

## SERVICE QUALITY IN BUS SERVICES: AN EMPIRICAL STUDY IN TAMILNADU

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### **Abstract**

*Transportation acts as a catalyst in the economic development. In Tamilnadu, the State Road Transport Corporation (SRTC) operates with an objective of connecting all villages and towns in the state. The SRTC is now facing hectic competition from private fleet operators and other competitive service providers. The success and survival of the SRTC rest on its service quality and the passengers satisfaction. The present study has made an attempt to study the service quality in bus services and passengers satisfaction with the help of structural equation modeling. The non-profitability judgement sampling technique was followed to select 980 samples in Madurai district, Tamilnadu. The response on the questionnaire was only 624. The study conclude that the important service quality factors are service planning, network, safety and cleanliness; comfort and receptivity. The service quality factors with a major effect on passenger satisfaction are service planning and network. The reliability, personnel and information variables have a significant impact on service planning whereas the bus stop availability route characteristics and frequency have a significant impact on network.*

Transport facility is one of the important factors leading to the economic development of any Nation. Though various transport modes are available, the road-based transport is the most popular since its peculiar advantages such as flexibility, capital requirements, capacity, infrastructure, accessibility and adaptability, route, direction, time and speed (Friman et al., 2001). The private bus operators' main objective is to make maximum profits. Their social concern is too thin (Saikumar, 2011). The public transport was introduced by the State Governments to maximize the social welfare with reasonable profit (Kanagaluru, 2012).

Public sector service provides (State Road Transport Corporation) plays a significant role in rendering road transport services to all the people in India to increase their connectivity and communication eventhough the route is not profitable. During the past 20 years, the delivery of public services have been subjected with so many changes in its roles, management, staffing and delivery of service since the introduction of globalization and liberalization (Bigne et al., 2003). Many private plays have been seeking ways to differentiate themselves from their competitors (Tam, 2000).

They have taken the service quality as competitive weapon in the market (Gowan et al., 2001; Hensher et al., 2002). The improvement in the service quality of road transport has become apparent in the public sector also (Lagrosen and Lagrosen, 2003). Control of service quality is an increasingly prevalent trend in the context of public management (Ancarani and Capaldo, 2001).

In India the transportation is treated as a part of public service and the primary focus is provision of an affordable, safe and reliable bus service to the people (Nagadevara and Ramanyya, 2009). In Tamil Nadu, the State Road Transport Corporation operates with an objective of connecting all villages and towns in the state. The market share of the State Road Transport Corporations (SRTC) is declining especially after liberalization and globalization (Nagadevara and Ramanyya, 2007). The SRTC is facing competition from private fleet operators, share-autorickshaws and also sub-urban/metro railways. The corporations are in a position to evolve appropriate strategies to increase their passenger's satisfaction and improve their market share. The passengers' satisfaction largely depend upon the service quality of the bus service. The service quality promotes passengers satisfaction and stimulates intention to turn, and encourages recommendations (Nadiri and Hussain, 2005).

Customer satisfaction increases profitability, market share, and return on investment (Barsky and Labagh, 1992; Stevens et al., 1995; Legoharel, 1998; Metri, 2006). In a highly competitive environment, the authorities of SRTC must understand their customer needs and then set out to meet these needs. In this juncture, the present study has made an attempt to analyse the Linkage between the service quality in bus transport and repurchase intention among the passengers.

### **Quality in Service Industry**

Quality in service is very important especially for the growth and development of service sector business enterprises (Powell, 1995). It works as an antecedent of customers' satisfaction (Ruyter and Bloemer, 1995). Crosby (1979) defined quality as the 'Conformance to requirements'. The guru of quality movement, Juran (1988, 1992) defined quality as 'fitness for use' while servicing viewed quality as a process promising to result in products and services. In late 1980s, Parasuraman et al., (1984) explained quality as a gap between what customers feel to be offered and what is provided. Eventhough there is no single definition on quality, they all have a single focus on how users look at it (Pijl, 1994, Zeithaml, 1988, Khader, 1997). Ramaswamy (1996) identified three different sets of measures for service quality such as service performance, customer measure and financial measure. The other researchers such as Lijander, (1995), Prakash and Lounbury (1984) and Swan (1988) suggested many possible comparison standards including predicted service, ideal service, excellent service, desire service, needs and values, adequate service, comparative expectations and fairness.

