Urban Public Transport: A Study on Service Performance

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Abstract
With the aim to improve the bus service quality in Ho Chi Minh City, Vietnam, this study investigated the factors impacting on bus service and then proposed appropriate solutions for service improvement. In contrast to previous researches which used attributes that cover items like service coverage, frequency of services, hours of services, this study applied the SERVQUAL compatible with the standard TCCS 10, which included five dimensions namely reliability, assurance, tangibility, empathy and responsiveness. These five dimensions were comprised of 29 attributes. Data for the study was from questionnaire surveys of 280 road-users in the city. It was ascertained that tangibility, reliability, responsiveness and empathy influenced the bus service quality. These factors served as the basis for evaluating bus service quality in the study area. In addition, the findings had implications for service providers, transport planners with regard to the implementation of the strategies to upgrade the bus service.

Key Words: Bus service quality, SERVQUAL, TCCS 10, Ho Chi Minh City

1. BACKGROUND

As a form of public transportation, bus transportation is essential to passenger because it offers chances to travel from one location to the other with ease. Bus transportation improves energy efficiency and the environment. It enhances the quality of life in societies by providing efficient and inexpensive transportation service, improving mobility and mitigating traffic jams on our roads. Bus transportation has been regarded as one of the solutions for traffic in many developing countries (Rohani, 2013), and in Vietnam, especially in HCMC, it is true that public bus operation plays an important role in providing transport for commuting passengers.

Ho Chi Minh City (HCMC) is one which has the highest concentration of population in Vietnam, with over 7.9 million people in 2014 and with an average growth rate of 2.1 % per year, the population of the city is forecasted to rise from 7.8 million to 14.5 million by 2020 (General Statistical Office of Ho Chi Minh City, 2014). Located between the south-eastern region and south-western region of Vietnam, HCMC is the center of economic activities, education and culture. Population growth and urbanization have led to several transport problems. In 2016, HCMC had more than 7.4 million motorcycles and 550.000 cars. Private transportation including motorcycles accounted for 96.3% of total transportation in HCMC while public transportation

only accounted for 3.7% (Le, 2013). The Department of Transport - HCMC have been making efforts in offering public transport services that have resulted in the establishment of Ho Chi Minh Public Passenger Transport Management and Operation Centre (HCM PPTM & OC) which has been in charge of controlling and operating the 137 bus route. In 2016, approximately 1.62 million people commuted by bus a day which represented 9.9% of the travel demand of local commuters.

Although the number of buses and bus routes has been increasing recently with 107 of a total of 137 bus routes price-subsidized by local government, bus ridership has been decreasing since 2013 owing to service quality deterioration. Results of the preliminary survey on the satisfaction of bus passengers implemented by the HCMC Institute for Development Studies in 2014 indicated five major causes for passengers' dissatisfaction with bus services (Le, 2015). Amongst these reasons, the rude staff accounted for 24.6% of respondents, low-quality buses for 14.5% and less safety for 10.1%, while careless bus drivers and ticket controllers made up 14.4% and 6.8% respectively. These causes have hugely affected the quality perceived by the road users, created user resentment and even encouraged them to travel by private vehicles like motorcycle or car, which have caused traffic congestion to get much worse.

Public bus transportation is characterized as a service, and the choice of public transport as a mode of travel by travelers in the city is mainly influenced by the quality of bus services (Wall & Mc Donald, 2007). It means that to attract people living in HCMC to use the bus service, its quality has to be upgraded. Although bus service quality may be defined using various attributes, the SERVQUAL model developed by Parasuraman *et al*. (1988) is mostly applied to measure bus service quality (Githui *et al*., 2010; Randheer *et al*., 2011; Sahney *et al*., 2004). The SERVQUAL includes 5 dimensions namely reliability, assurance, tangibility, empathy and responsiveness. Thus, improving bus service quality to increase customer satisfaction may be the key to drive road users living in HCMC to use bus service, thereby reducing the density of private vehicles. In recent years, the quality perceived by public transport riders has been investigated in Vietnam (Le and Trinh, 2015; An and Vu, 2017). Moreover, the increasing problems of service quality in urban public transport has also been acknowledged by the Ministry of Transport-Vietnam, with the releasing of the service quality standard in public transport: Specification on service quality of passenger transport by motorzied vehicle (TCCS 10: 2015/TCDBVN) (MOT, 2015). However, there is a lack of applications in the public transport area with no prior attempt to develop a framework for the service quality measurement by means of a SERVQUAL compatible with the standard TCCS 10. In light of the above, this research proposes the integration between the dimensions of SERVQUAL procedure and the TCCS 10 to measure bus service quality in the public bus sector and to determine levels of influence of each dimension on service quality. The long-term goal of this research was to improve the bus service quality in HCMC. The following sub-objectives were formulated in line with the main purpose of the study:

(1) To define the factors compatible with the requirements of the SERVQUAL and TCCS 10 that determine service quality of public bus transport system in HCMC that explain passenger satisfaction

(2) To evaluate the levels of influence of each factor on service quality in HCMC

(3) To propose solutions to upgrade the quality of bus service in HCMC

2. LITERATURE REVIEW

2.1 Bus transportation service

Recently, the public transport sector in many countries, especially developing countries, has been involved in a process of transformation (Randheer *et al*., 2011). Public transportation, which can be classified into three main groups namely General public transportation, Special public transportation, Tourist and charter traffic, includes all modes like taxis, coaches, trains and airplanes which are owned either by the government or private individuals (Dziekan, 2008). Bus as a form of public transportation means motor vehicle with motive power, which is used to transport adults and/or children (Wijaya, 2009). In less developed countries, the bus is typically the backbone of public transportation (Tiwari, 1999; Susilo *et al.*, 2007) and it is characterized as an activity of service.

