Transport service quality and perceived service value: an international comparative survey in European and Indian context

Naveen Bangalore Ramu* and Anjula Gurtoo

Department of Management Studies,
Indian Institute of Science,
Bengaluru 560012, India
Email: naveen.b.ramu@gmail.com
Email: anjula@iisc.ac.in
*Corresponding author

Abstract: Road transportation plays a critical role as a means to commute between places. Ensuring quality in this service, therefore, is crucial. In this paper, we explore the service quality characteristics of intercity bus passenger transport and analyse the determinants of commuters' perceived service value in the European and Indian context. A structured questionnaire was administered face-to-face and captured the passengers' perception of service quality. Factor analysis and multiple linear regression were used to test the research hypotheses of the study. Empirical results demonstrate that timely service, women-friendliness, ticket price affordability and service to price satisfaction are common to passengers from Europe and India, and significantly impact commuters' perceived service value devised as overall satisfaction. In particular, external tangibles such as clean drinking water, clean bus stops are however significantly more important for passengers in Europe, while handling of luggage is a more appropriate tangible for passengers in the Indian context. Additional analysis suggests that technology also significantly impacts the overall satisfaction of passengers in both contexts. Several comparative results were discussed for their context similarities and differences.

Keywords: service quality; perceived service value; intercity bus transport; public transport; transport policy; bus transport; international comparative study.

Biographical notes: Naveen Bangalore Ramu is a Postdoctoral Research Fellow at the Department of Management Studies, Indian Institute of Science, Bengaluru. He received his PhD in the field of Public Transport from Indian Institute of Science, Bengaluru. His research interests are mainly in the fields of public transport, service quality, customer satisfaction and sustainable livelihood.

Anjula Gurtoo is the Chairman of Centre for Society and Policy (CSP), at Indian Institute of Science, Bengaluru. She is a Professor at the Department of Management Studies, Indian Institute of Science, Bengaluru. Her teaching and research activities are mainly in the fields of equity issues in governance; sectoral reforms; informal economy; informal entrepreneurship; public

participation and empowerment; infrastructure and development; and environment, citizenship and group behaviour. Her research has been published in international journals of repute, such as *Journal of Sociology and Social Policy*, *Asian Social Work and Policy Review*, *International Entrepreneurship and Small Business*, *Developmental Entrepreneurship*, *Asian Public Policy*, *Economic Policy and Research*, and among others.

1 Introduction

The mobility of a passenger or a commodity from a particular origin to a destination for a specific time period is termed as transportation (Winston, 1985). Public transportation is the continuing transportation or special conveyance to the public through various modes such as buses, subways, rail, trolleys and ferry boats. Although intercity transport represents only 2%–10% of the total trips, it occupies 30%–45% of global passenger-kilometres (Bak et al., 2012; Hayashi et al., 2014).

A greater part of society recognises that transportation is an essential service, and the government plays a vital and unavoidable influence on this service (Winston, 1985). A proficient transport network builds profitability and upgrades the competitive efficiency of the economy (Namboodiri, 2007). The research on service quality attributes of transport, however, is inadequate. Although intercity transport activity has greater impact and reach but is eclipsed by urban transport research. However, growth projections demonstrate that travel between cities will rise in the future. Hence bringing in superior quality connectivity between intercity and urban transport becomes important (Allard and Moura, 2018).

In this paper, we explore the nature of intercity bus passenger transportation in the European context and the Indian context. Therefore, research questions are as follows:

R1 What are the basic service quality factors of intercity bus passenger transportation in European and Indian contexts?

R2 What are the determinants of perceived service value/satisfaction in both contexts?

R3 How technology does moderate the relationship between transport service quality factors and commuters' overall satisfaction in both contexts?

The sample size for the Indian context and the Europe context are 605 and 50, respectively. Since the data points in the two contexts differ substantially, bootstrapping is employed for both data to develop 3,000 samples each for both contexts.

According to the report of the International Road Transport Union, the second most preferred transport mode in Europe are buses and coaches after passenger vehicles (Rohani et al., 2013). In several countries of Europe, coaches are operated on a commercial basis (Rohani et al., 2013). According to Eurostat data, 9.2% of inland passenger transport is accounted by buses and coaches whereas 7.4% is accounted by trains in EU-28 by 2013 (ILO, 2015). The fare system of this mode appealing to young, older, lower income groups and people without access to a car (ILO, 2015). Buses and coaches usually fulfil the transport needs of less wealthy citizens in the countries like Canada, the European Union and the USA whereas services range from no frills to luxury first class buses in low and middle-income countries (ILO, 2015).

In India's comprehensive surface transport network, intercity bus transportation holds an important place because of the potential in connecting cities, smaller communities, rural areas and less populated regions (Fravel, 2003). Higher economic growth, large scale development of national highways which link Indian cities and relatively lesser growth in Indian railways makes intercity bus transport services important and equally essential in India (Clean Air Asia Center, 2012).

Two reasons compel us to study the two contexts in their service quality factors and overall satisfaction:

a   Does India's low transport infrastructure and Europe's better transport infrastructure make a difference in transport service quality?

b   Are there differences among commuters' perceived service value/overall satisfaction? If yes, do institutional and cultural differences play a role?

Because the composition of a population affects passengers' satisfaction level (Ponrahono et al., 2016) and perceptions vary with culture, for example, in the case of British and French viewers' responses to commercial advertisements (Bremser et al., 2018). Preferences, values and needs of individuals change over time and vary among groups and cultures (Steg and Gifford, 2005). Further, the influence of stakeholders will differ across cultures (Lamb and Roundy, 2018).

This study contributes to the transport and public sector management literature in two ways. First, external tangibles such as clean drinking water, clean bus stops are more important to passengers in the European context than in the Indian context. Handling of luggage on the other hand is given more importance by the passengers in the Indian context as compared to the European context. This highlights the cultural differences between the two regions. Second, the study highlights how technology changes the determinants of overall satisfaction. We find environmental and external tangibles become significant to overall satisfaction whereas tangibles become insignificant in the European context. The variance of the model is increased when technology is introduced in both European and Indian context. In other words, technology has a greater influence on overall satisfaction in the European context compared to the Indian context.

