A study on students' satisfaction with the service quality of higher education institutions: An empirical study at the University of Transport Technology in Vietnam

Assoc. Prof. Dr. Do Quang Hung
Posts and Telecommunications Institute of Technology

Abstract:*To remain viable and thriving in today's global educational environment that requires increasingly high quality, higher education institutions must pay attention to the quality of the training process, particularly students' satisfaction. The study aims to identify and evaluate the factors affecting the students' satisfaction with the quality of training services at the University of Transport Technology (UTT) in Vietnam. The research findings will provide management implications for increasing student satisfaction. The research is anticipated to help develop a scientific basis that supports university administrations in developing suitable policies and management regimes to improve students' satisfaction with quality training services in Vietnam.*

Keywords: *Students' satisfaction, University of Transport Technology, Vietnam; SERVQUAL.*

1. Introduction

Higher education is a high-level platform only available in universities and institutes. Higher education is regarded as a vital responsibility in every country's socio-economic growth since it leads to the generation of sufficient human resources for national development. Human resources, especially those with advanced expertise and knowledge, are precious because they will improve the country's quality of life during the latter's industrialization and modernization process. Enhancing the quality of higher education is not just the responsibility but the primary goal of every training institution (from now on referred to as schools). The quality of this level must be objectively examined and evaluated by using feedback from the service beneficiaries themselves, especially those being trained. Quality assurance, the main quality assessment activity, has become a worldwide trend in recent years. It has also been found widespread in the Southeast Asia region and Vietnam in particular.

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Several domestic and international studies in the field of education have also demonstrated the significance of analyzing students' satisfaction with the quality of training services (Freeman, 1994; Herwin et al., 2022; Kanwar & Sanjeeva, 2022; Nghi, Giao, & Chau, 2012; Nguyen & Nguyen, 2017; Phuong & Huong, 2019; Son, 2023; Zhao, Wang, & Liu, 2022). Concerning the educational institution, improving service quality and student satisfaction helps it meet education quality accreditation criteria. It attracts students to the school, thus contributing to the university's existence and development.

This study's main objective is to address the research question: What factors impact students' satisfaction with the quality of training services at the University of Transport Technology in Vietnam and their levels of influence? A theoretical model is also developed and tested to confirm the influence of these factors on students' satisfaction.

2. Literature review

Several studies in education have demonstrated the significance of students' satisfaction in connection with the standard of training services. Viraiyan (Viraiyan, Kamalanabhan, & Keshwar, 2016) studied the validity of Mauritius's higher education service quality scale by using an improved structural model validation and test approach that predicts loyalty. Image, perceived value, satisfaction, and service quality are all factors that students consider. Using feedback from 501 students enrolled at various higher education institutions in Mauritius, the research results show that both "technical service quality" and "image and value perceived," but not "functional service quality," influence students' satisfaction. The study utilized a comprehensive measure of service quality and demonstrated the value of considering functional service quality as a higher-level model. This study differentiates between functional and technical quality, as both play an essential role in shaping students' perceptions and behavior.

Chin and Subramaniam (Chuah & Sri Ramalu, 2011) used a case study of 100 Malaysian undergraduate students to investigate the link between service quality and student satisfaction. According to the findings of this study, service quality is a significant factor in students' satisfaction. It was demonstrated that the higher the degree of student satisfaction, the better the quality of services offered by institutions. The three factors are responsiveness, assurance, and empathy. The degree of student satisfaction is strongly correlated with the level of service quality. This study has significantly added to understanding students' satisfaction management in higher education institutions. Its findings have practical implications for higher education management, particularly in service quality improvement.

Vasiliki G. V. et al. (Vrana, Dimitriadis, & Karavasilis, 2015) assessed the quality of training services provided to students at the National University of Greece. The study surveyed 469 students on the five factors of academic perspective: facilities, training program, staff, and support services. Its findings put the factors influencing students' satisfaction in the following order: academic perspective, facilities, support services, personnel, and training program. This demonstrates that students appreciate the institution's academic environment and educational facilities.