2.2 Bus Service Quality

In the transportation context, the phrase service quality has been defined in many forms. It has been defined as the quality criteria for which the providers are responsible to provide (European Committee for Standardization, 2002), the measurement process of how the service quality level matches the customer satisfaction (Nathanail, 2008), the measurement that reflects passengers' perceptions towards the service (Tyrinopoulos & Antoniou, 2008) and the measuring of customer expectation on a service standard base (TRB, 1999). These definitions have built a firm foundation for further researches of the quality process in the context of bus transportation service.

Furthermore, in recent decades, many studies have been conducted so as to upgrade the public transportation according to the following approaches: (i) The identification of the important factors that impact the quality of public transportation, (ii) The development of models for assessing the quality of public transportation. Review of literature shows bus transportation is not an exception. Several models have been proposed for measuring bus transportation service quality. In 2011, Medeiros and Nodari used the focus group technique to identify factors that could help to improve the quality of bus transportation service, according to the perspective of the National Land Transportation Agency, employees of bus transportation companies and passengers. In 2007, Eboli and Mazzulla developed a structural equation model to investigate the influence of the relationship between the passenger's satisfaction with public transportation and service quality dimensions. The study analyzed the bus service used by students at the University of Calabria to go to the campus from the urban area of Cosenza City, Italy. In addition, so as to measure bus services, bus passenger satisfaction surveys on bus services in Scotland, UK had been implemented since 2002 to 2005 (Buchanan, 2006). In the survey, passengers were asked to evaluate several dimensions of bus services and to give the reasons why they did not use the bus service regularly. The survey findings indicated that between 2002 to 2005 most common service complaint was on reliability.

Although there have been many models used to measure bus service quality, SERVQUAL scale (Parasuraman *et al.*, 1988) emerged as the most popular questionnaire to assess customers' perceived quality in the service sector (Ladhari, 2009; Frost & Kumar, 2001). SERVQUAL model, in general, is comprised of five distinct dimensions (Parasuraman *et al.*, 1988; Ojo *et al.*, *2014*):

- *Tangibility*: physical facilities, equipment, appearance of personnel

- *Reliability*: ability to perform the promised service dependably and accurately
- *Responsiveness*: willingness to help customers and provide prompt service
- *Assurance*: knowledge and courtesy of employees and their ability to inspire trust and confidence
- *Empathy*: caring or the individualized attention a firm provides its customers.

Not only has SERVQUAL been applied in various countries including China (Yang *et al.*, 2010), India (Randheer *et al.*, 2011), Malaysia (Zakaria *et al.*, 2010) and the United States (Schwantz, 1996; Kilbourne *et al.*, 2004), it has also helped a wide range of companies in evaluating perceptions of service quality (Buttle, 1996). Several researchers have applied SERVQUAL to assess service quality in many sectors such as airline (Sultan & Simpson, 2000), retail banking (Ravichandran *et al.*, 2010), pharmaceuticals (ELSamen & Alshurideh, 2012), education (Oldfield & Baron, 2000; Kwan & Ng, 1999), professional services (Hoxley, 2000; Philip & Hazlett, 2001), care hospital (Bowers *et al.*, 1994; Carman, 1990) and public transport (Aidoo *et al.*, 2013; Ojo *et al.*, 2014; Barabino *et al.*, 2012; Yang *et al.*, 2010). In the transportation context, SERVQUAL has been modified to suit to a particular study situation. Ojo *et al.* (2014) examined service quality and customer satisfaction using the SERVQUAL model with regards to the intercity bus on the Cape Coast-Accra route in Ghana. The SERVQUAL scale was consisted of five dimensions namely reliability, tangibility, assurance, responsiveness and empathy. The findings of the study revealed 15 attributes in the SERVQUAL scale portray low perception of bus service quality there. In 2010, Too and Earl adapted a modified SERVQUAL to assess service quality in urban bus transport, especially emphasized on lower perceived quality of bus riders in comparison to train passengers in Varsity Lakes (Australia). Wang et al. (2010) analyzed the gap between perceived and expected quality among urban transport stakeholders commuting within the Taipei's metropolitan area. The results also illustrated a high degree of important attributes such as on-board security, reliability, cleanliness and frequency. With the purpose of increasing the travel demand of local commuters by increasing the bus service quality, Yang *et al.* (2010) proposed a '…revised SERVQUAL-based method…' to investigate urban bus service quality from passengers' perspective. Passengers who were regularly using two bus routes, Bei'an and Line 119, were chosen to become the respondents in their studies. Data was collected via questionnaire. The findings indicated that bus ridership was most concerned about waiting time, vehicle capacity, ticket fare and the inconvenience of the public transportation transfer system.