The remainder of the paper is organised as follows. Section 2 presents a review of the literature and hypotheses development; Section 3 explains sampling and questionnaire instrument; Sections 4 and 5 shows extensive comparative results and additional analysis output respectively; Section 6 discusses key findings of the study and test of the hypotheses; Section 7 concludes the study.

2   Literature review and hypotheses development

2.1   Comparison between Europe and India

Adhering to standard code of practice for bus design and services is mandatory for the transport service providers in developed countries (Echeverry et al., 2005; Estache and Gómez-Lobo, 2005; Finn and Mulley, 2011). Therefore, the passenger dissatisfaction with respect to bus design quality is not as apparent as compared to developing countries (Das and Pandit, 2016). Physical facilities such as comfort, cleanliness, waiting time, safety, aesthetics of bus, interior of bus and adequate maintenance are considered basic

service quality dimensions (Parasuraman et al., 1988; Herrmann et al., 2000; Lu and Ling, 2008; Carreira et al., 2013). The service attributes of public transport such as stops and terminals, transport points and vehicles also contribute to passengers' evaluation of service quality (Tyrinopoulos and Antoniou, 2008).

In Europe, environmentally friendly buses with affordable tickets, comfort seats and free Wi-fi make road public transport competitive with other modes of transports (Soloviev, 2015). The safety and high standards of buses in Germany are guaranteed by the inspections for every two years by Technical Inspection Association (TÜV) of Germany.

According to German Statistical Federal Office, the safest way to travel on Europe's roads is by bus. Many bus transport service providers in Europe are upgrading the equipment of their buses to enhance safety, security and comfort of passengers along with the regular health check to avoid bad habits such as drug intoxication, alcohol and lack of sleep (Soloviev, 2015). Adding to this, the regulations and policies transportation infrastructure are playing an important role for low fatal rate in Europe, where most of them are obligatory and some are voluntary which ensures high safety level. Technical attributes are enabling drivers to forecast the danger situations or directly participate in a save driving process (Soloviev, 2015).

According to the National Highways Authority of India (NHAI), India constitutes 3.3 million km of total road length while the share of national highways is only two per cent of the overall road network but still they carry about 40% of the total road traffic. The potential for surface transport is huge with the improvement in overall road connectivity. Since intercity transportation involves connecting cities, rural-urban areas and which has large transportation distance and most of the intercity public transport happens on national and state highways and because of this, quality of road infrastructure influences the quality of intercity bus passenger transport services.

In India, technology is being introduced rapidly. E-tickets are considered valid proof or ticket in the bus transport. Electronic ticketing systems such as online ticket buying websites, e-ticket teller machines and bus pass are introduced to minimise the passenger queues, waiting times and enhance service delivery time (Sam et al., 2018). Buses and coaches usually fulfil the transport needs of less wealthy citizens in the countries like Canada, the European Union and the USA whereas services range from no frills to luxury first class buses in low and middle-income countries (ILO, 2015).

However, poor economic profiles of transport users in developing countries is one of the reasons for service delivery compromises and poor service levels and bus design, to maintain the low fares (Andaleeb et al., 2007; Susilo et al., 2010; Kaushik, 2015). Ponnaluri (2011) suggests that providing high quality services should be the core theme of India's transport systems development strategy. Mobility and accessibility have increased in India over the years but there are critical issues like, delays, accidents and congestion leading to service quality. Safe and comfortable access to bus stations and intermodal integration are also equally essential in transportation infrastructure because lack of access to bus stops should not discourage passengers to use public transport (Clean Air Asia Center, 2012).

Table 1 Summary of key findings from cross-country researches on transport service quality

Author(s)	Objective	Mode	Sample	Measurement technique	Key findings
Sam et al. (2018)	The study aims to analyse the core public bus transport users' service quality expectations and perceptions, and its effect on overall satisfaction with public bus transport services in Kumasi.	Bus / Kumasi, Ghana	103	The cross-sectional, customer satisfaction survey sought to assess core public bus transport users' service quality expectations and perceptions with the intent to examine their level of satisfaction with public transport services in the Kumasi metropolis.	The study findings revealed vast differences between public bus transport service quality expectations and perceptions and a general dissatisfaction with the bus service delivery in the city. The bus service reliability and responsiveness were key to explaining the bus service quality in the city.
Fageda and Sansano (2018)	Empirical analysis of the determinants of prices and frequencies in the interurban bus market through a comparison across countries.	Inter-urban bus / France, Germany, Italy, Spain, Sweden and UK	177	The unit of observation for the empirical analysis is the routes linking two endpoints. The duration of each journey is also obtained directly from these websites.	The analysis indicates that bus prices are lower on routes with richer endpoints. The interurban bus market intramodal competition is based on frequencies while intermodal competition is based on prices. There is substantial difference across the countries examined, which could be attributed to differences in the regulatory model in operation in each country.
Chang and Yeh (2017)	This study proposes a new research model to examine how CSR affects customer loyalty in intercity bus services and how it interacts with service quality, corporate image and customer satisfaction in affecting customer loyalty.	Intercity bus / Taiwan	349	A survey questionnaire with a total of 58 survey items is used to collect data from passengers of a top leading intercity bus company in Taiwan.	The study finds that CSR has an indirect effect on customer satisfaction and customer loyalty through corporate image and customer satisfaction respectively as a mediator. In particular, a new finding of the study highlights the importance of the mediating role played by corporate image in enhancing the effect of CSR on customer loyalty.
Mahmoud and Hine (2016)	This study focuses on bus service quality from a user perspective and aims at investigating the relationships between the perceived quality of 29 indicators (independent) and the perception of users on the overall bus service (dependent).	Bus / Belfast City-Ireland	512	A questionnaire survey was distributed across Belfast City. The perceived quality from 29 indicators were evaluated using a 10-point Likert scale, whereby 10 is the highest value given to an indicator Nine explanatory variables were included in the questionnaire to address both socio-economic and travel characteristics.	Findings indicate that currently the service provides relatively high quality in safety and security, and service design attributes, while it provides relatively moderate quality in both operational and information and facility attributes. Fares and access to service attributes have relatively lower quality levels compared to other attributes as perceived by users. These findings indicate some variations in the service quality as perceived by both current and potential users.
Bakti and Sumaedi (2015)	This study aims to test a model of service quality of public land transport services, especially paratransit services.	Paratransit service / Indonesia	880	This study used quantitative approach. Data were collected through a survey method using questionnaire. The respondents of the study are passengers of paratransit services in Indonesia.	A model of service quality of public land transport, namely P-TRANSQUAL, was tested. P-TRANSQUAL consists of four dimensions, which are comfort, tangible, personnel, and reliability. The model has been proven to have good validity, reliability, and stability for measuring service quality of paratransit services in Indonesia.