### **Establishing Current Understanding of Service Quality**

Throughout the past two decades there has been a distinct devotion to service quality research (Brady and Cronin, 2001, Carman, 2000, Dabholkar, 1996, Klaus, 1985 and Lewis and Booms, 1983) from which possibly three dominant models of service quality emerged: Gronroos (1984) perceived service quality (PSQ) model; Parasuraman et al. (1988,

1985) Gap analysis model; and Boulding et al., (1993) dynamic process model of service quality (Gronroos 1984).

Gronroos (1984) thus purposed two dimensions: technical or outcome quality and functional or process quality which were supported by Ruyter and Wetzels, (1998); Brown and Swantz, (1989); and Carman (2000). Parasuraman et al., (1985) developed the Gap analysis model. Later it was refined to SERVQUAL scale (Parasuraman et al., 1988). It is designed to measure consumers' perceptions of the identified dimensions of tangibles, empathy, assurance, responsiveness and reliability, relative to consumers' expectations. SERVQUAL critics, have voiced their concerns for many years with respect to contextual, dimensional and empirical correctness considerations (Asubonteng et al., 1996, Mc Dongall and Levesque, 1994, Finn and Lamb, 1991).

Boulding et al., (1993) are among those who consider service quality to be performance based and hence take perceptions, rather than expectations, as they are of departure in developing their dynamic process model. But Boulding et al., (1993) also assume service quality as perceived with respect to Parasuraman's et al., (1988) five dimensions.

Since, these variables are related to measure the service quality of bus service, it is termed as 'BUSQUAL' as did by Shainesh and Mathur (2000) in the case of RAIL QUAL; Ekiz et al., (2006) in the case of AIRQUAL and Tsoukatos and Rand (2007) in case of GIQUAL. Service quality in bus services were highlighted by Too and Earl (2010) whereas Wang et al., (2010) analysed the gap between perceived and expected quality in urban transport. Benedelto et al., (2012) used 15 items to measure the service quality in bus services.

### **Passengers' Satisfaction**

Customers' satisfaction is defined, “. . . an emotional response to the experiences provided by, associated with particular products and services purchased, retail outlets, or even molar patterns of behaviour such as shopping and buyer behaviour, as well as the overall market place (Yi, 1990). There are so many empirical evidence on the measurement of customer satisfaction by the product or service performance (Anderson and Sullivan, 1993; Churchill and Suprenant, 1982). It is also an outcome of service quality (Anderson et al., 1994).

### **Literature Review**

Johns et al., (2004) reported that dimensions of SERVQUAL scale were not validating in measuring service quality and customer satisfaction. Dean (2007); and Kau and Lou (2004) identified the failure in linkage between the service quality with repurchase and words-of-mouth intentions. Vanniarajan and Stephen (2008) identified the strong impact of RAILQUAL on passengers' satisfaction. Amira (2008) identified the mediator role of patient satisfaction in between service quality of healthcare organisation and patient intentional behaviour. Lee et al., (2000) and Lasser et al., (2000) revealed the direct and

indirect effect of service quality on behavioural intention among the customers in banking. Yan and Yoo (2008) identified that the service quality dimensions, personal interaction was the strongest predictor of both grey consumers' satisfaction and overall loyalty behaviour. The study on service quality in bus transport and public transport were conducted by Beirao et al., (2007); Felleeson and Friman (2008); Hutchinson (2009); and Laith and Chen (2010). But, there is no exclusive study on the linkage between the service quality of road transport (bus service), consumer satisfaction and their behavioural intention in Indian context. Hence the present study has made an attempt to fill up the research gap.

In order to fill up the research gap, the objectives of the study are confined to i) identification of service quality factors in bus services; ii) measurement of passengers' perception the service quality factors and overall passengers' satisfaction; and the evaluation of linkage between the service quality factors and passengers' satisfaction on bus services.

## Methodology

### Instrument Development

The instrument used in this study is composed of two parts. The service quality in bus services was measured by seven been variables whereas the overall passengers' satisfaction was measured by seven variables. Each variable is measured at five point likert scale from highly satisfied to highly dissatisfied. These are shown in Table 1.