Specification on service quality of passenger transport by motorzied vehicle (TCCS 10: 2015/TCDBVN) or TCCS 10 issued by Ministry of Transport in 2015 is a national standard for service quality of passenger transport (e.g. bus transport, intercity passenger transport). TCCS 10 comprised five dimensions: the quality of vehicle, the management and operation of service provider, customer benefit, staff (e.g. driver, conductor), and route. The central aim of the standard is to ensure the comfort, safety, and convenience for passenger. Since 2015, TCCS 10 has been applied in the country to evaluate the service quality. However, not many researchers, (to our knowledge), utilize the standard in their researches to investigate the service.

3. CONCEPTUAL FRAMEWORK AND HYPOTHESES

Pullen (1993) defined service quality for public transport sector as a concept that includes the service's attributes affecting its fitness for purpose and circumstances. This means that each

region may assess its service quality in public transportation industry differently based on local circumstances. In the case of HCMC, the basis of the conceptual framework to be used in this research was a modified SERVQUAL model that incorporated with (a) the original SERVQUAL procedure comprised of five dimensions namely reliability, assurance, tangibility, empathy, responsiveness (Parasuraman *et al.,* 1988) (Figure 1) and (b) TCCS 10 including the quality of vehicle, the management and operation of service provider, customer benefit, staff (e.g. driver, conductor), and route). This integration prevented the original 22 items of SERVQUAL measurement. In the end, 29 items belonging to four dimensions (tangibles, reliability, responsiveness, assurance) that was related to its adherence to what prescribed by the TCCS 10 were chosen (Table 1). The attributes are unevenly distributed among the four dimensions and they fulfil the requisite of objective measurability, as set by the TCCS 10 standard. Some researches stated that "items in the dimension empathy were not included, since it is impossible for a transport provider serving tens of thousands of passengers on a daily basis to cater separately for the needs of each one" (Too and Earl, 2010; Barabino et al., 2012). However, in the context of Vietnam, culture plays an important role in the normal relationship and people seem to appreciate the way others, like service providers, communicate with them, which in turn affects on the customer satisfaction and loyalty. In the end, items comprised in empathy are still remain in the framework in the study. On the bases of literature review, following hypotheses were constructed to specify the relationship between the dimensions (independent variables) and service quality (dependent variable).

Hypothesis 1: Tangibility has positive relationship with bus service quality
Hypothesis 2: Reliability has positive relationship with bus service quality
Hypothesis 3: Assurance has positive relationship with bus service quality
Hypothesis 4: Responsiveness has positive relationship with bus service quality
Hypothesis 5: Empathy has positive relationship with bus service quality

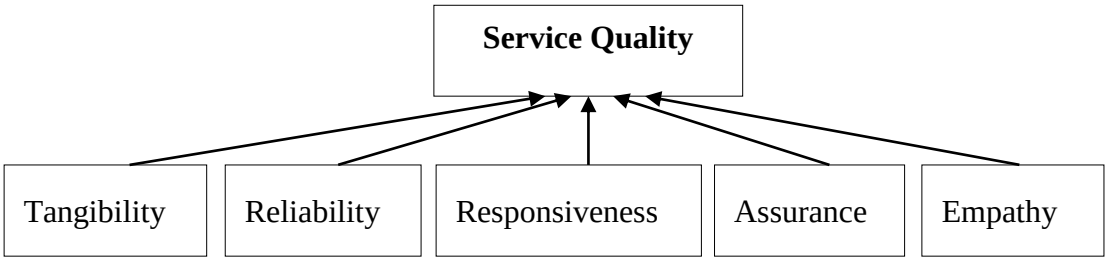

Figure 1. Conceptual framework adapted from Parasuraman *et al.,* (1988); Ojo *et al.,* (2014)

A regression function was developed to test the relationship between independent variables and dependent variable: $Y = a + b1X1 + b2X2 + b3X3 + b4X4 + b5X5 + \mu$. Where: Y = Dependent variable (Service Quality); X1,X2,X3,X4,X5 = Independent variable with X1 = Tangibility, X2 = Reliability, X3 = Assurance, X4 = Responsiveness, and X5 = Empathy; b value (b1,b2,b3,b4,b5) is the slope (beta coefficient) of independent value, whereas a value is the constant or intercept; μ is random error or residual.

