Public Transport Service Quality and Passenger Satisfaction: A Case of UPSRTC, Agra, India

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Abstract

Public services are offered by government to the public for their well-being and are offered to them on the basis of the principle of equality. This study measures the level of customer satisfaction with the quality of services offered by Uttar Pradesh State Public Transport Corporation (UPSRTC), Uttar Pradesh State in India. The study was conducted on over 2,000 passengers during June 2015 and October 2015. The various dimensions that are considered include safety, behavior, facilities, response to quarries, comfort, cost, availability etc. The study results reveal that while the passengers highly dissatisfied from attributes such as "Overall conditions of the buses" and "Behavior of the bus drivers and conductors", the other attributes viz., "Cleanliness of bus stand amenities", "Economy in travel by buses of UPSRTC" and "Comfort inside buses while travelling" etc also contributed in overall high degree of dissatisfaction among them. The study concluded with the findings of highly dissatisfied customers of UPSRTC and many scopes of improvements in the services being offered by UPSRTC.

Keywords: Public Transportation, Services, Quality, Satisfaction, UPSRTC, India

Introduction

Transport facility is one of the important inputs for the overall economic development of the country. This is critical service when offered by the government to the public for the reason that the socio-economic development of heavily populated states like Uttar Pradesh (approximate population of the state is about 200 millions) depends largely on the public transportation system.

This study demonstrates how the data, collected through questionnaire based survey, can actually be used in measuring public transportation service quality.

Uttar Pradesh State Road Transport Corporation

UPSRTC, short for Uttar Pradesh State Road Transport Corporation and one of the largest in India, is a public sector passenger road transport corporation providing services in the state of Uttar Pradesh and its adjoining states in North of India. With a fleet size of around 8000 buses, it operates over 3.0 million kilometers catering to the travel needs of over 1.8 million passengers and earning more than Rs.

60 million per day as on date. (INR or Rs. is short for Indian currency name, Rupee. $1.00 = Rs. 66 or INR66.00 approximately as on date).

The UPSRTC corporate office is based out at Lucknow, which is the capital city of the Uttar Pradesh State in India. Due to the large geographic area and country's largest population in the Uttar Pradesh state, the corporation has been divided into 19 regions for efficient functioning. Each region operates as urban and sub-urban transport services along with a regional workshop where major repair and maintenance work as well as assembly reconditioning work is performed on the buses operating from that region. Also, each region is further divided into transport operational units called depots. The total number of depots, at present, in the corporation is 108. Each depot has a depot workshop attached to it to provide supportive maintenance facilities. The location details of the various units of UPSRTC are shown in the Table 1 below:

Table 1: Locations of operations, UPSRTC

S. No.	Region	No. of Depots	S. No.	Region	No. of Depots
1	Agra	8	12	Lucknow	6
2	Ghaziabad	7	13	Faizabad	4
3	Meerut	4	14	Devipatan	3
4	Saharanpur	4	15	Chitrakoot	4
5	Aligarh	7	16	Allahabad	8
6	Moradabad	5	17	Azamgarh	7
7	Bareilly	4	18	Gorakhpur	6
8	Hardoi	5	19	Varanasi	7
9	Etawah	6	20	Noida	1
10	Kanpur	7	21	Lucknow	2
11	Jhansi	2			Total : 107

Source: UPSRTC website

While the main objectives of most private operators is to make profits rather than much of the social concerns, the public transportation system offers services to public keeping socio-economic developmental concerns in the mind. But, is UPSRTC, while offering such services, really able to satisfy the passengers? The answer to the question, through the analysis of this study, would not only help UPSRTC to understand in which areas the corporation needs to improve but also help them develop the strategies for eradicating the loopholes in the services.

Literature review

Satisfaction of the customers, an important term which is not only accepted as a measure of demand for the product or services being offered by firms but also drives the competitiveness of the firms. But this term means differently for service sector than for manufacturing sector, thus, making it difficult to measure customer satisfaction in service sector.

Andreassen (1995) discussed customer dissatisfaction with public transportation service such as bus, train or tram in and around the greater area of the capital of Norway. Using a data collected from 1,000 customers, study concluded that users have different preferences with respect to the frequency of uses (travel) of public transport.