Table 1   Summary of key findings from cross-country researches on transport service quality (continued)

Author(s)	Objective	Mode	Sample	Measurement technique	Key findings
Şimşekoğlu et al. (2015)	The main objective of the study is to examine the role of transport priorities, travel mode use attitudes, and car use habit on travel mode use among individuals in an urban Norwegian sample. An additional aim is to test these factors as predictors of both intentions to use public transport and use of public transport by structural equation modelling.	Public transport / Norway	546	Data were collected via a self-completion questionnaire survey conducted in June and August 2013. Participants were randomly selected from the urban regions of Norway using the Norwegian population registry.	Two clusters of transport users were identified; individuals who primarily use public and health-promoting transport (e.g., public transportation users, bicyclists) and car users. Older age, strength of the car use habit, and priorities of flexibility (e.g., prioritise being able to choose the exact time of travel) increased the odds of car use. The priority of convenience, priority of safety and security, and favourable attitudes towards public transport use were positive predictors of intentions to use public transportation, while car use habit was a negative predictor of both intentions to use public transportation and reported public transportation use.
Yaya et al. (2015)	The main objective of this study is to determine customer perception of public transport service quality and, thereafter, the importance that users place on certain improvable variables.	Bus / Girona-Spain	288	The survey method was a self-administering questionnaire distributed at various locations in the medium-sized city of Girona. Respondents were bus users and were selected by choosing a random starting point and choosing every fourth individual customer in succession thereafter.	The three dimensions of functional, convenience and physical environment quality were confirmed as underlying factors to assess customer perceived quality in a public transport setting. The results also showed that younger commuters appear to have lower perceptions of service quality compared to adults. This study adds theoretical knowledge on how to accurately assess opinions of customers' perception of service quality in public transport services, as well as how to provide sufficient insight on the direct role of demographic characteristics on customers' perceived service quality.
Carreira et al. (2013)	This study aimed at an in-depth understanding of customer perceptions and responses to address the complex and unstudied phenomenon of travel experience, and as such, a qualitative approach was adopted.	Bus / Portugal	49	Open-ended questions were developed considering all the phases of the passenger journey to enable them to express a comprehensive perspective regarding travel EFs, as well as their cognitive assessment, senses and emotions.	Study results show that passenger travel experience encompasses all moments of contact with the transportation service, as well as aspects that are not in direct control of the transportation provider. The results also reveal that the travel experience involves a holistic set of customer responses that go beyond cognitive assessments, also comprising sensorial and emotional components. The comparison of the two transportation settings shows that both experience-centric and utilitarian trip passengers have a holistic view of the travel experience, although focusing on different experience drivers and customer responses. These findings indicate that transport providers and planners should pay attention to the overall customer travel experience from a holistic view, and that transportation services should be carefully designed and managed in a systemic way.

Table 1 Summary of key findings from cross-country researches on transport service quality (continued)

Author(s)	Objective	Mode	Sample	Measurement technique	Key findings
De Oña et al. (2013)	This study aims to determine the influence of a series of characteristics describing the quality of the bus transit service on the Overall Service Quality (OSQ). Another aim of this paper is to reveal which are the unobserved latent aspects representing the main characteristics of the service, characterised by the attributes describing service quality.	Urban buses / Spain	1,200	A cardinal scale from 0 to 10 was used for measuring importance and satisfaction with the attributes and for the later evaluation of the overall service quality, while a five-point semantic scale (very poor, poor, fair, good and very good) was used for the previous evaluation.	Some interesting results have been obtained. Three latent variables were identified representing the main characteristics of the service. The unobserved latent construct obtaining the highest weight on overall service quality is service, while comfort and personnel have little influence. The passengers' evaluation better explaining the overall service quality is the evaluation made when passengers have reflected on the service.
Rojo et al. (2012)	The aim of this study is to model the parameters most valued by users when choosing between different modes of transport to make their inter-urban journeys.	Inter-urban buses / Spain	375	The survey was administered on working days in February and March 2009. The survey included more than 180 different destinations, representing small villages as well as national, regional and provincial cities.	The results indicate that, in general, improvements in the journey time or the number of daily journeys are valued less by inter-urban bus users than they are by car or railway users. The type of bus and its characteristics are evaluated as a function of the distance travelled and result in very small values for this variable. Contrary to what is often reported in satisfaction surveys, the journey cost is found to be relevant when choosing which mode of transport to use, but the most important variable is journey time. Little value is placed on the features of the bus, except on long distance journeys.
Susnienė (2012)	The aim of this study is to gain a better under-standing of the SERQUAL method in order to adapt it to public transport services and to identify the factors determining customer's satisfaction in this sector.	Urban buses / Lithuania	98	A questionnaire was employed to gather data on the pilot survey.	The benefits of public transport include increased mobility for everyone, reduced car dependence and a negative impact on health as well as decreased consequential needs for highway expansions .Service performance leads to customer satisfaction, which in turn leads to retention generating market share and producing profits. The purpose of SERQUAL is to serve as a diagnostic tool for discovering distinctive areas of company's service shortfalls and strengths.
Lai and Chen (2011)	This study aims to develop a relationship model that incorporates the main determinants of public transit passengers' behavioural intentions and explores their effects on behavioural intentions.	Mass rapid transit / Taiwan	763	An on-site survey was conducted at KMRT stations in Kaohsiung City on both weekdays and weekends in October 2008.	Service attributes such as vehicle safety, facility cleanliness, and complaint handing have significant influences on passenger behavioural intentions.
Randheer and Al-Motawa (2011)	This study aims to measure and assess the level and significance of service quality perception of the commuters on SERVQUAL scale given by Parasuraman et al. (1988) additionally including cultural dimension.	Commuter / India	512	A survey was conducted among the commuters who were regularly availing public transport services for travelling.	The study concluded that the service quality deliver meets the perception of commuters. In general, people of twin cities of Hyderabad and Secunderabad are benefited with the service quality delivery by public transport services.

