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Analysis of Service Quality Attributes for Jaipur Urban Bus Transportation

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ABSTRACT: At the start of the 21st century, most of the countries are facing critical issues and challenges related to urbanization. India is the IInd most populated nation in the world having more than one billion people residing in it. Transportation plays a very crucial part in socio-economic and sustainable growth of any nation. As the cities grows, a concurrent expansion of transportation requirements also happens but at a much faster pace.

The aim of the study is to find extent of service quality in Jaipur bus transportation system. In order to do so, five important factors were recognized from similar studies done in India as well as abroad: Tangibility, Reliability, Responsiveness, Assurance and Empathy. The results of the study generate information, which can be used by urban planners, municipal authorities, transport authorities, etc., towards improving the level of quality of services being offered to the passengers in pink city. Data set was explored in 2 stages. Firstly, passengers' satisfaction levels related to each service parameter were compared by using means, median and mode. Thereafter, principle component analysis with Varimax orthogonal rotation method was implemented to define the fundamental parameters that were related to satisfaction levels with city's transit system in Jaipur.

I. INTRODUCTION

Urbanization is due to increased prosperity, most of which goes in fulfilling the needs of increased mobility. People travel daily for different physical, psychological and economic needs like – work, shopping, leisure, recreational, etc. These travel motives are interdependent among themselves which thus creates multifaceted travel choices like complex set of trip patterns and travel configurations. People are inclined towards using more frequently their individualized motorized transport modes to fulfill their ever-changing mobility demand (Cirillo et al., 2011). In todays' setup, major Indian cities have high percentage of vehicles ownership and specifically the private ownership. This collective outcome of increased population, high percentage of urbanization rate and rapid growth of private vehicles combined with increasing needs for mobility is a matter of great concern (Kenworthy, 2008).

The existence of any company or provider in service sector is influenced by how well they attend and satisfy their users. A satisfied traveler is at all times the prime asset of any service industry. Particularly, with the arrival of personalized mode of transport, people are more oriented against the use of public transport. So in order to make them shift to public transport, a decent standard of service quality should be provided to them. Therefore both public and private bus service operators need to improve its services in order to attract passengers.

II. LITERATURE REVIEW

Service quality is being demonstrated towards a constructive outcome on commuters' behavioral intention (Lai and Chen, 2010). Providing a good service quality to meet commuters' requirements is crucial to hold the current passengers along with attracting new ones who currently use some other modes of transport. Public transportation is one of the crucial services most citizens need in their day-to-day lives. Today, transit providers have limited resources which should be used to best use for most benefit to their passengers (Eboli and Mazzulla, 2008).

A satisfactory level of service quality in public transportation is still an intangible objective for most of the Indian cities and its commuters. Apart from the modernization of public transportation, it is significant to take care of the quality aspects during service delivery. If the service delivery is not as per the passengers' satisfaction levels and also not well executed, it develops an adverse sensitivity and dissatisfaction towards that service (Karen and Peter, 2007).

Usually, in India regulatory authorities have given too much significance to infrastructure development, cost efficiency and cost effectiveness at the expense of service quality levels. But, study of service quality in public transport is becoming meaningfully important, both in research and in day-to-day life. Experts have started showing attentiveness to achieve a high quality service feature, looking towards the commuters' precedence systems and to be demand specific and reasonable. In order to gain effectiveness it becomes imperative for the urban public transport service providers to measure service quality

III. MODELLING TOOLS

A. Servqual Model

It has been widely applied in various service industries. Many studies have incorporated together the academic discussions and practical utility of SERVQUAL in a many settings namely manufacturing, profit-making and public sectors. SERVQUAL has emerged by way of the most prevalent uniform questionnaire towards judging the parameters of service quality. SERVQUAL scale needs to be altered to adjust to a specific research condition (Stafford, 1999; Akan, 1995).