Denson (2000) suggested that older riders (over 60 years of age) expect more from the service than young riders. This study also concluded that with regard to mobility and satisfaction, one might reasonably expect that riders with the greatest need for accessible transit will be more critical when the service fails to meet their mobility needs.

The exploratory research of Parasuraman, Zeithaml and Berry (1985) reported several insights and propositions concerning consumers' perceptions and service quality. The research pointed out four key discrepancies in the services that affected the quality of service.

The study by Sai Kumar (2012) reveals that there is highest gap in comfort dimension and lowest gap in responsiveness and empathy dimensions. Further, a comparison made

between the satisfaction of the respondents on the basis of gender and occupation, concludes that the satisfaction is different for male and female passengers as well as across occupations of the passengers.

In similar kind of study, Kumar and Anand (2014) explored what influences the decision makers to opt for certain class of services or products. They classified the factors most critical to satisfaction and decision making towards opting a service.

Kumar et. al. (2015) in their research concluded that it is also environment, in which people work, that plays major roles in overall satisfaction and hence performance and sense of responsibilities among employees.

A plethora of literatures on passenger satisfaction, perception and expectation is available but very few studies are conducted on Public Transport Facilities in India. In fact, not a single study was conducted on the Uttar Pradesh State Transport Corporation which offers the services to huge 200 million people in the state. Thus, need arises to study satisfaction level and quality of service as perceived by the passengers in the state and to explore into the factors that need be improved for better socio-economic conditions of the residents in the state.

Objectives of the study

The aim of this study is to determine the important factors and level of satisfaction perceived by customers concerning the quality of services provided by UPSRTC. The following are the main objectives of the study:

- To explore and understand the desirable service quality attributes

- To measure the satisfaction level of the passengers; and

- The critical factors impacting the passengers to opt for alternative transport solutions

Research methodology

Instrument development

In order to analyze the research objectives and measure the passengers' satisfaction the descriptive research design, the questionnaire based survey study is considered. Data was collected from primary as well as secondary sources. To measure the levels of passengers' satisfaction towards the quality of services offered by UPSRTC, a questionnaire was designed to collect primary data. Various attributes of service quality were included in questionnaire. Initially, a pilot survey was administered on a few respondents to improve the

quality of questionnaire. This pilot study was encouraging and helped us to omit few and include some more important attributes which were missing in the original questionnaire. The improved questionnaire, later, was used to administer the survey on passengers (customers) of UPSRTC. Customers' satisfaction was measured for attributes such as number of buses in operations, cleanliness, drivers' attitude and behavior, safety, timings etc. Appendix 1 represents the various attributes used in the survey.

Sample selection, procedure, and data collection

For data collection it was decided to use judgmental sampling and the respondents were selected on the basis of judgments. Any respondents who were below 18 years of age or travelling a few times in the year were not considered for the study. Only passengers, who are regular commuters and using both UPSRTC buses and private or other state transport corporations' services, were only considered for the study.

The primary data is then collected through questionnaire which uses a 5–point scaling technique. A field survey is conducted at various bus stands in Agra district (rural as well as urban areas) to collect data. The following criterion was adopted in selecting passengers as sample of study:

a.   The sample of study consisted randomly selected passengers from all the regions within Agra district

b.   The sample of study free from any biasness such as gender, cast, religion etc and represents all the demographic classifications

c.   If the age of passenger was below 18 years, they were omitted from being part of the sample. This ensures adulthood and maturity of the surveyed passengers

Initially, the survey was administered on 2000 passengers from Agra district. The selected passengers then were asked to fill-in questionnaire. The questions were explained to their best understanding. In case of any illiterate passengers, full assistance was given to them to understand the questions and their response were noted by surveyor onto questionnaire.

During final scrutiny, only 1542 questionnaires were found to be fully filled in (77%) and rest had either missing entries or multiple selections of answers within one question. Therefore, for final study purpose, 1500 randomly selected questionnaires (75% of total) were considered out of 1542 fully filled-in.

Therefore, the results of this study is based upon total sample size is of 1500 passengers representing both rural and urban areas of Agra district. The collected data was analyzed to examine the satisfaction of the passengers towards the service quality of UPSRTC in Agra district. The secondary

data was collected from the UPSRTC website and their offices in Agra.

