Strongly Disagree			Strongly Agree		
1	Lecturers have good communication skills.	1	2	3	4	5	6 7
2	Lecturers have extensive knowledge about their subjects.	1	2	3	4	5	6 7
3	Lecturers deliver theoretical and practical mixed subjects.	1	2	3	4	5	6 7
4	Classes are well prepared and organized.	1	2	3	4	5	6 7
5	The appearance of lecturers is neat and clean.	1	2	3	4	5	6 7
6	Lecturers are courteous and respectful.	1	2	3	4	5	6 7
7	Lecturers are friendly and helpful.	1	2	3	4	5	6 7
8	I can contact my lecturers with a minimum effort.	1	2	3	4	5	6 7
9	I can find my lecturers in their offices most of the time.	1	2	3	4	5	6 7
10	My lecturers are ready to solve my problems.	1	2	3	4	5	6 7
11	I feel comfortable when talking with lecturers.	1	2	3	4	5	6 7
12	My lecturers deal with my problem in a concerned fashion.	1	2	3	4	5	6 7
13	My lecturers encourage students to participate in class discussion.	1	2	3	4	5	6 7
14	The appearance of faculty administrators is neat and clean.	1	2	3	4	5	6 7
15	Faculty administrators are courteous and polite.	1	2	3	4	5	6 7
16	Faculty administrators perform their duties properly.	1	2	3	4	5	6 7
17	The course materials (e.g. textbooks) are useful.	1	2	3	4	5	6 7
18	The course materials are relevant to the subjects.	1	2	3	4	5	6 7
19	The course materials make complicated subjects understandable.	1	2	3	4	5	6 7
20	Overall, the quality of my interaction with the university staff is excellent.	1	2	3	4	5	6 7
21	Generally, the quality of my interaction with the university staff is high.	1	2	3	4	5	6 7
22	I would rate the quality of interaction with university staff highly.	1	2	3	4	5	6 7

Section B (Physical Environment Quality)								
		Strongly Disagree			Strongly Agree			
1	University residential accommodation is charged at a reasonable price.	1	2	3	4	5	6	7
2	University residential accommodation provides good living conditions.	1	2	3	4	5	6	7
3	Living on campus is convenient.	1	2	3	4	5	6	7
4	The campus is neat and clean.	1	2	3	4	5	6	7
5	The campus has excellent supporting facilities (e.g. canteen).	1	2	3	4	5	6	7
6	The appearance of the campus and its buildings is attractive.	1	2	3	4	5	6	7
7	Classrooms are comfortable and bright.	1	2	3	4	5	6	7
8	Classrooms have quality equipment.	1	2	3	4	5	6	7
9	Classrooms are always neat and clean.	1	2	3	4	5	6	7
10	Recreational facilities are offered to students.	1	2	3	4	5	6	7
11	Recreational facilities are easy to access.	1	2	3	4	5	6	7
12	Recreational facilities are well maintained.	1	2	3	4	5	6	7
13	Computers are well maintained.	1	2	3	4	5	6	7
14	Computer software is updated regularly.	1	2	3	4	5	6	7
15	Computers are accessible for students.	1	2	3	4	5	6	7
16	The library is a good place to study.	1	2	3	4	5	6	7
17	The library has an attractive layout and design.	1	2	3	4	5	6	7
18	The library provides an extensive collection of learning materials.	1	2	3	4	5	6	7
19	The active learning behavior and attitude of students sitting nearby me positively affects my learning during lectures.	1	2	3	4	5	6	7
20	I am not disturbed by noise during lectures (e.g. mobile phones ringing, construction noise).	1	2	3	4	5	6	7
21	I am impressed with the attitudes and behavior of my classmates.	1	2	3	4	5	6	7
22	Criminal activity rarely happens around campus.	1	2	3	4	5	6	7
23	Security often patrols during the night.	1	2	3	4	5	6	7
24	I feel safe in the university.	1	2	3	4	5	6	7
25	I enjoy my social life on campus.	1	2	3	4	5	6	7
26	I am offered an opportunity to participate in a variety of sports and recreational programs.	1	2	3	4	5	6	7
27	I am offered extra-curricular activities to share my own interest with others.	1	2	3	4	5	6	7
28	The physical environment provided by the university is excellent.	1	2	3	4	5	6	7
29	Generally, the university provides a satisfying physical environment.	1	2	3	4	5	6	7
30	I rate the university's physical environment highly.	1	2	3	4	5	6	7

Section C (Outcome Quality)								
		Strongly Disagree			Strongly Agree			
1	I understand the conceptual framework, major theories, and basic formulae in the subjects I study.	1	2	3	4	5	6	7
2	I have gained some deep and detailed knowledge of the subjects I study.	1	2	3	4	5	6	7
3	I have gained a background and specialization for further education in a professional discipline.	1	2	3	4	5	6	7
4	I have developed critical thinking and reasoning skills.	1	2	3	4	5	6	7
5	I have gained a broad knowledge of different fields.	1	2	3	4	5	6	7
6	I have learned how to learn.	1	2	3	4	5	6	7
7	I have developed my personal values and ethics.	1	2	3	4	5	6	7
8	I have developed competency in my field of study.	1	2	3	4	5	6	7
9	I have developed the ability to apply theory to practice.	1	2	3	4	5	6	7
10	I have gained knowledge and skills applicable to a specific career.	1	2	3	4	5	6	7
11	I understand ethical codes, responsibilities and norms in my area of study.	1	2	3	4	5	6	7
12	I have gained the ability to work in a team.	1	2	3	4	5	6	7
13	I have developed communication skills (e.g. oral presentation, report writing).	1	2	3	4	5	6	7
14	I have developed technical skills (e.g. use of software).	1	2	3	4	5	6	7
15	I have developed personal qualities (e.g. problem solving, initiative, time management)	1	2	3	4	5	6	7
16	I am satisfied with my learning experience at the university.	1	2	3	4	5	6	7
17	I evaluate my learning outcomes highly.	1	2	3	4	5	6	7
18	I have had an excellent learning experience at the university.	1	2	3	4	5	6	7

Section D (Higher-Order Constructs)								
		Strongly Disagree			Strongly Agree			
1	The university provides excellent service quality.	1	2	3	4	5	6	7
2	Overall, the service quality of the university is high.	1	2	3	4	5	6	7
3	Overall, I think that the service quality offered by the university is excellent.	1	2	3	4	5	6	7
4	I have had a satisfying experience at the university.	1	2	3	4	5	6	7
5	I am satisfied with my university experience.	1	2	3	4	5	6	7
6	The university provides a satisfying learning experience.	1	2	3	4	5	6	7
7	I have a good impression of the university.	1	2	3	4	5	6	7
8	I believe that the university has a good image in the minds of students.	1	2	3	4	5	6	7
9	Generally, the university always fulfills its promises.	1	2	3	4	5	6	7
10	The university has a good reputation.	1	2	3	4	5	6	7
11	The tuition fee charged is reasonable.	1	2	3	4	5	6	7
12	The miscellaneous fees charged are reasonable.	1	2	3	4	5	6	7
13	The university provides good value for money.	1	2	3	4	5	6	7
14	I would recommend the university to someone who seeks my advice.	1	2	3	4	5	6	7
15	I say positive things about the university to other people.	1	2	3	4	5	6	7
16	I would encourage friends and relatives to go to the university.	1	2	3	4	5	6	7
17	I would still consider this university as my first choice if I could start over again.	1	2	3	4	5	6	7
18	I would choose this university for my further education.	1	2	3	4	5	6	7
19	I will complete my bachelor degree at the university.	1	2	3	4	5	6	7

### Section E (demographic characteristics)

Please tick the appropriate answer to each question

- 1 What is your gender? ☐ Male ☐ Female
- 2 What is your age? ☐ 18-22 ☐ 23-27  
☐ 27+
- 3 What is your year of study? ☐ 2nd Year ☐ 3rd Year  
☐ 4th Year
- 4 What is your major?
- ☐ Accounting
  - ☐ Advertising
  - ☐ Bioscience
  - ☐ Chemistry
  - ☐ Chinese Language and Literature
  - ☐ Computer Science and Technology
  - ☐ Computer and Communication Engineering
  - ☐ Economics
  - ☐ E-commerce
  - ☐ Education
  - ☐ English
  - ☐ Environmental Science
  - ☐ Food Science and Engineering
  - ☐ Foreign Languages and Literature
  - ☐ Geography
  - ☐ Human Resource Management
  - ☐ History
  - ☐ Information and Computer Science
  - ☐ International Economics and Trade
  - ☐ Japanese
  - ☐ Journalism
  - ☐ Law
  - ☐ Mathematics and Applied Mathematics
  - ☐ Physics
  - ☐ Psychology
  - ☐ Public Administration
  - ☐ Russian



- |   |
|---|
| <ul style="list-style-type: none"><li><input type="checkbox"/> Software Engineering</li><li><input type="checkbox"/> Spanish</li><li><input type="checkbox"/> Supply Chain Management</li><li><input type="checkbox"/> Tourism Management</li><li><input type="checkbox"/> Other (please specify)</li></ul> |
|---|

**Thank you very much for your time!**

## Appendix 3: Data Imputation

**Table 25A: Summary Statistics of Missing Data for Original Sample (N=350)**

Item	Number of Cases	Mean	Standard Deviation	No.	Percent	Item	Number of Cases	Mean	Standard Deviation	No.	Percent	Item	Number of Cases	Mean	Standard Deviation	No.	Percent
a1	350	4.67	1.354	0	0.0	b9	349	4.33	1.438	1	0.3	c9	349	4.70	1.259	1	0.3
a2	350	4.96	1.378	0	0.0	b10	350	4.31	1.634	0	0.0	c10	350	4.60	1.239	0	0.0
a3	350	4.42	1.330	0	0.0	b11	350	4.09	1.570	0	0.0	c11	350	5.09	1.241	0	0.0
a4	350	4.60	1.357	0	0.0	b12	350	4.04	1.514	0	0.0	c12	350	5.09	1.252	0	0.0
a5	349	5.36	1.125	1	0.3	b13	350	4.18	1.463	0	0.0	c13	350	4.85	1.324	0	0.0
a6	350	5.27	1.224	0	0.0	b14	350	3.83	1.448	0	0.0	c14	349	4.89	1.201	1	0.3
a7	350	5.09	1.227	0	0.0	b15	350	3.90	1.622	0	0.0	c15	350	5.29	1.251	0	0.0
a8	350	4.51	1.462	0	0.0	b16	350	5.00	1.587	0	0.0	c16	350	4.60	1.278	0	0.0
a9	350	3.93	1.540	0	0.0	b17	350	4.47	1.439	0	0.0	c17	350	4.42	1.288	0	0.0
a10	350	5.16	1.373	0	0.0	b18	350	5.03	1.523	0	0.0	c18	350	4.64	1.376	0	0.0
a11	350	4.59	1.387	0	0.0	b19	350	4.94	1.526	0	0.0	d1	350	4.28	1.292	0	0.0
a12	350	4.51	1.271	0	0.0	b20	350	4.09	1.425	0	0.0	d2	350	4.37	1.331	0	0.0
a13	350	5.12	1.334	0	0.0	b21	349	4.85	1.303	1	0.3	d3	350	4.28	1.359	0	0.0
a14	350	5.16	1.244	0	0.0	b22	350	4.89	1.570	0	0.0	d4	350	4.55	1.238	0	0.0
a15	350	4.70	1.409	0	0.0	b23	350	3.89	1.545	0	0.0	d5	350	4.49	1.319	0	0.0
a16	350	4.66	1.382	0	0.0	b24	347	4.81	1.408	3	0.9	d6	350	4.44	1.344	0	0.0
a17	350	4.52	1.521	0	0.0	b25	350	4.61	1.360	0	0.0	d7	350	4.52	1.266	0	0.0
a18	350	4.68	1.436	0	0.0	b26	350	4.63	1.402	0	0.0	d8	350	4.52	1.306	0	0.0
a19	348	4.47	1.300	2	0.6	b27	350	4.69	1.398	0	0.0	d9	348	4.48	1.300	2	0.6
a20	350	4.43	1.182	0	0.0	b28	350	4.33	1.345	0	0.0	d10	350	4.86	1.257	0	0.0
a21	350	4.45	1.288	0	0.0	b29	350	4.55	1.359	0	0.0	d11	350	4.29	1.536	0	0.0
a22	350	4.31	1.292	0	0.0	b30	350	4.28	1.394	0	0.0	d12	350	4.38	1.495	0	0.0
b1	350	4.88	1.534	0	0.0	c1	350	4.38	1.226	0	0.0	d13	350	4.28	1.375	0	0.0
b2	350	4.45	1.592	0	0.0	c2	350	4.29	1.231	0	0.0	d14	350	4.33	1.437	0	0.0
b3	350	5.21	1.417	0	0.0	c3	350	4.29	1.281	0	0.0	d15	349	4.63	1.393	1	0.3
b4	350	5.00	1.347	0	0.0	c4	350	4.70	1.199	0	0.0	d16	350	4.15	1.460	0	0.0
b5	350	4.51	1.530	0	0.0	c5	350	4.37	1.370	0	0.0	d17	350	3.93	1.623	0	0.0
b6	350	3.84	1.439	0	0.0	c6	350	4.58	1.266	0	0.0	d18	350	3.78	1.656	0	0.0
b7	350	4.42	1.401	0	0.0	c7	350	5.08	1.294	0	0.0	d19	350	5.19	1.682	0	0.0
b8	350	4.31	1.456	0	0.0	c8	350	4.70	1.291	0	0.0						

## Appendix 4: Correlation Matrix

**Table 26A: Correlation Matrix**

	a1	a2	a3	a4	a5	a6	a7	a8	a9	a10	a11	a12	a13	a14	a15
a1	1.000	0.572	0.583	0.526	0.302	0.402	0.405	0.309	0.358	0.299	0.343	0.442	0.452	0.354	0.306
a2	0.572	1.000	0.512	0.511	0.348	0.406	0.423	0.160	0.220	0.305	0.214	0.317	0.408	0.367	0.286
a3	0.583	0.512	1.000	0.589	0.242	0.306	0.409	0.279	0.264	0.242	0.246	0.358	0.397	0.371	0.406
a4	0.526	0.511	0.589	1.000	0.407	0.449	0.475	0.282	0.319	0.386	0.344	0.444	0.469	0.387	0.418
a5	0.302	0.348	0.242	0.407	1.000	0.568	0.435	0.135	0.016	0.337	0.215	0.236	0.380	0.437	0.291
a6	0.402	0.406	0.306	0.449	0.568	1.000	0.671	0.252	0.147	0.427	0.321	0.394	0.437	0.434	0.382
a7	0.405	0.423	0.409	0.475	0.435	0.671	1.000	0.340	0.217	0.449	0.334	0.424	0.468	0.385	0.346
a8	0.309	0.160	0.279	0.282	0.135	0.252	0.340	1.000	0.502	0.386	0.382	0.382	0.355	0.174	0.218
a9	0.358	0.220	0.264	0.319	0.016	0.147	0.217	0.502	1.000	0.343	0.353	0.385	0.285	0.226	0.337
a10	0.299	0.305	0.242	0.386	0.337	0.427	0.449	0.386	0.343	1.000	0.492	0.394	0.434	0.334	0.283
a11	0.343	0.214	0.246	0.344	0.215	0.321	0.334	0.382	0.353	0.492	1.000	0.493	0.427	0.274	0.318
a12	0.442	0.317	0.358	0.444	0.236	0.394	0.424	0.382	0.385	0.394	0.493	1.000	0.456	0.408	0.421
a13	0.452	0.408	0.397	0.469	0.380	0.437	0.468	0.355	0.285	0.434	0.427	0.456	1.000	0.472	0.304
a14	0.354	0.367	0.371	0.387	0.437	0.434	0.385	0.174	0.226	0.334	0.274	0.408	0.472	1.000	0.569
a15	0.306	0.286	0.406	0.418	0.291	0.382	0.346	0.218	0.337	0.283	0.318	0.421	0.304	0.569	1.000
a16	0.351	0.265	0.308	0.459	0.331	0.388	0.378	0.258	0.338	0.316	0.353	0.440	0.322	0.502	0.689
a17	0.331	0.349	0.308	0.362	0.217	0.295	0.238	0.200	0.262	0.224	0.219	0.328	0.240	0.373	0.276
a18	0.335	0.384	0.331	0.356	0.193	0.301	0.301	0.251	0.270	0.255	0.260	0.281	0.253	0.334	0.317
a19	0.301	0.331	0.368	0.387	0.273	0.341	0.333	0.211	0.236	0.277	0.343	0.371	0.306	0.370	0.403
b1	0.229	0.248	0.203	0.322	0.267	0.339	0.349	0.275	0.156	0.359	0.288	0.242	0.335	0.257	0.239
b2	0.166	0.078	0.173	0.239	0.155	0.197	0.173	0.224	0.127	0.210	0.155	0.209	0.224	0.242	0.217
b3	0.183	0.190	0.171	0.295	0.256	0.266	0.276	0.262	0.157	0.327	0.259	0.214	0.303	0.254	0.181
b4	0.336	0.191	0.234	0.391	0.301	0.369	0.368	0.266	0.185	0.339	0.305	0.304	0.362	0.407	0.366
b5	0.247	0.201	0.272	0.315	0.217	0.256	0.247	0.210	0.168	0.212	0.238	0.274	0.221	0.364	0.395
b6	0.280	0.183	0.292	0.334	0.084	0.148	0.172	0.183	0.306	0.111	0.179	0.347	0.155	0.271	0.347
b7	0.311	0.222	0.251	0.367	0.185	0.258	0.326	0.207	0.109	0.236	0.334	0.322	0.284	0.297	0.267
b8	0.350	0.228	0.314	0.355	0.117	0.242	0.313	0.264	0.168	0.230	0.281	0.331	0.271	0.298	0.300
b9	0.318	0.267	0.269	0.392	0.291	0.262	0.276	0.212	0.174	0.247	0.308	0.335	0.273	0.326	0.373
b10	0.240	0.215	0.215	0.267	0.187	0.241	0.259	0.189	0.096	0.258	0.247	0.249	0.190	0.226	0.292
b11	0.290	0.205	0.282	0.296	0.134	0.199	0.228	0.208	0.195	0.183	0.229	0.299	0.215	0.217	0.286
b12	0.233	0.173	0.298	0.293	0.121	0.161	0.202	0.170	0.171	0.128	0.182	0.242	0.173	0.211	0.339
b13	0.305	0.238	0.298	0.351	0.121	0.159	0.224	0.207	0.176	0.230	0.187	0.298	0.261	0.257	0.302
b14	0.306	0.286	0.344	0.357	0.129	0.183	0.231	0.198	0.246	0.204	0.161	0.330	0.248	0.337	0.378
b15	0.258	0.287	0.246	0.291	0.107	0.200	0.232	0.184	0.211	0.241	0.195	0.287	0.204	0.234	0.315
b16	0.249	0.256	0.184	0.316	0.216	0.292	0.260	0.175	0.081	0.194	0.165	0.200	0.319	0.252	0.264
b17	0.275	0.234	0.296	0.324	0.094	0.252	0.235	0.187	0.229	0.131	0.118	0.258	0.232	0.236	0.320
b18	0.348	0.398	0.295	0.387	0.246	0.317	0.356	0.228	0.193	0.343	0.210	0.243	0.323	0.329	0.288
b19	0.271	0.320	0.222	0.351	0.351	0.341	0.288	0.123	0.081	0.224	0.214	0.257	0.321	0.369	0.374
b20	0.151	0.227	0.253	0.275	0.216	0.224	0.257	0.251	0.211	0.165	0.234	0.365	0.222	0.258	0.337
b21	0.230	0.191	0.197	0.224	0.303	0.278	0.285	0.171	0.110	0.246	0.229	0.331	0.245	0.279	0.261
b22	0.249	0.301	0.247	0.236	0.238	0.242	0.236	0.124	0.104	0.266	0.195	0.183	0.242	0.291	0.295
b23	0.296	0.254	0.351	0.401	0.131	0.157	0.164	0.247	0.317	0.185	0.200	0.359	0.252	0.365	0.351
b24	0.211	0.305	0.271	0.314	0.243	0.299	0.276	0.120	0.114	0.322	0.212	0.241	0.281	0.383	0.296
b25	0.326	0.286	0.270	0.387	0.303	0.374	0.362	0.230	0.227	0.239	0.288	0.299	0.363	0.350	0.341
b26	0.300	0.388	0.304	0.368	0.305	0.299	0.307	0.206	0.279	0.196	0.246	0.299	0.277	0.310	0.384
b27	0.269	0.338	0.338	0.332	0.270	0.242	0.292	0.142	0.240	0.200	0.211	0.272	0.302	0.281	0.359
c1	0.328	0.301	0.317	0.401	0.217	0.276	0.280	0.185	0.144	0.281	0.234	0.362	0.301	0.268	0.298
c2	0.356	0.269	0.329	0.377	0.130	0.200	0.238	0.205	0.234	0.256	0.271	0.369	0.293	0.279	0.340
c3	0.284	0.210	0.257	0.355	0.125	0.152	0.203	0.131	0.196	0.246	0.272	0.349	0.236	0.241	0.314
c4	0.341	0.230	0.210	0.297	0.212	0.194	0.208	0.146	0.235	0.208	0.211	0.285	0.291	0.296	0.261
c5	0.273	0.269	0.212	0.345	0.238	0.189	0.171	0.091	0.248	0.148	0.228	0.294	0.216	0.278	0.303
c6	0.273	0.303	0.259	0.358	0.240	0.217	0.244	0.213	0.262	0.223	0.198	0.301	0.227	0.262	0.309
c7	0.253	0.282	0.216	0.275	0.306	0.322	0.338	0.194	0.120	0.304	0.214	0.295	0.389	0.312	0.238
c8	0.338	0.286	0.248	0.340	0.217	0.213	0.218	0.201	0.169	0.209	0.262	0.253	0.317	0.298	0.285
c9	0.337	0.306	0.284	0.335	0.191	0.183	0.215	0.163	0.195	0.156	0.203	0.227	0.277	0.188	0.239
c10	0.375	0.329	0.312	0.357	0.207	0.286	0.277	0.209	0.177	0.221	0.260	0.238	0.315	0.230	0.242
c11	0.341	0.277	0.208	0.311	0.295	0.344	0.271	0.161	0.103	0.261	0.244	0.252	0.383	0.282	0.224
c12	0.280	0.314	0.216	0.257	0.173	0.247	0.267	0.216	0.195	0.239	0.243	0.221	0.347	0.208	0.187
c13	0.312	0.268	0.223	0.307	0.191	0.222	0.171	0.186	0.182	0.192	0.226	0.165	0.235	0.248	0.193
c14	0.269	0.288	0.282	0.372	0.236	0.248	0.256	0.231	0.183	0.188	0.200	0.198	0.272	0.202	0.230
c15	0.229	0.258	0.153	0.261	0.304	0.327	0.257	0.172	0.077	0.219	0.185	0.121	0.318	0.237	0.109

