MANAGEMENT SCIENCE AND ENGINEERING
Vol. **4**, No. **3**, **2010**, pp. 87-94
www.cscanada.org

ISSN 1913-0341 [Print]
ISSN 1913-035X [Online]
www.cscanada.net

Development of Railqual:

A Service Quality Scale for Measuring Indian Railway Passenger Services

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Abstract: The main objective of this study is to present a framework developed for assisting Railways to monitor and control the quality of services provided to passengers. The study evaluated the passenger Rail Service quality of Indian Railways by developing RAILQUAL instrument on the basis of SERVQUAL and Rail Transport quality. Three new transport dimensions (comfort, security and convenience) are added to the original five SERVQUAL dimensions (i.e. assurance, empathy, reliability, responsiveness and tangibles). The instrument is tested for reliability and validity. Empirical study was conducted at Secunderabad Railway station of South Central Railway, India, using a purposive sample of 100 respondents. Valid responses from the questionnaire are statistically analyzed by using factor analysis. This study identified the attributes to evaluate the quality of Railway Passenger Services and develops a comprehensive instrument "RAILQUAL", which can be used by the Railways for collecting feedback from passengers. This study would help the Railways to monitor, control and improve the service. It can also be used as a tool for comparing the performance of various Railway Zones and Divisions across the country.
Keywords: Railqual; Service Quality; Indian Railways

INTRODUCTION

In the global economy quality is just the entry ticket. It is recognized that high quality service is essential for organizations that want to be successful in their business (Parasuraman et al 1988; Rust and Oliver, 1994). The organization has to battle many competitors who have attained it. The next step is figuring out how to differentiate high quality service. This differentiating and improving is possible only through service quality measurement. In general research on service quality addresses two types of problems which are Instrument for measuring service quality and evaluation of service quality in separate framework of study indicating that it is highly desirable to incorporate both problems in a comprehensive manner. While there are a number of studies on rail passenger service quality (eg.Disney, 1988, 1999; Hann and Drea 1998;

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*Received 20 May 2010; accepted 4 August 2010

Drea and Hanna 2000; Tripp and Drea 2002), there is very little published literature that reports the use of SERVQUAL in the assessment of railway passenger service quality.

To understand service quality there are an array of factors or determinants. A number of researchers have provided lists of quality determinants, but the best known determinants emanate from Parasuraman and colleagues from USA, who found five dimensions of service quality, namely tangibles, reliability, responsiveness, assurance and empathy and used these as the basis for their service quality measurement instrument , SERVQUAL (Parasuraman et al 1988; Zeithaml et al ., 1990). The result was the development of SERVQUAL instrument based on the gap model. The central idea in this model is that service quality is a function of the difference scores or gaps between expectations and perceptions. An important advantage of the SERVQUAL instrument is that it has been proven valid and reliable across a large range of service contexts. However, while the SERVQUAL instrument has been widely used, it has been subjected to certain criticisms as well. It has been suggested that for some services the SERVQUAL instrument needs considerable adaptation (Dabholkar et al ., 1996) and that items used to measure service quality should reflect the specific service setting under investigation, and that it is necessary in this regard to modify some of the items and add or delete items as required (Carman,1990) .

SERVICE QUALITY OF RAILWAY PASSENGER SERVICES AND RAILQUAL

Allen and DiCesare (1976) considered that quality of service for public transport industry contained two categories: user and non – user categories. Under the user category, it consists of speed, reliability, comfort, convenience, safety, special services and innovations. For the non –user category, it is composed of system efficiency, pollution and demand. Sillock (1981) conceptualized service quality for pubic transport industry as the measures of accessibility, reliability, comfort, convenience and safety. Traditionally, the performance indicators for public transport are divided into two categories: efficiency and effectiveness. Under the efficiency category, the measures are concerned with the process that produce the services while the effectiveness category are used to determine how well the services provided are with respect to the objectives that are set for them (Pullen,1993). The gap model of service quality and concept of transport service quality showed that service quality should be measured on multidimensional basis. SERVQUAL is much more humanistic, or customer-related, while most of the measures used in public transport industry are much more mechanistic, or have technical focus, or use more objective measures. In summary, in order to measure the quality of service thoroughly, the attributes used in SERQUAL, the public transport industry and the railway service sector should be grouped together to form a pool of items for measurement. Hence we have modified the attributes in the SERVQUAL model and added three new dimensions namely, convenience, comfort and connection and created RAILQUAL for the measurement of Railway passenger Services.. We conducted the research to assess the service quality of railway passenger service by identifying customer perceived gaps.