Table 1   Summary of key findings from cross-country researches on transport service quality (continued)

Author(s)	Objective	Mode	Sample	Measurement technique	Key findings
Tyrinopoulos and Antoniou (2008)	This study aims to provide an overview of the Methodology developed by the Hellenic Institute of Transport (HIT) to assess the levels of quality and performance of public transport services.	Bus, trolley bus and rail (metro) / Greece	400	The data collected through the three different types of surveys, i.e., customer satisfaction, onsite and mystery shopping, was imported in a relational database and using the mathematical equations the values of the indicators were calculated.	The extensive know-how of the research team and the experience gained from the implementation of the Methodology to the various public transport operators mentioned earlier gave HIT the opportunity to establish a strong knowledge record and base in the field of quality control programs in the public transport business that could be applied to other transportation areas as well, such as short sea shipping, intermodal urban transport and inter urban bus transportation.
Eboli and Mazzulla (2007)	The main objective of this study is to propose a tool for measuring customer satisfaction in public transport to explore the impact of the relationship between global customer satisfaction and service quality attributes.	Bus / Italy	763	The sample survey was addressed to University of Calabria students who lived in the urban area of Cosenza. The survey, conducted in April 2006, was addressed to students who use the urban transport services.	The proposed model identifies service quality attributes to improve, with the aim of offering bus services characterised by higher levels of quality. In this case, the model suggest that an improvement of the service in terms of service planning and reliability can be more convenient for transport operators because the service planning and reliability latent variable has the greatest effect on global customer satisfaction.

2.2 A review of the literature and research gaps

Based on constructive suggestions for conducting a literature review and developing research hypotheses, we objectively survey several research articles published in various management and engineering journals. For brevity, we present some important findings of cross-country researches that explore transport service quality and commuters' overall satisfaction (see Table 1). Yet, there is a dearth of comparative studies in the case of intercity bus transport service and this paper, hence, is the first international comparative survey of European and Indian commuters in transport and public sector management literature. From the literature, it is evident that intercity bus transport is well defined and organised in the European context compared to Indian counterpart. This study is a unique attempt to analyse service quality and perceived service value dimensions of intercity bus transportation in India and Europe. This helps in understanding the nature of intercity bus transportation in both the contexts and provides an opportunity for learning good public governance practices.

2.3 Hypothesis development

2.3.1 Service quality

Bitner and Hubbert (1994) define service quality as the impression of relative superiority or inferiority by the customers. Public transport is considered a service for demonstrating characteristics similar to a service (Irtema et al., 2018). According to Zeithaml (1988), consumer's subjective view regarding the supremacy or superiority of a product or service gets reflected in the perceived quality.

Cronin and Taylor (1992) introduced the SERVPERF model with the argument that service quality should be measured as an attitude and reinforced the perception-based measurement of service quality. In support of the above, other service quality researchers argue that service quality should be measured through customer perception of service (Gagliano and Hathcote, 1994; LeBlanc and Nguyen, 1997; Nagata et al., 2004; Hu and Jen, 2006; Clemes et al., 2008;). Adding to these arguments, variation in service quality measurement was explained by SERVPERF by using the model in four service industries of fast food services, banks, pest control and dry cleaning (Leong et al., 2015). This paper uses the theoretical model of SERVPERF to study the research objectives.

2.3.2 Service quality features

The three distinctive characteristics of service quality identified by Horovitz (1986) are as follows:

- customer consumes the services at the same time as they are produced

- service is predominantly an 'experience' although it is made up of a set of benefits

- healthy relationship between the service provider and the consumer is an essential aspect of service quality.

According to Namboodiri (2007), benchmark for service quality measurement of bus transport includes reliability of buses, information provided to the passengers, perceived service quality by passengers, bus cleanliness and issue redressal. As per the findings of

Yaya et al. (2015) study, intercity passengers compare the characteristics of each mode such as fare, travel time, access to stations and airports, comfort and frequency before making choices. Lardinois (1989) shows that prices and other transportation service attributes, such as frequencies, travel times, schedules, vehicle comfort and congestion effects impact service quality. Providing a good accessibility resulting in safe, reliable, convenience, intelligent, and effectiveness of transportation system is one of the prerequisites for a public bus service (Aghdaie and Faghani, 2012). In road transport, employee's courtesy attributes such as respect, politeness, consideration and friendliness play an important role as service quality features (Parasuraman et al., 1985). According to Wen et al. (2005), indicators such as willingness to help, employee responsiveness, empathetic to passenger needs and employee courtesy represents the crew attitude which is one of the dimensions of intercity bus service quality. In the case of intercity bus passengers travelling longer distances, allowable vibration exposure time with respect to oscillatory comfort has a significant importance (Sekulić et al., 2018).

2.3.3   Satisfaction

Service quality is considered as a medium of achieving customer satisfaction and they both are conceptualised as explicit but closely connected entities in marketing literature (Beerli et al., 2004; Chen, 2008; Chou and Kim, 2009; Siddiqi, 2011). User satisfaction can be improved by emphasising on perceived value and service quality (Irtema et al., 2018). Service quality is positively related to customer satisfaction in the context of public transport (Khurshid et al., 2012). Satisfaction in the passenger's perception is determined by the cost, travel distance, purpose and frequency (Ponrahono et al., 2016). This is due to the difference between socio-demographics and characteristics of trip which influences the satisfaction level of the passengers (Ponrahono et al., 2016).

Consumption of service and purchasing decision can be used to determine the customer satisfaction (Chang and Yeh, 2017). For the services which are considered as necessities, user satisfaction is a key indicator of public service quality (Chica-Olmo et al., 2018). Customer satisfaction is seen through strengthening and improving service traits such as frequency, cleanliness and reliability (Irtema et al., 2018). The overall evaluation of total purchase and experience gained from the consumption is said to be the satisfaction for the intercity bus passengers (Anderson et al., 2004). Passengers' expectations, perception on service providers, perceived service quality and perceived price quality have significant influence in shaping passenger satisfaction (Fornell, 1992).

Based on the aforementioned contextual differences, literature review and theoretical perspectives, the following hypotheses are developed:

H1   Institutional and cultural differences exist between Europe and India with respect to the intercity bus transport service quality.