**Table 26A: Correlation Matrix (Continued)**

	a16	a17	a18	a19	b1	b2	b3	b4	b5	b6	b7	b8	b9	b10	b11
a1	0.351	0.331	0.335	0.301	0.229	0.166	0.183	0.336	0.247	0.280	0.311	0.350	0.318	0.240	0.290
a2	0.265	0.349	0.384	0.331	0.248	0.078	0.190	0.191	0.201	0.183	0.222	0.228	0.267	0.215	0.205
a3	0.308	0.308	0.331	0.368	0.203	0.173	0.171	0.234	0.272	0.292	0.251	0.314	0.269	0.215	0.282
a4	0.459	0.362	0.356	0.387	0.322	0.239	0.295	0.391	0.315	0.334	0.367	0.355	0.392	0.267	0.296
a5	0.331	0.217	0.193	0.273	0.267	0.155	0.256	0.301	0.217	0.084	0.185	0.117	0.291	0.187	0.134
a6	0.388	0.295	0.301	0.341	0.339	0.197	0.266	0.369	0.256	0.148	0.258	0.242	0.262	0.241	0.199
a7	0.378	0.238	0.301	0.333	0.349	0.173	0.276	0.368	0.247	0.172	0.326	0.313	0.276	0.259	0.228
a8	0.258	0.200	0.251	0.211	0.275	0.224	0.262	0.266	0.210	0.183	0.207	0.264	0.212	0.189	0.208
a9	0.338	0.262	0.270	0.236	0.156	0.127	0.157	0.185	0.168	0.306	0.109	0.168	0.174	0.096	0.195
a10	0.316	0.224	0.255	0.277	0.359	0.210	0.327	0.339	0.212	0.111	0.236	0.230	0.247	0.258	0.183
a11	0.353	0.219	0.260	0.343	0.288	0.155	0.259	0.305	0.238	0.179	0.334	0.281	0.308	0.247	0.229
a12	0.440	0.328	0.281	0.371	0.242	0.209	0.214	0.304	0.274	0.347	0.322	0.331	0.335	0.249	0.299
a13	0.322	0.240	0.253	0.306	0.335	0.224	0.303	0.362	0.221	0.155	0.284	0.271	0.273	0.190	0.215
a14	0.502	0.373	0.334	0.370	0.257	0.242	0.254	0.407	0.364	0.271	0.297	0.298	0.326	0.226	0.217
a15	0.689	0.276	0.317	0.403	0.239	0.217	0.181	0.366	0.395	0.347	0.267	0.300	0.373	0.292	0.286
a16	1.000	0.375	0.347	0.403	0.307	0.245	0.302	0.421	0.390	0.360	0.370	0.363	0.400	0.278	0.303
a17	0.375	1.000	0.729	0.579	0.254	0.198	0.176	0.206	0.282	0.248	0.293	0.270	0.272	0.200	0.216
a18	0.347	0.729	1.000	0.637	0.291	0.159	0.234	0.217	0.230	0.290	0.302	0.290	0.274	0.170	0.208
a19	0.403	0.579	0.637	1.000	0.271	0.198	0.222	0.273	0.321	0.328	0.360	0.349	0.386	0.271	0.284
b1	0.307	0.254	0.291	0.271	1.000	0.508	0.568	0.480	0.351	0.244	0.382	0.335	0.297	0.344	0.283
b2	0.245	0.198	0.159	0.198	0.508	1.000	0.596	0.586	0.539	0.403	0.445	0.521	0.418	0.362	0.366
b3	0.302	0.176	0.234	0.222	0.568	0.596	1.000	0.503	0.439	0.279	0.440	0.432	0.345	0.359	0.327
b4	0.421	0.206	0.217	0.273	0.480	0.586	0.503	1.000	0.597	0.428	0.564	0.563	0.492	0.411	0.389
b5	0.390	0.282	0.230	0.321	0.351	0.539	0.439	0.597	1.000	0.593	0.582	0.633	0.586	0.451	0.482
b6	0.360	0.248	0.290	0.328	0.244	0.403	0.279	0.428	0.593	1.000	0.546	0.567	0.531	0.413	0.518
b7	0.370	0.293	0.302	0.360	0.382	0.445	0.440	0.564	0.582	0.546	1.000	0.766	0.647	0.487	0.464
b8	0.363	0.270	0.290	0.349	0.335	0.521	0.432	0.563	0.633	0.567	0.766	1.000	0.676	0.490	0.529
b9	0.400	0.272	0.274	0.386	0.297	0.418	0.345	0.492	0.586	0.531	0.647	0.676	1.000	0.470	0.465
b10	0.278	0.200	0.170	0.271	0.344	0.362	0.359	0.411	0.451	0.413	0.487	0.490	0.470	1.000	0.793
b11	0.303	0.216	0.208	0.284	0.283	0.366	0.327	0.389	0.482	0.518	0.464	0.529	0.465	0.793	1.000
b12	0.289	0.197	0.185	0.246	0.212	0.385	0.318	0.391	0.508	0.513	0.479	0.542	0.488	0.649	0.787
b13	0.313	0.231	0.230	0.250	0.370	0.447	0.387	0.522	0.531	0.502	0.556	0.581	0.466	0.572	0.589
b14	0.378	0.261	0.251	0.336	0.263	0.391	0.292	0.396	0.508	0.570	0.485	0.538	0.496	0.465	0.545
b15	0.316	0.311	0.340	0.320	0.283	0.251	0.309	0.303	0.450	0.522	0.401	0.415	0.397	0.487	0.521
b16	0.302	0.253	0.220	0.251	0.364	0.234	0.308	0.308	0.343	0.216	0.358	0.310	0.234	0.249	0.230
b17	0.288	0.280	0.256	0.338	0.250	0.259	0.237	0.323	0.359	0.425	0.371	0.414	0.317	0.330	0.370
b18	0.368	0.341	0.283	0.308	0.372	0.183	0.352	0.316	0.270	0.243	0.316	0.315	0.289	0.302	0.264
b19	0.442	0.334	0.257	0.287	0.374	0.202	0.338	0.385	0.254	0.143	0.273	0.212	0.252	0.245	0.228
b20	0.339	0.314	0.342	0.365	0.208	0.151	0.215	0.221	0.287	0.317	0.279	0.242	0.279	0.296	0.296
b21	0.361	0.286	0.195	0.219	0.299	0.268	0.330	0.328	0.271	0.270	0.335	0.338	0.302	0.365	0.350
b22	0.266	0.258	0.225	0.283	0.261	0.200	0.238	0.312	0.230	0.181	0.332	0.258	0.372	0.328	0.274
b23	0.399	0.347	0.279	0.325	0.258	0.313	0.216	0.344	0.359	0.430	0.424	0.386	0.393	0.232	0.291
b24	0.281	0.318	0.240	0.269	0.372	0.412	0.397	0.430	0.343	0.258	0.439	0.410	0.404	0.343	0.293
b25	0.393	0.317	0.251	0.322	0.366	0.343	0.374	0.437	0.395	0.342	0.476	0.403	0.407	0.355	0.364
b26	0.390	0.343	0.282	0.343	0.231	0.212	0.282	0.273	0.354	0.344	0.375	0.340	0.446	0.366	0.395
b27	0.337	0.300	0.231	0.276	0.171	0.216	0.267	0.339	0.328	0.275	0.307	0.350	0.397	0.346	0.383
c1	0.350	0.253	0.220	0.329	0.396	0.321	0.341	0.389	0.317	0.380	0.430	0.439	0.368	0.301	0.303
c2	0.348	0.349	0.319	0.378	0.318	0.339	0.301	0.414	0.336	0.467	0.433	0.476	0.417	0.333	0.413
c3	0.335	0.269	0.241	0.314	0.288	0.241	0.212	0.356	0.327	0.436	0.414	0.420	0.416	0.329	0.358
c4	0.306	0.331	0.233	0.266	0.378	0.302	0.318	0.431	0.319	0.278	0.386	0.374	0.388	0.318	0.312
c5	0.354	0.336	0.262	0.304	0.260	0.279	0.283	0.355	0.278	0.387	0.388	0.367	0.442	0.345	0.365
c6	0.379	0.320	0.202	0.244	0.297	0.281	0.326	0.364	0.343	0.295	0.370	0.352	0.352	0.262	0.308
c7	0.261	0.243	0.225	0.266	0.389	0.259	0.408	0.367	0.258	0.167	0.353	0.331	0.278	0.320	0.280
c8	0.334	0.302	0.219	0.313	0.384	0.296	0.317	0.332	0.367	0.296	0.438	0.441	0.401	0.323	0.342
c9	0.281	0.257	0.221	0.221	0.187	0.136	0.207	0.243	0.214	0.259	0.327	0.311	0.290	0.232	0.235
c10	0.299	0.262	0.217	0.278	0.282	0.209	0.309	0.315	0.279	0.244	0.396	0.353	0.333	0.304	0.316
c11	0.281	0.204	0.184	0.168	0.271	0.246	0.388	0.355	0.274	0.141	0.334	0.325	0.264	0.216	0.230
c12	0.232	0.181	0.208	0.154	0.316	0.238	0.398	0.301	0.192	0.148	0.325	0.300	0.254	0.215	0.235
c13	0.189	0.227	0.185	0.174	0.271	0.231	0.287	0.324	0.270	0.197	0.318	0.323	0.316	0.250	0.231
c14	0.246	0.221	0.255	0.265	0.277	0.233	0.329	0.269	0.222	0.295	0.305	0.372	0.329	0.321	0.349
c15	0.217	0.181	0.191	0.163	0.317	0.266	0.409	0.325	0.196	0.086	0.311	0.309	0.248	0.178	0.179

**Table 26A: Correlation Matrix (Continued)**

	b12	b13	b14	b15	b16	b17	b18	b19	b20	b21	b22	b23	b24	b25	b26
a1	0.233	0.305	0.306	0.258	0.249	0.275	0.348	0.271	0.151	0.230	0.249	0.296	0.211	0.326	0.300
a2	0.173	0.238	0.286	0.287	0.256	0.234	0.398	0.320	0.227	0.191	0.301	0.254	0.305	0.286	0.388
a3	0.298	0.298	0.344	0.246	0.184	0.296	0.295	0.222	0.253	0.197	0.247	0.351	0.271	0.270	0.304
a4	0.293	0.351	0.357	0.291	0.316	0.324	0.387	0.351	0.275	0.224	0.236	0.401	0.314	0.387	0.368
a5	0.121	0.121	0.129	0.107	0.216	0.094	0.246	0.351	0.216	0.303	0.238	0.131	0.243	0.303	0.305
a6	0.161	0.159	0.183	0.200	0.292	0.252	0.317	0.341	0.224	0.278	0.242	0.157	0.299	0.374	0.299
a7	0.202	0.224	0.231	0.232	0.260	0.235	0.356	0.288	0.257	0.285	0.236	0.164	0.276	0.362	0.307
a8	0.170	0.207	0.198	0.184	0.175	0.187	0.228	0.123	0.251	0.171	0.124	0.247	0.120	0.230	0.206
a9	0.171	0.176	0.246	0.211	0.081	0.229	0.193	0.081	0.211	0.110	0.104	0.317	0.114	0.227	0.279
a10	0.128	0.230	0.204	0.241	0.194	0.131	0.343	0.224	0.165	0.246	0.266	0.185	0.322	0.239	0.196
a11	0.182	0.187	0.161	0.195	0.165	0.118	0.210	0.214	0.234	0.229	0.195	0.200	0.212	0.288	0.246
a12	0.242	0.298	0.330	0.287	0.200	0.258	0.243	0.257	0.365	0.331	0.183	0.359	0.241	0.299	0.299
a13	0.173	0.261	0.248	0.204	0.319	0.232	0.323	0.321	0.222	0.245	0.242	0.252	0.281	0.363	0.277
a14	0.211	0.257	0.337	0.234	0.252	0.236	0.329	0.369	0.258	0.279	0.291	0.365	0.383	0.350	0.310
a15	0.339	0.302	0.378	0.315	0.264	0.320	0.288	0.374	0.337	0.261	0.295	0.351	0.296	0.341	0.384
a16	0.289	0.313	0.378	0.316	0.302	0.288	0.368	0.442	0.339	0.361	0.266	0.399	0.281	0.393	0.390
a17	0.197	0.231	0.261	0.311	0.253	0.280	0.341	0.334	0.314	0.286	0.258	0.347	0.318	0.317	0.343
a18	0.185	0.230	0.251	0.340	0.220	0.256	0.283	0.257	0.342	0.195	0.225	0.279	0.240	0.251	0.282
a19	0.246	0.250	0.336	0.320	0.251	0.338	0.308	0.287	0.365	0.219	0.283	0.325	0.269	0.322	0.343
b1	0.212	0.370	0.263	0.283	0.364	0.250	0.372	0.374	0.208	0.299	0.261	0.258	0.372	0.366	0.231
b2	0.385	0.447	0.391	0.251	0.234	0.259	0.183	0.202	0.151	0.268	0.200	0.313	0.412	0.343	0.212
b3	0.318	0.387	0.292	0.309	0.308	0.237	0.352	0.338	0.215	0.330	0.238	0.216	0.397	0.374	0.282
b4	0.391	0.522	0.396	0.303	0.308	0.323	0.316	0.385	0.221	0.328	0.312	0.344	0.430	0.437	0.273
b5	0.508	0.531	0.508	0.450	0.343	0.359	0.270	0.254	0.287	0.271	0.230	0.359	0.343	0.395	0.354
b6	0.513	0.502	0.570	0.522	0.216	0.425	0.243	0.143	0.317	0.270	0.181	0.430	0.258	0.342	0.344
b7	0.479	0.556	0.485	0.401	0.358	0.371	0.316	0.273	0.279	0.335	0.332	0.424	0.439	0.476	0.375
b8	0.542	0.581	0.538	0.415	0.310	0.414	0.315	0.212	0.242	0.338	0.258	0.386	0.410	0.403	0.340
b9	0.488	0.466	0.496	0.397	0.234	0.317	0.289	0.252	0.279	0.302	0.372	0.393	0.404	0.407	0.446
b10	0.649	0.572	0.465	0.487	0.249	0.330	0.302	0.245	0.296	0.365	0.328	0.232	0.343	0.355	0.366
b11	0.787	0.589	0.545	0.521	0.230	0.370	0.264	0.228	0.296	0.350	0.274	0.291	0.293	0.364	0.395
b12	1.000	0.607	0.577	0.481	0.230	0.364	0.247	0.250	0.339	0.362	0.242	0.322	0.303	0.317	0.371
b13	0.607	1.000	0.708	0.609	0.317	0.399	0.331	0.300	0.288	0.336	0.293	0.432	0.369	0.368	0.377
b14	0.577	0.708	1.000	0.715	0.270	0.416	0.318	0.261	0.362	0.325	0.267	0.488	0.317	0.342	0.428
b15	0.481	0.609	0.715	1.000	0.347	0.426	0.390	0.233	0.336	0.331	0.332	0.375	0.307	0.322	0.429
b16	0.230	0.317	0.270	0.347	1.000	0.638	0.530	0.405	0.223	0.347	0.222	0.239	0.293	0.413	0.250
b17	0.364	0.399	0.416	0.426	0.638	1.000	0.543	0.338	0.278	0.356	0.164	0.371	0.290	0.419	0.301
b18	0.247	0.331	0.318	0.390	0.530	0.543	1.000	0.480	0.232	0.375	0.318	0.274	0.356	0.404	0.362
b19	0.250	0.300	0.261	0.233	0.405	0.338	0.480	1.000	0.370	0.434	0.281	0.339	0.358	0.409	0.349
b20	0.339	0.288	0.362	0.336	0.223	0.278	0.232	0.370	1.000	0.466	0.261	0.358	0.219	0.301	0.401
b21	0.362	0.336	0.325	0.331	0.347	0.356	0.375	0.434	0.466	1.000	0.289	0.301	0.316	0.364	0.336
b22	0.242	0.293	0.267	0.332	0.222	0.164	0.318	0.281	0.261	0.289	1.000	0.373	0.532	0.342	0.338
b23	0.322	0.432	0.488	0.375	0.239	0.371	0.274	0.339	0.358	0.301	0.373	1.000	0.519	0.371	0.364
b24	0.303	0.369	0.317	0.307	0.293	0.290	0.356	0.358	0.219	0.316	0.532	0.519	1.000	0.523	0.363
b25	0.317	0.368	0.342	0.322	0.413	0.419	0.404	0.409	0.301	0.364	0.342	0.371	0.523	1.000	0.581
b26	0.371	0.377	0.428	0.429	0.250	0.301	0.362	0.349	0.401	0.336	0.338	0.364	0.363	0.581	1.000
b27	0.362	0.423	0.366	0.375	0.212	0.337	0.346	0.357	0.320	0.327	0.296	0.342	0.377	0.530	0.707
c1	0.354	0.422	0.379	0.334	0.323	0.417	0.313	0.327	0.301	0.430	0.245	0.365	0.294	0.427	0.350
c2	0.445	0.499	0.459	0.393	0.275	0.401	0.332	0.297	0.303	0.357	0.221	0.398	0.314	0.393	0.383
c3	0.364	0.403	0.401	0.366	0.260	0.371	0.245	0.245	0.249	0.276	0.290	0.343	0.333	0.384	0.373
c4	0.279	0.383	0.366	0.322	0.323	0.280	0.341	0.401	0.231	0.353	0.336	0.336	0.366	0.432	0.369
c5	0.360	0.358	0.374	0.343	0.251	0.348	0.245	0.325	0.275	0.301	0.294	0.315	0.323	0.365	0.386
c6	0.337	0.353	0.359	0.317	0.280	0.301	0.342	0.346	0.312	0.358	0.261	0.332	0.357	0.389	0.446
c7	0.232	0.310	0.235	0.210	0.325	0.248	0.361	0.429	0.232	0.409	0.356	0.211	0.360	0.365	0.341
c8	0.310	0.370	0.345	0.270	0.349	0.338	0.359	0.348	0.235	0.294	0.277	0.320	0.308	0.451	0.419
c9	0.259	0.269	0.263	0.246	0.254	0.238	0.282	0.283	0.178	0.206	0.228	0.227	0.214	0.336	0.365
c10	0.272	0.339	0.342	0.296	0.320	0.333	0.337	0.377	0.214	0.314	0.247	0.339	0.299	0.348	0.393
c11	0.224	0.236	0.240	0.180	0.346	0.255	0.355	0.369	0.152	0.373	0.248	0.183	0.316	0.278	0.292
c12	0.231	0.229	0.190	0.151	0.209	0.173	0.281	0.280	0.090	0.259	0.226	0.169	0.265	0.269	0.350
c13	0.226	0.318	0.271	0.190	0.225	0.216	0.288	0.333	0.141	0.280	0.187	0.238	0.243	0.296	0.377
c14	0.315	0.365	0.357	0.292	0.193	0.258	0.253	0.324	0.224	0.336	0.242	0.289	0.232	0.314	0.454
c15	0.170	0.273	0.187	0.150	0.226	0.165	0.283	0.349	0.085	0.354	0.232	0.155	0.265	0.340	0.310