3. RESEARCH METHODOLOGY:

3.1 Objective of the Study:

The Study was aimed at finding out the following.

What are the attributes on the basis of which customers of passengers services evaluate service quality?
What are customers' perceptions of quality of railway passenger services?
What are customers' expectations from railway passenger service?
What is the extent of gap between customers' expectations and perceptions?

The objective of this research is to develop an instrument which will help the Indian Railways measure service quality of various divisions and Zones monitor and improve its service, and increase competitiveness.

3.2 Study Methods:

The study followed the research accomplishments at home and abroad as its basis, especially referring to the dimension categories and variables design in Zeithmal and others' SERVQUAL model and aiming at the railway passenger service. Based on the dimensions, we designed the questionnaire. We used Cronbach's alpha, Item-to- total correlation and factor analysis methods to carry out scale purification. Finally we evaluated the reliability and validity of the questionnaire.

3.3 The selection and definition of variables

The study aims at evaluating the railway passenger's service quality by referring to Zeithmal and others' SERVQUAL model, which is a universal model and contains the common elements. However, specifically regarding to railway passenger service, it should be adjusted accordingly. Through the interviews with some passengers, railway officers we established 42 items about passenger's evaluation of railway passengers service quality based on the eight service elements. Three new transport dimensions (comfort, security and convenience) are added to the original five SERVQUAL dimensions (i.e. assurance, empathy, reliability, responsiveness and tangibles).

3.4 Attributes generated for the study:

Table 1

Dimensions	Number	Attributes
Assurance	7	Q1.Courtesy of staff on train Q2. Being informed if there are delays Q3.Personal safety at stations. Q4.Personal safety on train Q5.Staff at ticket office Q6.Staff having knowledge to answer your questions. Q7.Providing you with information about any changers in iternary
Empathy	5	Q8. Dealing with you in caring fashion when you make inquiries Q9.Understanding your needs when you make inquiries Q10. Having your best interest at heart. Q11 Availability of coach attendant/helper in the train Q12. Availability of Carriers (Coolie and trolley)
Reliability	5	Q13. Maintaining the frequency of trains as scheduled Q14. Providing on time train services Q15.Dependability in handling your service problems' Q16. Updated information about status of train during travel Q17 Complaint Handling System
Responsiveness	3	Q18.Willingness to help you Q19.Prompt service Q20. Availability of staff in handling requests
Tangibles	9	Q21. Clarity of information given in timetables Q22.Clarity of information given at stations Q23.Cleanliness of the station Q24.Modern appearance of Station Q25. Cleanliness of train Q26.Overall appearance of the train Q27. A neat professional staff Q28. Food facility in the train Q29. Medical facility in the train
Comfort	5	Q30 Availability of seating in train Q31 Comfortable seats in the train Q32 Comfortable temperature in the train Q33. Smoothness of ride of the train Q34. Traveling time of the train

To be continued

Continued

Dimensions	Number	Attributes
Connection	5	Q35. Adequacy of parking facilities Q36 Ease of access to your home station Q37 Ease of access to the nearest station at your working place Q38. Frequency of trains that meet your needs Q39 Trains running at suitable times for catching connecting transport
Convenience	3	Q40 Ease of access of travel information Q41. Ease of buying tickets Q42. Convenient office hours at ticket office