Analytical tool

The collected data sorted, tabulated and analyzed using statistical tools like mean, standard deviation, and factor analysis to make the study meaningful. To measure internal consistency of data, Cronbach's Alpha was measure for reliability. Further, Kaiser-Meyer-Olkin (KMO) test was used to measure of sample adequacy. Later, Barlett's test of sphericity and Factor Analysis were used for dimension reduction. Statistical software SPSS v.17 was used in this study.

Scope of study

The results of the study generate information, which can be used by UPSRTC towards improving the quality of services being offered to the passengers in the state.

Limitation of the study

The results of the study are, in majority, based on the primary data collected though a survey administered on the 1500 passengers using public transport facilities and services from UPSRTC. The study is limited by scopes in Agra district of Utter Pradesh State in India. This study further can be extended to other districts and regions in the state, excluding the certain imposed conditions in the survey (as mentioned in the sub-heading 3.2 of research methodology above), and also by introducing more attributes of services quality to deliver stronger results.

Analysis of the data

Before data analysis, all the service quality attributes (variables) were rearranged and tabulated. Later, each of these attributes was given a notation to make it easy to understand, analyze in SPSS and represent in the research report. Table 2 indicates notations used for the attributes:

Table 2: Attributes and notations

Attributes (Variables for measurement)	Notations
Number and General Availability of UPSRTC Buses	F1
Timings (Arrival, Departure and Travel) of Buses	F2
Overall Conditions of Buses	F3
Behaviour of Conductors and Drivers	F4
Overall Conditions of Bus Stands	F5
Cleanliness of Bus Stand Amenities	F6
Safety Inside Buses and Bus Stands	F7
Comfort Inside Buses While Travelling	F8
Travel By Buses is Economical	F9
Response to Telephonic Enquiry	F10
Seat Reservation Facilities	F11
Ease of Information Access (Offline and Online)	F12
Tourism Supports and Other Services	F13
Availability, Prices and Quality of Food, Snacks and Eateries	F14
Rate Buses as Compare to its Competitors	F15
Valid N (Listwise)	

Source: Primary data

7.1. Descriptive statistics

Table 3 below represents the descriptive statistics   of the primary data collected:

Table 3: Descriptive statistics

Descriptive Statistics				
Attributes	**N**	**Mean**	**Std. Deviation**	**Variance**
	Statistic	Statistic	Statistic	Statistic
F1	1500	1.68	.780	.608
F2	1500	1.67	.806	.649
F3	1500	3.59	1.055	.633
F4	1500	3.53	1.096	.803
F5	1500	1.81	.875	.765
F6	1500	3.48	1.044	.415
F7	1500	1.93	.990	.980
F8	1500	2.29	.935	.403
F9	1500	2.43	1.015	1.134
F10	1500	1.59	.756	.572
F11	1500	1.17	.389	.151
F12	1500	1.45	.657	.432
F13	1500	1.71	.918	.843
F14	1500	1.11	.866	1.136
F15	1500	2.36	1.419	2.013
Valid N (listwise)	1500			

Source: Primary data

The results in the table above reveals that the highest variance (of 2.013) in response is seen in attribute F15 i.e. where respondents were asked to rate UPSRTC as compared to its peers (viz., private operators and trains etc). Overall, the respondents have fairly responded against each of the questions. It can be inferred from the above Table 3 that the responded shown primary concerns over attribute F3 (Overall conditions of the buses in operations, mean 3.59) followed by F4 (Behavior of the bus drivers and conductors, mean 3.53), F6 (Cleanliness of bus stand amenities, mean 3.48) and F9 (Economy in travel by buses of UPSRTC, mean 2.43).

Test of reliability: Cronbach's Alpha

Due to the question of data reliability, a commonly accepted rule of thumb for minimum acceptable alpha value is 0.70 for questionnaire based survey studies. If the alpha value is greater than 0.7, data can be termed as "reliable". The higher the value better is the reliability. Table 4 below represents the reliability test statistics of the primary data collected. The Cronbach's alpha value is 0.977 which sufficiently meets the minimum requirement to move ahead for other tests such as KMO and Barlett's.