**Table 26A: Correlation Matrix (Continued)**

	b27	c1	c2	c3	c4	c5	c6	c7	c8	c9	c10	c11	c12	c13	c14	c15
a1	0.269	0.328	0.356	0.284	0.341	0.273	0.273	0.253	0.338	0.337	0.375	0.341	0.280	0.312	0.269	0.229
a2	0.338	0.301	0.269	0.210	0.230	0.269	0.303	0.282	0.286	0.306	0.329	0.277	0.314	0.268	0.288	0.258
a3	0.338	0.317	0.329	0.257	0.210	0.212	0.259	0.216	0.248	0.284	0.312	0.208	0.216	0.223	0.282	0.153
a4	0.332	0.401	0.377	0.355	0.297	0.345	0.358	0.275	0.340	0.335	0.357	0.311	0.257	0.307	0.372	0.261
a5	0.270	0.217	0.130	0.125	0.212	0.238	0.240	0.306	0.217	0.191	0.207	0.295	0.173	0.191	0.236	0.304
a6	0.242	0.276	0.200	0.152	0.194	0.189	0.217	0.322	0.213	0.183	0.286	0.344	0.247	0.222	0.248	0.327
a7	0.292	0.280	0.238	0.203	0.208	0.171	0.244	0.338	0.218	0.215	0.277	0.271	0.267	0.171	0.256	0.257
a8	0.142	0.185	0.205	0.131	0.146	0.091	0.213	0.194	0.201	0.163	0.209	0.161	0.216	0.186	0.231	0.172
a9	0.240	0.144	0.234	0.196	0.235	0.248	0.262	0.120	0.169	0.195	0.177	0.103	0.195	0.182	0.183	0.077
a10	0.200	0.281	0.256	0.246	0.208	0.148	0.223	0.304	0.209	0.156	0.221	0.261	0.239	0.192	0.188	0.219
a11	0.211	0.234	0.271	0.272	0.211	0.228	0.198	0.214	0.262	0.203	0.260	0.244	0.243	0.226	0.200	0.185
a12	0.272	0.362	0.369	0.349	0.285	0.294	0.301	0.295	0.253	0.227	0.238	0.252	0.221	0.165	0.198	0.121
a13	0.302	0.301	0.293	0.236	0.291	0.216	0.227	0.389	0.317	0.277	0.315	0.383	0.347	0.235	0.272	0.318
a14	0.281	0.268	0.279	0.241	0.296	0.278	0.262	0.312	0.298	0.188	0.230	0.282	0.208	0.248	0.202	0.237
a15	0.359	0.298	0.340	0.314	0.261	0.303	0.309	0.238	0.285	0.239	0.242	0.224	0.187	0.193	0.230	0.109
a16	0.337	0.350	0.348	0.335	0.306	0.354	0.379	0.261	0.334	0.281	0.299	0.281	0.232	0.189	0.246	0.217
a17	0.300	0.253	0.349	0.269	0.331	0.336	0.320	0.243	0.302	0.257	0.262	0.204	0.181	0.227	0.221	0.181
a18	0.231	0.220	0.319	0.241	0.233	0.262	0.202	0.225	0.219	0.221	0.217	0.184	0.208	0.185	0.255	0.191
a19	0.276	0.329	0.378	0.314	0.266	0.304	0.244	0.266	0.313	0.221	0.278	0.168	0.154	0.174	0.265	0.163
b1	0.171	0.396	0.318	0.288	0.378	0.260	0.297	0.389	0.384	0.187	0.282	0.271	0.316	0.271	0.277	0.317
b2	0.216	0.321	0.339	0.241	0.302	0.279	0.281	0.259	0.296	0.136	0.209	0.246	0.238	0.231	0.233	0.266
b3	0.267	0.341	0.301	0.212	0.318	0.283	0.326	0.408	0.317	0.207	0.309	0.388	0.398	0.287	0.329	0.409
b4	0.339	0.389	0.414	0.356	0.431	0.355	0.364	0.367	0.332	0.243	0.315	0.355	0.301	0.324	0.269	0.325
b5	0.328	0.317	0.336	0.327	0.319	0.278	0.343	0.258	0.367	0.214	0.279	0.274	0.192	0.270	0.222	0.196
b6	0.275	0.380	0.467	0.436	0.278	0.387	0.295	0.167	0.296	0.259	0.244	0.141	0.148	0.197	0.295	0.086
b7	0.307	0.430	0.433	0.414	0.386	0.388	0.370	0.353	0.438	0.327	0.396	0.334	0.325	0.318	0.305	0.311
b8	0.350	0.439	0.476	0.420	0.374	0.367	0.352	0.331	0.441	0.311	0.353	0.325	0.300	0.323	0.372	0.309
b9	0.397	0.368	0.417	0.416	0.388	0.442	0.352	0.278	0.401	0.290	0.333	0.264	0.254	0.316	0.329	0.248
b10	0.346	0.301	0.333	0.329	0.318	0.345	0.262	0.320	0.323	0.232	0.304	0.216	0.215	0.250	0.321	0.178
b11	0.383	0.303	0.413	0.358	0.312	0.365	0.308	0.280	0.342	0.235	0.316	0.230	0.235	0.231	0.349	0.179
b12	0.362	0.354	0.445	0.364	0.279	0.360	0.337	0.232	0.310	0.259	0.272	0.224	0.231	0.226	0.315	0.170
b13	0.423	0.422	0.499	0.403	0.383	0.358	0.353	0.310	0.370	0.269	0.339	0.236	0.229	0.318	0.365	0.273
b14	0.366	0.379	0.459	0.401	0.366	0.374	0.359	0.235	0.345	0.263	0.342	0.240	0.190	0.271	0.357	0.187
b15	0.375	0.334	0.393	0.366	0.322	0.343	0.317	0.210	0.270	0.246	0.296	0.180	0.151	0.190	0.292	0.150
b16	0.212	0.323	0.275	0.260	0.323	0.251	0.280	0.325	0.349	0.254	0.320	0.346	0.209	0.225	0.193	0.226
b17	0.337	0.417	0.401	0.371	0.280	0.348	0.301	0.248	0.338	0.238	0.333	0.255	0.173	0.216	0.258	0.165
b18	0.346	0.313	0.332	0.245	0.341	0.245	0.342	0.361	0.359	0.282	0.337	0.355	0.281	0.288	0.253	0.283
b19	0.357	0.327	0.297	0.245	0.401	0.325	0.346	0.429	0.348	0.283	0.377	0.369	0.280	0.333	0.324	0.349
b20	0.320	0.301	0.303	0.249	0.231	0.275	0.312	0.232	0.235	0.178	0.214	0.152	0.090	0.141	0.224	0.085
b21	0.327	0.430	0.357	0.276	0.353	0.301	0.358	0.409	0.294	0.206	0.314	0.373	0.259	0.280	0.336	0.354
b22	0.296	0.245	0.221	0.290	0.336	0.294	0.261	0.356	0.277	0.228	0.247	0.248	0.226	0.187	0.242	0.232
b23	0.342	0.365	0.398	0.343	0.336	0.315	0.332	0.211	0.320	0.227	0.339	0.183	0.169	0.238	0.289	0.155
b24	0.377	0.294	0.314	0.333	0.366	0.323	0.357	0.360	0.308	0.214	0.299	0.316	0.265	0.243	0.232	0.265
b25	0.530	0.427	0.393	0.384	0.432	0.365	0.389	0.365	0.451	0.336	0.348	0.278	0.269	0.296	0.314	0.340
b26	0.707	0.350	0.383	0.373	0.369	0.386	0.446	0.341	0.419	0.365	0.393	0.292	0.350	0.377	0.454	0.310
b27	1.000	0.356	0.404	0.367	0.361	0.383	0.449	0.354	0.365	0.370	0.364	0.292	0.342	0.344	0.435	0.309
c1	0.356	1.000	0.714	0.638	0.530	0.533	0.504	0.442	0.558	0.367	0.466	0.329	0.318	0.347	0.439	0.362
c2	0.404	0.714	1.000	0.697	0.596	0.578	0.528	0.373	0.573	0.439	0.446	0.341	0.324	0.317	0.380	0.323
c3	0.367	0.638	0.697	1.000	0.588	0.621	0.501	0.322	0.511	0.475	0.464	0.299	0.315	0.350	0.332	0.213
c4	0.361	0.530	0.596	0.588	1.000	0.665	0.581	0.515	0.593	0.497	0.523	0.431	0.384	0.501	0.392	0.425
c5	0.383	0.533	0.578	0.621	0.665	1.000	0.540	0.406	0.543	0.518	0.451	0.333	0.349	0.356	0.362	0.309
c6	0.449	0.504	0.528	0.501	0.581	0.540	1.000	0.492	0.498	0.449	0.419	0.364	0.361	0.398	0.349	0.381
c7	0.354	0.442	0.373	0.322	0.515	0.406	0.492	1.000	0.569	0.460	0.494	0.593	0.547	0.470	0.500	0.587
c8	0.365	0.558	0.573	0.511	0.593	0.543	0.498	0.569	1.000	0.668	0.593	0.482	0.422	0.456	0.469	0.462
c9	0.370	0.367	0.439	0.475	0.497	0.518	0.449	0.460	0.668	1.000	0.569	0.432	0.494	0.465	0.475	0.428
c10	0.364	0.466	0.446	0.464	0.523	0.451	0.419	0.494	0.593	0.569	1.000	0.570	0.558	0.584	0.553	0.489
c11	0.292	0.329	0.341	0.299	0.431	0.333	0.364	0.593	0.482	0.432	0.570	1.000	0.631	0.469	0.486	0.552
c12	0.342	0.318	0.324	0.315	0.384	0.349	0.361	0.547	0.422	0.494	0.558	0.631	1.000	0.559	0.529	0.606
c13	0.344	0.347	0.317	0.350	0.501	0.356	0.398	0.470	0.456	0.465	0.584	0.469	0.559	1.000	0.654	0.630
c14	0.435	0.439	0.380	0.332	0.392	0.362	0.349	0.500	0.469	0.475	0.553	0.486	0.529	0.654	1.000	0.602
c15	0.309	0.362	0.323	0.213	0.425	0.309	0.381	0.587	0.462	0.428	0.489	0.552	0.606	0.630	0.602	1.000

## Appendix 5: Anti-Image Correlation Matrix

**Table 27A: Anti-Image Correlation Matrix**

	a1	a2	a3	a4	a5	a6	a7	a8	a9	a10	a11	a12	a13	a14	a15
a1	0.927	-0.303	-0.328	-0.008	-0.094	-0.086	0.022	-0.006	-0.167	0.075	-0.059	-0.129	-0.055	0.031	0.100
a2	-0.303	0.930	-0.103	-0.119	-0.029	-0.027	-0.070	0.123	-0.030	-0.024	0.071	-0.025	-0.075	-0.053	0.034
a3	-0.328	-0.103	0.914	-0.325	0.044	0.105	-0.119	-0.119	0.122	0.047	-0.014	0.066	-0.052	-0.078	-0.164
a4	-0.008	-0.119	-0.325	0.951	-0.134	-0.032	-0.076	0.099	-0.076	-0.079	0.008	-0.080	-0.093	0.118	-0.027
a5	-0.094	-0.029	0.044	-0.134	0.912	-0.273	-0.022	-0.053	0.181	-0.117	0.042	0.093	-0.053	-0.189	0.028
a6	-0.086	-0.027	0.105	-0.032	-0.273	0.925	-0.423	0.013	0.067	-0.080	-0.010	-0.097	-0.004	-0.018	-0.101
a7	0.022	-0.070	-0.119	-0.076	-0.022	-0.423	0.938	-0.092	-0.014	-0.076	0.052	-0.086	-0.053	-0.027	0.050
a8	-0.006	0.123	-0.119	0.099	-0.053	0.013	-0.092	0.899	-0.336	-0.088	-0.068	-0.121	-0.093	0.093	0.032
a9	-0.167	-0.030	0.122	-0.076	0.181	0.067	-0.014	-0.336	0.851	-0.227	-0.103	-0.008	-0.042	-0.001	-0.121
a10	0.075	-0.024	0.047	-0.079	-0.117	-0.080	-0.076	-0.088	-0.227	0.933	-0.232	-0.027	-0.060	-0.019	0.022
a11	-0.059	0.071	-0.014	0.008	0.042	-0.010	0.052	-0.068	-0.103	-0.232	0.927	-0.241	-0.145	0.054	-0.031
a12	-0.129	-0.025	0.066	-0.080	0.093	-0.097	-0.086	-0.121	-0.008	-0.027	-0.241	0.939	-0.085	-0.089	-0.087
a13	-0.055	-0.075	-0.052	-0.093	-0.053	-0.004	-0.053	-0.093	-0.042	-0.060	-0.145	-0.085	0.959	-0.242	0.074
a14	0.031	-0.053	-0.078	0.118	-0.189	-0.018	-0.027	0.093	-0.001	-0.019	0.054	-0.089	-0.242	0.939	-0.293
a15	0.100	0.034	-0.164	-0.027	0.028	-0.101	0.050	0.032	-0.121	0.022	-0.031	-0.087	0.074	-0.293	0.903
a16	-0.067	0.118	0.096	-0.074	-0.008	0.004	-0.063	0.021	-0.066	0.002	-0.028	-0.021	0.043	-0.045	-0.488
a17	-0.010	0.048	-0.002	-0.082	0.029	-0.083	0.108	-0.001	-0.060	0.021	0.087	-0.122	0.020	-0.114	0.224
a18	-0.069	-0.152	0.010	0.014	0.045	0.011	-0.041	-0.083	0.017	-0.035	-0.018	0.155	0.063	-0.035	-0.111
a19	0.087	0.019	-0.091	0.030	-0.100	-0.006	-0.017	0.090	-0.009	0.010	-0.131	-0.065	-0.037	0.041	-0.062
b1	0.075	-0.046	-0.051	0.027	-0.039	-0.070	-0.077	-0.010	-0.037	0.000	-0.067	0.054	-0.034	0.107	-0.034
b2	-0.006	0.086	-0.005	0.014	0.014	-0.003	0.052	-0.046	0.050	-0.011	0.081	-0.043	-0.045	0.050	-0.040
b3	0.049	0.041	-0.012	-0.051	-0.043	0.056	0.043	-0.022	-0.075	-0.039	-0.012	-0.006	0.009	-0.048	0.154
b4	-0.112	0.094	0.143	-0.117	-0.002	-0.054	-0.058	-0.076	0.031	-0.038	-0.025	0.093	-0.031	-0.120	0.015
b5	0.101	-0.086	-0.086	0.077	-0.046	-0.012	0.001	0.001	0.027	-0.020	-0.044	0.067	0.080	-0.051	-0.108
b6	-0.015	0.019	-0.037	-0.005	-0.025	-0.013	0.075	0.093	-0.201	0.111	0.089	-0.097	0.043	-0.031	0.027
b7	0.013	0.070	0.046	-0.025	0.013	0.069	-0.113	0.068	0.128	0.016	-0.140	-0.001	0.000	0.011	0.089
b8	-0.089	-0.013	-0.031	0.041	0.172	-0.029	-0.056	-0.084	0.031	0.021	0.013	-0.002	0.024	-0.013	0.032
b9	-0.024	-0.010	0.102	-0.090	-0.153	0.041	0.047	-0.045	0.066	-0.019	-0.013	-0.056	-0.045	0.062	-0.027
b10	-0.015	-0.081	0.070	0.005	0.015	-0.037	0.001	-0.067	0.124	-0.097	-0.046	0.078	0.085	-0.020	-0.102
b11	-0.049	0.024	-0.029	-0.018	0.011	-0.005	0.049	0.006	-0.020	0.011	0.027	-0.116	-0.042	-0.006	0.163
b12	0.041	0.074	-0.061	-0.006	-0.019	-0.007	-0.045	0.024	-0.064	0.085	-0.027	0.114	0.002	0.051	-0.144
b13	-0.055	0.030	0.012	-0.047	-0.005	0.093	0.036	0.006	0.003	-0.009	0.067	-0.085	-0.038	0.067	0.015
b14	0.037	-0.091	-0.076	0.030	0.019	0.014	-0.008	0.022	-0.021	-0.045	0.097	0.013	-0.009	-0.123	0.007
b15	-0.021	0.004	0.113	0.020	0.076	-0.031	-0.020	-0.010	0.076	-0.063	-0.062	-0.005	-0.014	0.069	-0.039
b16	0.009	-0.055	0.099	-0.093	-0.032	0.008	0.030	-0.061	0.109	0.016	-0.003	0.040	-0.116	0.005	-0.015
b17	0.007	0.075	-0.090	0.061	0.088	-0.110	0.015	0.023	-0.155	0.095	0.109	-0.004	0.012	0.055	-0.089
b18	-0.012	-0.107	0.014	-0.084	0.028	0.076	-0.074	-0.059	0.041	-0.139	0.017	0.064	0.042	-0.075	0.095
b19	-0.033	-0.087	0.077	-0.014	-0.021	-0.010	0.046	0.033	0.151	0.025	-0.026	0.014	-0.016	0.005	-0.097
b20	0.161	-0.020	-0.031	-0.012	-0.011	-0.004	-0.026	-0.109	-0.006	0.064	-0.007	-0.129	-0.045	0.033	0.011
b21	-0.026	0.062	-0.029	0.153	-0.140	0.086	-0.061	0.064	0.017	-0.037	-0.056	-0.085	0.060	0.003	0.045
b22	-0.078	-0.071	-0.066	0.104	0.023	-0.023	0.023	-0.007	0.014	-0.031	0.003	0.116	0.013	0.025	-0.118
b23	-0.008	0.044	-0.017	-0.141	0.010	0.055	0.116	-0.093	-0.118	0.065	0.038	-0.088	0.013	-0.102	0.092
b24	0.141	-0.115	-0.075	0.042	0.035	-0.047	0.000	0.095	0.061	-0.145	0.008	0.013	0.036	-0.089	-0.027
b25	-0.076	0.079	0.067	-0.058	0.013	-0.073	-0.038	-0.056	-0.042	0.101	-0.063	0.052	-0.053	0.003	0.008
b26	0.003	-0.104	0.047	0.003	-0.059	-0.049	0.012	-0.025	-0.071	0.070	0.017	0.008	0.056	0.008	-0.032
b27	0.087	-0.016	-0.135	0.102	-0.074	0.074	-0.055	0.138	-0.055	-0.004	-0.009	-0.003	-0.088	0.063	-0.054
c1	-0.020	-0.109	-0.047	-0.042	0.018	-0.067	0.070	0.002	0.113	-0.104	0.092	-0.082	-0.001	0.017	0.043
c2	-0.038	-0.001	-0.024	0.048	0.097	-0.006	-0.012	-0.022	0.059	-0.046	-0.057	0.036	-0.006	0.016	-0.109
c3	0.035	0.105	0.049	-0.082	0.011	0.095	-0.033	0.032	0.087	-0.099	-0.041	-0.077	-0.010	-0.013	0.041
c4	-0.096	0.143	-0.006	0.095	-0.004	0.070	-0.034	0.090	-0.144	0.060	0.106	-0.054	-0.052	0.006	0.009
c5	0.086	-0.094	0.046	-0.058	-0.125	-0.012	0.046	0.083	-0.122	0.116	-0.093	0.022	0.075	-0.043	0.030
c6	0.038	-0.105	0.010	-0.062	-0.044	0.024	0.005	-0.093	-0.061	0.026	0.027	0.009	0.112	0.058	-0.009
c7	0.079	0.063	-0.030	0.082	-0.003	0.032	-0.087	0.025	0.003	-0.063	0.106	-0.138	-0.091	-0.018	-0.022
c8	-0.059	0.001	0.106	-0.009	0.022	0.081	0.040	-0.045	0.046	0.011	-0.071	0.096	0.009	-0.108	-0.023
c9	-0.025	-0.027	-0.091	-0.007	-0.042	0.008	-0.001	0.007	-0.004	-0.003	0.056	-0.051	-0.035	0.108	-0.003
c10	-0.033	-0.025	-0.076	0.040	0.045	-0.077	-0.049	-0.035	0.015	0.018	-0.032	0.101	0.009	0.071	0.019
c11	-0.135	0.060	0.065	-0.064	-0.045	-0.101	0.106	0.048	0.047	0.001	-0.021	-0.042	-0.067	0.023	-0.012
c12	0.041	-0.121	0.001	0.096	0.101	0.056	-0.045	-0.029	-0.046	0.004	0.011	-0.047	-0.072	0.021	-0.036
c13	-0.111	0.007	0.012	-0.035	0.071	-0.033	0.112	0.000	-0.023	-0.021	-0.087	0.039	0.101	-0.107	-0.054
c14	0.091	0.027	0.017	-0.133	-0.043	0.049	-0.073	-0.080	0.015	0.040	-0.008	0.072	0.015	0.055	-0.026
c15	0.086	-0.029	0.019	-0.012	-0.071	-0.138	0.042	-0.014	0.014	0.027	0.002	0.081	-0.043	-0.043	0.147