3.5 Samples

The survey takes the form of randomly selected respondents at the Secunderabad Railway Station of South Central Railway, India.The Survey took place in October 2009.Among a total of 140 questionnaires, and 112 questionnaires were valid. The valid rate of questionnaire is 80%. Samples characteristics are as follows: men accounted for 60.71 % and women 39.29. %. Age below 18 accounted for 14.29 %, 19-30 accounted for 22.32 %, 30-60 accounted for 35.71 % and older than 60 accounted for 27.68%. Education background, 23.21. % of under graduation, Graduates accounted for 46.43 % and post Graduate and above accounted for 30.36 %. Income level per annum less than 1.5 Lakhs accounted for 11.6%, 1.5 – 3 lakhs accounted for 21.43 %, 3-5 lakhs accounted for 41.07% and above 5 lakhs accounted for 25.89 %.

3.6 Scale purification of indicators:

Referring to Zeithmal and others' work, we simplified the questionnaire by using Cronbach's Alpha, Item – total correlation, factor analysis and other methods. The first step of scale purification is to calculate item to total correlation items and delete some of them whose scores is below 0.4. After analyzing item-to-total correlation for three times we excluded attributes Q5, Q21, Q22, Q34, Q37, Q39, Q42.

The second step is to analyze factor. We use a principal component analysis and deleted factor load which are less than 0.5 or the attributes whose two factors are all more than 0.5.

We found that the items Q2, Q09, Q10, Q14, Q20, Q26, Q32 have to be deleted because their results of factor analysis are less than 0.5.We did the factor analysis on the remaining 28 items again. The results are shown in the table 2 .From the table it can be found that all the attributes' factor loadings are reasonable and we extracted 7 factors from them. One dimension (connection) completely disappeared. In total 16 of the initial 42 attributes were deleted. This intensity of the attributes deletion is not exceptional in scale development studies as the final scale may even contain one fifth of the original items (Bienstock et al.,1997).

Following is the despcription about the attributes included in the seven factors as well as their meanings.

Factor 1. "Tangibles". It included Q29,Q28,Q25,Q27,Q24,Q23.Thease six attributes have higher loading .Factor 1 can be described as the indicator to measure whether railway passengers food facilities , Medical facilities, cleanliness is given importance. Factor 2. "Reliability". It included Q14, Q13, Q17, Q15, and Q16. These five items are all from factor 2 which includes running trains punctually, providing services as promised and passenger friendly attitude .It represents the ability of railways to fulfill the service they promise .Factor 3 " Assurance". It included Q3, Q4, Q6, Q7, and Q1. This dimension mainly takes care safety and security in the journey.

Factor 4 "Responsiveness" which included Q18, Q19 which talks about willingness to help and prompt service. Factor 5 "Empathy" which includes Q8, Q10, Q11 which deals about human touch in relations like dealing in caring fashion, having passenger best interest in heart etc. Factor 6 "Comfort" which includes Q30, 31, 33 which is talks about availability of seating and comfort levels while journeying. Factor 7 "Convenience" which includes Q40, Q41 which is about ease of travel information and ease in buying tickets etc which also need a lot of importance.

Table 2: The Result of the Second factor Analysis

Attributes	Factors (i.e. Dimensions)						
	1	2	3	4	5	6	7
Q29	0.807						
Q28	0.774						
Q25	0.645						
Q27	0.585						
Q24	0.543						
Q 23	0.517						
Q14		0.807					
Q13		0.715					
Q17		0.681					
Q15		0.598					
Q16		0.519					
Q3			0.846				
Q4			0.735				
Q6			0.615				
Q7			0.525				
Q1			0.507				
Q18				0.826			
Q19				0.737			
Q8					0.791		
Q10					0.739		
Q11					0.564		
Q30						0.615	
Q31						0.585	
Q33						0.516	
Q40							0.594
Q41							0.527

3.7 Reliability and validity test:

After finishing the railway passenger quality evaluation model, we have to test its reliability and validity. In reliability test, the study uses Cronbachs' Alpha Coefficients as the test standard to observe the consistency of internal attributes in the model. The coefficient is 0.795 from the test, which shows the attributes in the model are very ideal.