Table 4: Reliability test – Cronbach's alpha

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha based on standardized items	N of items
.977	.983	15

Source: Primary data

Kaiser-Meyer-Olkin test of adequacy and Barlett's test of sphericity

To measure sample adequacy, KMO test and to measure strength of relationships among attributes (of correlation matrix), the Barlett's test are applied to the data. Generally, a high value of KMO is considered good. Table 5 below represents the both tests' statistics for the data. The KMO measure of sample adequacy in the present study is 0.929 which is of very high order and a good score to continue analyzing data. Furthermore, Barlett's test of sphericity results a significance level of <0.001, a clear indication that Factor Analysis can be applied on the data.

Table 5: KMO and Barlett's Tests

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.929
Bartlett's Test of Sphericity	Approx. Chi-Square	47728.244
	DF	105
	Sig.	0.000

Source: Primary data

Multi-collinearity: correlation analysis

The correlation analysis is performed on the data to test the problem of multi-collinearity. This problem is common in most survey based studies. It is assumed that this problem exists if the correlation between two or more attributes (variables) is more than 0.5 (correlation coefficient) and, if so, the data requires the factor analysis. Table 6 below represents the correlation analysis of the data. The correlation matrix in table 6 reveals that for almost all the attributes, the correlation coefficient is more than 0.5 and hence the data requires factor analysis to be performed.

Table 6: Correlation matrix

Correlation Matrix[a]	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15
F1	1.0	.965	.900	.846	.925	.859	.909	.780	.905	.933	.748	.843	.900	.686	.747
F2	.965	1.0	.937	.820	.907	.876	.902	.797	.905	.925	.721	.860	.902	.662	.718
F3	.900	.937	1.0	.741	.864	.922	.883	.815	.875	.934	.687	.904	.925	.624	.680
F4	.846	.820	.741	1.0	.828	.712	.815	.593	.824	.799	.588	.684	.763	.873	.881
F5	.925	.907	.864	.828	1.0	.851	.948	.804	.928	.883	.732	.842	.933	.705	.783
F6	.859	.876	.922	.712	.851	1.0	.861	.770	.854	.909	.659	.958	.912	.626	.707
F7	.909	.902	.883	.815	.948	.861	1.0	.820	.959	.885	.721	.862	.911	.695	.783
F8	.780	.797	.815	.593	.804	.770	.820	1.0	.790	.794	.863	.801	.859	.381	.431
F9	.905	.905	.875	.824	.928	.854	.959	.790	1.0	.893	.726	.857	.901	.704	.790
F10	.933	.925	.934	.799	.883	.909	.885	.794	.893	1.0	.757	.886	.943	.659	.727
F11	.748	.721	.687	.588	.732	.659	.721	.863	.726	.757	1.0	.685	.776	.364	.411
F12	.843	.860	.904	.684	.842	.958	.862	.801	.857	.886	.685	1.0	.896	.578	.653
F13	.900	.902	.925	.763	.933	.912	.911	.859	.901	.943	.776	.896	1.0	.653	.719
F14	.686	.662	.624	.873	.705	.626	.695	.381	.704	.659	.364	.578	.653	1.0	.949
F15	.747	.718	.680	.881	.783	.707	.783	.431	.790	.727	.411	.653	.719	.949	1.0

a. Determinant = 1.312E-014

Source: Primary Data

Factor analysis

Factor analysis reduces the, comparatively, large number of attributes to a smaller number of factors, capable of explaining the observed total variances in all the attributes in the study. It takes qualitative observations against each of the attributes and resolves them into distinct pattern of occurrence.

Communalities

It measures the extent to which an attribute correlates with all other attributes. If the load for a particular attribute is less than 0.5, it might struggle significantly to load onto any factor during data reduction process. The Table 7 below represents the result of communalities in the data. This is the amount of variation extracted from each attribute. The extraction of factors is performed using Principal Component Analysis:

Table 7: Communalities

Communalities		
	Initial	**Extraction**
F1	1.000	.820
F2	1.000	.916
F3	1.000	.950
F4	1.000	.906
F5	1.000	.897
F6	1.000	.963
F7	1.000	.820
F8	1.000	.804
F9	1.000	.814
F10	1.000	.823
F11	1.000	.772
F12	1.000	.859
F13	1.000	.841
F14	1.000	.841
F15	1.000	.764
Extraction Method: Principal Component Analysis.		