Adnan et al. (2016) investigated 42 variables. They surveyed 550 students on the five factors: satisfaction with academic quality, satisfaction with lecturers' assistance, satisfaction with the laboratory and equipment, satisfaction with the enrollment process, and satisfaction with exchange and training programs.

Those studies all show that evaluating students' satisfaction with the quality of training services is complicated. Realizing that research on students' satisfaction in higher education institutions in Vietnam is relatively limited, this research is conducted to fill this gap.

3. Methodology

According to the SERVQUAL model, students ' satisfaction with training service quality will be assessed by five quality factors of reliability, assurance, tangibility, empathy, and responsiveness, via eight main groups of factors affecting students in the learning process, namely training program, teaching resources, faculty members, facilities, staff, academic advisors, team members that organize exams, tests, and support learners throughout their education.

The following hypotheses were developed:

Hypothesis 1: Reliability positively impacts students' satisfaction with the university's service quality.

Hypothesis 2: Assurance positively impacts students' satisfaction with the university's service quality.

Hypothesis 3: Responsiveness positively impacts students' satisfaction with the university's service quality.

Hypothesis 4: Empathy positively impacts students' satisfaction with the university's service quality.

Hypothesis 5: The institution's tangibility has a positive impact on students' satisfaction with the university's service quality.

The research steps are as follows:

Step 1: The author examines the reliability of each scale component and discusses the reliability of the observed variables using Cronbach's Alpha.

Step 2: The survey data is input into the main component analysis, which removes unimportant variables and determines the structure of the factors influencing students' satisfaction with service quality at the university. This research's primary data analysis approach is exploratory factor analysis (EFA).

Step 3: Based on the main component analysis results, correlation analysis is performed to examine the linear association between factors that influence students' satisfaction.

The scale has five dimensions: tangibility, reliability, responsiveness, assurance, and empathy (Parasuraman, Zeithaml, & Berry, 1985). The original SERVQUAL scale uses 22 question items to measure these five dimensions. Derived from prior studies, 37 question items in total, which are presented in detail in Tables 1-6.

Table 1: Reliability

No	Item	Code
1	Students are well informed about the curriculum.	REL1
2	The classes are well organized and logical in a systematic way.	REL2
3	According to the training duration, the curriculum provides adequate knowledge and skills.	REL3
4	Lecturers are punctual and follow the lesson plan.	REL4
5	A variety of evaluation methods are used.	REL5
6	Learning outcomes are accurately and equally assessed.	REL6
7	Students' issues are quickly identified and resolved.	REL7
8	Every student is well informed of criteria for assessing learning outcomes and class schedule.	REL8

Table 2: Assurance

No	Item	Code
1	The educational program has clear objectives and standards.	ASS1
2	The educational program provides students with sufficient professional knowledge and skills.	ASS2
3	The educational program meets requirements of future professional career path.	ASS3
4	Various teaching methods are used.	ASS4
5	Lecturers are willing to share knowledge and experiences with students.	ASS5
6	Professional career orientation is always paid attention to in teaching activities.	ASS6
7	All class materials are available.	ASS7
8	Textbooks are well-organized and readable.	ASS8
9	The textbook content is accurate and up-to-date.	ASS9
10	Student support services (i.e., canteen, parking lots) are available and meet the student's requirement.	ASS10
11	The quality of the WI-FI signal is good.	ASS11
12	The staff (i.e., department assistants, librarians) adequately resolve students' related issues.	ASS12
13	Students easily contact staff and related departments to get additional support and assistance.	ASS13

Table 3: Responsiveness

No	Item	Code
1	The lecturer has a wide knowledge of the subjects he/she presents.	RES1
2	The lecturer's teaching method is clear and understandable.	RES2
3	The lecturers are friendly with students.	RES3
4	The lecturers use teaching equipment effectively	RES4