The SERVQUAL scale of Parasuraman *et.al* (1991) has been taken as the classical model by use of parameters like Consistency, Assurance, Tangibility, Understanding, and Receptiveness along with the dimensions of Availability, Affordability, Safety and Integration for the purpose of developing the conceptual framework to measure service quality in Indian public transport.

B. RECSA Model

Service quality parameters of transport services includes five important parameters, specifically, is consistency, well-being, provisions, safety and affordability, commonly denoted as RECSA which is an amendment to Parasuraman et al.'s (1988) RATER model. Many of the constituents of RECSA aspects deliver evidence which helps in producing the surveys to decide onto the passengers' sensitivity towards quality parameters of public transport service. The proposed research is to explore commuters' perceptions of the public transport facilities is in terms of parameters (Table 1) related to service quality perception of the users specifically, Reliability, Comfort, extent of service, Security; and Affordability (RECSA).

IV. CASE STUDY AREA – JAIPUR CITY

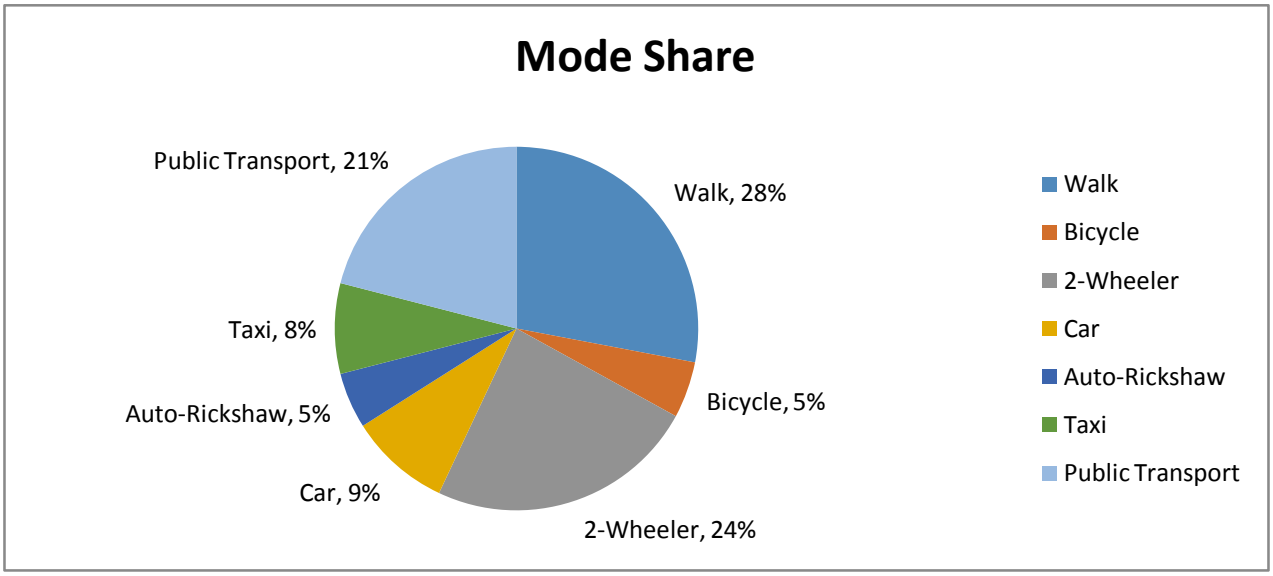
Jaipur, capital of largest state in India, Rajasthan is always at the centre of attention due to its rich culture and heritage, handicraft, and jewelry, diverse social structure, sustained economic growth and epicenter of political life of State.

Table 1: Measures for the Mass Transit Service Quality.

