ORIGINAL ARTICLES

Does the servperf instrument have reliability and validity in a higher education setting: The results from a university in Vietnam

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ABSTRACT

Objective: This article aims to assess the validity and reliability of the SERVPERF scale used for evaluating the quality of training services at the Hanoi University of Public Health (HUPH).

Methods: The research team used the SERVPERF scale, translated and standardized this instrument. The self-structured questionnaire based on the SERVPERF scale was administered to 350 students currently attending formal courses at the HUPH. Principal Components Analysis (PCA) was performed with Cronbach' Alpha to measure the instrument items' internal consistency to assess the scale's reliability. Confirmatory factor analysis (CFA) was used to validate the relevance of the scale.

Results: All the interscale correlations were positive and significant. The overall statistical value for Cronbach's alpha was equal to 0.91 (95%CI: 0.91-0.94), and in all domains, this value ranged from 0.7 to 0.92. The factor analysis identified eight factors that explain 66.6% of the variance, 5 of which consisted of the same structure as the theoretical model's five domains.

Conclusions: The University should use SERVPERF to assess the quality of training services yearly so that proper adjustments can be made to improve training quality, thereby enhancing students' satisfaction and confidence in service quality.

***Keywords*:** *SERVPERF, reliability, validity, University.*

INTRODUCTION

The university system faces a series of challenges caused by numerous factors, such as quality of the teaching and learning, demographic structure of students, information technology demand, globalization, and competition (1). In order to successfully face the future, service quality has become important agenda to universities. Service quality may be conceptualized as customers or consumers overall feeling about the superiority or inferiority of the service provider's services (2).

In marketing research, students could be considered 'primary customers' in higher education (3). Higher education institutions should ensure that all services are managed to increase the perceived quality by customers (4). Educators of higher education should be accountable for the quality of education, reach the program goals, and improve the student's basic skills (5).

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Service quality is not only outcome-oriented; it also includes process-oriented evaluations. In higher education, appropriate performance indicators are important because this would help managers assess the service quality provided by their institutions, thus having the ability to use the results to better design service delivery. A review of the literature reveals that the most popular scales used to measure service quality in higher education are: (a) SERVQUAL—Service Quality (6); (b) SERVPERF—Service Performance (7); (c) HedPERF—Higher Education Performance (5) and (d) a merged SERVPERF–HedPERF (5,7). These scales were used to assess services in higher education in different parts of the world (8–12).

SERVQUAL and SERVPERF were the most common scales for measuring service quality in higher education. These utilized 22 items in five dimensions: tangibles, reliability, responsiveness, empathy, and assurance. While SERVQUAL considers both the expectations and perceptions of customers' evaluation, SERVPERF merely considers the customers' perceptions. The review was shown that both SERVQUAL and SERVPERF are equally valid predictors of overall service quality (8,13). Depending on the purpose of study, type of services, and level of involvement, the appropriate tool could be selected. SERVQUAL is considered helpful for diagnostic purpose, and SERVPERF is recommended for the sound theoretical model. Despite the common usage of SERVQUAL, there seems to be solid support for the performance-based model, SERVPERF, even in the context of higher education (8,14). The practitioners will have less effort in modifying tools for specific contexts with SERVPERF than SERVQUAL.

In 1986, Vietnam began reform 'Doi Moi', from a centrally planned to a socialist-oriented market economy (15). The higher education reform agenda 2006-2020 (known as Resolution 14/2005/NQ-CP) was promulgated to enhance the autonomization of higher education institutions. Several policies on autonomy were promulgated (Decree 10, Decree 43) and amendment Law on higher education and Decree 10 and Decree 43. However, autonomisation still has limited objective of giving opportunity and the incentive to generate alternative sources of revenue to fund their operating budgets in the face of diminishing state subsidies (16). With autonomization, higher education faces greater competition in the new era. Education was considered as a service, and they should be able to provide quality services.

Ensuring quality is the target to scale up and maintain the branding of academic settings and attract more students/customers. Therefore, standardized instruments for evaluating quality should be important. The SERVPERF scale has been standardized in several countries but not yet in Vietnam, especially higher education. This study aimed to test the validity and reliability of SERVPERF in one public University in Vietnam.