H2   Transport service quality will have a positive impact on commuters' perceived service value in Europe and Indian contexts and this positive effect significantly differs.

3 Methodology

3.1 Sampling

According to Karnataka State Road Transport Corporation (KSRTC) Key Statistics 2015, on an average 26.90 lakh passengers travel every day. By considering 26.90 lakh as the population, with 95% confidence level and 4% margin of error, the sample size for passenger questionnaire is 600. The survey was conducted between August 2016 and March 2017 at the intercity bus stations mainly in the Bangalore region, through convenience sampling technique. In the demographic distribution, majority of Indian respondents are 15–30 years of age group, are students and males have post graduate qualification. Majority of the passengers have monthly income is between INR 5,000 to 10,000. In the journey distribution, majority of the passengers travelled in government buses which are non-AC normal and travelled for more than 350 kilometres with travel time more than eight hours with the route having both hilly and plain routes. Majority of the passengers spent around 15 to 30 minutes of time in traffic in their journey, are occasional travellers and have chosen the same bus service provider for two to five times in their previous intercity travel. With respect to policy attributes, most of the buses had fire exit, first aid box, no entertainment opportunities and no seat belts. Majority of respondents agreed that seat belt in buses and inspection by officials improves the safety and expressed their opinion in making seat belt mandatory.

The European survey was conducted in February 2017 at the intercity bus stations in the European countries of France, Germany and Netherlands, and 51 passengers responded to the survey. Majority of the respondents are below 35 years of age and had travelled in private buses in Europe. Most of them travelled more than 350 kms and in AC semi sleeper buses. Regarding the improving of service quality by inspection of officials most of them agree that inspection by officials will improve the intercity bus service quality, and that seat belt should be made mandatory and improve the safety. Majority of respondents opined that graduated driver license should be practiced for responsible and informed driving.

Study with larger sample is done in the Indian context whereas smaller sample is considered in the European context due to survey constraints. European study can be used as a case study, but bootstrapping technique is used to compare the service quality of intercity bus service in both the contexts. In India, intercity buses originating from Bangalore region is considered whereas in Europe, buses originating from Amsterdam, Berlin and Paris are considered due to geographical constraints. The rationale behind considering three regions in the Europe is that these regions allow considerable journey time and distance for the passengers to experience the intercity bus journey.

3.2 Questionnaire

Dimensions and items of reliability, assurance, tangibility, empathy, and responsiveness (RATER) are adopted from SERVPERF (Cronin and Taylor, 1992) which is well established and widely accepted service quality measuring instrument in measuring perceived service quality (Leong et al., 2015). Intercity bus transport passengers form the

population for this study. Pilot study is conducted for totally 35 respondents and survey was administered face to face. Initial questionnaire had 134 items. After the pilot study necessary changes are made to the questionnaire with find items being 141. Most of the variables are continuous since questionnaire captures perceptions about service quality (Appendixes 3–4).

The questionnaire piloted and tested in India is implemented for survey in the Europe as well. The sample size in Indian context is 605 and European context is 51. Data employs hierarchical regression with bootstrapping to explore the relationship of service quality factors with overall satisfaction of intercity bus transport in both the contexts. Bootstrapping is a useful technique for testing model stability and estimates the sampling distribution of an estimator by resampling with replacement from the original sample. Bootstrapping is one method to assess a statistic computed from a sample and temporarily substitute the empirical probability distribution induced by the sample for the probability distribution defined by the population. It is a method for deriving robust estimates of standard errors and confidence intervals for estimates and increasing sample size makes the error smaller. The bootstrap principle says that choosing a random sample of size n from the population can be mimicked by choosing a bootstrap sample of size n from the original sample. 3,000 samples for bootstrapping are chosen to represent the population well enough to mitigate outliers and anomalies that can degrade the accuracy or applicability of analysis. 3,000 samples result in minimum error and beyond which there was no beneficial effect.

3.3   Data analysis

Factor analysis explores the basic factors of service quality of intercity bus transport in both European and Indian context. Reliability analysis namely, Cronbach's alpha test validates the explored service quality constructs. Hierarchical regression with bootstrapping explores the determinants of service quality satisfaction in both European and Indian contexts. Hierarchical regression technique studies the change in the relationship between service quality factors and overall satisfaction when technology factor is included in the model. Note that profile of respondents was not presented in light of the privacy and security concerns promised at the time of survey in both contexts.

4   Results

4.1   Service quality factors: European context

The service quality variables are subjected to factor analysis in the SPSS software. First, the Kaeser-Meyer-Olkin (KMO) and Bartlett's sphericity tests are conducted to assess the sampling adequacy and the strength of relationship among the variables respectively (Table 2). Kaeser (1974) recommended the threshold value of KMO as 0.5 to conduct satisfactory factor analysis. Bartlett's test of sphericity is significant at less than 0.05 to reject the hypothesis of correlation matrix being an identity matrix. These two tests pave the way to conduct the factor analysis.

Table 2 KMO and Bartlett's test: dimensions of service quality

KMO and Bartlett's test		
Kaiser-Meyer-Olkin measure of sampling adequacy		.659
Bartlett's test of sphericity	Approx. chi-square	1,628.314
	df	378
	Sig.	0.000**

Note: **$p < 0.01$; *$p < 0.05$.

Table 3 Reliability analysis and factor loadings of survey instrument (European context)

Sl. no.	Construct	Items	Factor	Cronbach
1	Reliability	Clean bus	0.868	0.949
		Employees tidiness	0.826	
		Good seats in bus	0.789	
		Women friendly	0.785	
		Women safety and security	0.778	
		Safety precaution information	0.769	
		Pleasant interiors	0.751	
		Ticket price affordability	0.750	
		Clean bus stops	0.737	
		AC working	0.718	
		On time departure and arrival	0.673	
2	Responsiveness	Necessary intervals	0.847	0.804
		Employees responsiveness	0.829	
		Luggage carrying	0.586	
		Luggage place	0.502	
3	Environment	Abnormal vibration	0.929	0.940
		Air pollution	0.913	
		Noise pollution	0.890	
4	Empathy	Information announcement at stops	0.943	0.977
		Individual attention	0.936	
5	Tangibles	Clean toilets	0.760	0.798
		Sufficient poles	0.745	
6	Assurance	Information on bus	0.903	0.713
		Sufficient buses	0.759	
7	External tangibles	Clean drinking water	0.797	0.527
		Eateries at stops	0.700	

Seven components are extracted from the factor analysis whose eigenvalues are greater than 1. These ten factors cumulatively add up to 82.56 % of variance in the service quality variables as shown in the Table 2. After the extraction of seven factors, we rotate the obtained factor structure to reduce the number of factors, to create a simple structure for interpretation.