**Table 1 Variables in service quality of bus transport and overall passengers' satisfaction**

| Sl.No. | Attributes            | Description  | Related Reviews             |
|--------|-----------------------|--|-----------------------------|
| 1.     | Bus Stop availability | Availability of bus stop near home                 | Domencih and Fadden, (1975) |
| 2.     | Route characteristics | Number of bus stops and distance between bus stops | Hensher et al., (2003)      |
| 3.     | Frequency             | Bus frequency                                      | Quattro (1998)              |
| 4.     | Reliability           | Scheduled time kept by the bus                     | Andersen, (1998)            |
| 5.     | Bus stop facility     | Tangibles at bus stop                              | Cobb, 2003                  |
| 6.     | Crowding              | Crowd management by the conductors                 | Hensher, et al., 2003       |
| 7.     | Cleanlines            | Cleanliness of interior and seats                  | Karlaftis et al., 2001      |
| 8.     | Cost                  | Ticket fare  | Bambug and Schmidst, 1998   |
| 9.     | Information           | Information on bus schedule and map of the site    | Anderson, 1995              |
| 10.    | Safety on Board       | Reliable driving and competence of drivers         | Lawa and Mazzulla, 2007     |

|     |  |                                      |                            |
|-----|--|--------------------------------------|----------------------------|
| 11. | Personal security                      | Safety against crimes on buses       | Karlaftis et al., 2001     |
| 12. | Personal                               | Driver and conductor behaviour       | Valeria and Marcucci, 2008 |
| 13. | Complaints                             | Handling of complaints by management | Fillona, et al., 2005      |
| 14. | Busstop maintenance                    | Physical condition of bus stops      | Colob, 2003                |
| 15. | Fast services to customers             | Ticket sales                         | Bryland and curry, (2001)  |
| 16. | Comfortable services                   | Comfortableness                      | Evans and Shaw (2001)      |
| 17. | Readiness to respond customers request | Ticket sellers, drivers, etc.        | Lee et al., (2006)         |

| Sl.No. | Attributes                     | Description                          | Related Reviews                 |
|--------|--------------------------------|--------------------------------------|---------------------------------|
|        | <b>Passengers Satisfaction</b> |                                      |                                 |
| 1.     | Assurance                      | Overall satisfaction on bus services | Saikumar (2011)                 |
| 2.     | Empathy                        |                                      | Vanniarajan and Alleswari, 2010 |
| 3.     | Service Frequency              |                                      | Ferguso, 2002                   |
| 4.     | Service Cost                   |                                      | Collins and Bulter, 1995        |
| 5.     | Reliability                    |                                      | Friman, et al., 2001            |
| 6.     | Comfort responsiveness         |                                      | Sanchez (1999) Sreusson (2004)  |
| 7.     | Responsiveness                 |                                      | Malhotra et al., (1994)         |

### Sampling Plan of the Study

Since the population is unknown, sample size of the study was determined with the help of the formula of  $n = \left[ \frac{Z\sigma}{D} \right]^2$  whereas n - sample size; Z - Z statistics at five per cent level;  $\sigma$  = standard deviation of passengers overall attitude towards bus service at pilot study? and D - Degree of error acceptance. In the present study, the  $n = \left[ \frac{1.96 \times 0.7986}{0.05} \right]^2 = 980$  passengers.

### Data Collection

In total, 980 questionnaires were distributed to the passengers. The passengers were requested to fill up these questionnaires in a self-administered manner. Of these, 734 questionnaires were returned. In all, only 624 questionnaires were found to be useful which represents the response rate of 63.67 per cent from the original sample of 980. AMOS 4.0 package were employed for the scale measurements. Descriptive analysis such as means and standard deviation are calculated.

### Results

In the proposed structural equation model, the observed variables are the 17 service quality variables and 7 passenger satisfaction variables evaluated by the user sample. The service quality variables were narrated by the Exploratory Factor Analysis (EFA) in the form of principal component analysis. EFA was conducted by using a correlation matrix. To determine the number of factors, only the eigen values greater than or equal to one were considered (Cuttman, 1954; Kaiser, 1960). An orthogonal rotated solution (Quartimax) was adopted (Carroll, 1953). In addition, the Kaiser-Meyer-Ohlin measure of sampling adequacy and the Bartlett Sphericity test were effected (Fabris, 1997) in order to test validity of data for EFA. The results are given in Table 2.