**Table 27A: Anti-Image Correlation Matrix (Continued)**

	a16	a17	a18	a19	b1	b2	b3	b4	b5	b6	b7	b8	b9	b10	b11
a1	-0.067	-0.010	-0.069	0.087	0.075	-0.006	0.049	-0.112	0.101	-0.015	0.013	-0.089	-0.024	-0.015	-0.049
a2	0.118	0.048	-0.152	0.019	-0.046	0.086	0.041	0.094	-0.086	0.019	0.070	-0.013	-0.010	-0.081	0.024
a3	0.096	-0.002	0.010	-0.091	-0.051	-0.005	-0.012	0.143	-0.086	-0.037	0.046	-0.031	0.102	0.070	-0.029
a4	-0.074	-0.082	0.014	0.030	0.027	0.014	-0.051	-0.117	0.077	-0.005	-0.025	0.041	-0.090	0.005	-0.018
a5	-0.008	0.029	0.045	-0.100	-0.039	0.014	-0.043	-0.002	-0.046	-0.025	0.013	0.172	-0.153	0.015	0.011
a6	0.004	-0.083	0.011	-0.006	-0.070	-0.003	0.056	-0.054	-0.012	-0.013	0.069	-0.029	0.041	-0.037	-0.005
a7	-0.063	0.108	-0.041	-0.017	-0.077	0.052	0.043	-0.058	0.001	0.075	-0.113	-0.056	0.047	0.001	0.049
a8	0.021	-0.001	-0.083	0.090	-0.010	-0.046	-0.022	-0.076	0.001	0.093	0.068	-0.084	-0.045	-0.067	0.006
a9	-0.066	-0.060	0.017	-0.009	-0.037	0.050	-0.075	0.031	0.027	-0.201	0.128	0.031	0.066	0.124	-0.020
a10	0.002	0.021	-0.035	0.010	0.000	-0.011	-0.039	-0.038	-0.020	0.111	0.016	0.021	-0.019	-0.097	0.011
a11	-0.028	0.087	-0.018	-0.131	-0.067	0.081	-0.012	-0.025	-0.044	0.089	-0.140	0.013	-0.013	-0.046	0.027
a12	-0.021	-0.122	0.155	-0.065	0.054	-0.043	-0.006	0.093	0.067	-0.097	-0.001	-0.002	-0.056	0.078	-0.116
a13	0.043	0.020	0.063	-0.037	-0.034	-0.045	0.009	-0.031	0.080	0.043	0.000	0.024	-0.045	0.085	-0.042
a14	-0.045	-0.114	-0.035	0.041	0.107	0.050	-0.048	-0.120	-0.051	-0.031	0.011	-0.013	0.062	-0.020	-0.006
a15	-0.488	0.224	-0.111	-0.062	-0.034	-0.040	0.154	0.015	-0.108	0.027	0.089	0.032	-0.027	-0.102	0.163
a16	0.931	-0.110	0.006	-0.016	0.007	0.069	-0.088	-0.074	0.013	-0.032	-0.002	-0.050	-0.035	0.023	-0.096
a17	-0.110	0.883	-0.570	-0.167	-0.005	-0.107	0.168	0.134	-0.177	0.106	-0.033	0.028	0.087	-0.064	0.069
a18	0.006	-0.570	0.870	-0.313	-0.095	0.050	-0.101	-0.017	0.144	-0.083	-0.052	-0.040	-0.031	0.138	-0.042
a19	-0.016	-0.167	-0.313	0.951	0.038	0.012	-0.015	-0.019	-0.031	0.026	-0.018	-0.014	-0.072	-0.042	-0.031
b1	0.007	-0.005	-0.095	0.038	0.936	-0.228	-0.215	-0.101	0.045	-0.008	-0.024	0.095	-0.008	-0.062	-0.061
b2	0.069	-0.107	0.050	0.012	-0.228	0.929	-0.325	-0.211	-0.122	-0.078	0.112	-0.115	-0.010	-0.025	0.022
b3	-0.088	0.168	-0.101	-0.015	-0.215	-0.325	0.942	-0.002	-0.116	0.053	-0.060	-0.024	0.048	-0.037	0.036
b4	-0.074	0.134	-0.017	-0.019	-0.101	-0.211	-0.002	0.954	-0.229	-0.052	-0.097	-0.044	0.027	-0.008	0.020
b5	0.013	-0.177	0.144	-0.031	0.045	-0.122	-0.116	-0.229	0.935	-0.273	0.011	-0.150	-0.164	0.028	-0.024
b6	-0.032	0.106	-0.083	0.026	-0.008	-0.078	0.053	-0.052	-0.273	0.938	-0.182	0.007	-0.081	0.055	-0.108
b7	-0.002	-0.033	-0.052	-0.018	-0.024	0.112	-0.060	-0.097	0.011	-0.182	0.946	-0.428	-0.151	-0.117	0.083
b8	-0.050	0.028	-0.040	-0.014	0.095	-0.115	-0.024	-0.044	-0.150	0.007	-0.428	0.950	-0.257	0.045	-0.074
b9	-0.035	0.087	-0.031	-0.072	-0.008	-0.010	0.048	0.027	-0.164	-0.081	-0.151	-0.257	0.961	-0.068	0.081
b10	0.023	-0.064	0.138	-0.042	-0.062	-0.025	-0.037	-0.008	0.028	0.055	-0.117	0.045	-0.068	0.926	-0.544
b11	-0.096	0.069	-0.042	-0.031	-0.061	0.022	0.036	0.020	-0.024	-0.108	0.083	-0.074	0.081	-0.544	0.903
b12	0.122	-0.021	-0.001	0.057	0.139	-0.036	-0.031	0.027	-0.074	0.019	-0.018	-0.028	-0.086	-0.027	-0.514
b13	0.016	0.031	-0.050	0.107	-0.082	0.005	0.007	-0.147	-0.075	0.059	-0.120	-0.038	0.111	-0.161	0.026
b14	-0.070	0.035	0.122	-0.111	0.037	-0.152	0.081	0.041	0.055	-0.034	-0.009	-0.061	-0.079	0.093	-0.001
b15	0.056	-0.017	-0.153	0.063	-0.040	0.161	-0.121	0.081	-0.118	-0.166	0.068	0.057	0.048	-0.068	-0.071
b16	-0.067	0.020	-0.002	0.014	-0.105	-0.010	0.002	0.089	-0.128	0.100	-0.092	0.013	0.081	0.056	0.037
b17	0.159	0.019	-0.009	-0.101	0.086	-0.018	0.053	-0.062	0.036	-0.077	0.031	-0.063	-0.007	-0.039	-0.052
b18	-0.110	-0.065	0.068	-0.027	-0.093	0.107	-0.098	0.040	0.092	-0.080	0.054	-0.044	-0.019	-0.046	0.076
b19	-0.127	-0.090	0.052	-0.001	-0.101	0.079	-0.072	-0.123	0.021	0.075	0.019	0.095	0.016	0.078	-0.003
b20	0.022	0.091	-0.182	-0.058	0.001	0.071	-0.040	0.026	-0.064	-0.042	-0.006	0.037	0.058	-0.084	0.087
b21	-0.095	-0.142	0.088	0.114	0.004	-0.038	0.007	-0.002	0.103	-0.037	0.040	-0.061	-0.013	-0.061	-0.013
b22	0.035	-0.045	0.071	-0.072	0.049	0.004	0.023	-0.097	0.077	0.071	-0.070	0.111	-0.161	-0.006	-0.057
b23	-0.126	-0.005	0.011	0.006	-0.034	-0.035	0.112	0.040	-0.028	-0.062	-0.128	0.063	0.010	0.095	0.031
b24	0.105	-0.073	0.030	0.031	-0.037	-0.119	-0.083	-0.021	0.105	0.027	0.013	-0.118	-0.031	-0.050	0.067
b25	-0.018	-0.005	0.011	0.011	0.016	-0.020	-0.034	-0.026	-0.026	-0.056	-0.139	0.093	0.042	0.015	-0.087
b26	-0.029	-0.030	0.050	-0.034	0.016	-0.005	-0.013	0.119	-0.008	-0.007	-0.083	0.087	-0.085	-0.003	-0.003
b27	0.025	-0.061	0.019	0.052	0.139	0.016	-0.004	-0.124	-0.017	0.129	0.133	-0.072	-0.075	0.007	-0.055
c1	-0.071	0.068	0.078	-0.047	-0.111	0.005	-0.041	0.009	0.007	0.004	-0.056	-0.035	0.078	-0.001	0.197
c2	0.102	-0.086	-0.021	-0.067	0.086	-0.049	-0.023	-0.084	0.168	-0.138	0.056	-0.001	-0.033	0.095	-0.075
c3	-0.049	0.073	-0.061	-0.003	-0.093	0.087	0.099	0.038	-0.050	-0.090	0.053	-0.050	0.017	-0.021	0.007
c4	0.092	-0.029	-0.014	0.019	-0.095	0.035	0.041	-0.106	-0.046	0.119	0.047	-0.021	-0.035	-0.067	-0.001
c5	-0.059	-0.082	0.015	0.035	0.095	-0.071	-0.064	-0.025	0.170	-0.073	-0.013	0.047	-0.139	-0.036	-0.030
c6	-0.103	-0.092	0.116	0.046	0.012	-0.015	-0.028	-0.010	-0.059	0.058	-0.078	0.050	0.032	0.116	-0.043
c7	0.111	0.052	-0.060	-0.068	-0.025	0.066	-0.029	-0.016	0.011	-0.049	0.013	-0.014	0.059	-0.103	-0.007
c8	-0.003	-0.045	0.096	-0.041	-0.191	-0.026	0.070	0.154	-0.131	0.086	0.003	-0.073	-0.034	0.041	-0.098
c9	-0.045	-0.003	-0.027	0.048	0.113	0.032	0.024	-0.036	0.058	-0.085	-0.031	-0.009	0.071	-0.058	0.162
c10	-0.028	-0.015	0.069	-0.066	0.080	0.023	-0.036	0.014	0.003	0.051	-0.088	0.091	-0.016	-0.010	-0.081
c11	-0.016	0.019	-0.029	0.097	0.119	0.011	-0.067	-0.045	-0.112	0.064	-0.034	0.005	0.058	0.054	0.012
c12	-0.018	0.009	-0.034	0.048	-0.115	-0.006	-0.098	-0.008	0.045	0.011	-0.081	0.033	0.007	0.034	-0.024
c13	0.148	-0.061	0.039	0.042	0.004	-0.010	0.064	-0.053	-0.069	0.014	-0.012	0.039	-0.066	-0.031	0.053
c14	0.032	0.026	-0.055	-0.048	-0.026	0.021	-0.041	0.073	0.143	-0.161	0.154	-0.128	0.006	-0.039	-0.074
c15	-0.103	0.085	-0.065	-0.006	0.034	-0.037	-0.061	0.024	0.006	0.097	-0.025	-0.047	0.012	0.091	0.015