In validity test, the study uses the exploratory factor analysis; Test results showed that the common degrees of attributes in the model are all above 0.51.Because of the common degree is the significant sign to evaluate structural validity of the evaluation model. So the validity of the model is accepted.

3.8 Computation and analysis of Rail Passenger service quality:

The study refers to the way of calculating the gap of passengers' perception and expectation in SERVQUAL Model. In SERVQUAL model, the attributes of service quality are considered equal to be calculated. The expression of evaluation model is as following.

$$SQ = \sum_{i=1}^{n} (P_i - E_i)$$

In the expression

SQ – Scores of perception of service quality

P_i - Scores of perception of indicator I

E_i - Scores of perception of indicator I

Then, add all the scores in the sample in order to get arithmetic average scores, which is called the average score of service quality

$$AVSQ = \frac{\sum_{i=1}^{n} (P_i - E_i)}{N}$$

In the expression AVSQ - average score of service quality

SQ_i --- perception of service quality of passenger I

N --- Total numbers in sample.

By using the two above formulas, we can calculate and get the evaluation scores of the service quality. Here, in order to facilitate the calculation and analyze the outcome, we firstly calculate average of each dimension. Then we calculate customer perceived service quality score. To easily analyze, a detailed dimensions and their respective attributes are listed as shown in table 3.

Table 3

Dimensions	Attribute Number		Average Gap	Dimension Score	Total Average Score
	Old	New			
Tangibility	29	1	- 1.56	-1.503	-1.731
	28	2	- 1.28		
	25	3	-1.52		
	27	4	- 2.00		
	24	5	- 1.45		
	23	6	- 1.21		
Reliability	14	7	-2.01	-1.920	
	13	8	-1.50		
	17	9	-1.75		
	15	10	-2.19		
	16	11	-2.15		
Assurance	3	12	-1.42	-1.528	
	4	13	-1.67		
	6	14	-1.85		
	7	15	-1.31		
	1	16	-1.39		
Responsiveness	18	17	-2.11	-2.165	
	19	18	-2.22		
Empathy	8	19	-1.97	-1.797	
	10	20	-1.77		
	11	21	-1.65		
Comfort	30	22	-1.45	-1.663	
	31	23	-1.72		
	32	24	-1.82		
Convenience	40	25	-1.65	-1.550	
	41	26	-1.45		

After calculating, the average score of perceived quality is: AVSQ= - 1.731. This is the passengers' evaluation score of service quality. We can get the following conclusions from the results.

(1) The overall average score (-1.731) reflects that railway transport service does not meet passengers' expectations. That is, Railway passengers are not satisfied with the rail service.

(2) Scores of the dimensions in Table III show that Tangibility, convenience, assurance get higher scores. This means that passenger's perception on tangibility, convenience, assurance is much higher than other aspects.

(3) Reliability and Responsiveness gets the lowest score among these dimensions which means that passengers are not happy with railways punctuality and staff behavior in general. This needs to be taken care by Railways.

(4) All in all, service quality gets the comparatively low scores among the seven dimensions evaluation of rail passenger service quality. So, it is necessary to do a comprehensive adjustment and improve the service quality to meet passengers demand.

4. CONCLUSION

Improving the quality of service is one of the ways to improve the competitiveness of the Railway Passenger business. The application of RAILQUAL may be one of the steps in improving the railway passenger service All the Divisions and Zones can use the instrument to keep track of the service quality scores. The instrument will help identify the gaps in each of the dimensions over a period of time and enable managers judge the performance of Divisions on a more objective scale.

Another application of the RAILQUAL instrument can be to categories passengers into several perceived quality segments (e.g. high, medium, and low) on the basis of their scores on expectations and perceived performance. These segments can be then analyzed on the basis of different profiles, relative importance of the dimensions in influencing the service quality perceptions, and the reasons behind the perceptions reported. Thus, the RAILQUAL will help in pinpointing the areas of managerial attention and action to improve service quality in Railway passenger services. In essence, the study defines the concept of railway passenger service quality, designs its operative variables and demonstrates its applicability in the railway passenger services.

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