The varimax rotation results in fseven orthogonal factors (Appendix 1). Factor 1 represents reliability; 2 represents responsiveness; 3 represents environment; 4 represents empathy; 5 represents tangibles; 6 represents assurance; 7 represents external tangibles. The factor loadings which correspond to the individual contribution of a variable in the factor or component are presented in the Table 3, along with reliability analysis using Cronbach's alpha. Higher the factor loading, more is the correlation between the observed variable and the latent factor.

4.2   Service quality factors: Indian context

The Kaeser-Meyer-Olkin (KMO) and Bartlett's sphericity tests are conducted to assess the sampling adequacy and the strength of relationship among the variables respectively (Table 4). These two tests pave the way to conduct further analysis and explore underlying factors.

Table 4   KMO and Bartlett's test: dimensions of service quality (Indian context)

KMO and Bartlett's test		
Kaiser-Meyer-Olkin measure of sampling adequacy		0.804
Bartlett's test of sphericity	Approx. chi-square	8,275.518
	df	528
	Sig.	0.000**

Note: **$p < 0.01$; *$p < 0.05$.

A total of ten components are extracted whose eigenvalues are greater than 1. These ten factors cumulatively add up to 62.15% of variance in the service quality variables as shown in Appendix 2. The factor loadings which correspond to the individual contribution of a variable in the factor/component are presented in the Table 5. Higher the factor loading, more is the correlation between the observed variable and the latent factor.

The Cronbach's alpha values, for reliability of all the service quality constructs are around 0.6 to 0.8 which is considered as a threshold value and hence there is an internal consistency in service quality measures. The Cronbach's alpha value of satisfaction construct is 0.613 which is considered acceptable by researchers. The constructs, corresponding items and Cronbach's alpha value are presented in Table 5.

Table 5   Reliability analysis and factor loadings of survey instrument (Indian context)

Sl. no.	Construct	Items	Factor	Cronbach
1	Service time reliability	On time arrival	0.774	0.698
		On time departure	0.749	
2	Information reliability	Information on arrival and departure	0.854	0.846
		Information announcement in bus	0.824	
		Information sufficiency	0.757	
3	Luggage assurance	Luggage place	0.739	0.733
		Carrying luggage	0.694	
		Luggage safety	0.683	
4	Tangibles	Clean bus	0.775	0.705
		Good condition seats	0.606	
		Comfortable seats	0.626	
		Necessary intervals	0.502	
5	External tangibles	Clean bus stops	0.503	0.720
		Clean toilets at bus stops	0.815	
		Clean drinking water at bus stops	0.797	
6	Empathy	Driver courteousness	0.649	0.601
		Conductor courteousness	0.685	
		Eateries	0.578	
		Sufficient poles	0.510	
7	Responsiveness	Conductor individual attention	0.619	0.772
		Other staff individual attention	0.607	
		Getting reserved seats for special passengers	0.790	
		Getting reserved seats for general passengers	0.790	
8	Women friendliness	Women friendly	0.897	0.860
		Safety and Security	0.915	
9	Economic	Ticket price affordability	0.711	0.683
		Bus fare satisfaction	0.860	
		Service satisfaction for price paid	0.825	
		Service to price paid	0.749	
10	Environmental	Air pollution	0.709	0.839
		Noise pollution	0.842	
		Abnormal vibration	0.843	
		Disturbance due to vibration	0.845	

4.3 Determinants of overall satisfaction in the European context

Table 6 gives the regression results with dependent variable 'overall satisfaction'. The value of R square is 0.810 which means that about 81% of the variation in overall satisfaction of the intercity bus transport is explained by the estimated sample regression plane that uses external tangibles, assurance, tangibles, empathy, environment, responsiveness, reliability as the predictors and the model is significant at 1% level.

The service quality factors of reliability, empathy and tangibles significantly impact the overall satisfaction of the intercity bus service in the European context with the coefficient values of 0.732, 0.393 and 0.308 respectively. Factors such as responsiveness, environmental, assurance and external tangibles do not significantly impact the overall satisfaction although they have emerged as distinct and important service quality factors. This indicates that these factors exist as a part of service quality, but they are not important for passengers when it comes to their overall satisfaction of the service.

Table 6   Model summary (European context)

Model	R	R square	Adjusted R square	SE (estimate)	Durbin-Watson	F value	P value
1	0.900	0.810	0.778	0.47534110	1.556	25.598	0.000**

Variables in the multiple regression analysis – bootstrap				
Model	Variables	B	Bias	Std. Error	Sig. (2-tailed)
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1	(Constant)	.003	–.002	.071	0.966
	Reliability	.732	–.006	.081	0.000**
	Responsiveness	.155	.000	.086	0.069
	Environmental	–.102	–.006	.079	0.195
	Empathy	.393	–.004	.063	0.000**
	Tangibles	.308	–.017	.066	0.000**
	Assurance	–.024	.003	.074	0.733
	External tangibles	.075	.006	.064	0.247

Note: **$p < 0.01$; * $p < 0.05$.

4.4 Determinants of overall satisfaction in the Indian context

Table 7 gives the regression results for the dependent variable 'overall satisfaction'. The value of R square is 0.443 means that about 44.3% of the variation in overall satisfaction of intercity bus transport is explained by the estimated sample regression plane that uses environmental, economic, women friendliness, responsiveness, empathy, external tangibles, tangibles, luggage assurance, information reliability, service time reliability as the predictors and the model is significant at 1% level.