Source: Primary data

From the results above in the Table 7, it can be revealed that the attributes F6 (Cleanliness of bus stand amenities, 0.963), and F3 (Overall conditions of buses, 0.953) shown highest communalities followed by F2 (Timing of arrivals and departures, 0.916) and F4 (Behavior of bus drivers and conductors, 0.906).

Total variance explained

Further, the attributes were analyzed for Eigen-value, which is total variance explained by each factor. In other words, Eigen-value, for a given factor, measures the variance in all the attributes for which that factor is accounted for. The varimax rotation method was adopted to rotate the factor axes to maximize the variance of loading a factor in column in all the attributes. Table 8 below represents the results of total variance as explained by different attributes in the study. Extraction is done through Principal Component Analysis.

Table 8: Total variance explained by different variables

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Var.	Cumu. %	Total	% of Var.	Cumu. %	Total	% of Variance	Cumulative %
1	12.257	81.713	81.713	12.257	81.713	81.713	8.216	54.776	54.776
2	1.281	8.543	90.255	1.281	8.543	90.255	5.322	35.480	90.255
3	.462	3.082	93.337						
4	.225	1.497	94.834						
5	.210	1.398	96.232						
6	.125	.835	97.068						
7	.110	.731	97.798						
8	.086	.574	98.372						
9	.067	.448	98.820						
10	.041	.272	99.092						
11	.040	.265	99.357						
12	.034	.229	99.586						
13	.023	.155	99.742						
14	.021	.141	99.883						
15	.018	.117	100.000						

Extraction Method: Principal Component Analysis.

Source: Primary data

There are two variables which have Eigen-value more than 1.0 and cumulative variance explained by these two components is 90%. The sorted Eigen-value against the factor number is represented by the graph (Scree Plot) in Picture 1 below:

Figure 1: Scree Plot
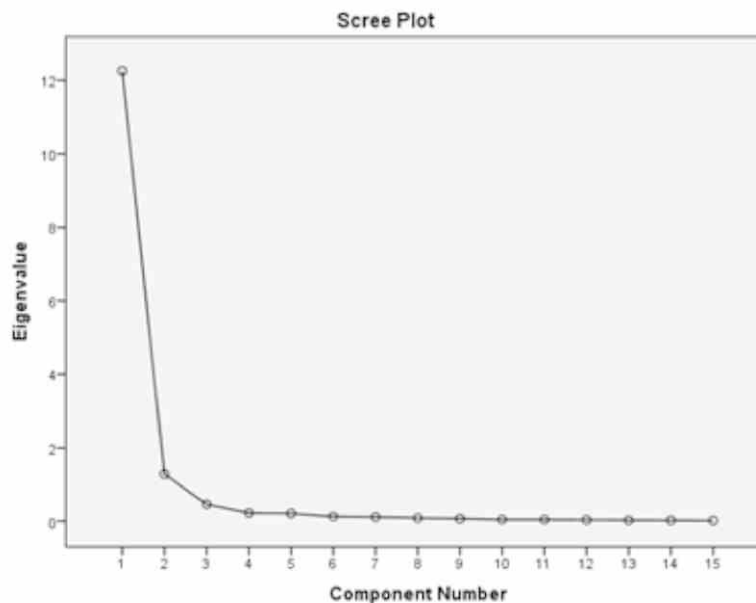
The Scree plot graph above exhibits that two factors are able to explain all the attributes in the study for service quality assessment.

8.3. Component matrix

The component matrix, as shown in the Table 9 below, represents the correlation between the retained two factors. This solution is not as easy to interpret as rotated component matrix (in next sub-heading).

Table 9: Component Matrix

Component Matrix[a]		
	Component	
	1	2
F1	.959	-0.010
F2	.956	-0.047
F3	.942	-0.115
F4	.866	0.369
F5	.957	0.013
F6	.925	-0.086
F7	.959	0.001
F8	.838	-0.449
F9	.956	0.023
F10	.958	-0.072
F11	.771	-0.421
F12	.913	-0.157
F13	.963	-0.119
F14	.745	0.622
F15	.807	0.559
Extraction Method: Principal Component Analysis.		
a. 2 components extracted		

Source: Primary data

Rotated component matrix

Factor loading for each variable on the factors after rotation is shown in factor pattern matrix. Table 10 below represents the results in rotated component matrix. This matrix represents how the variables are weighted for each factor and the correlation between them. In this process, the SPSS was asked to suppress correlation below 0.3 so that the output is easy to understand by the removal of low correlation clutters in the results.