METHODS

Study subjects: The study recruited students attending public health degrees from 2nd to 4th grade in 2019. The public health student was chosen because they are a major student in HUPH. Inclusion criteria: Students who agreed to participate in the study.

Sampling: The sample size was calculated based on the 5:1 ratio of five students for each variable in the scale (17). The scale composes 22 variables; thus, the minimal sample should consist of 110 students. As cluster sampling was used (each class was treated as a cluster), we doubled the mentioned sample size (220 students). Estimating that 10% of the students might refuse to participate in the study, the research team selected 242 students. In practice, we delivered self-administered questionnaire forms to 365 students using the convenience sampling method. However, only 350 forms were valid and therefore included for analysis; 15 other forms were discarded due to incompleteness.

Translation of SERVPERF scale: Scale development and testing process developed by Timothy R. Hinkin (1995) was adopted. Stage one: item generation, stage two: scale development, and stage three: scale evaluation (18). The original SERVPERF (7) was translated into Vietnamese. The tools were revised with comments from experts and then tested with 10 third-year students and adjusted accordingly. Afterward, the instrument was back-translated into English and compared with the original version to ensure the accuracy and quality of the translation.

Independence variables: The main variables were 22 questions in the SERVPERF scale; they were adapted to the university context, and a 5-Likert scale, from strongly disagree to strongly agree, was used for all of the questions. The final section of the instrument covered variables related to the students' general information, namely gender, age, and year of University.

Dependence variables: The study outcome was service quality, a hidden variable generated from 22 variables in the SERVPERF scale during Structural Equation Modelling (SEM) analysis.

Data analysis

Data were analyzed using STATA 14.0, in which the validity of the scale was measured using internal consistency (Cronbach' alpha). Principal component analysis and varimax as the rotation method was used to identify dimension with factor loadings (18). SEM was used as an analysis in the construction of SERVPERF. CFA was conducted to certify the elementary factors using Comparative Fit Index (CFI), Tucker Lewis Index (TLI), and Root Mean Squared Error of Approximation (RMSEA). These indices' criteria must be met for a satisfactory fit model: (i) CFI and TLI must approach 1 (19,20); (ii) the Standardized Root Mean Square Residual (SRMR) must be less than 0.1; (iii) RMSEA should be up to 0.09 with 90% confidence interval values below 0.1 (20).

Ethics approval: Approval for this study was granted by the HUPH research review board (Decision No.404/2018/YTCC-HD3). Students received informed consent at the beginning of the self-administered questionnaire and were informed that all data collected would be anonymous.

RESULTS

A total of 350 students participated in the study. Their age ranged from 19 to 27 years, and male students accounted for 32.3%.

Reliability of the scale

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Table 1. Reliability value

Factor	Cronbach' Alpha	Eigenvalue	The minimum value of Factor loadings
Tangibles	0.79	1.26	0.56
Reliability	0.88	9.04	0.68
Responsiveness	0.85	1.83	0.64
Assurance	0.78	1.02	0.51
Empathy	0.86	1.65	0.56
Overall Cronbach' Alpha =0.93; KMO=0.92; Bartlett's test: p<0.001			

Table 1 shows the reliability value of SERVPERF scale. The result was shown that the Kaiser-Meyer-Olkin (KMO) measure was 0.92, meaning that the sample size for this study was reasonable for factor analysis, and the Cronbach' Alpha value for each factor was relatively high ranging from 0.78 (*Assurance*) to 0.88 (*Reliability*). The overall Cronbach' Alpha value of 0.93 indicated the high internal consistency of the items. The items were correlated with each other ($p<0.001$; Bartlett's test). All five factors had their Eigenvalues (the variance explained by each factor) greater than 1. The lowest factor loadings (i.e., the correlation coefficient between variables and factors) across all factors exceeded 0.5.