Table 1. The 29 attributes and their adherence to SERVQUAL & TCCS10

SERVQUAL Dimensions	Coding	Attributes adherence to SERVQUAL & TCCS10	TCCS 10 Standard
Tangibility	T1	Vehicle body has good looking	*The quality of vehicle*
	T2	Physical facilities are visually appealing	
	T3	Neatness and cleanliness inside a bus	
	T4	Public Transport Supplier (PTS) provides a complete set of bus safety equipment with instruction signs	
	T5	No disturbing noise from engine when sitting inside a bus	
	T6	Having good customer contact system (i.e. call center for informing problems) with easy access	
Reliability	R1	When PTS promises to do something by a certain time, it does so	*The management & operation of service provider*
	R2	When you have a problem, PTS shows a sincere interest in solving it Quyền lợi của hành khách	*Customer benefit*
	R3	PTS performs the service right the first time	*The management & operation of service provider*
	R4	Services are punctual	
	R5	Discipline of staff	
	R6	When you have a problem, PTS shows their sympathetic and reassuring	
Responsiveness	Rs1	Effective and correct emergency management	*The management & operation of service provider*
	Rs2	Employees (drivers, ticket controller, etc.) give you prompt service	*Staff (e.g. driver, conductor)*
	Rs3	Employees are always willing to help you	
	Rs4	Employees are never too busy to respond to your request	
	Rs5	Bus driver driving safely with respect for traffic rules	
Assurance	A1	The behavior of employees instills confidence in you	*Customer benefit*
	A2	You feel safe in your transactions with PTS	
	A3	Employees have the knowledge to answer your questions	*Staff (e.g. driver, conductor)*
	A4	Employees are trustworthy	
	A5	Route network is convenient for you	*Route*
	A6	On-time performance	*The management & operation of service provider*
Empathy	E1	Emloyees gives attention to women, children, the old and pregnant	*Staff (e.g. driver, conductor)*
	E2	Employees give you personal attention	
	E3	Operating hour appropriate to all ridership	*Customer benefit*
	E4	The employees understand your specific needs	*Staff (e.g. driver, conductor)*
	E5	Emloyees gives attention to handicapped	
	E6	Employee prioritizes your interest	

4. METHODS

Based on the conceptual framework and hypothese outlined, the following research process has been adopted for the rest of the study (Figure 2).

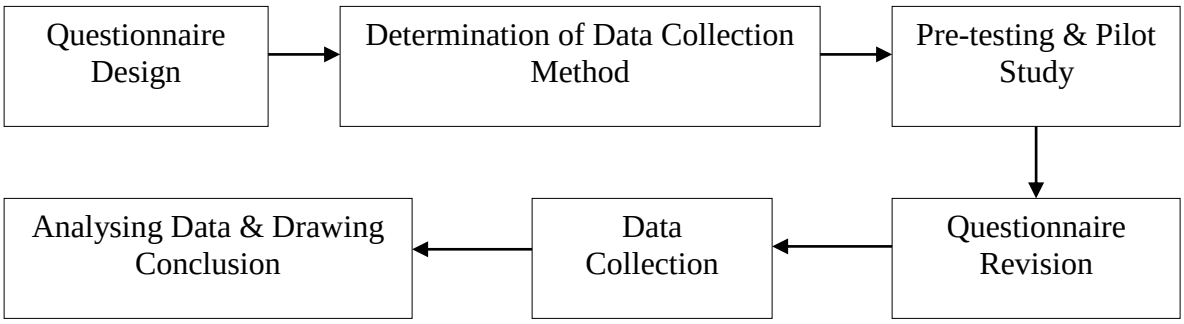

Figure 2. Research Process

A commuter intercept survey and face-to-face interviews were employed for data collection. The questionnaire used in study was based on the reviewed researches in this work. The questionnaire was divided into two parts: The first part contained the socioeconomic characteristics of the passengers such as sex, age, educational background, occupational status and monthly income level. The second part was the 29-observed variable modified SERVQUAL model and TCCS 10 measured on a 5-point Likert-scale from strongly agree to strongly disagree (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree and 5 = strongly agree). With all empirical studies, using 5-point Likert scale allows reducing the time of response and makes respondent more comfortable (Pe´rez *et al.*, 2007; Cui *et al.*, 2003).

Pre-testing and pilot study were also conducted to make sure that the measuring instrument represented the goal and sub-objectives of the study in terms of the information to be gathered (Aaker *et al.,* 2007). To ensure that all types of commuters could be surveyed, 280 commuters randomly selected were interviewed during an entire week at 8 bus stations in HCMC (from Monday to Sunday). The interviewing process lasted about 30 min. The age of the respondents was limited to between 15 years and 60 years, which was to enable only ridership that could travel without being given any assistance to take part in the interview. Also, people in this age range had regular commuting travel routine. Linear multiple regression analysis and other related techniques (e.g. reliability test, factor analysis) were used to examine these hypotheses described above.

5. RESULTS AND DISCUSSION

5.1 Descriptive Statistics

Out of the complete questionnaires filled in 50.6% were males and 49.4 % females. 30.2 % of the respondents were less than 25 years old, 41.6% were between 26-35 years old, 16.3 % were between 36-45 years old and 11.9 % were above 45 years old. In terms of employment status, 24.3% were employees, 48.8% were students, 7.4% were self-employed and 19.5% were other occupations. 70.1% had a bachelor's degree and only 29.9 % reported an educational level higher than a bachelor's degree. Most of respondents' income was around 3~6 Million VND (70%) while only 10.3% earned more than 7 Million VND. The number of bus users earning less than 3 million VND per month accounted for 19.7%. It is clear that middle- and low-income people were the main user of urban bus service in HCMC. With regard to the time period of service use,

53.2% of the interviewees reported usage from last 1 to 4 years, 21.7% reported usage for more than 4 years and 25.1% of the respondents reported usage from less than 1 year.