**Table 27A: Anti-Image Correlation Matrix (Continued)**

	b12	b13	b14	b15	b16	b17	b18	b19	b20	b21	b22	b23	b24	b25	b26
a1	0.041	-0.055	0.037	-0.021	0.009	0.007	-0.012	-0.033	0.161	-0.026	-0.078	-0.008	0.141	-0.076	0.003
a2	0.074	0.030	-0.091	0.004	-0.055	0.075	-0.107	-0.087	-0.020	0.062	-0.071	0.044	-0.115	0.079	-0.104
a3	-0.061	0.012	-0.076	0.113	0.099	-0.090	0.014	0.077	-0.031	-0.029	-0.066	-0.017	-0.075	0.067	0.047
a4	-0.006	-0.047	0.030	0.020	-0.093	0.061	-0.084	-0.014	-0.012	0.153	0.104	-0.141	0.042	-0.058	0.003
a5	-0.019	-0.005	0.019	0.076	-0.032	0.088	0.028	-0.021	-0.011	-0.140	0.023	0.010	0.035	0.013	-0.059
a6	-0.007	0.093	0.014	-0.031	0.008	-0.110	0.076	-0.010	-0.004	0.086	-0.023	0.055	-0.047	-0.073	-0.049
a7	-0.045	0.036	-0.008	-0.020	0.030	0.015	-0.074	0.046	-0.026	-0.061	0.023	0.116	0.000	-0.038	0.012
a8	0.024	0.006	0.022	-0.010	-0.061	0.023	-0.059	0.033	-0.109	0.064	-0.007	-0.093	0.095	-0.056	-0.025
a9	-0.064	0.003	-0.021	0.076	0.109	-0.155	0.041	0.151	-0.006	0.017	0.014	-0.118	0.061	-0.042	-0.071
a10	0.085	-0.009	-0.045	-0.063	0.016	0.095	-0.139	0.025	0.064	-0.037	-0.031	0.065	-0.145	0.101	0.070
a11	-0.027	0.067	0.097	-0.062	-0.003	0.109	0.017	-0.026	-0.007	-0.056	0.003	0.038	0.008	-0.063	0.017
a12	0.114	-0.085	0.013	-0.005	0.040	-0.004	0.064	0.014	-0.129	-0.085	0.116	-0.088	0.013	0.052	0.008
a13	0.002	-0.038	-0.009	-0.014	-0.116	0.012	0.042	-0.016	-0.045	0.060	0.013	0.013	0.036	-0.053	0.056
a14	0.051	0.067	-0.123	0.069	0.005	0.055	-0.075	0.005	0.033	0.003	0.025	-0.102	-0.089	0.003	0.008
a15	-0.144	0.015	0.007	-0.039	-0.015	-0.089	0.095	-0.097	0.011	0.045	-0.118	0.092	-0.027	0.008	-0.032
a16	0.122	0.016	-0.070	0.056	-0.067	0.159	-0.110	-0.127	0.022	-0.095	0.035	-0.126	0.105	-0.018	-0.029
a17	-0.021	0.031	0.035	-0.017	0.020	0.019	-0.065	-0.090	0.091	-0.142	-0.045	-0.005	-0.073	-0.005	-0.030
a18	-0.001	-0.050	0.122	-0.153	-0.002	-0.009	0.068	0.052	-0.182	0.088	0.071	0.011	0.030	0.011	0.050
a19	0.057	0.107	-0.111	0.063	0.014	-0.101	-0.027	-0.001	-0.058	0.114	-0.072	0.006	0.031	0.011	-0.034
b1	0.139	-0.082	0.037	-0.040	-0.105	0.086	-0.093	-0.101	0.001	0.004	0.049	-0.034	-0.037	0.016	0.016
b2	-0.036	0.005	-0.152	0.161	-0.010	-0.018	0.107	0.079	0.071	-0.038	0.004	-0.035	-0.119	-0.020	-0.005
b3	-0.031	0.007	0.081	-0.121	0.002	0.053	-0.098	-0.072	-0.040	0.007	0.023	0.112	-0.083	-0.034	-0.013
b4	0.027	-0.147	0.041	0.081	0.089	-0.062	0.040	-0.123	0.026	-0.002	-0.097	0.040	-0.021	-0.026	0.119
b5	-0.074	-0.075	0.055	-0.118	-0.128	0.036	0.092	0.021	-0.064	0.103	0.077	-0.028	0.105	-0.026	-0.008
b6	0.019	0.059	-0.034	-0.166	0.100	-0.077	-0.080	0.075	-0.042	-0.037	0.071	-0.062	0.027	-0.056	-0.007
b7	-0.018	-0.120	-0.009	0.068	-0.092	0.031	0.054	0.019	-0.006	0.040	-0.070	-0.128	0.013	-0.139	-0.083
b8	-0.028	-0.038	-0.061	0.057	0.013	-0.063	-0.044	0.095	0.037	-0.061	0.111	0.063	-0.118	0.093	0.087
b9	-0.086	0.111	-0.079	0.048	0.081	-0.007	-0.019	0.016	0.058	-0.013	-0.161	0.010	-0.031	0.042	-0.085
b10	-0.027	-0.161	0.093	-0.068	0.056	-0.039	-0.046	0.078	-0.084	-0.061	-0.006	0.095	-0.050	0.015	-0.003
b11	-0.514	0.026	-0.001	-0.071	0.037	-0.052	0.076	-0.003	0.087	-0.013	-0.057	0.031	0.067	-0.087	-0.003
b12	0.932	-0.124	-0.119	0.063	-0.026	0.042	-0.025	-0.094	-0.083	-0.064	0.028	0.007	-0.060	0.071	-0.012
b13	-0.124	0.957	-0.342	-0.115	-0.056	0.019	0.002	-0.038	0.044	0.038	-0.029	-0.035	-0.025	0.062	0.053
b14	-0.119	-0.342	0.935	-0.464	0.092	-0.040	0.021	0.002	-0.088	0.021	0.083	-0.123	0.090	-0.042	-0.055
b15	0.063	-0.115	-0.464	0.929	-0.111	-0.026	-0.093	0.076	0.038	-0.052	-0.138	0.008	-0.025	0.087	-0.093
b16	-0.026	-0.056	0.092	-0.111	0.917	-0.486	-0.090	-0.046	0.013	-0.065	-0.041	0.060	0.014	-0.101	-0.009
b17	0.042	0.019	-0.040	-0.026	-0.486	0.903	-0.319	-0.030	0.000	-0.060	0.140	-0.122	0.011	-0.079	0.103
b18	-0.025	0.002	0.021	-0.093	-0.090	-0.319	0.938	-0.180	0.079	-0.049	-0.118	0.082	-0.010	-0.003	-0.050
b19	-0.094	-0.038	0.002	0.076	-0.046	-0.030	-0.180	0.955	-0.163	-0.082	0.066	-0.108	-0.020	-0.055	0.027
b20	-0.083	0.044	-0.088	0.038	0.013	0.000	0.079	-0.163	0.926	-0.299	-0.106	-0.076	0.072	0.006	-0.129
b21	-0.064	0.038	0.021	-0.052	-0.065	-0.060	-0.049	-0.082	-0.299	0.943	-0.029	-0.022	0.001	-0.026	0.009
b22	0.028	-0.029	0.083	-0.138	-0.041	0.140	-0.118	0.066	-0.106	-0.029	0.916	-0.141	-0.259	0.019	-0.028
b23	0.007	-0.035	-0.123	0.008	0.060	-0.122	0.082	-0.108	-0.076	-0.022	-0.141	0.937	-0.350	0.074	0.004
b24	-0.060	-0.025	0.090	-0.025	0.014	0.011	-0.010	-0.020	0.072	0.001	-0.259	-0.350	0.926	-0.294	0.031
b25	0.071	0.062	-0.042	0.087	-0.101	-0.079	-0.003	-0.055	0.006	-0.026	0.019	0.074	-0.294	0.951	-0.253
b26	-0.012	0.053	-0.055	-0.093	-0.009	0.103	-0.050	0.027	-0.129	0.009	-0.028	0.004	0.031	-0.253	0.947
b27	0.057	-0.164	0.121	-0.068	0.106	-0.088	-0.040	-0.046	-0.012	0.009	0.046	-0.045	-0.020	-0.168	-0.446
c1	-0.132	0.001	0.074	-0.043	0.033	-0.104	0.072	0.049	-0.003	-0.160	-0.009	-0.037	0.130	-0.120	0.063
c2	-0.065	-0.143	0.017	0.030	0.015	0.038	-0.086	0.031	-0.031	0.000	0.149	-0.069	0.020	0.056	-0.008
c3	0.011	0.017	-0.026	0.013	0.028	-0.106	0.114	0.023	0.051	0.044	-0.141	0.077	-0.082	-0.030	-0.049
c4	0.098	0.044	-0.065	-0.035	-0.096	0.183	-0.067	-0.089	0.035	-0.022	-0.068	-0.030	0.005	-0.107	0.030
c5	-0.008	0.016	0.007	-0.041	0.036	-0.142	0.129	-0.039	-0.036	0.052	-0.019	0.075	-0.028	0.082	0.023
c6	-0.052	0.056	-0.028	-0.019	0.005	0.007	-0.039	0.053	-0.081	-0.008	0.070	0.021	-0.089	0.076	-0.051
c7	0.064	-0.039	0.022	0.062	-0.035	0.033	0.003	-0.113	0.017	-0.060	-0.130	0.054	-0.032	0.024	0.025
c8	0.062	-0.006	-0.014	0.098	0.007	-0.028	-0.044	0.048	-0.032	0.097	-0.002	-0.028	0.042	-0.088	-0.087
c9	-0.115	0.035	0.042	-0.077	-0.054	0.073	-0.018	-0.003	-0.002	0.045	-0.005	0.030	0.051	-0.050	0.075
c10	0.095	-0.003	-0.018	-0.049	-0.008	-0.038	0.025	-0.066	-0.012	0.006	0.078	-0.122	-0.019	0.058	-0.004
c11	-0.022	0.107	-0.099	0.048	-0.087	-0.013	-0.069	0.012	-0.007	-0.113	0.009	0.085	-0.115	0.122	0.026
c12	-0.079	0.064	0.024	0.060	0.029	0.020	-0.014	0.056	0.088	0.037	-0.011	0.002	0.016	0.049	-0.080
c13	-0.001	-0.055	-0.008	0.079	-0.026	0.017	-0.080	-0.021	-0.035	-0.001	0.120	0.010	0.003	0.054	-0.056
c14	0.045	-0.015	-0.067	0.012	0.044	-0.016	0.118	-0.050	0.031	-0.016	-0.068	-0.063	0.054	0.055	-0.108
c15	0.007	-0.085	0.043	-0.047	0.076	-0.017	0.034	-0.026	0.117	-0.137	-0.061	0.041	0.035	-0.117	0.041

**Table 27A: Anti-Image Correlation Matrix (Continued)**

	b27	c1	c2	c3	c4	c5	c6	c7	c8	c9	c10	c11	c12	c13	c14	c15
a1	0.087	-0.020	-0.038	0.035	-0.096	0.086	0.038	0.079	-0.059	-0.025	-0.033	-0.135	0.041	-0.111	0.091	0.086
a2	-0.016	-0.109	-0.001	0.105	0.143	-0.094	-0.105	0.063	0.001	-0.027	-0.025	0.060	-0.121	0.007	0.027	-0.029
a3	-0.135	-0.047	-0.024	0.049	-0.006	0.046	0.010	-0.030	0.106	-0.091	-0.076	0.065	0.001	0.012	0.017	0.019
a4	0.102	-0.042	0.048	-0.082	0.095	-0.058	-0.062	0.082	-0.009	-0.007	0.040	-0.064	0.096	-0.035	-0.133	-0.012
a5	-0.074	0.018	0.097	0.011	-0.004	-0.125	-0.044	-0.003	0.022	-0.042	0.045	-0.045	0.101	0.071	-0.043	-0.071
a6	0.074	-0.067	-0.006	0.095	0.070	-0.012	0.024	0.032	0.081	0.008	-0.077	-0.101	0.056	-0.033	0.049	-0.138
a7	-0.055	0.070	-0.012	-0.033	-0.034	0.046	0.005	-0.087	0.040	-0.001	-0.049	0.106	-0.045	0.112	-0.073	0.042
a8	0.138	0.002	-0.022	0.032	0.090	0.083	-0.093	0.025	-0.045	0.007	-0.035	0.048	-0.029	0.000	-0.080	-0.014
a9	-0.055	0.113	0.059	0.087	-0.144	-0.122	-0.061	0.003	0.046	-0.004	0.015	0.047	-0.046	-0.023	0.015	0.014
a10	-0.004	-0.104	-0.046	-0.099	0.060	0.116	0.026	-0.063	0.011	-0.003	0.018	0.001	0.004	-0.021	0.040	0.027
a11	-0.009	0.092	-0.057	-0.041	0.106	-0.093	0.027	0.106	-0.071	0.056	-0.032	-0.021	0.011	-0.087	-0.008	0.002
a12	-0.003	-0.082	0.036	-0.077	-0.054	0.022	0.009	-0.138	0.096	-0.051	0.101	-0.042	-0.047	0.039	0.072	0.081
a13	-0.088	-0.001	-0.006	-0.010	-0.052	0.075	0.112	-0.091	0.009	-0.035	0.009	-0.067	-0.072	0.101	0.015	-0.043
a14	0.063	0.017	0.016	-0.013	0.006	-0.043	0.058	-0.018	-0.108	0.108	0.071	0.023	0.021	-0.107	0.055	-0.043
a15	-0.054	0.043	-0.109	0.041	0.009	0.030	-0.009	-0.022	-0.023	-0.003	0.019	-0.012	-0.036	-0.054	-0.026	0.147
a16	0.025	-0.071	0.102	-0.049	0.092	-0.059	-0.103	0.111	-0.003	-0.045	-0.028	-0.016	-0.018	0.148	0.032	-0.103
a17	-0.061	0.068	-0.086	0.073	-0.029	-0.082	-0.092	0.052	-0.045	-0.003	-0.015	0.019	0.009	-0.061	0.026	0.085
a18	0.019	0.078	-0.021	-0.061	-0.014	0.015	0.116	-0.060	0.096	-0.027	0.069	-0.029	-0.034	0.039	-0.055	-0.065
a19	0.052	-0.047	-0.067	-0.003	0.019	0.035	0.046	-0.068	-0.041	0.048	-0.066	0.097	0.048	0.042	-0.048	-0.006
b1	0.139	-0.111	0.086	-0.093	-0.095	0.095	0.012	-0.025	-0.191	0.113	0.080	0.119	-0.115	0.004	-0.026	0.034
b2	0.016	0.005	-0.049	0.087	0.035	-0.071	-0.015	0.066	-0.026	0.032	0.023	0.011	-0.006	-0.010	0.021	-0.037
b3	-0.004	-0.041	-0.023	0.099	0.041	-0.064	-0.028	-0.029	0.070	0.024	-0.036	-0.067	-0.098	0.064	-0.041	-0.061
b4	-0.124	0.009	-0.084	0.038	-0.106	-0.025	-0.010	-0.016	0.154	-0.036	0.014	-0.045	-0.008	-0.053	0.073	0.024
b5	-0.017	0.007	0.168	-0.050	-0.046	0.170	-0.059	0.011	-0.131	0.058	0.003	-0.112	0.045	-0.069	0.143	0.006
b6	0.129	0.004	-0.138	-0.090	0.119	-0.073	0.058	-0.049	0.086	-0.085	0.051	0.064	0.011	0.014	-0.161	0.097
b7	0.133	-0.056	0.056	0.053	0.047	-0.013	-0.078	0.013	0.003	-0.031	-0.088	-0.034	-0.081	-0.012	0.154	-0.025
b8	-0.072	-0.035	-0.001	-0.050	-0.021	0.047	0.050	-0.014	-0.073	-0.009	0.091	0.005	0.033	0.039	-0.128	-0.047
b9	-0.075	0.078	-0.033	0.017	-0.035	-0.139	0.032	0.059	-0.034	0.071	-0.016	0.058	0.007	-0.066	0.006	0.012
b10	0.007	-0.001	0.095	-0.021	-0.067	-0.036	0.116	-0.103	0.041	-0.058	-0.010	0.054	0.034	-0.031	-0.039	0.091
b11	-0.055	0.197	-0.075	0.007	-0.001	-0.030	-0.043	-0.007	-0.098	0.162	-0.081	0.012	-0.024	0.053	-0.074	0.015
b12	0.057	-0.132	-0.065	0.011	0.098	-0.008	-0.052	0.064	0.062	-0.115	0.095	-0.022	-0.079	-0.001	0.045	0.007
b13	-0.164	0.001	-0.143	0.017	0.044	0.016	0.056	-0.039	-0.006	0.035	-0.003	0.107	0.064	-0.055	-0.015	-0.085
b14	0.121	0.074	0.017	-0.026	-0.065	0.007	-0.028	0.022	-0.014	0.042	-0.018	-0.099	0.024	-0.008	-0.067	0.043
b15	-0.068	-0.043	0.030	0.013	-0.035	-0.041	-0.019	0.062	0.098	-0.077	-0.049	0.048	0.060	0.079	0.012	-0.047
b16	0.106	0.033	0.015	0.028	-0.096	0.036	0.005	-0.035	0.007	-0.054	-0.008	-0.087	0.029	-0.026	0.044	0.076
b17	-0.088	-0.104	0.038	-0.106	0.183	-0.142	0.007	0.033	-0.028	0.073	-0.038	-0.013	0.020	0.017	-0.016	-0.017
b18	-0.040	0.072	-0.086	0.114	-0.067	0.129	-0.039	0.003	-0.044	-0.018	0.025	-0.069	-0.014	-0.080	0.118	0.034
b19	-0.046	0.049	0.031	0.023	-0.089	-0.039	0.053	-0.113	0.048	-0.003	-0.066	0.012	0.056	-0.021	-0.050	-0.026
b20	-0.012	-0.003	-0.031	0.051	0.035	-0.036	-0.081	0.017	-0.032	-0.002	-0.012	-0.007	0.088	-0.035	0.031	0.117
b21	0.009	-0.160	0.000	0.044	-0.022	0.052	-0.008	-0.060	0.097	0.045	0.006	-0.113	0.037	-0.001	-0.016	-0.137
b22	0.046	-0.009	0.149	-0.141	-0.068	-0.019	0.070	-0.130	-0.002	-0.005	0.078	0.009	-0.011	0.120	-0.068	-0.061
b23	-0.045	-0.037	-0.069	0.077	-0.030	0.075	0.021	0.054	-0.028	0.030	-0.122	0.085	0.002	0.010	-0.063	0.041
b24	-0.020	0.130	0.020	-0.082	0.005	-0.028	-0.089	-0.032	0.042	0.051	-0.019	-0.115	0.016	0.003	0.054	0.035
b25	-0.168	-0.120	0.056	-0.030	-0.107	0.082	0.076	0.024	-0.088	-0.050	0.058	0.122	0.049	0.054	0.055	-0.117
b26	-0.446	0.063	-0.008	-0.049	0.030	0.023	-0.051	0.025	-0.087	0.075	-0.004	0.026	-0.080	-0.056	-0.108	0.041
b27	0.930	-0.002	-0.043	-0.008	0.054	-0.019	-0.108	-0.017	0.061	-0.064	0.018	-0.001	-0.052	0.019	-0.104	0.031
c1	-0.002	0.938	-0.332	-0.215	-0.004	-0.094	-0.066	-0.088	-0.148	0.205	-0.077	0.114	0.018	0.038	-0.179	0.006
c2	-0.043	-0.332	0.947	-0.285	-0.172	-0.007	-0.073	0.085	-0.145	0.007	0.041	-0.057	-0.006	0.150	0.033	-0.120
c3	-0.008	-0.215	-0.285	0.945	-0.103	-0.164	-0.079	0.096	0.061	-0.142	-0.092	-0.024	-0.056	-0.122	0.078	0.155
c4	0.054	-0.004	-0.172	-0.103	0.945	-0.331	-0.163	-0.060	-0.053	0.000	-0.073	-0.049	0.082	-0.183	0.048	-0.026
c5	-0.019	-0.094	-0.007	-0.164	-0.331	0.947	-0.070	-0.025	-0.064	-0.134	0.007	0.027	-0.059	0.060	0.030	0.016
c6	-0.108	-0.066	-0.073	-0.079	-0.163	-0.070	0.964	-0.204	0.016	-0.060	0.043	0.028	0.027	-0.051	0.087	-0.058
c7	-0.017	-0.088	0.085	0.096	-0.060	-0.025	-0.204	0.956	-0.203	-0.011	0.021	-0.188	-0.103	0.007	-0.054	-0.143
c8	0.061	-0.148	-0.145	0.061	-0.053	-0.064	0.016	-0.203	0.939	-0.431	-0.139	-0.096	0.130	0.038	0.004	-0.048
c9	-0.064	0.205	0.007	-0.142	0.000	-0.134	-0.060	-0.011	-0.431	0.930	-0.121	0.056	-0.150	-0.017	-0.102	-0.031
c10	0.018	-0.077	0.041	-0.092	-0.073	0.007	0.043	0.021	-0.139	-0.121	0.967	-0.182	-0.132	-0.175	-0.063	0.032
c11	-0.001	0.114	-0.057	-0.024	-0.049	0.027	0.028	-0.188	-0.096	0.056	-0.182	0.938	-0.302	0.085	-0.136	-0.049
c12	-0.052	0.018	-0.006	-0.056	0.082	-0.059	0.027	-0.103	0.130	-0.150	-0.132	-0.302	0.942	-0.136	-0.018	-0.195
c13	0.019	0.038	0.150	-0.122	-0.183	0.060	-0.051	0.007	0.038	-0.017	-0.175	0.085	-0.136	0.925	-0.346	-0.285
c14	-0.104	-0.179	0.033	0.078	0.048	0.030	0.087	-0.054	0.004	-0.102	-0.063	-0.136	-0.018	-0.346	0.937	-0.178
c15	0.031	0.006	-0.120	0.155	-0.026	0.016	-0.058	-0.143	-0.048	-0.031	0.032	-0.049	-0.195	-0.285	-0.178	0.934

## Appendix 6: Factor Extraction Table

**Table 28A: Eigenvalues and the Explained Percentage of Variance by the Factors**

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	20.067	32.897	32.897	20.067	32.897	32.897
2	3.660	6.000	38.897	3.660	6.000	38.897
3	3.430	5.623	44.521	3.430	5.623	44.521
4	2.350	3.853	48.374	2.350	3.853	48.374
5	1.903	3.120	51.493	1.903	3.120	51.493
6	1.671	2.739	54.232	1.671	2.739	54.232
7	1.483	2.431	56.663	1.483	2.431	56.663
8	1.430	2.344	59.008	1.430	2.344	59.008
9	1.403	2.300	61.308	1.403	2.300	61.308
10	1.258	2.062	63.370	1.258	2.062	63.370
11	1.206	1.976	65.346	1.206	1.976	65.346
12	1.041	1.706	67.052	1.041	1.706	67.052
13	1.017	1.668	68.720	1.017	1.668	68.720
14	0.951	1.559	70.279			
15	0.837	1.372	71.651			
16	0.768	1.259	72.910			
17	0.751	1.231	74.141			
18	0.727	1.192	75.333			
19	0.716	1.174	76.507			
20	0.703	1.153	77.660			
21	0.638	1.046	78.706			
22	0.617	1.011	79.717			
23	0.591	0.970	80.687			
24	0.563	0.922	81.609			
25	0.548	0.899	82.508			
26	0.538	0.882	83.390			
27	0.501	0.821	84.212			
28	0.486	0.797	85.009			
29	0.476	0.781	85.790			
30	0.452	0.741	86.531			
31	0.446	0.732	87.263			
32	0.430	0.704	87.967			
33	0.415	0.680	88.647			
34	0.396	0.650	89.297			
35	0.389	0.638	89.936			
36	0.369	0.605	90.540			
37	0.362	0.594	91.134			
38	0.350	0.574	91.708			
39	0.329	0.540	92.248			
40	0.315	0.516	92.764			
41	0.303	0.496	93.260			
42	0.297	0.486	93.746			
43	0.278	0.456	94.203			
44	0.274	0.449	94.651			
45	0.262	0.430	95.081			
46	0.254	0.416	95.497			
47	0.246	0.403	95.900			
48	0.239	0.393	96.293			
49	0.225	0.368	96.661			
50	0.216	0.354	97.015			
51	0.208	0.341	97.357			
52	0.204	0.335	97.692			
53	0.192	0.315	98.007			
54	0.190	0.312	98.319			
55	0.182	0.298	98.617			
56	0.167	0.273	98.890			
57	0.154	0.253	99.143			
58	0.145	0.238	99.381			
59	0.137	0.224	99.605			
60	0.133	0.217	99.823			
61	0.108	0.177	100.000			

## Appendix 7: Rotated Factor Table

**Table 29A: Rotated Component Matrices with VARIMAX Rotation**

	Component												
	1	2	3	4	5	6	7	8	9	10	11	12	13
b11	0.830												
b12	0.803												
b10	0.772												
b13	0.671												
b14	0.661												
b15	0.627												
b6	0.589												
b8	0.578												
b5	0.525			0.438									
b9	0.508												
b7	0.507												
c15		0.771											
c12		0.769											
c13		0.747											
c11		0.714											
c14		0.697											
c10		0.649											
c7		0.627											
c9		0.559	0.443										
c3			0.772										
c2			0.726										
c1			0.700										
c5			0.693										
c4			0.646										
c8		0.491	0.544										
c6			0.544										
b2				0.770									
b3				0.659									
b1				0.602									
b4				0.575									
a3					0.730								
a2					0.653								
a1					0.640								
a4					0.581								
a8						0.723							
a9						0.697							
a11						0.662							
a10						0.572							
a12						0.521							
a13													
a15							0.711						
a16							0.664						
a14							0.616						
b23													
a5								0.677					
a6								0.673					
a7								0.603					
a18									0.853				
a17									0.783				
a19									0.709				
b16										0.808			
b17										0.727			
b18										0.656			
b19													
b26											0.720		
b27											0.701		
b25											0.548		
b22												0.754	
b24												0.668	
b21													0.460
b20													0.454

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 15 iterations.