**Table 2 Service Quality Factors (SQFB) in Bus Services**

| Sl. No.                                 | SQFB                   | Number of variables in | Eigen value  | Per cent of Variation explained | Reliability co-efficient | Cumulative per cent of variation explained |
|---|------------------------|------------------------|--|---------------------------------|--------------------------|--|
| 1.                                      | Service Planning       | 4                      | 3.8417   | 22.59                           | 0.8218                   | 22.59                                      |
| 2.                                      | Network                | 3                      | 3.0656   | 18.03                           | 0.7809                   | 40.62                                      |
| 3.                                      | Safety and cleanliness | 3                      | 2.7882   | 16.40                           | 0.8033                   | 57.02                                      |
| 4.                                      | Comfort                | 4                      | 2.5085   | 14.75                           | 0.7664                   | 71.77                                      |
| 5.                                      | Receptivity            | 3                      | 1.8917   | 11.13                           | 0.7902                   | 82.90                                      |
| KMO measure of sampling adequacy:0.8213 |                        |                        | Bartlett's test of sphericity: Chi-square value : 96.37* |                                 |                          |  |

\* Significant at zero per cent level.

By means of EFA, five service quality factors were identified. The first factor, service planning related to the variables namely reliability, information, personal and complaints. The second factor network consists of three variables namely bus stop availability, route characteristics and frequency. The third factor, safety and cleanliness includes cleanliness, safety on board and personal security. The fourth factor, comfort

consists of bus stop facility, crowding, cost and bus stop maintenance. The fifth factor includes fast services, comfortable services and readiness to respond customers request.

### User's Perception on Various Service Quality Factors and Passengers Satisfaction

The users' perception on the constructs namely service planning, network, safety and cleanliness, comfort receptivity and passengers' satisfaction have been computed by the mean score of the variables included in each constant since its reliability co-efficients are greater than 0.60. The discriminant validity among the constructs have been tested with the help of mean of average variance extracted by the pair of the construct and its square of correlation co-efficients between the pair. The computed mean score, standard deviation, average variance extracted and the inter-correlation co-efficients among the construct are given in Table 3.

**Table 3 Users' Perception on Construct**

| Sl.No. | Constructs               | Mean   | Standard Deviation | Average Variance Extracted (in %) | Inter-correlation co-efficient |       |       |       |       |        |
|--------|--------------------------|--------|--------------------|-----------------------------------|--------------------------------|-------|-------|-------|-------|--------|
|        |                          |        |                    |                                   | 1                              | 2     | 3     | 4     | 5     | 6      |
| 1.     | Service planning         | 3.2084 | 0.4568             | 56.67                             |                                | .4917 | .3086 | .4249 | .3844 | 0.4241 |
| 2.     | Network                  | 3.0996 | 0.3909             | 54.08                             |                                |       | .4022 | .4565 | .4081 | 0.3973 |
| 3.     | Safety and Cleanliness   | 2.4507 | 0.3011             | 55.42                             |                                |       |       | .3774 | .4217 | 0.3541 |
| 4.     | Comfort                  | 2.6563 | 0.4217             | 51.04                             |                                |       |       |       | .4669 | 0.4229 |
| 5.     | Receptivity              | 2.4511 | 0.4919             | 52.41                             |                                |       |       |       |       | 0.4606 |
| 6.     | Passengers' satisfaction | 2.4142 | 0.4039             | 50.02                             |                                |       |       |       |       |        |

The level of perception on the various constructs are ranging from moderate to satisfied since their respective mean scores are from 2.4142 to 3.2084. The correlation between all pair of the constructs are significant at five per cent level. The mean of AVE of all pair of the constructs included in the present study is greater than the square of correlation co-efficients between the respective pairs. Hence, the discriminant validity among the constructs have been confirmed.

### Results of the Proposed Model

The model was calibrated by using the AMOS 4.0 package from Small Waters Corporation (Arbuckle and Wothke, 1995). The goodness of fit indices are given in Table 4.