Table 2. Factor loadings of items

	Items	Factor loadings
Latent variable 1: Tangibles		
e1	University has up-to-date equipment	0.55
e2	University physical facilities are visually appealing	0.84
e3	Employees of University are well dressed and appear neat	0.68
e4	The appearance of the University's physical facilities is in keeping with the type of services provided.	0.83
Latent variable 2: Reliability		
e5	When University promises to do something by a certain time, it does so.	0.70
e6	Staff at University provides support and help to students.	0.71
e7	University provides services based exactly on students' reasonable requests	0.80
e8	University provides its services at the time it promises to do so	0.68
e9	The academic staff has precise records of students' activities.	0.69
Latent variable 3: Responsiveness		
e10	University tells its students exactly when services will be performed.	0.72
e11	You receive prompt service from university employees	0.74

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	Items	Factor loadings
e12	Employees of the University are always willing to help students.	0.74
e13	Employees of the University always respond to student requests promptly.	0.64
Latent variable 4: Assurance		
e14	You can trust employees of University	0.51
e15	You can feel safe in your transaction with the University's employees	0.83
e16	Academic staffs show a positive attitude (polite, kind) towards students.	0.78
e17	Employees get adequate support from the University to do their jobs well	0.67
Latent variable 5: Empathy		
e18	University gives you individual attention.	0.87
e19	Employees of the University give you the personal attention	0.71
e20	The academic staff understands students' needs.	0.69
e21	University has your best interests at heart.	0.67
e22	University has operating hours convenient to all students	0.56

Factor loadings in all items were higher than 0.6, except for two items on Tangible (*University has up-to-date equipment)* and Empathy (*University has operating hours convenient to all students)* (Table 2). The highest factor loadings were identified for Empathy (*University gives you individual attention*) and Tangible (*University physical facilities are visually appealing*).

Validity of the scale

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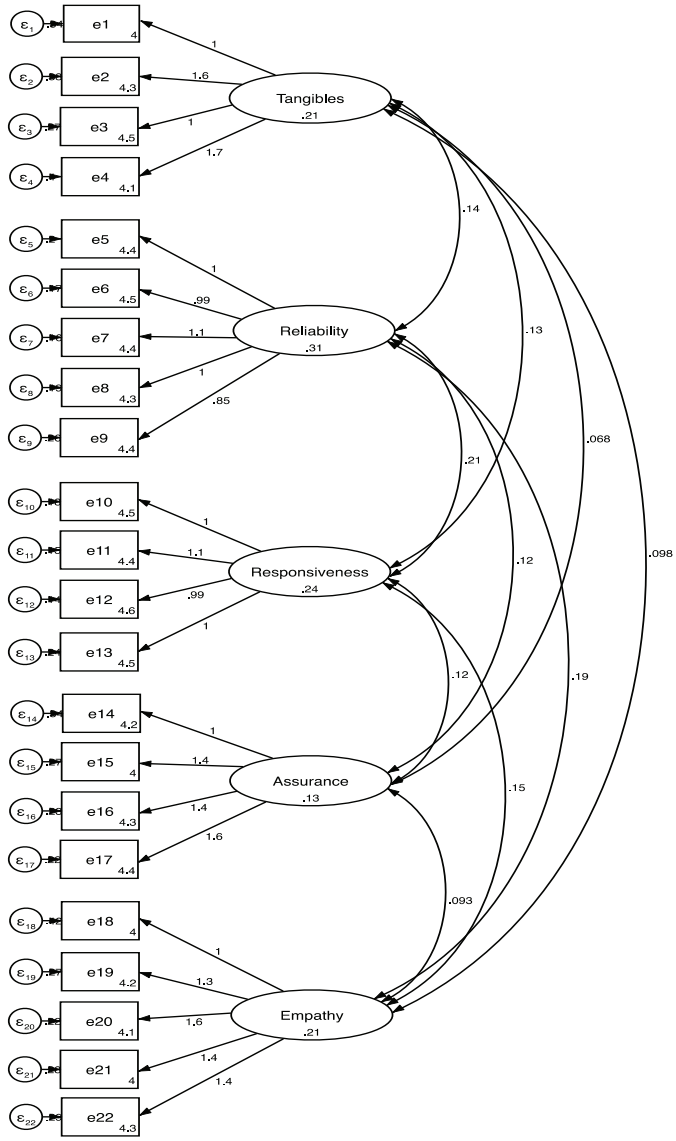

Figure 1. Structural equation modeling of service quality

In CFA, the SEM was used in which 22 items of SERVPERF were treated as observatory variables that generated five hidden variables, namely: (i) Tangibles; (ii) Reliability; (iii) Responsiveness; (iv) Assurance, and (v) Empathy. These hidden variables were assumed to generate the dependent variable "Service quality" (Figure 1). Values shown in the diagram are regression coefficients for each item with a corresponding hidden variable to which it contributed. The results were shown that all regression coefficients are not equal to 0, indicating that those items had a linear relationship with the corresponding factors to which those items contributed. Accordingly, the generation of 5 variables from the 22 items was relevant, and so was that of the service quality.