S. No.	Prameters	S. No.	Parameters
1	Service Punctuality	13	Service availability on Holidays
2	Time-table availability	14	Service availability at late-hours
3	Timely arrival at Destination	15	Behaviour of Drivers
4	Adherence to Routes	16	Accident Rates
5	Seat Availability	17	Injuries due to accidents
6	Smoothness of Service	18	Driving skills of drivers
7	Availability of Air Conditioner	19	Condition of vehicles
8	Ride Comfort	20	Driver obeying the traffic rules
9	Condition of Bus shelters	21	Fare Affordability
10	Exact location-destination	22	Value for Money Service
11	Service availability on Weekends	23	Reliability of the Service
12	Service availability on Weekdays		

Source: Parasuraman *et al.* (1988); McKnight *et al.* (1986)

It has observed tremendous economic growth in terms of physical and demographic factors. As the socio-economic status of citizens of Jaipur improved and due to insufficiency of mass transit system, residents are unwillingly encouraged to buy the personalized conveyance. The modal split in the city shows 26% of travel by public transport including intermediate public transport. Though public transport covered less than 7 percent of the total number of vehicles, approximately 26 percent of passengers use it for travel.



Source: Trip Information (Updated DPR of JMRC Phase II)

Fig. 1. Mode Share for Jaipur City.

V. DATA ANALYSIS AND DISCUSSION

Before analyzing the data, all the service quality aspects and features were reorganized and tabularized. Further, each of these parameters was given a representation to make it easier to comprehend, investigated in SPSS with the uses of Cronbach's Alpha, Kaiser-Meyer-Olkin Measure of Sampling Adequacy, Frequency distribution, and Exploratory Principal Component Analysis and results were presented in the study.

Improvement as suggested by the passengers:

As observed from the figure 1, nearly 30% of the passengers suggested for the increasing the frequency of buses which would help in improving the service quality of bus transportation system. Consequently, almost 30% suggested that reduction in overcrowding would help in improving the service attributes of the Jaipur public bus transportation system.

Passengers were requested to show how satisfied they were with public transport with regard to 37 service parameters. Table 1 below shows an assessment of the service items by means, median and mode. Commuters were satisfied with maximum of the service parameters of public transportation system, as specified by the fact that almost all parameters (except timetable availability at bus stops, overcrowding and seat availability during peak hours) have a tally less than 3.0 (neither dissatisfied nor satisfied).

Features or attributes of public transport in Jaipur that were highly valued (M<=2.00, satisfied) include fare affordability, safety at bus stops, consistency, network connection, and service frequency. Parameters that got lowermost levels are printed time table info at bus stops, reliability, availability of next stop information on bus, and overcrowding. These factors were also most revealed in passenger's observations and suggestions for service quality improvement.

Additionally, comprehensive assessment of satisfaction parameters with specific attributes of the public transport services was done where users were requested to mark their overall satisfaction. Conclusions showed a fairly sufficient level of satisfaction with public transport in Jaipur, with a mean score of 2.58 and mode of 2.0.