Table 7 Model summary (Indian context)

Model	R	R square	Adjusted R square	SE (estimate)	Durbin-Watson	F value	P value
1	0.666	0.443	0.434	0.752351	1.953	47.308	0.000**

Variables in the multiple regression analysis – bootstrap					
Model	Variables	B	Bias	Std. error	Sig. (2-tailed)
1	(Constant)	–1.002E-013	–.001	.031	1.000
	Service time reliability	.188	.000	.035	0.000**
	Information reliability	.196	–.001	.034	0.000**
	Luggage assurance	.259	.000	.032	0.000**
	Tangibles	.274	.001	.033	0.000**
	External tangibles	–.031	–.002	.031	0.322
	Empathy	.372	.001	.038	0.000**
	Responsiveness	.257	.000	.031	0.000**
	Women friendliness	.068	.001	.032	0.032*
	Economic	.121	.000	.033	0.000**
	Environmental	–.051	.000	.033	0.118

Note: **$p < 0.01$; *$p < 0.05$.

Service quality factors of service time reliability, information reliability, luggage assurance, tangibles, empathy, responsiveness, women friendliness and economic significantly impact the overall satisfaction of the intercity bus service in the Indian context, with the coefficient value of 0.188, 0.196, 0.259, 0.274, 0.372, 0.257, 0.068 and 0.121 respectively. Factors such as external tangibles and environmental do not emerge significant. This indicates that these factors exist as part of service quality, but they are not important for passengers in the satisfaction of the service.

5 Additional analysis: impact of technology

5.1 Impact of technology on the relationship between transport service quality and overall satisfaction in the European context

Table 8 gives the results of regression when technology is introduced as an independent variable in the regression equation. The value of R square is 0.874 means that about 87.4% of the variation in overall satisfaction of the intercity bus transport is explained by the estimated sample regression plane that uses external tangibles, assurance, tangibles, empathy, environment, responsiveness, reliability and technology as the predictors and the mode l is significant at 1% level.

Table 8   Model summary (European context)

Model	R	R square	Adjusted R square	SE (estimate)	Durbin-Watson	F value	P value
2	0.935	0.874	0.849	0.39263645	1.556	35.397	0.000**

Variables in the multiple regression analysis – bootstrap				
Model	Variables	B	Bias	Std. error	Sig. (2-tailed)
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2	(Constant)	−.004	−.002	.060	0.941
	Reliability	.358	.010	.108	0.003**
	Responsiveness	.036	.003	.059	0.511
	Environment	−.147	−.005	.063	0.034*
	Empathy	.291	.001	.053	0.000**
	Tangibles	.122	−.007	.071	0.097
	Assurance	−.021	−.004	.059	0.725
	External tangibles	.128	.003	.057	0.043**
	Technology	.516	−.018	.132	0.000**

Note: **$p < 0.01$; *$p < 0.05$.

The introduction of technology as a new independent variable brings forth the following changes in the regression results:

a   Environmental and external tangibles factors become significant to overall satisfaction. Whereas tangibles factor becomes insignificant (which was significant in the regression model without technology variable).

b   The variance (R square value) of the model is increased from 81% to 87.4%.

c   Technology variable significantly impact the overall satisfaction of intercity bus transport.

5.2   Impact of technology on the relationship between transport service quality and overall satisfaction in the Indian context

Table 9 gives the results of regression when technology is introduced as an independent variable in the regression equation. The value of R square is 0.467 which means that about 46.7% of the variation in overall satisfaction of intercity bus transport is explained by the estimated sample regression plane that uses environmental, economic, women friendliness, responsiveness, empathy, external tangibles, tangibles, luggage assurance, information reliability, service time reliability and technology as the predictors and the model is significant at 1% level.

Table 9 represents that along with significant service quality factors from model 1, the technology factor significantly impacts the overall satisfaction of the intercity bus service with the coefficient value of 0.161 in the Indian context.

Table 9 Model summary (Indian context)

Model	R	R Square	Adjusted R Square	Std. error (estimate)	Durbin-Watson	F value	P value
2	0.683	0.467	0.457	0.737008	1.953	47.179	0.000**

	Variables in the multiple regression analysis – bootstrap				
Model	*Variables*	*B*	*Bias*	*Std. error*	*Sig. (2-tailed)*
2	(Constant)	−1.002E-013	−.001	.030	1.000
	Service time reliability	.188	.000	.035	0.000**
	Information reliability	.172	.000	.033	0.000**
	Luggage assurance	.238	.000	.032	0.000**
	Tangibles	.262	.001	.033	0.000**
	External tangibles	−.025	−.001	.031	0.430
	Empathy	.378	.001	.038	0.000**
	Responsiveness	.225	.000	.031	0.000**
	Women friendliness	.071	.001	.031	0.023*
	Economic	.125	4.785E-005	.032	0.000**
	Environmental	−.033	.000	.033	0.313
	Technology	.161	.000	.031	0.000**

Note: **$p < 0.01$; *$p < 0.05$.

The introduction of technology as a new independent variable brings forth the following changes in the regression result.

a   The variance (R square value) of the model is increased from 44.3% to 46.7%.

b   Technology variable significantly impact the overall satisfaction of intercity bus transport.

6   Discussion

6.1   Key findings of the study

We present a summary of the research objectives, analytical tools and key findings of this international comparative study (Table 10).

6.2   Main differences between Europe and India and test of the hypotheses

The results of the study show seven factors emerge as significant for service quality of intercity bus transportation in the European context. The seven factors are reliability (clean bus, employee tidiness, good seats, etc.); responsiveness (intervals, luggage space, etc.); environment (abnormal vibration, air pollution and noise pollution); empathy (information announcement, and individual attention); tangibles (clean toilets and sufficient space); assurance (information on bus and sufficient buses) and external tangibles (drinking water and eateries at the stops).