Table 4: Empathy

No	Item	Code
1	The time is allocated reasonably between experiment and theory in curriculum is.	EMP1
2	Administrative staff have a good service attitude and respect students.	EMP2
3	Academic staff are willing to support students.	EMP3
4	Academic consultants are willing to provide advice,guidance and support to students.	EMP4

Table 5: Tangibility

No	Item	Code
1	The classroom is spacious.	TAN1
2	The classroom is comfortable and conducive to learning.	TAN2
3	The classroom is well equipped with teaching equipment.	TAN3
4	The library collection is diverse.	TAN4
5	The library is spacious.	TAN5

Table 6: Items measuring students' satisfaction

No	Item	Code
1	Would you suggest the University of Transport Technology to someone?	SAT1
2	Are you satisfied with the service quality provided by the University of Transport Technology?	SAT2
3	Does the service quality at the university meet your expectations?	SAT3

Table 7: Respondents' background

	Characteristic	Number	Percentage (%)
Academic year	Third year	73	36.50%
	Second year	62	31.00%
	First year	65	32.50%
Gender	Female	169	84.50%
	Male	31	15.50%
Major	Information Technology	165	82.50%
	Accounting	18	9.00%
	Civil Engineering	4	2.00%
	Business Administration	4	2.00%
	Others	9	4.50%

4. Findings and discussion

4.1. Descriptive statistic

The table 7 gives the demographic information of the study sample based on frequency statistics and valid percentages. This study employed the following demographic characteristics: course, gender, and major.

As shown, the survey sample is generally representative of the total number of UTT students participating in terms of gender, course, and major, and therefore, it may be utilized for data analysis.

4.2. Reliability

Cronbach's alpha coefficient is used to evaluate the reliability of the scales. This is a statistical test of the quality of the scale used for each question, considering the relationship between the item being asked and the evaluation aspect.

4.3. Assessment of the measurement model

As mentioned above, the training service quality scale includes five components: Reliability (REL), Assurance (ASS), Responsiveness (RES), Empathy (EMP), and Tangibility (TAN). These five components of this scale are measured through 34 observed variables. Evaluating the scale's reliability by Cronbach's Alpha coefficient for each element shows that these components ensure good quality and are accepted for use in the research model. Thus, based on testing the reliability of the scale by Cronbach's Alpha coefficient, the training service quality scale of the research model ensures good quality with 34 variables.

4.4. Items measuring the students' satisfaction

Similar to the components of the training service quality scale, the students' satisfaction scale is also tested by Cronbach's Alpha. The test results show that the observed variables of the students' satisfaction scale have a variable-total correlation coefficient greater than 0.3 and Cronbach's Alpha coefficient greater than 0.7. Thus, the students' satisfaction scale ensures good quality and is used for the research model characterized by three observed variables.

After all the scales have been tested for reliability through Cronbach's Alpha coefficient, the tested variables satisfy the reliability conditions and are included in the model. The next step is EFA factor analysis.

4.5. EFA factor analysis

After conducting the test using Cronbach's Alpha coefficient, the next step will include the variables not excluded in the factor analysis using the principal components method with Varimax rotation. For factor analysis, specific criteria should be met as follows:

First, the extracted factor must have an Eigenvalue >1.0 that will be retained in the analytical model because this is a representative quantity of the variation explained by the factor (Hair, Black, Babin, Anderson, & Tatham, 2006).

Second, variables with weight <0.4 will be eliminated, and variables with weights that do not have a high discriminant between factors (<0.3) will also be eliminated.

Third, the Kaiser-Meyer-Olkin index (KMO) must be between 0.5 and 1 to be a sufficient condition for factor analysis; if this value is less than 0.5, the factor analysis is likely unsuitable.

Fourth, Bartlett's test: testing a null hypothesis (H0 = variables are not correlated with each other in the population) based on the value sig., if sig. < 0.05, factor analysis can be carried out, and the extracted Variance (Cumulative % of Variance) must be greater than or equal to 50% for the analysis to be valid.