Table 2 contains information about Correlation, mean, standard deviation, skewness and kurtosis. Bartlett's Test of Sphericity and Kaiser–Meyer–Olkin measure of sampling adequacy was used to check whether we factorize efficiently the original variables. The analysis based on 29 observed variables showed that 406 relationships between pairs of variables differed from zero at the 0.01 level of significance. In addition, the direction of the correlation was positive, in the range of 0.24 – 0.80. The positive coefficients verified the correlation among the observed variables with the same direction. Moreover, Bartlett's Test which is a test statistic used to examine if the observed correlation matrix is significantly different from the identity matrix indicated $\chi^2 = 90177.93$ ($df = 435$, $p < 0.001$), varying from zero with a significance level of 0.01, KMO = 0.978. Hence, the correlation matrix of observed variables is not the identity matrix and it is suitable for factor analysis.

Parameter A2 (You feel safe in your transactions with public transport supplier) has the highest average value, 5.60 (SD=1.23), followed by Rs1 (Employees (drivers, ticket controller, etc.) give you prompt service) (Mean=5.51, SD=1.09). E2 (employees give you personal attention) has the min value with an average score of 4.43 (SD= 1.63). Skewness and kurtosis were used for testing normal distribution and we would expect the value of Skewness and kurtosis should be near to zero (-1.5; +1.5) (Muthén and Kaplan, 1985). In table 2, it is clear that the skewness and kurtosis values for all questions met the statistic criteria, meaning that data are relative to a normal distribution.

5.2 Exploratory Factor Analysis and Reliability

For EFA, we used the values of 29 observed variables to conduct group classification. In the study, the observed variables were divided into five groups employing PCA (principal component analysis) for factor extraction and varimax rotation with Kaiser Normalization. If parameters had factor loadings equal to or greater than 0.5, they will be considered significant because 0.5 loading denotes that 25 percent of the variance is accounted for by the factor (Hair et al., 2014). If the following problems emerge in the data, parameters were discarded: (1) items are weak and unstable (loadings factor < 0.5), (2) item communalities are considered low (the scores were less than 0.4), or (3) cross-loaded on two or more factors (Hair et al., 2014). The analysis results showed that a group of parameters (R5, R6, A4, A5, E3, E6) was deleted. Five factors had eigen values higher than 1, explaining 68.313% of the total variance. Table 3 presents the results on factor groups. For Cronbach's alpha, Cronbach's alpha is a measure of internal consistency showing how closely related a set of items is as a group. It is considered to be a measure of scale reliability (Byrne, 2010). In this study, the results indicated that five service quality dimensions (Cronbach's Alpha values was higher than 0.8) were reliable. There were no factors being removed because its "Cronbach's Alpha if Item deleted" was less than "the overall Cronbach's Alpha" and "Corrected Item - Total Correlation" was greater than 0.3 (Table 3).

Table 2. Correlation, mean, standard deviation, skewness and kurtosis

	T1	T2	T3	T4	T5	T6	R1	R2	R3	R4	R5	R6	Rs1	Rs2	
T1	1.00	0.72	0.70	0.65	0.60	0.57	0.59	0.63	0.60	0.55	0.62	0.60	0.52	0.54	
T2		1.00	0.67	0.63	0.58	0.66	0.40	0.51	0.68	0.45	0.54	0.58	0.66	0.50	
T3			1.00	0.60	0.73	0.68	0.59	0.55	0.56	0.50	0.54	0.50	0.66	0.52	
T4				1.00	0.69	0.66	0.45	0.53	0.58	0.55	0.57	0.64	0.69	0.51	
T5					1.00	0.56	0.62	0.48	0.56	0.59	0.57	0.58	0.54	0.53	
T6						1.00	0.58	0.58	0.67	0.58	0.65	0.66	0.60	0.57	
R1							1.00	0.54	0.63	0.51	0.60	0.64	0.66	0.60	
R2								1.00	0.60	0.43	0.50	0.68	0.70	0.61	
R3									1.00	0.44	0.67	0.63	0.71	0.41	
R4										1.00	0.70	0.71	0.66	0.51	
R5											1.00	0.50	0.52	0.52	
R6												1.00	0.63	0.60	
Rs1													1.00	0.80	
Rs2														1.00	
Rs3															
Rs4															
Rs5															
A1															
A2															
A3															
A4															
A5															
A6															
E1															
E2															
E3															
E4															
E5															
E6															
M	5.30	5.45	5.33	5.22	5.29	5.30	5.21	4.55	4.80	5.29	5.40	5.10	5.51	5.40	
SD	1.06	1.01	1.15	1.17	1.10	1.16	1.09	1.55	1.57	1.07	1.17	1.06	1.00	1.04	
Sk	-0.75	-0.78	-0.75	-0.69	-0.75	-0.81	-0.80	-0.77	-0.71	-0.74	-0.75	-0.77	-0.80	-0.69	
Ku	1.14	1.12	1.01	0.75	1.17	1.11	1.05	-0.16	0.44	1.21	1.10	1.05	0.95	0.80	