**Table 30A: Pattern Matrix with OBLIMIN Rotation**

	Component												
	1	2	3	4	5	6	7	8	9	10	11	12	13
c3	0.812												
c2	0.760												
c1	0.756												
c5	0.700												
c4	0.640												
c6	0.524												
c8	0.484												
b11		-0.831											
b10		-0.796											
b12		-0.772											
b15		-0.566											
b13		-0.563											
b14		-0.545											
b6													
c12			-0.769										
c15			-0.756										
c13			-0.748										
c11			-0.699										
c14			-0.685										
c10			-0.582										
c7			-0.539										
c9			-0.469										
b2				0.782									
b3				0.653									
b1				0.588									
b4				0.524									
b5													
a8					0.730								
a9					0.711								
a11					0.631								
a10					0.521								
a12					0.449								
a3						0.730							
a2						0.650							
a1						0.628							
a4						0.553							
a13													
b16							0.886						
b17							0.793						
b18							0.686						
a18								0.959					
a17								0.861					
a19								0.775					
b21									0.423				
b7									-0.422				
b8									-0.416				
b20									0.409				
b9									-0.404				
b22										0.775			
b24										0.670			
a15											-0.732		
a16											-0.670		
a14											-0.626		
b19													
b26												-0.769	
b27												-0.755	
b25												-0.592	
a5													0.579
a6													0.577
a7													0.517
b23													-0.487

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.

a. Rotation converged in 36 iterations.

## Appendix 8: Questionnaire Items with Orthogonal (VARIMAX) Rotation

**Table 31A: VARIMAX Rotated Component Matrix with Variables**

No	Item Name	Component												
		1	2	3	4	5	6	7	8	9	10	11	12	13
b11	Recreational facilities are easy to access.	0.830												
b12	Recreational facilities are well maintained.	0.803												
b10	Recreational facilities are offered to students.	0.772												
b13	Computers are well maintained.	0.671												
b14	Computer software is updated regularly.	0.661												
b15	Computers are accessible for students.	0.627												
b6	The appearance of the campus and its buildings is attractive.	0.589												
b8	Classrooms have quality equipment.	0.578												
b5	The campus has excellent supporting facilities (e.g. canteen).	0.525			0.438									
b9	Classrooms are always neat and clean.	0.508												
b7	Classrooms are comfortable and bright.	0.507												
c15	I have developed personal qualities (e.g. problem solving, initiative, time management)		0.771											
c12	I have gained the ability to work in a team.		0.769											
c13	I have developed communication skills (e.g. oral presentation, report writing).		0.747											
c11	I understand ethical codes, responsibilities and norms in my area of study.		0.714											
c14	I have developed technical skill (e.g. use of software).		0.697											
c10	I have gained knowledge and skills applicable to a specific career.		0.649											
c7	I have developed my personal values and ethics.		0.627											
c9	I have developed the ability to apply theory to practice.		0.559	0.443										
c3	I have gained a background and specialization for further education in a professional discipline.			0.772										
c2	I have gained some deep and detailed knowledge of the subjects I study.			0.726										
c1	I understand the conceptual framework, major theories, and basic formulae in the subjects I study.			0.700										
c5	I have gained a broad knowledge of different fields.			0.693										
c4	I have developed critical thinking and reasoning skills.			0.646										
c8	I have developed competency in my field of study.		0.491	0.544										
c6	I have learned how to learn.			0.544										
b2	University residential accommodation provides good living conditions.				0.770									
b3	Living on campus is convenient				0.659									
b1	University residential accommodation is charged at a reasonable price.				0.602									
b4	The campus is neat and clean.				0.575									

**Table 31A: VARIMAX Rotated Component Matrix with Variables (Continued)**

No	Item Name	Component												
		1	2	3	4	5	6	7	8	9	10	11	12	13
a3	Lecturers deliver theoretical and practical mixed subjects.					0.730								
a2	Lecturers have extensive knowledge about their subjects.					0.653								
a1	Lecturers have good communication skills.					0.640								
a4	Classes are well prepared and organized.					0.581								
a8	I can contact my lecturers with a minimum effort.						0.723							
a9	I can find my lecturers in their offices most of the time.						0.697							
a11	I feel comfortable when talking with lecturers.						0.662							
a10	My lecturers are ready to solve my problems.						0.572							
a12	My lecturers deal with my problem in a concerned fashion.						0.521							
a13	My lecturers encourage students to participate in class discussion.													
a15	Faculty administrators are courteous and polite.							0.711						
a16	Faculty administrators perform their duties properly.							0.664						
a14	The appearance of faculty administrators is neat and clean.							0.616						
b23	Security often patrols during the night.													
a5	The appearance of lecturers is neat and clean.								0.677					
a6	Lecturers are courteous and respectful.								0.673					
a7	Lecturers are friendly and helpful.								0.603					
a18	The course materials are relevant to the subjects.									0.853				
a17	The course materials (e.g. textbooks) are useful.									0.783				
a19	The course materials make complicated subjects understandable.									0.709				
b16	The library is a good place to study.										0.808			
b17	The library has an attractive layout and design.										0.727			
b18	The library provides an extensive collection of learning materials.										0.656			
b19	The active learning behavior and attitude of students sitting nearby me positively affects my learning during lectures.													
b26	I am offered an opportunity to participate in a variety of sports and recreational programs.											0.720		
b27	I am offered extra-curricular activities to share my own interest with others.											0.701		
b25	I enjoy my social life on campus.											0.548		
b22	Criminal activity rarely happens around campus.												0.754	
b24	I feel safe in the university.												0.668	
b21	I am impressed with the attitudes and behavior of my classmates.													0.460
b20	I am not disturbed by noise during lectures (e.g. mobile phones ringing, construction noise).													0.454

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 15 iterations.

## Appendix 9: Multicollinearity Statistics

**Table 32A: Pearson Correlation Matrix, Model 1**

		IQ	IT1	IT2	IT3	IT4	IT5
IQ: Interaction Quality	Pearson Correlation	1	0.621 <sup>**</sup>	0.558 <sup>**</sup>	0.577 <sup>**</sup>	0.476 <sup>**</sup>	0.534 <sup>**</sup>
	Sig. (2-tailed)		0.000	0.000	0.000	0.000	0.000
	N	350	350	350	350	350	350
IT1: Expertise	Pearson Correlation	0.621 <sup>**</sup>	1	0.514 <sup>**</sup>	0.513 <sup>**</sup>	0.560 <sup>**</sup>	0.484 <sup>**</sup>
	Sig. (2-tailed)	0.000		0.000	0.000	0.000	0.000
	N	350	350	350	350	350	350
IT2: Personal Communication	Pearson Correlation	0.558 <sup>**</sup>	0.514 <sup>**</sup>	1	0.502 <sup>**</sup>	0.459 <sup>**</sup>	0.413 <sup>**</sup>
	Sig. (2-tailed)	0.000	0.000		0.000	0.000	0.000
	N	350	350	350	350	350	350
IT3: Administration Staff	Pearson Correlation	0.577 <sup>**</sup>	0.513 <sup>**</sup>	0.502 <sup>**</sup>	1	0.520 <sup>**</sup>	0.473 <sup>**</sup>
	Sig. (2-tailed)	0.000	0.000	0.000		0.000	0.000
	N	350	350	350	350	350	350
IT4: Attitudes and Behaviours	Pearson Correlation	0.476 <sup>**</sup>	0.560 <sup>**</sup>	0.459 <sup>**</sup>	0.520 <sup>**</sup>	1	0.375 <sup>**</sup>
	Sig. (2-tailed)	0.000	0.000	0.000	0.000		0.000
	N	350	350	350	350	350	350
IT5: Course Content	Pearson Correlation	0.534 <sup>**</sup>	0.484 <sup>**</sup>	0.413 <sup>**</sup>	0.473 <sup>**</sup>	0.375 <sup>**</sup>	1
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	
	N	350	350	350	350	350	350

<sup>\*\*</sup>. Correlation is significant at the 0.01 level (2-tailed).



**Table 33A: Pearson Correlation Matrix, Model 2**

		PEQ	PE1	PE2	PE3	PE4	PE5	PE6
PEQ: Physical Environment Quality	Pearson Correlation	1	0.716**	0.586**	0.526**	0.585**	0.508**	0.426**
	Sig. (2-tailed)		0.000	0.000	0.000	0.000	0.000	0.000
	N	350	350	350	350	350	350	350
PE1: Physical Facilities	Pearson Correlation	0.716**	1	0.614**	0.493**	0.563**	0.465**	0.479**
	Sig. (2-tailed)	0.000		0.000	0.000	0.000	0.000	0.000
	N	350	350	350	350	350	350	350
PE2: University Accommodation	Pearson Correlation	0.586**	0.614**	1	0.426**	0.416**	0.454**	0.358**
	Sig. (2-tailed)	0.000	0.000		0.000	0.000	0.000	0.000
	N	350	350	350	350	350	350	350
PE3: Library	Pearson Correlation	0.526**	0.493**	0.426**	1	0.464**	0.368**	0.413**
	Sig. (2-tailed)	0.000	0.000	0.000		0.000	0.000	0.000
	N	350	350	350	350	350	350	350
PE4: Social Life	Pearson Correlation	0.585**	0.563**	0.416**	0.464**	1	0.492**	0.464**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000		0.000	0.000
	N	350	350	350	350	350	350	350
PE5: Safety	Pearson Correlation	0.508**	0.465**	0.454**	0.368**	0.492**	1	0.360**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000		0.000
	N	350	350	350	350	350	350	350
PE6: Social Factors	Pearson Correlation	0.426**	0.479**	0.358**	0.413**	0.464**	0.360**	1
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000	
	N	350	350	350	350	350	350	350

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

**Table 34A: Pearson Correlation Matrix, Model 3**

		OQ	OC1	OC2
OQ: Outcome Quality	Pearson Correlation	1	0.675**	0.675**
	Sig. (2-tailed)		0.000	0.000
	N	350	350	350
OC1: Personal Development	Pearson Correlation	0.675**	1	0.665**
	Sig. (2-tailed)	0.000		0.000
	N	350	350	350
OC2: Academic Development	Pearson Correlation	0.675**	0.665**	1
	Sig. (2-tailed)	0.000	0.000	
	N	350	350	350

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

**Table 35A: Pearson Correlation Matrix, Model 4**

		SQ	IQ	PEQ	OQ
SQ: Service Quality	Pearson Correlation	1	0.581**	0.739**	0.763**
	Sig. (2-tailed)		0.000	0.000	0.000
	N	350	350	350	350
IQ: Interaction Quality	Pearson Correlation	0.581**	1	0.541**	0.523**
	Sig. (2-tailed)	0.000		0.000	0.000
	N	350	350	350	350
PEQ: Physical Environment Quality	Pearson Correlation	0.739**	0.541**	1	0.657**
	Sig. (2-tailed)	0.000	0.000		0.000
	N	350	350	350	350
OQ: Outcome Quality	Pearson Correlation	0.763**	0.523**	0.657**	1
	Sig. (2-tailed)	0.000	0.000	0.000	
	N	350	350	350	350

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

**Table 36A: Pearson Correlation Matrix, Model 5 (a)**

		Satisfaction	Service Quality	Value
Satisfaction	Pearson Correlation	1	0.823**	0.596**
	Sig. (2-tailed)		0.000	0.000
	N	350	350	350
Service Quality	Pearson Correlation	0.823**	1	0.566**
	Sig. (2-tailed)	0.000		0.000
	N	350	350	350
Value	Pearson Correlation	0.596**	0.566**	1
	Sig. (2-tailed)	0.000	0.000	
	N	350	350	350

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

**Table 37A: Pearson Correlation Matrix, Model 5 (b)**

		Satisfaction	Service Quality ×Value
Satisfaction	Pearson Correlation	1	0.773**
	Sig. (2-tailed)		0.000
	N	350	350
Service Quality ×Value	Pearson Correlation	0.773**	1
	Sig. (2-tailed)	0.000	
	N	350	350

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

**Table 38A: Pearson Correlation Matrix, Model 6**

		Value	Service Quality
Value	Pearson Correlation	1	0.566**
	Sig. (2-tailed)		0.000
	N	350	350
Service Quality	Pearson Correlation	0.566**	1
	Sig. (2-tailed)	0.000	
	N	350	350

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

**Table 39A: Pearson Correlation Matrix, Model 7**

		Image	Service Quality
Image	Pearson Correlation	1	0.790**
	Sig. (2-tailed)		0.000
	N	350	350
Service Quality	Pearson Correlation	0.790**	1
	Sig. (2-tailed)	0.000	
	N	350	350

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

**Table 40A: Pearson Correlation Matrix, Model 8**

		Satisfaction	Value	Image	Service Quality
Satisfaction	Pearson Correlation	1	0.596**	0.828**	0.823**
	Sig. (2-tailed)		0.000	0.000	0.000
	N	350	350	350	350
Value	Pearson Correlation	0.596**	1	0.666**	0.566**
	Sig. (2-tailed)	0.000		0.000	0.000
	N	350	350	350	350
Image	Pearson Correlation	0.828**	0.666**	1	0.790**
	Sig. (2-tailed)	0.000	0.000		0.000
	N	350	350	350	350
Service Quality	Pearson Correlation	0.823**	0.566**	0.790**	1
	Sig. (2-tailed)	0.000	0.000	0.000	
	N	350	350	350	350

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

**Table 41A: Pearson Correlation Matrix, Model 9**

		Recommendation	Satisfaction
Recommendation	Pearson Correlation	1	0.717**
	Sig. (2-tailed)		0.000
	N	350	350
Satisfaction	Pearson Correlation	0.717**	1
	Sig. (2-tailed)	0.000	
	N	350	350

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

**Table 42A: Pearson Correlation Matrix, Model 10**

		Future Attendance	Satisfaction
Future Attendance	Pearson Correlation	1	0.626**
	Sig. (2-tailed)		0.000
	N	350	350
Satisfaction	Pearson Correlation	0.626**	1
	Sig. (2-tailed)	0.000	
	N	350	350

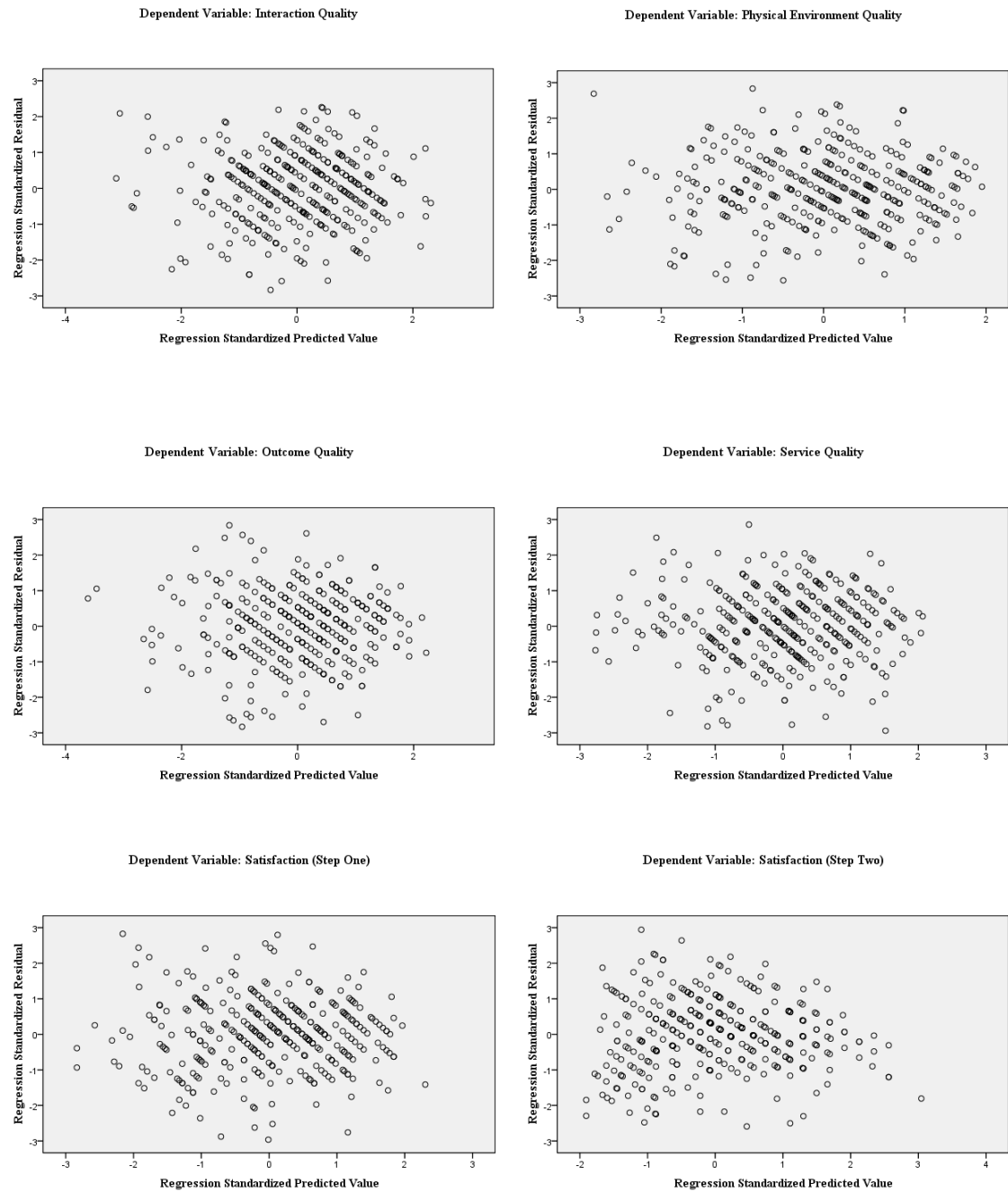
\*\*. Correlation is significant at the 0.01 level (2-tailed).