4.6. The quality scale of training services

The training service quality scale consists of 5 components, namely Reliability (REL), Assurance (ASS), Responsiveness (RES), Empathy (EMP), and Tangibility (TAN). The five components of this scale are measured through 34 observed variables. The variables were included in the EFA factor analysis after testing the scale's reliability using Cronbach's Alpha coefficient.

The results of Bartlett's test of Sphericity in KMO and Bartlett's test table with sig = 0.000 < 0.05 show that the necessary condition to apply factor analysis is that the variables must be correlated. The KMO index = 0.878 > 0.5 shows that sufficient conditions for factor analysis are appropriate and satisfactory.

At levels of eigenvalues greater than 1 with the Principal Components extraction method and Varimax rotation, factor analysis extracted six factors from 34 variables with an extracted variance of 78.915% (>50%) to meet the requirements.

After the factor rotates, the factor loading coefficient of 34 variables in the factor rotation matrix table > 0.4 meets the requirements. However, considering the standard of difference, the factor loading coefficient of an observed variable between the factors is

greater than or equal to 0.4 to ensure the discriminant value between the variables. Two variables (ASS7 and ASS13) were excluded because of uploading two groups of factors, and the difference in load factor was less than 0.3. The analysis of factors is explored the second time after removing each variable one by one with three variables. Removed from the model (ASS13, EMP4, ASS11), the obtained factor analysis results are as follows:

The factor analysis results in table 8 show that the coefficient KMO = 0.878>0.50, so the EFA is consistent with the data-Bartlett Sig test. = 0.00 < 0.05, so the observed variables are correlated on the overall scale. The total variance when extracting factors at Eigenvalue = 1.475 > 1 is 78.978 > 50%, showing that 31 variables in the model explain nearly 80% of the variation of the observed data, so the drawn scale is accepted.

The rotated factor loading matrix shows that the factor loading coefficients of 31 variables are all ≥ 0.50, and each observed variable has a difference in factor loading coefficients are all ≥ 0.30, so the distinction between the factors can be ensured. That confirms that these 31 variables are significant in the model, that the names of the extracted factors remain unchanged, and that the proposed model is correct.

4.7. Student's satisfaction scale

Table 8: Result of exploratory factor analysis – Service quality scale

Rotated Component Matrixa

Variable	Factor				
	1	2	3	4	5
ASS4	0.894				
ASS6	0.884				
ASS5	0.858				
ASS8	0.852				
ASS3	0.849				
ASS12	0.847				
ASS9	0.844				
ASS2	0.842				
ASS1	0.792				
ASS7	0.77				
ASS10	0.732				
REL8		0.881			
REL3		0.869			
REL5		0.862			
REL1		0.858			
REL4		0.845			
REL2		0.838			
REL7		0.828			
REL6		0.817			

	1	2	3	4	5
TAN3			0.883		
TAN1			0.865		
TAN2			0.823		
TAN5			0.817		
TAN4			0.795		
RES1				0.921	
RES4				0.919	
RES2				0.917	
RES3				0.852	
EMP2					0.892
EMP3					0.85
EMP1					0.727
Extraction Method: Principal Component Analysis.					
Rotation Method: Varimax with Kaiser Normalization.					
a. Rotation converged in 6 iterations.					

Source: SPSS Software

Like the training service quality scale, the exploratory factor analysis for the Students' satisfaction scale has a KMO of 0.748, satisfying the 0.5 < KMO < 1 condition. Sig = 0.000 satisfied Sig requirement ≤ 0.05. The extracted variance value is 91.011; only one observed variable explains 91.011% of the factor change. Thus, the variables of the satisfaction scale continue to be kept for the following analysis; there is neither change nor disturbance in the scale. The results of the EFA factor analysis for the students' satisfaction scale are as follows.

Thus, after performing the test using Cronbach's Alpha coefficient and exploratory factor analysis EFA, the proposed scale is satisfactory and statistically significant. The above scales will be used for the following test analysis.