	Rs3	Rs4	Rs5	A1	A2	A3	A4	A5	A6	E1	E2	E3	E4	E5	E6
T1	0.52	0.50	0.51	0.50	0.48	0.54	0.49	0.48	0.51	0.45	0.38	0.33	0.37	0.36	0.47
T2	0.57	0.52	0.57	0.55	0.54	0.56	0.48	0.49	0.50	0.57	0.36	0.33	0.40	0.35	0.46
T3	0.58	0.55	0.52	0.54	0.50	0.53	0.52	0.53	0.58	0.44	0.43	0.30	0.39	0.38	0.46

T4	0.54	0.58	0.53	0.52	0.50	0.56	0.53	0.55	0.55	0.47	0.42	0.37	0.40	0.37	0.47
T5	0.53	0.55	0.55	0.55	0.52	0.55	0.50	0.50	0.55	0.47	0.43	0.42	0.45	0.38	0.45
T6	0.59	0.60	0.60	0.60	0.55	0.57	0.55	0.50	0.51	0.48	0.45	0.36	0.37	0.37	0.44
R1	0.61	0.58	0.37	0.50	0.37	0.40	0.47	0.49	0.56	0.44	0.53	0.37	0.45	0.35	0.51
R2	0.59	0.47	0.50	0.53	0.45	0.47	0.56	0.57	0.43	0.45	0.45	0.48	0.41	0.37	0.41
R3	0.49	0.50	0.68	0.62	0.64	0.55	0.55	0.60	0.55	0.41	0.49	0.47	0.46	0.47	0.52
R4	0.55	0.68	0.75	0.65	0.63	0.61	0.57	0.58	0.60	0.53	0.43	0.40	0.45	0.43	0.54
R5	0.70	0.73	0.70	0.68	0.57	0.61	0.60	0.63	0.58	0.50	0.37	0.32	0.37	0.44	0.53
R6	0.76	0.74	0.66	0.67	0.66	0.61	0.52	0.56	0.60	0.58	0.45	0.44	0.40	0.46	0.57
Rs1	0.81	0.76	0.78	0.68	0.66	0.63	0.55	0.60	0.63	0.59	0.34	0.34	0.39	0.43	0.54
Rs2	0.80	0.79	0.77	0.70	0.68	0.62	0.50	0.59	0.64	0.66	0.38	0.40	0.39	0.40	0.55
Rs3	1.00	0.78	0.83	0.72	0.67	0.67	0.54	0.60	0.61	0.57	0.40	0.37	0.41	0.42	0.54
Rs4		1.00	0.70	0.69	0.72	0.68	0.47	0.56	0.59	0.60	0.35	0.33	0.39	0.40	0.50
Rs5			1.00	0.73	0.72	0.70	0.55	0.54	0.57	0.62	0.35	0.33	0.40	0.40	0.52
A1				1.00	0.70	0.68	0.60	0.55	0.63	0.56	0.40	0.35	0.42	0.43	0.55
A2					1.00	0.55	0.43	0.53	0.56	0.52	0.33	0.24	0.37	0.44	0.50
A3						1.00	0.68	0.66	0.68	0.77	0.55	0.51	0.55	0.58	0.62
A4							1.00	0.72	0.71	0.78	0.62	0.58	0.55	0.50	0.60
A5								1.00	0.70	0.59	0.53	0.55	0.45	0.53	0.62
A6									1.00	0.65	0.55	0.50	0.52	0.55	0.57
E1										1.00	0.37	0.35	0.40	0.38	0.50
E2											1.00	0.68	0.56	0.55	0.56
E3												1.00	0.61	0.58	0.57
E4													1.00	0.64	0.65
E5														1.00	0.70
E6															1.00
M	5.44	5.49	5.49	5.33	5.60	5.23	4.77	5.07	5.27	5.5	4.43	4.54	4.82	4.90	5.23
SD	1.09	1.10	1.10	1.07	1.23	1.06	1.29	1.11	1.16	1.60	1.63	1.57	1.62	1.58	1.27
Sk	-0.86	-0.77	-0.93	-0.72	-0.91	-0.73	-0.73	-0.85	-0.70	-0.99	-0.67	-0.65	-0.86	-0.96	-0.95
Ku	1.07	1.33	1.42	1.30	1.25	1.47	0.77	0.98	0.05	1.43	-0.33	-0.39	0.15	0.47	1.11

M=Mean, SD=Standard Deviation, Sk=Skewness, Ku=Kurtosis. Correlation is significant at the 0.01 level (two-tailed) for all pairs

KMO = 0.978 and Bartlett's Test of Sphericity: Chi-Square = 90177.93, df = 435, $p < 0.001$