**Table 43A: Multicollinearity Statistics**

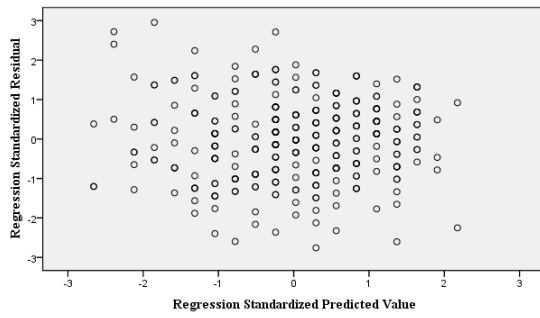
Model	Dependent Variables	Independent Variables	$1/(1-R^2)$	Collinearity Statistics		
				Tolerance	VIF	Condition Index
1	a20&a21&a22 Interaction Quality	Expertise	2.387	0.541	1.850	12.020
		Personal Communication		0.624	1.602	14.737
		Administration Staff		0.582	1.717	15.014
		Attitudes and Behaviours		0.585	1.710	15.488
		Course Content		0.682	1.466	19.891
2	b28&b29&b30 Physical Environment Quality	Physical Facilities	2.703	0.463	2.160	12.436
		University Accommodation		0.563	1.777	13.059
		Library		0.668	1.498	13.532
		Social Life		0.567	1.765	14.059
		Safety		0.662	1.510	15.416
		Social Factors		0.681	1.468	18.444
3	c16&c17&c18 Outcome Quality	Personal Development	2.421	0.549	1.820	10.896
		Academic Development		0.549	1.820	14.970
4	d1&d2&d3 Service Quality	Interaction Quality	3.597	0.647	1.545	9.969
		Physical Environment Quality		0.506	1.978	11.696
		Outcome Quality		0.520	1.922	13.140
5	d4&d5&d6 Satisfaction	Step One Service Quality	3.846	0.671	1.491	8.093
		Value		0.671	1.491	9.306
		Step Two Service Quality $\times$ Value	2.584	1.000	1.000	4.261
6	d11&d12&d13 Value	Service Quality	1.550	1.000	1.000	7.078
7	d7&d8&d9&d10 Image	Service Quality	2.778	1.000	1.000	7.093
8	d4&d5&d6 Satisfaction	Value	4.651	0.548	1.825	10.486
		Image		0.301	3.318	18.155
		Service Quality		0.366	2.735	9.336
9	d14&d15&d16 Recommendation	Satisfaction	2.151	1.000	1.000	7.657
10	d17&d18&d19 Future Attendance	Satisfaction	1.795	1.000	1.000	7.695

## Appendix 10: Scatter Plots

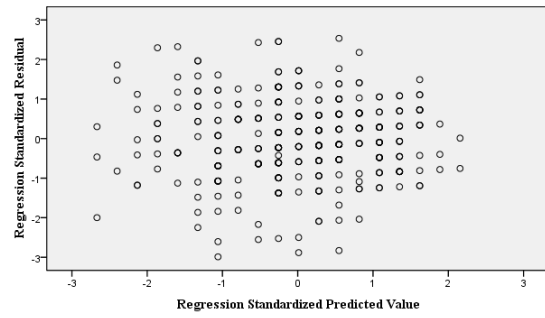
Figure 10A: Residual Scatter Plots



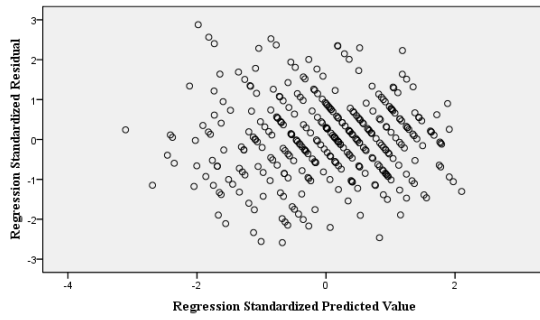
Dependent Variable: Value



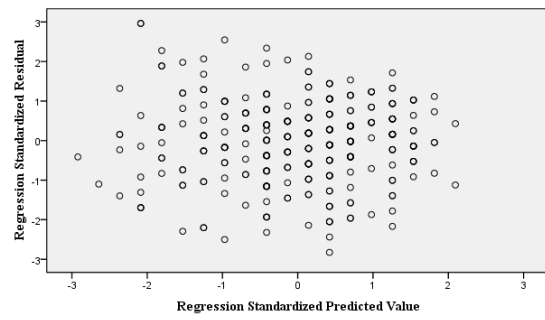
Dependent Variable: Image



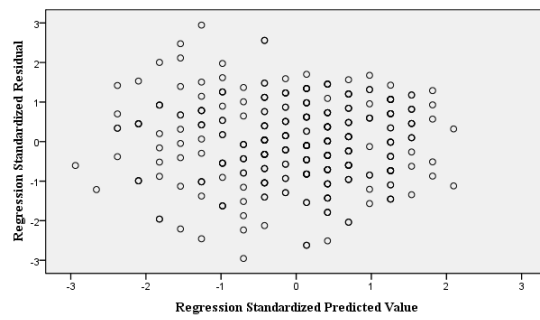
Dependent Variable: Satisfaction



Dependent Variable: Recommendation

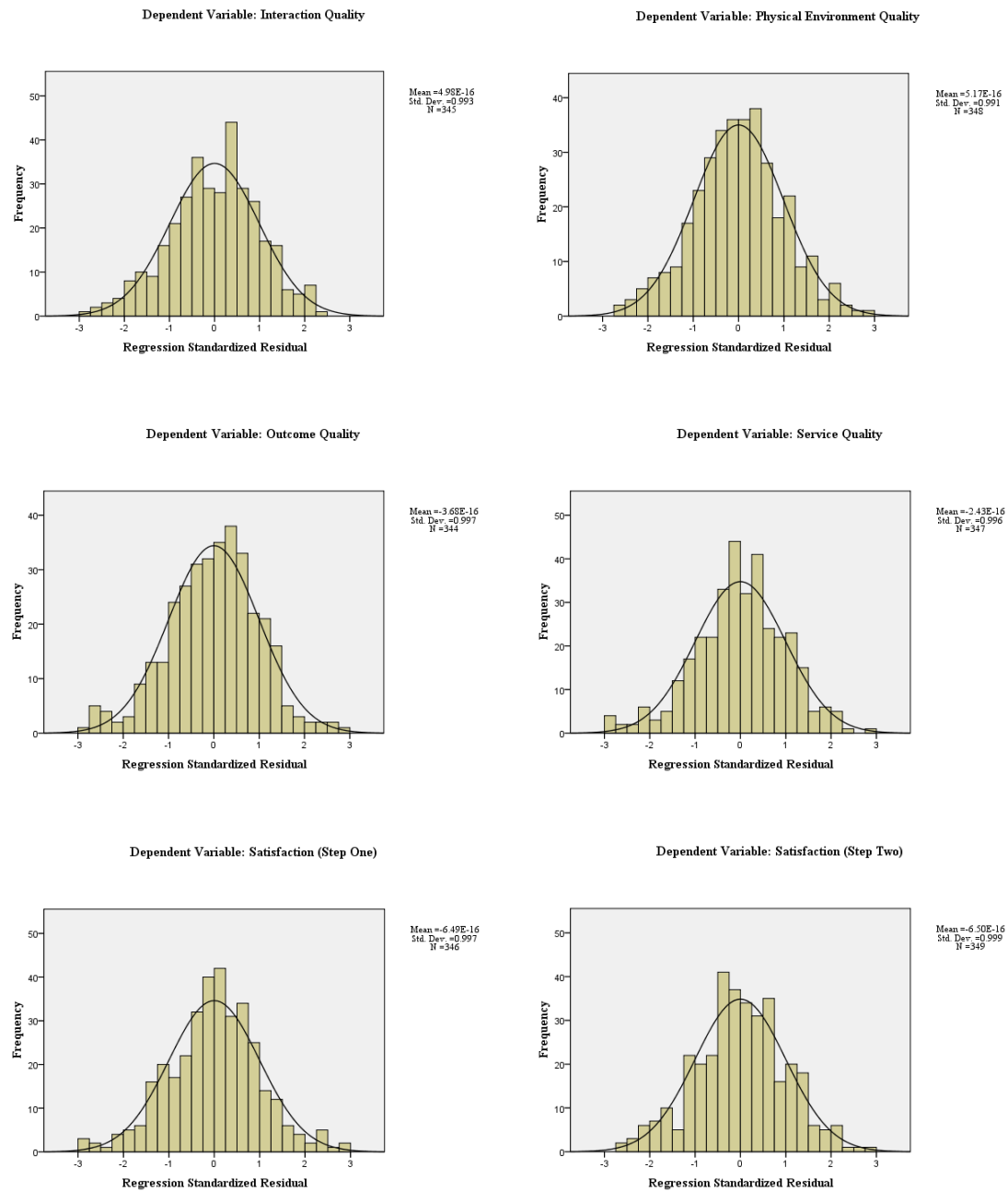


Dependent Variable: Future Attendance



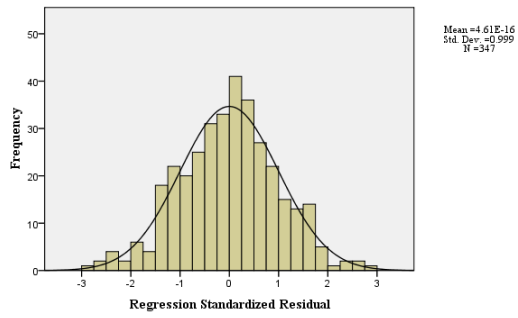
## Appendix 11: Normality Plots

Figure 11A: Histograms of the Standardised Residuals

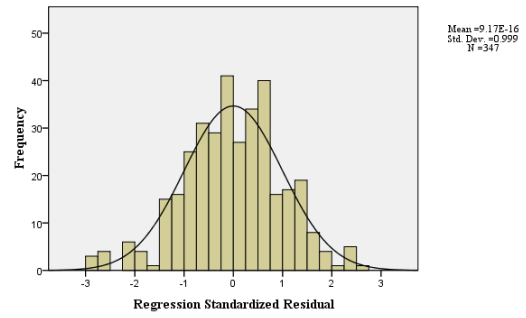




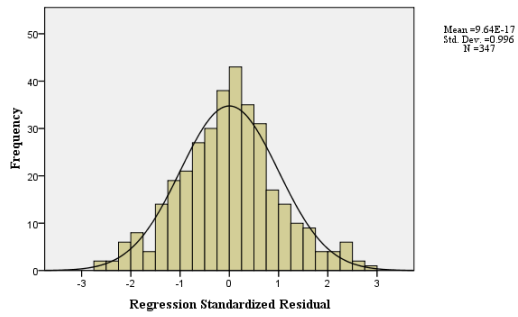
Dependent Variable: Value



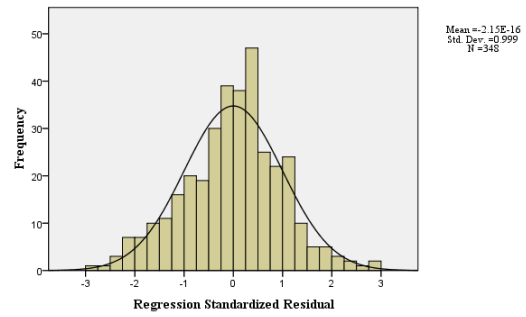
Dependent Variable: Image



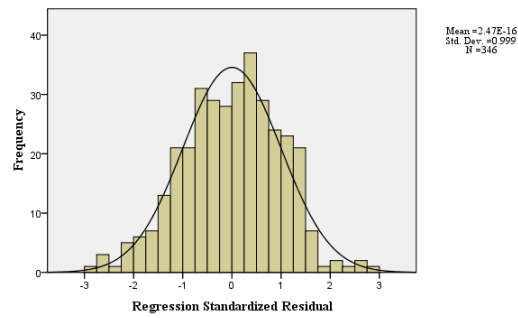
Dependent Variable: Satisfaction



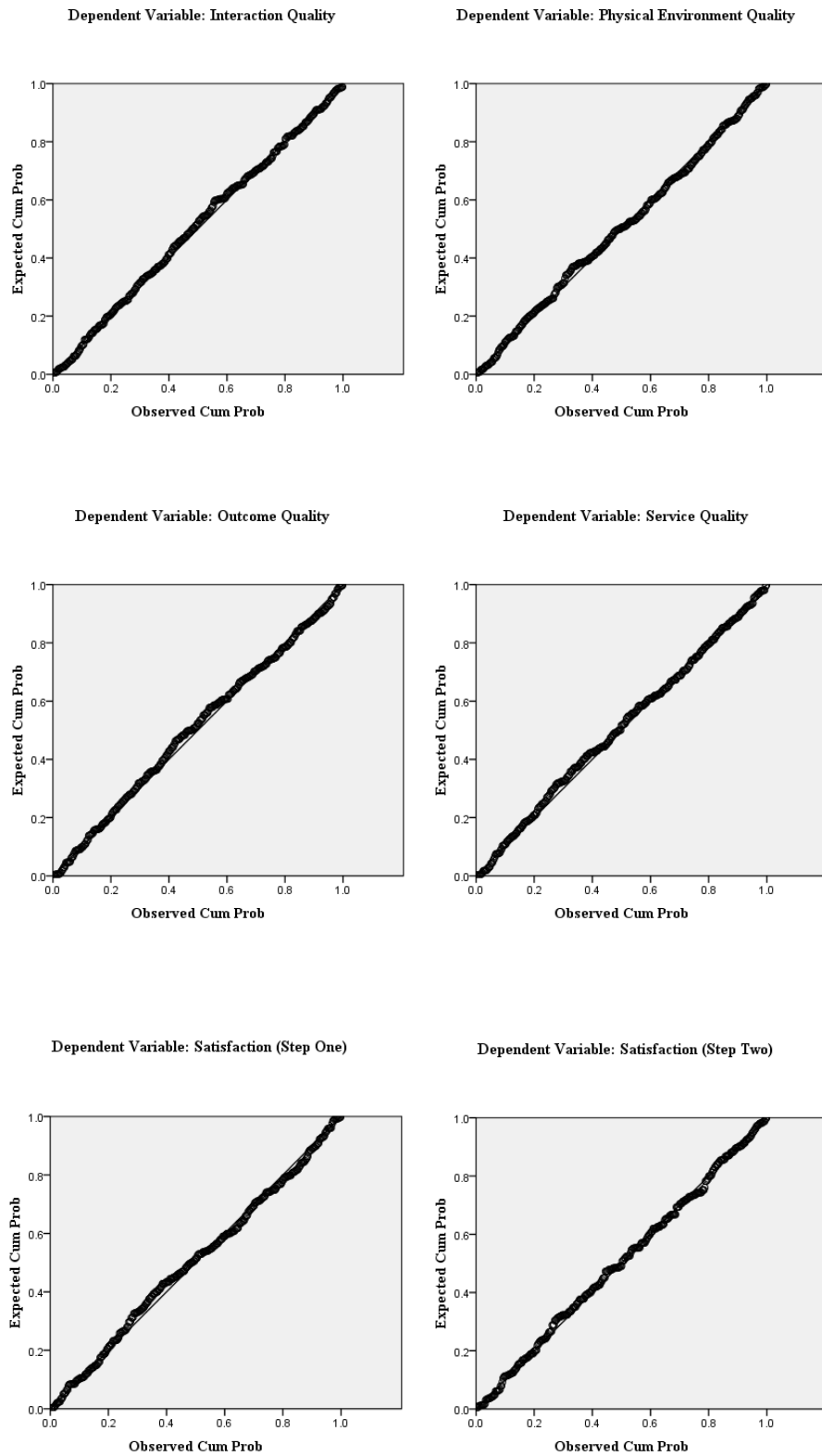
Dependent Variable: Recommendation



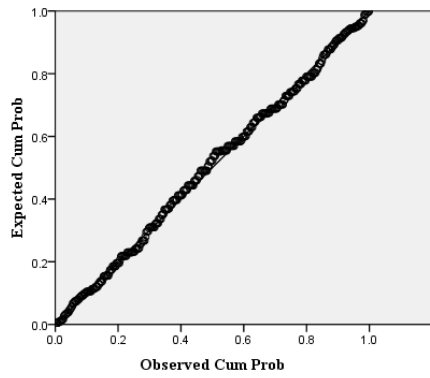
Dependent Variable: Future Attendance



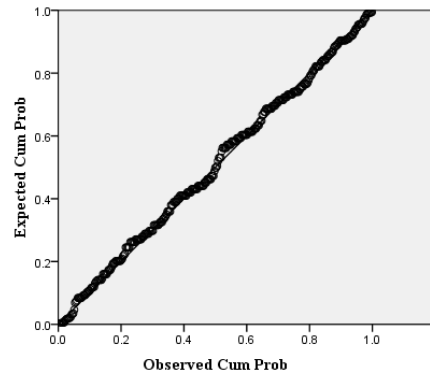
**Figure 12A: Normal P-P Plots of Regression Standardised Residual**



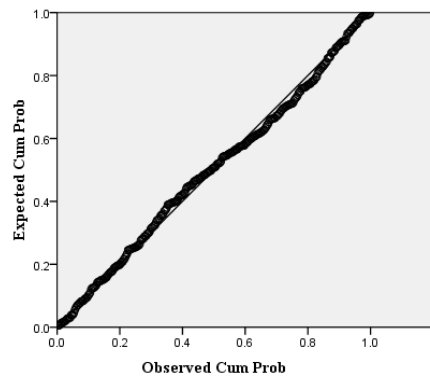
Dependent Variable: Value



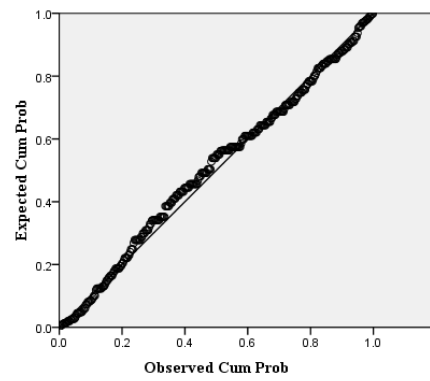
Dependent Variable: Image



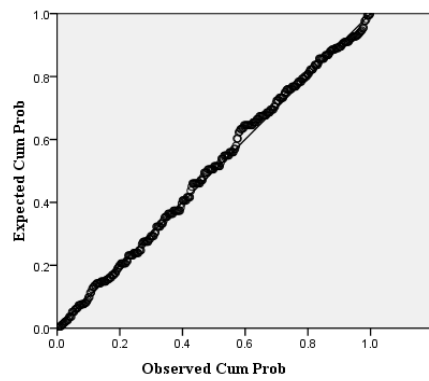
Dependent Variable: Satisfaction



Dependent Variable: Recommendation



Dependent Variable: Future Attendance



## Appendix 12: Analysis of Variance Results

**Table 44A: Students' Perceptions of Satisfaction and Pertaining Constructs**

### Gender

Variable	Gender	Frequency	Mean	F	Sig
Service Quality	Male	171	13.012	0.144	0.705
	Female	179	12.860		
	Total	350	12.934		
Value	Male	171	13.023	0.128	0.721
	Female	179	12.872		
	Total	350	12.946		
Image	Male	171	18.167	0.785	0.376
	Female	179	18.589		
	Total	350	18.383		
Satisfaction	Male	171	13.386	0.215	0.643
	Female	179	13.564		
	Total	350	13.477		
Recommendation	Male	171	12.901	1.059	0.304
	Female	179	13.316		
	Total	350	13.113		
Future Attendance	Male	171	13.047	0.464	0.496
	Female	179	12.771		
	Total	350	12.906		