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Table 3. Model fit indicators

Statistics	Recommended Thresholds *	Results
Sample size (SS)	>250	350
Number of variables/ items (m)	12<m<30	22
RMSEA	<0.07 with CFI>=0.92	0.07; CI95% (0.06; 0.08)
CFI	>0.92	0.9257
TLI	>0.92	0.9236
SRMR	<=0.08 with CFI>0.92	0.06
Chi-square	-	542.48
p-value	<0.05	<0.001

** Applied for the model with a SS of (n)>250 and the number of items between 12 and 30* (17)

Table 3 shows that 350 students completed questionnaire forms exactly as recommended for the 22-item SERVPERF scale. RMSEA score of 0.07 indicates a close fair fit. Goodness of fit indices GFI, AGFI, CFI, NNFI, and IFI have values on higher side in a range of zero to one indicating a stronger fitness (Hoelter, 1983). The values used to assess the scale's reliability were acceptable (17). This means the data collected from HUPH students were suitable for the SERVPERF scale with 22 items and five factors.

Table 4. Correlation between factors and items contributing to latent variables

Items	β (CI95%β)	r	R^2
Tangibles			
e4	1	0.76	0.58
e3	0.33 (0.22; 0.44)	0.46	0.21
e2	0.85 (0.72; 0.98)	0.72	0.52
e1	0.62 (0.48; 0.77)	0.65	0.42
Reliability			
e9	1	0.62	0.39
e8	1.15 (0.94; 1.37)	0.66	0.43
e7	1.42 (1.16; 1.68)	0.75	0.56
e6	1.39 (1.14; 1.64)	0.76	0.58
e5	1.41 (1.15; 1.66)	0.75	0.56
Responsiveness			
e13	1	0.73	0.53
e12	0.96 (0.83; 1.09)	0.79	0.63
e11	1.09 (0.95; 1.24)	0.82	0.67
e10	0.93 (0.79; 1.07)	0.73	0.54

Items	β (CI95%β)	r	R^2
Assurance			
e17	1	0.78	0.61
e16	1.15 (1.02; 1.29)	0.83	0.69
e15	1.25 (1.11; 1.39)	0.85	0.73
e14	1.18 (1.04; 1.32)	0.83	0.68
Empathy			
e22	1	0.76	0.58
e21	1.04 (0.89; 1.20)	0.70	0.49
e20	1.16 (1.01; 1.31)	0.80	0.64
e19	1.19 (1.05; 1.34)	0.83	0.69
e18	1.09 (1.05; 1.33)	0.72	0.52

β (CI95%β): Regression coefficient reflecting a linear relationship between each item and the factor to which it contributes.
r: Correlation coefficient between each item and service quality
R^2: Coefficient of determination reflecting the proportion (%) of variation in each item explaining the variation in service quality

Table 4 shows that all items had positive linear relationships with the five factors to which they contributed ($p<0.001$). All regression coefficients were positive, and their confidence intervals did not contain zero, which means all items had positive relationships with service quality. The lowest correlation coefficient r was 0.46 (*e3: Employees of HUPH are well dressed and appear neat*), followed by 0.62 (*e9: Academic staff has precise records of student's activities*). Meanwhile, the highest one was 0.85 (*e15: You can feel safe in your transaction with the HUPH's employees*). The R^2 coefficient of determination is a statistical measure representing the proportion of the variance for the study outcome explained by each item in a regression model. The lowest and highest R^2 values were 21% and 73%, respectively.

Table 5. Correlation between factors and service quality

Factors	β (CI95%β)	r	R^2
Tangibles	1	0.65	0.42
Reliability	0.72(0.56; 0.89)	0.96	0.92
Responsiveness	0.94(0.74; 1.13)	0.93	0.87
Assurance	0.91(0.73; 1.09)	0.94	0.89
Empathy	1.01(0.81; 1.21)	0.96	0.92

β (CI95%β): Regression coefficient reflecting a linear relationship between each factor and service quality.
r: Correlation coefficient between each factor and service quality
R^2: Coefficient of determination reflecting the proportion (%) of variation in each factor explaining the variation in service quality.