Table 3. EFA results on factor groups

Code	Statements of Service Quality	Loadings	Cronbach's α
Tangibility			
T1	Vehicle body has good looking	0.675	0.958
T2	Physical facilities are visually appealing	0.611	
T3	Neatness and cleanliness inside a bus	0.645	
T4	Public Transport Supplier (PTS) provides a complete set of bus safety equipment with instruction signs	0.754	
T5	No disturbing noise from engine when sitting inside a bus	0.669	
T6	Having good customer contact system (i.e. call center for informing problems) with easy access	0.577	
Reliability			
R1	When PTS promises to do something by a certain time, it does so	0.639	0.923
R3	PTS performs the service right the first time	0.662	
R4	Services are punctual	0.643	
Responsiveness			
Rs1	Effective and correct emergency management	0.800	0.848
Rs2	Employees (drivers, ticket controller, etc.) give you prompt service	0.807	
Rs3	Employees are always willing to help you	0.813	
Rs4	Employees are never too busy to respond to your request	0.778	
Rs5	Bus driver driving safely with respect for traffic rules	0.815	
Assurance			
A1	The behavior of employees instills confidence in you	0.643	0.927
A2	You feel safe in your transactions with PTS	0.575	
A3	Employees have the knowledge to answer your questions	0.730	
A6	On-time performance	0.763	
R2	When you have a problem, PTS shows a sincere interest in solving it	0.757	
Empathy			
E1	Emloyees gives attention to women, children, the old and pregnant	0.813	0.971
E2	Employees give you personal attention	0.626	
E4	The employees understand your specific needs	0.712	
E5	Emloyees gives attention to handicapped	0.645	

Note: EFA loading ≥ 0.5 is accepted

5.3 Model Parameters Estimated

Regression analysis was used to examine the relationship between independent variables (5 factor groups: Tangibility, Reliability, Empathy, Responsiveness, Assurance) and Bus service quality. The regression analysis results llustrated statistical values as follows: Adjusted $R^2 = 0.455$, F value was 25.035, 1 < Durbin – Watson = 1,944 < 3 and sig. = 0.000 <0.05 (Table 4).

Table 4. Coefficients(a)

Model	Standardized Coefficients	t	Sig.	Collinearity Statistics		Adjusted R^2	Durbin-Watson	F	Sig.
				Tolerance	VIF				
Tangibility	0.149	2.003	0.047	0.484	2.065	0.464	1.944	30.042	0.000
Reliability	0.253	3.662	0.000	0.560	1.785				
Empathy	0.195	2.431	0.016	0.414	2.417				
Responsiveness	0.256	4.383	0.000	0.780	1.282				
Assurance	0.101	1.628	0.105	0.695	1.439				

a Dependent Variable: Service quality

Through the value of R^2, the explanatory level of the model was 45.5%, meaning that 45.5% of bus service quality could be explained by the factor groups in the measurement model. The Sig. of factors indicated that four factors among five factors had significant impact on Bus service quality. They are Tangibility, Reliability, Empathy and Responsivens with standardized coefficients ranging from 0.149 to 0.256. The scores of VIF < 2,5 showed that there was no multicollinearity.

5.5 Hypotheses Testing

The standardized regression coefficients obtained from the model were used to test the hypotheses. As shown in Table 4, the explanation about testing hypotheses was presented below:

- *Hypothesis 1: Tangibility has positive relationship with bus service quality*

The standardized regression coefficient of tangibility on bus service quality was 0.149 (sig. = 0.047 < 0.05). This meant that tangibility was directly proportional to bus service quality with 95% confidence. Therefore, the hypothesis 1 was accepted.

- *Hypothesis 2: Reliability has positive relationship with bus service quality.*

The standardized regression coefficient of reliability on bus service quality was 0.253 (sig. = 0.000 < 0.05). This meant that reliability was directly proportional to bus service quality with 95% confidence. Therefore, the hypothesis 2 was accepted.