### Age

Variable	Age	Frequency	Mean	F	Sig
Service Quality	18-22	269	12.978	0.157	0.692
	23+	81	12.790		
	Total	350	12.934		
Value	18-22	269	13.205	4.993	0.026**
	23+	81	12.086		
	Total	350	12.946		
Image	18-22	269	18.600	2.780	0.096*
	23+	81	17.660		
	Total	350	18.383		
Satisfaction	18-22	269	13.599	1.328	0.250
	23+	81	13.074		
	Total	350	13.477		
Recommendation	18-22	269	13.311	3.199	0.075*
	23+	81	12.457		
	Total	350	13.113		
Future Attendance	18-22	269	13.104	3.216	0.074*
	23+	81	12.247		
	Total	350	12.906		

### Year of Study

Variable	Year of Study	Frequency	Mean	F	Sig
Service Quality	Year 2	129	12.752	0.332	0.718
	Year 3	145	13.117		
	Year 4	76	12.895		
	Total	350	12.934		
Value	Year 2	129	13.333	1.791	0.168
	Year 3	145	12.966		
	Year 4	76	12.250		
	Total	350	12.946		
Image	Year 2	129	18.512	0.490	0.613
	Year 3	145	18.503		
	Year 4	76	17.934		
	Total	350	18.383		
Satisfaction	Year 2	129	13.326	0.976	0.378
	Year 3	145	13.786		
	Year 4	76	13.145		
	Total	350	13.477		
Recommendation	Year 2	129	12.850	3.261	0.040**
	Year 3	145	13.697		
	Year 4	76	12.447		
	Total	350	13.113		
Future Attendance	Year 2	129	13.124	2.820	0.061*
	Year 3	145	13.186		
	Year 4	76	12.000		
	Total	350	12.906		

### Major

Variable	Major	Frequency	Mean	F	Sig
Service Quality	Accounting	26	13.654	1.376	0.176
	Biological Science	29	11.035		
	Economics	33	12.485		
	Finance	20	12.950		
	Information Science	27	14.333		
	International Economics and Trade	35	13.486		
	Language	19	11.895		
	Law	22	12.864		
	Management	43	12.861		
	Marketing	20	13.650		
	Math	23	13.304		
	Tourism Management	40	12.700		
	Others	13	13.308		
	Total	350	12.934		
Value	Accounting	26	12.577	1.456	0.139
	Biological Science	29	13.483		
	Economics	33	12.212		
	Finance	20	13.600		
	Information Science	27	13.370		
	International Economics and Trade	35	12.000		
	Language	19	11.737		
	Law	22	12.318		
	Management	43	12.349		
	Marketing	20	12.550		
	Math	23	14.957		
	Tourism Management	40	13.925		
	Others	13	13.846		
	Total	350	12.946		
Image	Accounting	26	18.539	0.733	0.719
	Biological Science	29	17.793		
	Economics	33	17.273		
	Finance	20	18.350		
	Information Science	27	19.370		
	International Economics and Trade	35	18.800		
	Language	19	17.105		
	Law	22	19.682		
	Management	43	18.442		
	Marketing	20	18.900		
	Math	23	18.783		
	Tourism Management	40	17.812		
	Others	13	18.806		
	Total	350	18.383		
Satisfaction	Accounting	26	13.577	0.669	0.781
	Biological Science	29	12.793		
	Economics	33	12.849		
	Finance	20	13.700		
	Information Science	27	14.111		
	International Economics and Trade	35	13.629		
	Language	19	13.000		
	Law	22	14.227		
	Management	43	12.698		
	Marketing	20	13.900		
	Math	23	14.348		
	Tourism Management	40	13.650		
	Others	13	13.615		
	Total	350	13.477		

### Major (Continued)

Variable	Major	Frequency	Mean	F	Sig
Recommendation	Accounting	26	13.462	1.257	0.243
	Biological Science	29	11.828		
	Economics	33	12.273		
	Finance	20	14.200		
	Information Science	27	13.815		
	International Economics and Trade	35	13.400		
	Language	19	11.349		
	Law	22	13.227		
	Management	43	12.721		
	Marketing	20	13.950		
	Math	23	13.783		
	Tourism Management	40	13.575		
	Others	13	13.308		
	Total	350	13.113		
Future Attendance	Accounting	26	12.654	1.159	0.312
	Biological Science	29	11.552		
	Economics	33	12.970		
	Finance	20	13.750		
	Information Science	27	13.778		
	International Economics and Trade	35	13.771		
	Language	19	11.632		
	Law	22	13.500		
	Management	43	12.000		
	Marketing	20	13.350		
	Math	23	12.957		
	Tourism Management	40	13.075		
	Others	13	13.385		
	Total	350	12.906		

**Table 45A: Students' Perceptions of the Primary Dimensions of Service Quality**

**Gender**

Variable	Gender	Frequency	Mean	F	Sig
Interaction Quality	Male	171	13.146	0.054	0.819
	Female	179	13.229		
	Total	350	13.189		
Physical Environment Quality	Male	171	13.199	0.032	0.859
	Female	179	13.129		
	Total	350	13.163		
Outcome Quality	Male	171	13.579	0.210	0.647
	Female	179	13.754		
	Total	350	13.669		

**Age**

Variable	Age	Frequency	Mean	F	Sig
Interaction Quality	18-22	269	13.416	5.484	0.020**
	23+	81	12.432		
	Total	350	13.189		
Physical Environment Quality	18-22	269	13.134	0.072	0.789
	23+	81	13.259		
	Total	350	13.163		
Outcome Quality	18-22	269	13.777	1.068	0.302
	23+	81	13.309		
	Total	350	13.669		

**Year of Study**

Variable	Year of Study	Frequency	Mean	F	Sig
Interaction Quality	Year 2	129	13.597	2.262	0.106
	Year 3	145	13.145		
	Year 4	76	12.579		
	Total	350	13.189		
Physical Environment Quality	Year 2	129	12.651	2.013	0.135
	Year 3	145	13.510		
	Year 4	76	13.368		
	Total	350	13.163		
Outcome Quality	Year 2	129	13.574	0.486	0.615
	Year 3	145	13.883		
	Year 4	76	13.421		
	Total	350	13.669		

### Major

Variable	Major	Frequency	Mean	F	Sig
Interaction Quality	Accounting	26	14.039	0.602	0.840
	Biological Science	29	12.724		
	Economics	33	12.394		
	Finance	20	13.200		
	Information Science	27	13.667		
	International Economics and Trade	35	13.600		
	Language	19	12.947		
	Law	22	13.182		
	Management	43	13.674		
	Marketing	20	12.700		
	Math	23	13.304		
	Tourism Management	40	12.775		
	Others	13	13.000		
	Total	350	13.189		
Physical Environment Quality	Accounting	26	14.077	1.807	0.046**
	Biological Science	29	11.207		
	Economics	33	12.242		
	Finance	20	13.100		
	Information Science	27	14.444		
	International Economics and Trade	35	13.800		
	Language	19	12.579		
	Law	22	12.773		
	Management	43	13.116		
	Marketing	20	14.100		
	Math	23	14.000		
	Tourism Management	40	12.625		
	Others	13	14.154		
	Total	350	13.163		
Outcome Quality	Accounting	26	14.000	0.878	0.570
	Biological Science	29	12.276		
	Economics	33	13.455		
	Finance	20	13.900		
	Information Science	27	14.741		
	International Economics and Trade	35	14.086		
	Language	19	12.790		
	Law	22	13.409		
	Management	43	13.465		
	Marketing	20	13.450		
	Math	23	14.522		
	Tourism Management	40	13.800		
	Others	13	13.769		
	Total	350	13.669		



**Table 46A: Students' Perceptions of the Sub-dimensions of Service Quality**

<b>Gender</b>					
Variable	Gender	Frequency	Mean	F	Sig
Expertise	Male	171	18.211	3.197	0.075*
	Female	179	19.050		
	Total	350	18.640		
Personal Communication	Male	171	22.497	0.454	0.501
	Female	179	22.866		
	Total	350	22.686		
Administration Staff	Male	171	14.415	0.362	0.548
	Female	179	14.637		
	Total	350	14.529		
Attitudes and Behaviours	Male	171	15.651	0.180	0.672
	Female	179	15.788		
	Total	350	15.721		
Course Content	Male	171	13.968	2.039	0.154
	Female	179	13.399		
	Total	350	13.677		
Physical Facilities	Male	171	46.760	2.026	0.155
	Female	179	44.840		
	Total	350	45.778		
University Accommodation	Male	171	19.912	2.074	0.151
	Female	179	19.179		
	Total	350	19.537		
Library	Male	171	14.538	0.038	0.846
	Female	179	14.458		
	Total	350	14.497		
Social Life	Male	171	14.474	8.018	0.005***
	Female	179	13.402		
	Total	350	13.926		
Safety	Male	171	9.986	4.125	0.043**
	Female	179	9.424		
	Total	350	9.698		
Social Factors	Male	171	9.122	2.045	0.154
	Female	179	8.765		
	Total	350	8.940		
Personal Development	Male	171	39.239	0.686	0.408
	Female	179	39.926		
	Total	350	39.590		
Academic Development	Male	171	31.409	0.060	0.806
	Female	179	31.224		
	Total	350	31.314		

### Age

Variable	Age	Frequency	Mean	F	Sig
Expertise	18-22	269	18.996	7.748	0.006***
	23+	81	17.457		
	Total	350	18.640		
Personal Communication	18-22	269	22.844	1.112	0.292
	23+	81	22.161		
	Total	350	22.686		
Administration Staff	18-22	269	14.691	2.616	0.107
	23+	81	13.988		
	Total	350	14.529		
Attitudes and Behaviours	18-22	269	15.860	2.497	0.115
	23+	81	15.259		
	Total	350	15.721		
Course Content	18-22	269	13.847	2.438	0.119
	23+	81	13.111		
	Total	350	13.677		
Physical Facilities	18-22	269	45.840	0.028	0.867
	23+	81	45.572		
	Total	350	45.778		
University Accommodation	18-22	269	19.353	1.732	0.189
	23+	81	20.148		
	Total	350	19.537		
Library	18-22	269	14.550	0.221	0.639
	23+	81	14.321		
	Total	350	14.497		
Social Life	18-22	269	14.141	4.267	0.040**
	23+	81	13.210		
	Total	350	13.926		
Safety	18-22	269	9.668	0.161	0.689
	23+	81	9.800		
	Total	350	9.698		
Social Factors	18-22	269	8.988	0.505	0.478
	23+	81	8.778		
	Total	350	8.940		
Personal Development	18-22	269	39.601	0.002	0.963
	23+	81	39.556		
	Total	350	39.590		
Academic Development	18-22	269	31.424	0.278	0.598
	23+	81	30.951		
	Total	350	31.314		

### Year of Study

Variable	Year of Study	Frequency	Mean	F	Sig
Expertise	Year 2	129	19.264	3.663	0.027**
	Year 3	145	18.655		
	Year 4	76	17.553		
	Total	350	18.640		
Personal Communication	Year 2	129	23.124	0.802	0.449
	Year 3	145	22.510		
	Year 4	76	22.276		
	Total	350	22.686		
Administration Staff	Year 2	129	14.853	1.565	0.211
	Year 3	145	14.531		
	Year 4	76	13.974		
	Total	350	14.529		
Attitudes and Behaviours	Year 2	129	15.791	0.427	0.653
	Year 3	145	15.807		
	Year 4	76	15.439		
	Total	350	15.721		
Course Content	Year 2	129	14.287	4.136	0.017**
	Year 3	145	13.617		
	Year 4	76	12.756		
	Total	350	13.677		
Physical Facilities	Year 2	129	44.512	1.521	0.220
	Year 3	145	47.126		
	Year 4	76	45.355		
	Total	350	45.778		
University Accommodation	Year 2	129	18.302	7.085	0.001***
	Year 3	145	20.276		
	Year 4	76	20.224		
	Total	350	19.537		
Library	Year 2	129	14.612	0.218	0.804
	Year 3	145	14.524		
	Year 4	76	14.250		
	Total	350	14.497		
Social Life	Year 2	129	14.147	0.448	0.639
	Year 3	145	13.855		
	Year 4	76	13.684		
	Total	350	13.926		
Safety	Year 2	129	9.555	0.339	0.713
	Year 3	145	9.750		
	Year 4	76	9.842		
	Total	350	9.698		
Social Factors	Year 2	129	9.100	1.700	0.184
	Year 3	145	8.669		
	Year 4	76	9.184		
	Total	350	8.940		
Personal Development	Year 2	129	38.728	1.554	0.213
	Year 3	145	40.377		
	Year 4	76	39.553		
	Total	350	39.590		
Academic Development	Year 2	129	30.985	0.674	0.510
	Year 3	145	31.835		
	Year 4	76	30.882		
	Total	350	31.314		

### Major

Variable	Major	Frequency	Mean	F	Sig
Expertise	Accounting	26	19.539	0.681	0.770
	Biological Science	29	18.345		
	Economics	33	17.333		
	Finance	20	19.350		
	Information Science	27	18.482		
	International Economics and Trade	35	18.629		
	Language	19	18.263		
	Law	22	20.091		
	Management	43	18.954		
	Marketing	20	17.850		
	Math	23	18.565		
	Tourism Management	40	18.450		
	Others	13	19.077		
	Total	350	18.640		
Personal Communication	Accounting	26	22.769	0.789	0.662
	Biological Science	29	22.207		
	Economics	33	21.818		
	Finance	20	23.150		
	Information Science	27	22.630		
	International Economics and Trade	35	24.257		
	Language	19	22.790		
	Law	22	21.864		
	Management	43	22.628		
	Marketing	20	21.050		
	Math	23	24.130		
	Tourism Management	40	22.850		
	Others	13	21.846		
	Total	350	22.686		
Administration Staff	Accounting	26	15.269	0.948	0.499
	Biological Science	29	14.207		
	Economics	33	13.606		
	Finance	20	14.850		
	Information Science	27	14.963		
	International Economics and Trade	35	15.657		
	Language	19	13.895		
	Law	22	14.000		
	Management	43	14.791		
	Marketing	20	14.200		
	Math	23	14.696		
	Tourism Management	40	14.350		
	Others	13	13.385		
	Total	350	14.529		
Attitudes and Behaviours	Accounting	26	15.885	1.116	0.345
	Biological Science	29	15.448		
	Economics	33	14.424		
	Finance	20	16.350		
	Information Science	27	15.778		
	International Economics and Trade	35	15.943		
	Language	19	14.895		
	Law	22	16.182		
	Management	43	16.171		
	Marketing	20	15.950		
	Math	23	16.522		
	Tourism Management	40	15.275		
	Others	13	16.154		
	Total	350	15.721		

### Major (Continued)

Variable	Major	Frequency	Mean	F	Sig
Course Content	Accounting	26	14.385	2.223	0.011**
	Biological Science	29	13.414		
	Economics	33	14.455		
	Finance	20	15.000		
	Information Science	27	13.444		
	International Economics and Trade	35	14.743		
	Language	19	13.842		
	Law	22	14.136		
	Management	43	12.220		
	Marketing	20	11.874		
	Math	23	14.870		
	Tourism Management	40	12.600		
	Others	13	14.231		
	Total	350	13.677		
Physical Facilities	Accounting	26	50.885	3.004	0.001***
	Biological Science	29	37.276		
	Economics	33	47.212		
	Finance	20	49.700		
	Information Science	27	49.556		
	International Economics and Trade	35	48.057		
	Language	19	42.053		
	Law	22	46.273		
	Management	43	44.302		
	Marketing	20	50.300		
	Math	23	46.580		
	Tourism Management	40	41.100		
	Others	13	46.385		
	Total	350	45.778		
University Accommodation	Accounting	26	21.000	2.736	0.001***
	Biological Science	29	16.241		
	Economics	33	19.788		
	Finance	20	21.150		
	Information Science	27	21.704		
	International Economics and Trade	35	19.829		
	Language	19	18.368		
	Law	22	20.455		
	Management	43	19.186		
	Marketing	20	21.000		
	Math	23	18.565		
	Tourism Management	40	18.600		
	Others	13	19.231		
	Total	350	19.537		
Library	Accounting	26	15.385	1.281	0.228
	Biological Science	29	14.621		
	Economics	33	13.606		
	Finance	20	14.450		
	Information Science	27	15.333		
	International Economics and Trade	35	14.229		
	Language	19	12.526		
	Law	22	15.091		
	Management	43	14.791		
	Marketing	20	14.600		
	Math	23	15.304		
	Tourism Management	40	13.600		
	Others	13	15.846		
	Total	350	14.497		

### Major (Continued)

Variable	Major	Frequency	Mean	F	Sig
Social Life	Accounting	26	13.808	0.900	0.547
	Biological Science	29	13.138		
	Economics	33	13.424		
	Finance	20	14.350		
	Information Science	27	14.852		
	International Economics and Trade	35	14.400		
	Language	19	13.000		
	Law	22	14.636		
	Management	43	13.442		
	Marketing	20	13.750		
	Math	23	15.174		
	Tourism Management	40	13.825		
	Others	13	13.462		
	Total	350	13.926		
Safety	Accounting	26	9.846	2.007	0.023**
	Biological Science	29	8.517		
	Economics	33	9.061		
	Finance	20	10.250		
	Information Science	27	11.333		
	International Economics and Trade	35	10.132		
	Language	19	9.263		
	Law	22	9.273		
	Management	43	9.326		
	Marketing	20	9.700		
	Math	23	9.783		
	Tourism Management	40	9.845		
	Others	13	10.231		
	Total	350	9.698		
Social Factors	Accounting	26	9.346	0.419	0.956
	Biological Science	29	8.862		
	Economics	33	8.970		
	Finance	20	8.950		
	Information Science	27	9.185		
	International Economics and Trade	35	8.514		
	Language	19	8.737		
	Law	22	8.948		
	Management	43	8.907		
	Marketing	20	8.850		
	Math	23	9.652		
	Tourism Management	40	8.800		
	Others	13	8.539		
	Total	350	8.940		
Personal Development	Accounting	26	39.846	0.953	0.494
	Biological Science	29	37.379		
	Economics	33	37.849		
	Finance	20	41.600		
	Information Science	27	42.366		
	International Economics and Trade	35	39.829		
	Language	19	38.316		
	Law	22	38.850		
	Management	43	38.674		
	Marketing	20	39.850		
	Math	23	40.870		
	Tourism Management	40	40.525		
	Others	13	39.539		
	Total	350	39.590		
Academic Development	Accounting	26	31.346	1.275	0.232
	Biological Science	29	28.621		
	Economics	33	30.091		
	Finance	20	34.100		
	Information Science	27	34.111		
	International Economics and Trade	35	32.657		
	Language	19	31.053		
	Law	22	30.727		
	Management	43	30.558		
	Marketing	20	31.350		
	Math	23	31.696		
	Tourism Management	40	31.325		
	Others	13	29.769		
	Total	350	31.314		