**Table 4 Goodness of Fit Indices**

| Sl.No. | Indices                              | Value   |
|--------|--------------------------------------|---------|
| 1.     | Chi-square                           | 316.763 |
| 2.     | Goodness of Fit Index                | 0.9574  |
| 3.     | Comparative Fit Index                | 0.9016  |
| 4.     | Adjusted goodness of fit index       | 0.9304  |
| 5.     | Root mean square residual            | 0.1317  |
| 6.     | Root mean square error approximation | 0.0431  |

The tests on the goodness of fit are quite satisfactory. The goodness of fit index (GFI) is at 0.9574, the adjusted goodness of fit index (AGFI) is 0.9304, and the comparative fit index (CFI) is 0.9016. The indices are bounded above by 1 which indicates a perfect fit. Therefore the indices obtained from the model are very good. The root mean square residual (RMR) index has a value of 0.1317, and the root mean square error of approximation (RMSFA) has a value of 0.0431; the value of these indices are low and therefore are quite good (Bollen, 1989). The minimum value of the discrepancy function is 316.763; this value is statistically significant according to the chi-square test.

#### Path Co-efficients in Structural Equation Modeling (SEM)

The significant paths in SEM has been given in Figure 1. The significant paths, its parameter estimated, the standard error, the critical ratio, and the level of significance (p-value) are reported in Table 5.

**Table 5 Path Co-efficients of the Significant Paths in SEM**

| Sl. No. | Significant Paths                     | Un standardized weight | Standard error | Critical Ratio | p-value | Standardized weight |
|---------|---------------------------------------|------------------------|----------------|----------------|---------|---------------------|
| 1.      | Service Planning → Satisfaction       | 0.6245                 | 0.1245         | 5.0161         | 0.0000  | 0.7446              |
| 2.      | Network → Satisfaction                | 0.4024                 | 0.1786         | 2.2534         | 0.0174  | 0.4972              |
| 3.      | Safety and cleanliness → Satisfaction | 0.2969                 | 0.0841         | 3.5303         | 0.0019  | 0.3603              |
| 4.      | Comfort → Satisfaction                | 0.1838                 | 0.0932         | 1.9721         | 0.0518  | 0.2364              |
| 5.      | Receptivity → Satisfaction            | 0.2473                 | 0.0799         | 3.0951         | 0.0024  | 0.2869              |
| 6.      | Service Planning ← Reliability        | 1.0865                 | 0.1679         | 6.4711         | 0.0000  | 0.6842              |
| 7.      | Service Planning ← Personnel          | 1.2997                 | 0.2084         | 6.2365         | 0.0000  | 0.7029              |
| 8.      | Service Planning ← Information        | 1.1338                 | 0.2248         | 5.0436         | 0.0000  | 0.3993              |
| 9.      | Network ← Bus stop availability       | 0.9697                 | 0.3841         | 2.5246         | 0.0245  | 0.4562              |
| 10.     | Network ← Route characteristics       | 0.7038                 | 0.1809         | 3.8905         | 0.0012  | 0.3996              |
| 11.     | Network ← Frequency                   | 0.6697                 | 0.1045         | 6.4086         | 0.0000  | 0.2461              |