Table 10: Rotated Component Matrix

Rotated Component Matrixa		
	Component	
	1	2
F1	.768	0.574
F2	.788	0.543
F3	.818	0.480

F4	.465	0.819
F5	.753	0.591
F6	.787	0.493
F7	.762	0.582
F8	.938	
F9	.746	0.598
F10	.805	0.524
F11	.868	
F12	.821	0.430
F13	.837	0.490
F14		0.946
F15	.302	0.934
Extraction Method: Principal Component Analysis.		
Rotation Method: Varimax with Kaiser Normalization		
a. Rotation converged in 3 iterations		

Source: Primary data

The results in the table above show that there are 12 attributes loading onto factor one and 3 attributes loading onto factor two. Using extraction method of Principal Component Analysis and Varimax (Orthogonal) Rotations method with Kaiser Normalization, the factor analysis produced two factors. The entire rotation solution converged within 3 iterations. The component transformation matrix is discussed in the next sub-heading.

Component transformation matrix

This matrix describes the specific rotation applied to the factor solution. Table 11 represents the correlations among both the extracted factors. It does not require to be interpreted.

Table 11: Component transformation matrix

Component Transformation Matrix		
Component	**1**	**2**
1	.795	0.607
2	-.607	0.795
Extraction Method: Principal Component Analysis.		
Rotation Method: Varimax with Kaiser Normalization.		

Source: Primary data

Results and discussions

Inline to the objectives of the study, the attributes were formulated to explore the passengers' satisfaction level and critical factors in UPSRTC's service quality. To make the study meaningful, the factor analysis, using SPSS, was applied on the data. Factor analysis extracted two critical factors from these attributes. These factors are able to explain 90% of the total variances in all the attributes. Following are the two factors along with grouped attributes:

Factor 1

It includes 12 attributes of service and these are "Number and General Availability of UPSRTC Buses", "Timings (Arrival, Departure and Travel) of Buses", "Overall Conditions of

Buses", "Overall Conditions of Bus Stands", "Cleanliness of Bus Stand Amenities", "Safety Inside Buses and Bus Stands", "Comfort Inside Buses While Travelling", "Economy in Travel By UPSRTC Buses", "Response to Telephonic Enquiry", "Seat Reservation Facilities", "Ease of Information Access (Offline and Online)" and "Tourism Supports and Other Services".

This factor can be renamed as "Main Factor" as it includes majority of the attributes to describe quality of services being offered by UPSRTC.

Factor 2

It includes 03 attributes of services viz., "Behaviour of Conductors and Drivers", "Availability, Prices and Quality of Food, Snacks and Eateries" and "Rating UPSRTC as Compare to its Competitors".

This factor can be named as "Secondary Factor" as it describes part of services quality.

Conclusion

The present empirical study attempts to explain the extent to which passengers are satisfied with the quality of the services being offered to public from the UPSRTC in Agra district of Uttar Pradesh State in India. It also attempts to penetrate into the critical attributes leading to high degree of dissatisfaction among the UPSRTC customers. The outcome of the study reveals that all the attributes, the satisfaction measurement parameters, can be grouped into two categories viz., Main and Secondary. The main category emerged out of the 12 critical attributes such as "Number and General Availability of UPSRTC Buses", "Timings (Arrival, Departure and Travel) of Buses", "Overall Conditions of Buses", "Overall Conditions of Bus Stands", "Cleanliness of Bus Stand Amenities", "Safety Inside Buses and Bus Stands", "Comfort Inside Buses While Travelling", "Economy in Travel By UPSRTC Buses", and "Response to Telephonic Enquiry" etc while the Second Category relates with the three attributes "Behaviour of Conductors and Drivers", "Availability, Prices and Quality of Food, Snacks and Eateries" and "Rating UPSRTC as Compare to its Competitors".

The result reveals that the passengers (respondents in the study) were highly dissatisfied with almost all the critical attributes of service quality from UPSRTC. This means UPSRTC, being public transport facility provider, needs to take strategic decisions of implementing improved quality in the services it is offering to public. Only such action will improve the satisfaction of passengers and hence social-economic conditions in the state.

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