Table 10   Research objectives, analysis and key findings of the study

Research objective	Research question	Method	Key findings
To explore the service quality characteristics of intercity bus passenger transport and the determinants of overall satisfaction in the European and the Indian contexts.	What are the basic service quality factors of intercity bus passenger transport in the European context and the Indian context?	Factor analysis and reliability analysis	Reliability, responsiveness, environmental, empathy, tangibles, assurance, external tangibles are the service quality factors in European context. Information reliability and time reliability, luggage assurance, tangibles (bus related) and external tangibles (outside bus). Women friendliness, economic and environmental are the service quality factors in Indian context.
	What are determinants of service quality satisfaction in both contexts?	Multiple linear regression (hierarchical regression with bootstrapping)	Reliability, environment, empathy, external tangibles and technology significantly impact the overall satisfaction in European context. Service time reliability, information reliability, luggage assurance, tangibles, empathy, responsiveness, women friendliness and economic factors significantly impact the overall satisfaction in Indian context.
	What is the change in the relationship between service quality factors and overall satisfaction when technology is included?	Multiple linear regression (hierarchical regression with bootstrapping)	In the European context, environmental and external tangibles factors become significant to overall satisfaction. Whereas tangibles factor becomes insignificant which was significant in the regression model without technology variable. The variance of the model is increased to 87.4% from 81% when technology variable is introduced. Technology variable significantly impact the overall satisfaction of intercity bus transport.
			In the Indian context, variance of the model is increased to 46.7% from 44.3% when technology variable is introduced. Technology variable significantly impact the overall

The results of the study show ten factors emerge as significant for service quality of intercity bus transportation in the Indian context. The ten factors are: service time reliability (timely arrival and departure); information reliability (information on arrival and departure, sufficient and adequate announcements); luggage assurance (luggage place, and safety); tangibles (lean bus, good condition seats, comfortable seats); external tangibles (bus stop facilities like cleanliness, toilets and drinking water); empathy (driver and conductor courteousness); responsiveness (conductor and staff giving individual

attention, getting reserved seats); women-friendliness (women safety and security); economic (ticket price affordability, bus fare, satisfaction for price paid and service to price paid); and environmental (air pollution, noise pollution, abnormal vibration and disturbance due to vibration). From the findings it is evident that there are cultural differences between India and Europe in reliability, responsiveness, luggage assurance and empathy dimensions with respect to intercity bus transport. Hence, the hypothesis (H1) 'institutional and cultural differences exist between Europe and India with respect to the intercity bus transport service quality' is generally supported.

In the European context, the reliability factor such as clean bus, employee tidiness, good seats, women-friendliness, women safety and security, safety precaution information, pleasant interiors, ticket price affordability, clean bus stops, AC and on time departure and arrival significantly impact overall satisfaction. Further, environment factor such as abnormal vibration, air pollution and noise pollution, external tangibles such as clean drinking water and eateries significantly impact overall satisfaction.

In the Indian context, service time reliability, information reliability, luggage assurance, tangibles, empathy, responsiveness, women-friendliness, and economic factors significantly impact overall satisfaction.

The impact of the introduction of technology demonstrates several changes. In the European context it makes environmental and external tangibles factors significant to overall satisfaction and also improves the variance of the model. In the Indian context it improves the variance of the model. Technology factor has a greater influence on overall satisfaction in the European context (87.4%) when compared to Indian context (46.7%) which is evident from its larger shift in variance explained in the model. Service quality factors could explain variance better in the European context (81%) when compared to the Indian context (44.3%). From the findings, it is evident that the service quality impact on overall satisfaction dimensions' differs between Indian and European passengers in external tangibles, environmental, responsiveness, tangibles and assurance dimensions with respect to intercity bus transport. Hence the hypothesis (H2) 'transport service quality will have a positive impact on commuters' perceived service value in Europe and Indian contexts and this positive effect significantly differs' is accepted.

7 Conclusions

Based on the above empirical results and research findings of the study, the following observations emerge.

First, compared to the Indian context, European intercity bus passengers are less sensitive to responsiveness such as necessary intervals, employee responsiveness, luggage carrying and luggage place. In India, on the other hand, passengers are cautious about the luggage while travelling in an intercity bus. Luggage assurance emerges as one of the defining and important dimensions of the service quality in India. In the European context, luggage assurance forms only a small part of the reliability and responsiveness of the intercity bus service. This indicates that the preferences vary with cultures which are in accordance with the study of Bremser et al. (2018).

Second, tangibles such as clean toilets and sufficient poles, and assurance factors such as information on bus and sufficient buses are important to European intercity bus passengers. These aspects are an integral part of the service process. The Indian intercity

bus passengers however are less sensitive to these tangibles such as clean bus stops, clean drinking water and clean toilets.

Third, the reliability dimension of service quality forms an important for intercity bus passengers in both Indian and European context. Reliability dimensions such as service time reliability and information reliability significantly impact the overall satisfaction of the passengers in the Indian context and the European context. In other words, time and frequency are the priority for passengers of both regions. In particular, the reliability dimension of European context is comprehensive which constitutes women-friendliness, economic and service time as part of it whereas in Indian context these dimensions are evaluated individually. This may be because these aspects are considered as the part of the reliable dimension of the service for European passengers than Indian counterpart.

Fourth, notably, the technology interface is essential for passengers of both European and Indian context. Technology significantly impacts and improves the overall satisfaction of the passengers in both the contexts. Technology-based user friendliness and reduced time influences the passengers irrespective of the regions.

Last but not least, environmental factor such as air pollution, noise pollution, abnormal vibration and disturbance due to vibration are not important to Indian intercity bus passengers. This could be of two reasons. One being used to this environment for long time and two exposed to better services with the affordable costs. Environmental dimension has emerged as an important factor of service quality of intercity bus transport in European context. Environmental dimension significantly impacts the overall satisfaction of passengers in European context but not for passenger in the Indian context. Three, lack of awareness of environmental aspects and sustainability practices. This shows that the influence of stakeholder's perception differ across the cultures similar to the study findings of (Lamb and Roundy, 2018).

The study also discusses several limitations of the research strategy which may help scholars in furthering comparative researches on transport service quality and commuters' satisfaction. Firstly, because the sample size of European survey is smaller compared to the sample size of Indian survey, and only France, Netherlands and Germany are selected for the European survey, our comparative empirical findings are generally limited to these sample countries. Second, because there is a large difference in sample size between the sample contexts, extensive comparative analysis using adequate empirical tools such as structural equation modelling is undone. Though, it should be noted that for producing some meaningful comparative results, the study applies a bootstrapping with 3,000 samples in both contexts. However, since the sample size of Indian survey is relatively larger than the sample size of earlier studies in the Indian context (Randheer and Al-Motawa, 2011), main results are consistent and more applicable to emerging countries. Future studies are suggested to generate a large sample size in each context and conduct extensive international comparative researches between developed and emerging countries, which may have several implications for improving intercity transport service quality and passengers' perceived service value.

Appendices/Supplementary materials are available on request by emailing the corresponding author.

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