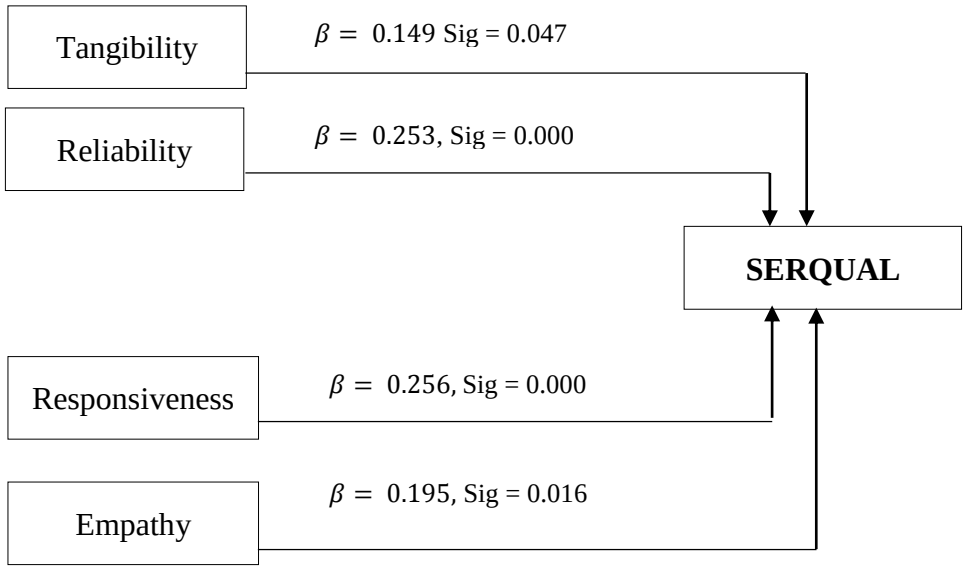

Figure 3. Regression coefficients of model

- *Hypothesis 3: Assurance has positive relationship with bus service quality.*

The standardized regression coefficient of assurance on bus service quality was 0.101 (sig. = 0.105 > 0.05). This meant at the level of confidence of 95%, assurance did not contribute to the explanation of the level of bus service quality. Therefore, the hypothesis 3 was rejected.

- *Hypothesis 4: Responsiveness has positive relationship with bus service quality.*

The standardized regression coefficient of responsiveness on bus service quality was 0.256 (sig. = 0.000 < 0.05). This meant that responsiveness was directly proportional to bus service quality with 95% level of confidence. Therefore, the hypothesis 4 was accepted.

- *Hypothesis 5: Empathy has positive relationship with bus service quality.*

The standardized regression coefficient of empathy on bus service quality was 0.195 (sig. = 0.016 < 0.05). This meant that empathy was directly proportional to bus service quality with 95% level of confidence. Therefore, the hypothesis 5 was accepted.

The study showed that out of 5 service dimensions, 4 dimensions were significant in determining the bus transport service quality. The outcome reveals that more than half of service attributes are human-related elements: reliability, responsiveness, empathy, while the remaining attribute : tangibility is related to bus service facility. Each attribute has different levels of influences on bus service which implies that providers should focus on improving bus service quality in factors in order of priority as follows (Table 5). Based on the results, it can be stated that SERVQUAL developed by Parasuraman *et al.*, (1988) and Ojo *et al.* (2014) are powerful model for measuring the HCMC bus service quality.

Table 5. Level of importance of bus service dimensions

Variable	Standardized coefficient Beta	Level of importance (the more larger, the more important)
Tangibility	0.149	4
Responsiveness	0.256	1
Empathy	0.195	3
Reliability	0.253	2

Bus users in HCMC were unsatisfied with the public transport services. Therefore, there is room for service improvement. Based on the findings discussed above, enhancement of bus transport system in HCMC should focus on four key dimensions Responsiveness, Reliability, Empathy, Tangibility.

Regarding *Responsiveness*, it is recognized as very important for ridership. Training programs which help the staff work in a professional way is necessary. In addition, passenger usually considers much more on safety aspect. Hence, to avoid many cases of fire, explosion, or technical issues in terms of engine, light system, brake system, the development of emergency management system should be taken into account seriously. *Reliability* is crucial for bus operators because it can reduce operating costs and increase revenues by retaining current ridership and attracting new ones. In order to increase the ridership's attractiveness, bus system should be designed to ensure on-time performance, avoiding being early and minimizing running late. Reliability also involves service frequency. While HCMC has an extensive transport network, public transport does not run very frequently. Increasing service frequency is promised to stimulate ridership. In terms of *Empathy*, it has a major impact on the public transport attractiveness. Empathy expresses in the way that employees give their attentions to the vulnerable groups of women, children, the old and pregnant and understanding ridership's specific needs. *Tangibility* is a key aspects in maintaining an efficient bus system, which increases users' satisfaction. Bus fleet in HCMC has low condition with the lack of neatness and cleanliness inside a bus or modern facilities like safety equipment with instruction signs. The decision of increasing services might be affected by finance and budget, however, investment in 'Tangibilty' has proven positive in the case of encouraging people to use public transport.

6. CONCLUSION

Bus transportation can be used to 'kill two birds with one stone' (Randheer *et al.,* 2011). Firstly, better bus transportation service quality can attract a large number of citizens in HCMC to reduce the use of private vehicles like car, motorcycles and others. Secondly, better bus service quality will solve the traffic problem in HCMC. This paper provides a detailed examination of a quality of service indicator to assess the opinions of passengers towards bus transport. This research applied a modified SERVQUAL measurement and TCCS 10 as well as statistical analysis in an attempt to measure bus service quality in the public bus sector and to determine levels of influence of each dimension on service quality. The implications of this are that an in-depth analysis of bus service quality may reveal how changes to service provision could be altered to better cater to riders' mobility demands. With reference to the research question, four dimensions namely Empathy, Responsiveness, Tangibility and Reliability, which include both aspects from TCCS 10 and those previously found in studies, are still valid and in urgent need of enhancement influenced the bus service quality, while assurance does not contribute to explain bus service quality in HCMC. The research also strongly pointed that, 'Responsiveness' is the most influential service dimension and determinant of overall bus service quality. Taking measurements of these service provision concepts could allow the government to consider how strategies to retain existing customers and policies to attract new customers could be developed.

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