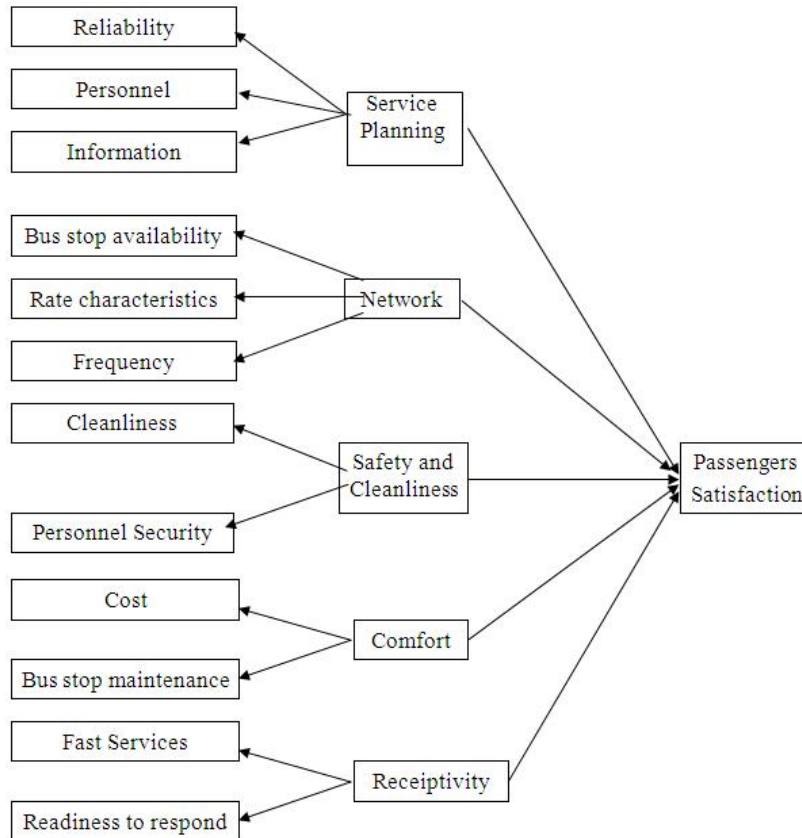


|     |   |        |        |        |        |        |
|-----|---|--------|--------|--------|--------|--------|
| 12. | Safety and cleanliness←<br>Cleanliness        | 0.3152 | 0.1302 | 2.4209 | 0.0296 | 0.1886 |
| 13. | Safety and cleanliness← Personnel<br>security | 0.2409 | 0.0969 | 2.4861 | 0.0317 | 0.1397 |
| 14. | Comfort←cost                                  | 0.4172 | 0.0965 | 4.3233 | 0.0000 | 0.2969 |
| 15. | Comfort ← Bus stop maintenance                | 0.7209 | 0.1861 | 3.8737 | 0.0008 | 0.4541 |
| 16. | Receptivity← Fast services                    | 0.6549 | 0.2117 | 3.0755 | 0.0096 | 0.6803 |
| 17. | Receptivity← Readiness to respond             | 0.4783 | 0.2264 | 2.1126 | 0.0395 | 0.4917 |

The service quality factor with a major effect on passenger satisfaction is service planning, which has a standardized co-efficients value of 0.7446. It is followed by network and safety and cleanliness which have a significant impact on passenger's satisfaction but the degree of impact is lesser than the impact made by service planning since its standardized co-efficients are 0.4772, and 0.3603 respectively. The comfort also have a significant impact on passengers satisfaction, even its standardized co-efficients (0.2364) is lesser than all other four service quality factors. The receptivity has a significant impact on satisfaction since it's path co-efficient is 0.2869. The reliability, personnel and information variables have a significant impact on service planning. The personnel variable has a higher influence on service planning than the other two variables mentioned above since its standardized co-efficients (0.7029) is greater than other two standardized co-efficients (0.6842 and 0.3993). Similarly, the variables namely bus stop availability since its standardized co-efficient is 0.4562.

The variables namely cleanliness and personnel security have a significant impact on safety and cleanliness since its standardized co-efficients are significant at five per cent level. The higher influencing variables among them is cleanliness since its co-efficients is 0.1886. The 'comfort' factor is significant influenced by cost and bus stop maintenance. The highly influencing variable on comfort is bus stop maintenance since its standardized co-efficients (0.4541) is higher than another variable namely cost (0.2969). The highly influencing variable on the receptivity is fast services and readiness to response the customers' request since it's standardized co-efficient are significant at five per cent level. The most influencing variable is fast services since it's co-efficient is 0.6803 compared to the co-efficient of to respond is 0.4917. By effecting some preparatory calibrations, the present study propose the final model shown in Figure 1.

**Figure 1**  
**Final Structure of the Model**



The model offers empirical findings and practical implications. It can be used for improving the particular services in order to strengthen the passengers' satisfaction. In this case, the model suggest that an improvement in service planning and networks can be convenient for transport operators because these two service quality factors have the greatest effect on passenger satisfaction.

### Conclusion

The present study used the structural equation model to evaluate the passengers' perception on service quality in bus services and then overall satisfaction towards bus services. The proposed model identifies service quality factors to improve, with the aim of offering bus services characterized by high level of quality. The bus operators have been advised to improve their service planning especially through the behavior of drivers and conductors (personnel). And they are asked to concentrate on the improvement of network specially through bus stop availability to the passengers. Similarly, they may enrich their

quality factors namely safety and cleanliness; and comfort through cleanliness of interior and seats & windows; and physical conditions of bus stops. The receptivity can be enriched with the help of improvement in fast services and readiness to respond on passengers' request.

The major limitation of this study is the scope of the study is limited to Madurai District, Tamilnadu. A more accurate analysis of service quality in public transport should be based on a survey addressed to all districts in Tamilnadu and also at the national level. However, the present study will be a base for future research on service quality of public and private transportation. And also the comparative study on transit quality may be focused in Bus and Railways made in near future.

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