4.8. Validity of the model and regression analysis

Based on the research model, we can see the relationship between empathy, assurance, tangibility, responsiveness, and reliability factors with the students' satisfaction. Mathematically, the above relationship is expressed by the function:

SAT = f (EMP, ASS, TAN, RES, REL)

Where the value of each independent factor is the average of the variables that make up that factor, the results showed that most students did not highly appreciate the service quality. They are temporarily satisfied with the level of trust that the University of Transport Technology brings. The response level of the University needs to be appreciated, as shown in the average assessment score of 3.3402. Finally, students are generally not satisfied with the University's educational services. Thus, the students' assessments of the factors are similar.

The relationship between the factors related to service quality and the factor of students' satisfaction is considered through Pearson correlation analysis. The results of the Pearson correlation analysis are shown in the correlation matrix, presented in Table 9 below.

The results of correlation analysis show that the Sig Pearson correlation of

Table 9: The correlation of the scales for satisfaction		
Correlations		Satisfaction
EMP (Empathy)	Pearson Correlation	.375**
	Sig. (2-tailed)	0
	N	200
ASS (Assurance)	Pearson Correlation	-0.014
	Sig. (2-tailed)	0.842
	N	200
TAN (Tangibility)	Pearson Correlation	.534**
	Sig. (2-tailed)	0
	N	200
RES (Responsiveness)	Pearson Correlation	.236**
	Sig. (2-tailed)	0.001
	N	200
REL (Reliability)	Pearson Correlation	.882**
	Sig. (2-tailed)	0
	N	200
SAT (Satisfaction)	Pearson Correlation	1
	Sig. (2-tailed)	
	N	200
**. Correlation is significant at the 0.01 level (2-tailed).		
Source: SPSS Software		

independent variables EMP, TAN, RES, and REL with the dependent variable SAT is less than 0.05. Thus, there is a linear relationship between these independent variables and the SAT variable. REL and SAT have the strongest correlation, with an R coefficient of 0.882, and RES and SAT have the weakest correlation, with an R coefficient of 0.236.

The Sig Pearson correlation between SAT and ASS is more significant than 0.05, so there is no linear correlation between these two variables. The variable ASS will be removed when performing multivariate regression analysis. Also, Hypothesis H2, "Students' satisfaction will be high or low depending on the extent of the assurance that the institution commits," is rejected.

Through correlation analysis, the selected model is a multivariable linear regression model, shown in the following equation.

$$SAT = \beta 0 + \beta 1EMP + \beta 2TAN + \beta 3RES + \beta 4REL$$

The results of multivariable linear regression have a coefficient of determination R2 of 0.783 and a coefficient of determination of adjusted R2 of 0.778. This means that the relevance of the model is 78.3%, or in other words, 78.3% of the variability of the students' satisfaction variable (SAT), which is generally explained by the variables in the model.

In the ANOVA analysis of the variance table, the F-statistic is calculated from the R square value of sig. tiny shows the suitability of the multivariable linear regression model with the data set. Thus, the independent variables in the model have a relationship with the dependent variable; the model can be used.

Table 10: Regression coefficients

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Toler-ance	VIF
1	(Constant)	0.136	0.166		0.82	0.413		
	EMP Empathy	0.039	0.038	0.04	1.036	0.302	0.754	1.327
	TAN Tangibility	0.042	0.041	0.045	1.016	0.311	0.563	1.776
	RES Responsiv eness	-0.034	0.035	-0.034	-0.954	0.341	0.858	1.165
	REL Reliability	0.902	0.044	0.852	20.644	0	0.654	1.53

a. Dependent Variable: Satisfaction

Source: SPSS Software

At the 5% significance level selected in the conventional study, if Sig. <0.05, the independent variables all affect the dependent variable. The results of the variance analysis show that the Sig value of the variable REL is less than 0.05, so the variable is significant in the model and positively impacts students' satisfaction. The EMP, TAN, and RES variables are not statistically significant (Sig. > 0.05), so they are excluded from the model.