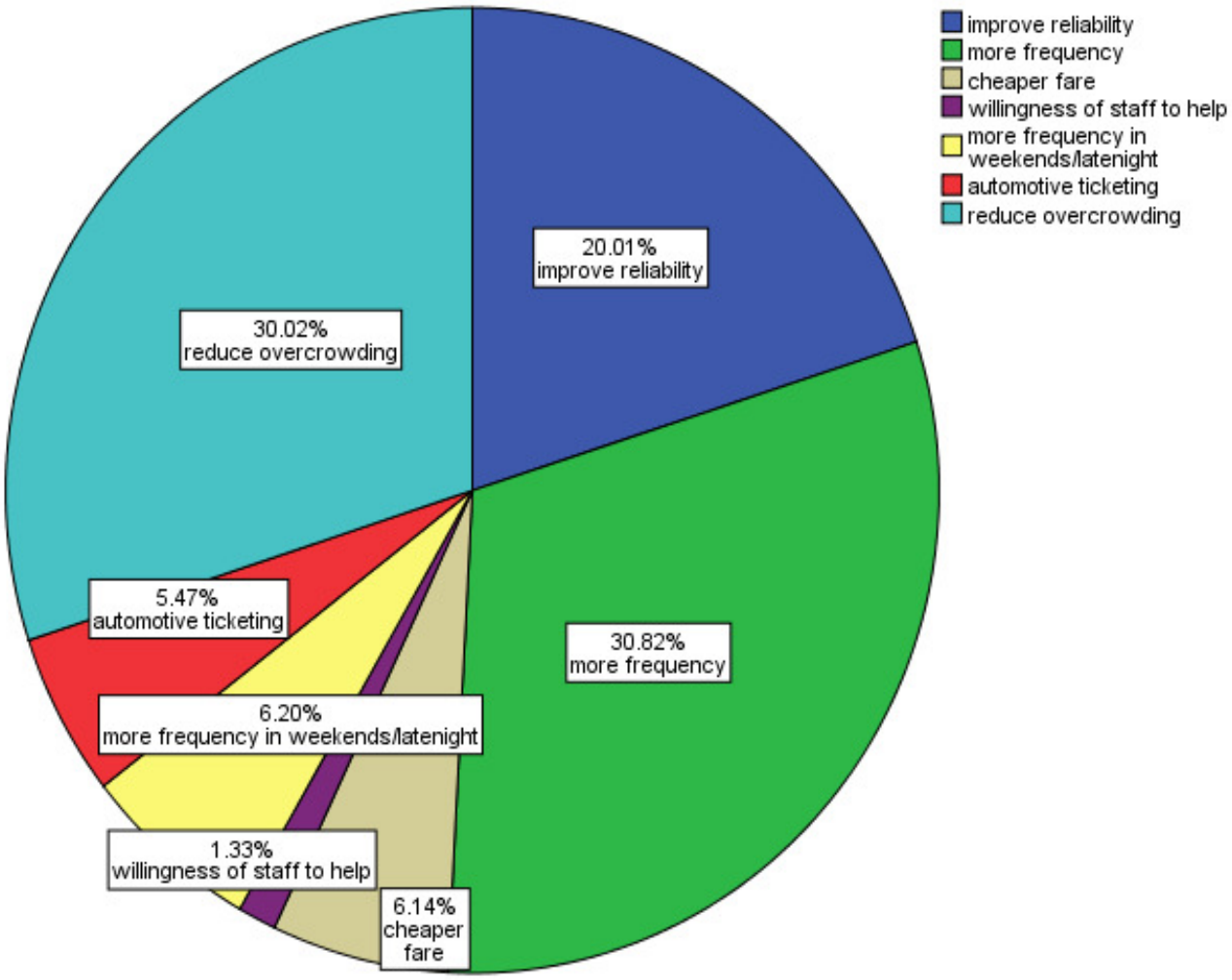


Fig. 2. Improvement as suggested by the passengers.

The analysis resulted in a considerably high Cronbach's Alpha of 0.881. Since this value is greater than the required 0.7 Cronbach's Alpha, the items used have an acceptable internal consistency and can be considered as consistent and reliable statistically.

Exploratory factor analysis was performed using SPSS software v21.0 using a total of 1502 users. All the 37 parameters of service quality were used to recognize the number of attributes and their relationship with each of the attributes. The first phase during exploratory factor analysis was to check if the data is appropriate for using factor analysis. In this case Kaiser-Meyer-Olkin (KMO) measure of sample appropriateness and Bartlett's Test of Sphericity were tested. From the results of KMO and Bartlett's Test it is observed that the sampling adequacy value 0.874 and the Chi-Square value for Bartlett's Test of Sphericity 15579.479 are statistically significant at 5% level. These results indicate that KMO measure of sampling suitability was quite satisfactory, and Bartlett's Test of Sphericity was significant at $p < 0.001$, indicating the dataset were appropriate for factor analysis. This signifies that the 37 variables related to passengers' service quality scale are satisfactory in representing its concept and the sampling scattering is also standard to describe the definite features of the diverse scale.