In table 5, all factors had positive linear relationships with service quality ($p<0.001$). They were closely correlated with service quality, with the lowest correlation coefficient of 0.65 (Tangibles) and the highest value of 0.96 (Reliability and Empathy). Explaining 92% of the variance in service quality by Empathy and Reliability, followed by assurance (89%) and responsiveness (87%), and tangible (42%). The analysis results reveal that the service quality dimensions of SERVPERF scale are statistically significant ($p<0.05$). Therefore, 22 items in the SERVPERF scale were suitable for assessing the quality of training services delivered by HUPH.

DISCUSSION

Adequate sample size is important for testing new and existing scale; sample size adequacy was achieved by crossing the requirement of a sample size greater than the number of statements multiplied by five (17). It can be concluded that a total sample size of 350 indicates a good sample size adequacy.

The SERVPERF scale in higher education was tested for reliability and validity. The reliability (internal consistency) was analyzed using Cronbach's alpha values (19). In this study, items with significance at $p=0.05$ with a factor loading of 0.6 have been considered. Although many studies considered item loadings as low as 0.3, the factor loading at 0.6 was recommended for reliability and internal consistency of a scale or an independent construct adopted into a new scale development or modification of an existing scale to suit a particular study context (20). In this study, 2 items having factor loadings less than 0.6 were still considered for CFA assessing unidimensionality. Many other authors have confirmed the internal consistency/reliability of the SERVPERF scale (21–23)importance-weighted SERVQUAL, service performance (SERVPERF. This is also the basis for the popularity of SERVPERF in assessing service quality. In addition, the items were correlated with one another (Bartlett test, $p<0.001$). These attributes show that the scale can be considered for use in a Vietnamese university context with such reliability.

The validity of SERVPERF was performed by using CFA. The CFA is a type of structural modeling that deals with measurement models and are currently used frequently in scale development to assess the latent structure of the tool. 5 hidden variables were confirmed: tangibles, reliability, assurance, responsiveness, and empathy (6), which indicate that the data collected at HUPH were suited for the model proposed by Hair et al. (17). In other words, the collected data demonstrated that the 22-item and 5-factor scale was a relevant model. This result was also validated by other authors (14,24)empirical investigation regarding the concurrence or difference of the two instruments is the purpose of this paper. Design/methodology/approach – The research is qualitative (meta-analysis of service quality literature. In a study that aimed to compare the SERVPEF scale with other service quality scales, Brochodo demonstrated that the SERVPERF scale could assess service quality with students as informants.

SERVQUAL scale was widely used to measure the quality of service in higher education and different countries, including Vietnam. The results were shown reliable results in assessing student satisfaction in different contexts (25–30). Nevertheless, this study's findings confirmed that SERVPERF is a good model

for assessing quality service, particularly for sound theoretical models, and less effort for modifying tools for a specific context, including higher education (8,14,21).

Assessment of student perception on quality services is important for continuing quality improvement, particularly in autonomous and high competition among universities in Vietnam (16,17). The results of using SERVPERF will help to decide on the important domain that should be improved. The overall model provided a good explanation of the relationships between the variables and explained a 34% of variance in service quality in higher education (14), which supports the model's validity. This study showed that empathy and realibility are the most influential factors, followed by assurance and responsiveness, and tangible is the less influential factor. The findings highlighted the need for improvement of the tangibles domain. The finding is similar to another study in Vietnam (32). That means the University should focus more on improving their facilities like lecturing room, campus, internet, teaching materials, library, etc. to gain higher student satisfaction.

Limitations: A limitation of this study was the sample representative, which included public health students for the survey. Further research should expand the different majors and different universities to ensure the research result's representativeness. Another limitation was regarding the aspect of validation; we did not conduct a test-retest for the reliability or convergent validity of the scale.

CONCLUSION

The SERVPERF scale is valid and reliable for assessing training service quality based on students' perspectives at a university in Vietnam. Therefore, HUPH and other universities in Viet Nam should avail themselves of this scale to regularly assess their quality of services, thereby making timely and appropriate adjustments.

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