The regression analysis results show that the model does not have multicollinearity, i.e., the independent variables do not affect each other because the variance inflation factor (VIF) of all variables is <10. Thus, the regression results show that the student's satisfaction is affected by the level of reliability. The normalized regression coefficients indicate the degree of impact of each dependent variable on the independent variable. In the model, the reliability factor is essential for students' satisfaction; the regression coefficient of this variable is β = 0.852. The model's linear regression equation has the form:

SAT = 0.136 + 0.852REL

ANOVA analysis aimed to discover faculty members' different perceptions about the quality of training services provided by the university. Through ANOVA analysis of variance, we see the Sig significance level. If all variables are more significant than 0.05, we can conclude that there is no difference between the variables and the student's assessment across faculties. Similarly, the study uses the ANOVA analysis method to test the difference in quality assessment by significance and gender. It was shown that students' quality assessment by year and by gender of study are not different.

Test the hypotheses of the research model

Four hypotheses need to be tested. Hypotheses 1, 3, 4, and 5 present the relationship between the factors in the service

quality scale and students' satisfaction.

Hypothesis 4, "Students' satisfaction will be high or low depending on the extent of the institution's empathy," is rejected by Sig. = 0.302>0.05.

Hypothesis 5, "Students' satisfaction will be high or low depending on the extent of the institution's tangibility," is rejected by Sig. = 0.311>0.05.

Hypothesis 3, "Students' satisfaction will be high or low depending on the extent of the institution's responsiveness," is rejected by Sig. = 0.341>0.05.

Hypothesis 1, "Students' satisfaction will be high or low depending on the extent of the reliability that the institution creates," is not rejected at the 5% significance level.

Hypothesis 1 is not rejected at the 5% significance level, which means that the reliability factor affects the student's satisfaction.

This improved factor will increase students' satisfaction with the quality of UTT's training services. Hypotheses 3, 4, and 5 were rejected. So, empathy, tangibility, and responsiveness do not affect students' satisfaction.

5. Conclusion

This research aims to determine the influence of the elements on the satisfaction of students studying at the institution and the importance of each factor's effects. Based on the theoretical foundation and previous related studies on the factors influencing students' satisfaction with training services at other educational institutions, the author developed a preliminary research model with five main scales and 34 representative variables and a satisfaction scale with five components. The SERVQUAL scale created by Parasuraman et al. (Parasuraman et al., 1985) is used in the study model. The study model and suggested scales were modified after analyzing the scale's reliability using Cronbach's Alpha coefficient and EFA factor analysis, and the final model was established, which included five factors described by 31 observed variables. Following the completion of descriptive statistics for each independent variable of the analytical model, the author used linear regression analysis to estimate the impact of each independent variable on the dependent variable, students' satisfaction. The investigation of the components' effect by the analytical model reveals a difference in the degree of the impact of each independent variable on the model's dependent variable, and that difference is accurately represented.

The author addressed the research questions and achieved the study's objective of measuring the influence of the factors on students' satisfaction with quality training services provided by the institution with high reliability through the tests for the model and its independent variables through the results of the research model. The paper proposes several managerial implications based on those factors that influence students' satisfaction with the quality of the university's training services, thereby contributing to the development of the university and the prestige of the school. The degree of reliability demonstrates that the educational institution strives to instill trust in students. The implementation of education must adhere to the established plan, and the evaluation of learning outcomes must always maintain impartiality and equity. Another of the six views on the quality of education and training in higher education institutions is organizational culture, which is related to reliability.

The study's limitation is mainly related to its scope. The study was conducted on an average scale at the University of Transport Technology, a public university. Hence, the research's generalizability is limited. The second limitation is due to the respondents who were selected to implement the research. The research primarily focuses on current

students' perceived service quality and satisfaction. In addition, the study also excludes stakeholders such as graduates, organizations, or students' parents, whose satisfaction is also determined by the service quality. With the abovementioned limitations, the author will continue studying this broad topic in future studies to fill all these gaps.

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