Table 2: Satisfaction with Service Aspects – Mean, Median, Mode and Standard Deviation.

Statistics						
	N		Mean	Median	Mode	Std. Deviation
	Valid	Missing				
Ease of connection with other modes of transport	1502	0	2.43	2.00	2	.790
Break down of busses on road is rare	1502	0	2.59	2.00	2	.895
Bus arrival on time	1500	2	2.82	3.00	3	.912
Journey time satisfactory for distance travelled	1500	2	2.57	2.00	2	.865
Ease of purchasing of ticket	1502	0	2.09	2.00	2	.899
Passenger request are satisfied	1502	0	2.53	2.00	2	.900
Frequency of service	1502	0	2.80	3.00	3	2.062
Finding info(routes, stops, timetables) is easy	1502	0	2.90	3.00	2	.992
Availability of next stop information on bus	1500	2	3.13	3.00	4	1.095
Printed time table info at bus stops	1500	2	3.62	4.00	5	1.192
Arrival of buses at scheduled time	1501	1	2.93	3.00	3	.951
Maintaining journey time	1501	1	2.61	3.00	3	.787
Total hours of service is sufficient	1501	1	2.56	3.00	2	.845
Services of weekends and public holidays available	1501	1	2.34	2.00	2	1.033
Services on weekdays is available	1501	1	2.27	2.00	2	.891
Waiting time at bus stops is less	1501	1	2.93	3.00	3	1.003
Visibility of route names and number on busses	1501	1	2.73	3.00	2	1.086
Announcement of arrival at stops	1501	1	2.99	3.00	3	1.194
Timely and efficient services	1501	1	2.72	3.00	2	.887
Cleanliness in bus and bus stops satisfactory	1499	3	2.37	2.00	2	.949
Staff attire neat and clean	1501	1	2.19	2.00	2	.874
Bus condition satisfactory	1501	1	2.29	2.00	2	.814
Getting in and out of bus is easy	1499	3	2.28	2.00	2	.843
Spacious seats in buses	1501	1	2.50	2.00	2	.858
Legroom and foot space sufficient	1501	1	2.61	2.00	2	1.195
Seat available during peak hours	1501	1	3.38	4.00	4	.997
Level of crowding in buses is high	1501	1	3.37	4.00	4	1.049
Damage to seats, fittings and windows	1501	1	2.67	3.00	3	.867
Comfort at bus stops	1499	3	2.70	3.00	2	.999
Accessible grab handles and poles	1501	1	2.17	2.00	2	.833
Safety at bus stops	1501	1	2.11	2.00	2	.936
Safety inside buses	1501	1	1.94	2.00	2	.783
Drivers and conductors behaviour	1499	3	2.14	2.00	2	.810
Drive safely and smoothly	1501	1	2.28	2.00	2	.908
Convenient operational hours	1501	1	2.45	2.00	2	.875
Bus routes as per needs	1501	1	2.49	2.00	2	.925
Fares are affordable	1501	1	1.89	2.00	1	.926

VI. RECOMMENDATIONS

On the basis of data analysis and thereafter the interpretation of results, following recommendations are made:

1. Variance among sensitivities of different cities and towns with respect to service quality parameters for state mass transit system for different types and size of cities need to be identified in Indian context.
2. A greater requirement for integration of all the public transportation systems – MRTS, BRTS, para-transits - for door-to-door service, for reduction in travel time.
3. There is growing need for public transport to provide services to new areas or new communities and to more people by enhancing comfort level and safety to commuters & to eliminate wasteful duplication
4. Increased focus on improving the desirable modal share by providing better service to existing and future demand.
5. Additional research can be done in the field of – assessing the accessibility index, service level benchmarking for a transportation system of a city, integrated land use planning, development of land form and its integration with city's transport needs.
6. Also, study of effect of mixed land use on the mode choice & urban form & structures can also be taken in future.

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