Users' Perception about Service Quality of Paratransit in Dhaka City

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ABSTRACT

This paper aims to explore users' perception of paratransit service in Dhaka, Bangladesh. Paratransit is recognized in Dhaka as special transportation services with more flexibility and availability in selected routes operated by private companies and individuals. A questionnaire survey was conducted with the paratransit user in fifteen different locations of survey. The aim of this research is to explore user perception of service quality of paratransit by using the factor analysis model. Based on 22 service quality variables users satisfaction and service quality are analyzed. The main variables are transformed into a smaller set of components which have a strong linear correlation. Results indicate that among the 22 factors prevailing paratransit service quality and seat comfort level appears to be the most substantial. By improving these components, the overall condition of paratransit can be improved and future existence of paratransit will be more acceptable in developing countries such as Bangladesh.

Keywords: Users' Perception, Service Quality, Paratransit, Factor Analysis

1. INTRODUCTION

In developing countries paratransit plays a significant role for movement of large number of people. The mobility needs are increasing along with the expansion of the cities themselves in developing countries (Booth et al. 2000; Kaltheier, 2002). Presently the high use of automobiles and poor service quality of public transport in Dhaka city is an acute problem. The necessity first to meet the mobility needs especially for low income people ensuring adequate capacity is restrained by the service provided by it. The actual problem is not the eminent use of autos, but the poor service quality of public transit (Senbil et al, 2005). As a result actual contribution of paratransit turns out to be substantial. Paratransit refers to vehicles used on rent for flexible passenger transportation, which do not follow a fixed time schedule. They may or may not follow a fixed route. It provides personalized and flexible transport services to general people with certain levels of service quality and it covers service gaps between private transport modes and mass transit system (Roos and Alschuler, 1975). It assists the social economic activities through its service availability and employment opportunity for the poor or low-skilled people (Cervero and Golub, 2007). Moreover, it requires little policy intervention and no public investment or subsidy (Joewono and Kubota, 2007a). Paratransit is a public or group transportation as by automobile, van or minibus organized to relieve the congestion of mass transportation.

An important feature of modern society is its concern with providing sustainable modes of transportation to substitute the excessive use of the private car in urban areas as explained by dell'Olio et al. (2010). Bus services are frequently insufficient to meet demand although buses play the vital role in any urban areas. Moreover, the facilities that are provided mostly suffer from low output (Ali, 2010). People tend to use their private vehicles owing to lack of contentment they derive from the services of public transportation. Cullinane (2002) shows that If paratransit is in general perceived to be good and cheap, public transportation can suppress demand for private cars. An improvement in the supplied service quality can attract further users (Eboli and Mazzula, 2007).

Majority of people in developing countries, especially the low income people, cannot afford private transport, and hence predominantly rely on paratransit services. Because of its service necessity the role of paratransit remains inevitable in urban mobility context. A number of researches have been carried out to investigate various study fields of paratransit system including physical and operational characteristics, cost and benefit and its sustainability (Shimazaki and Rahman, 1995; Regidor et al. 2009; Tarigan et al. 2010).

The rapid pace of motorization throughout the world has changed travel behavior, which in turn has influenced every aspect of transport operations. This impact has also increasingly challenged the future existence of such road-based urban public transport as paratransit due to its characteristics and problems especially in developing countries (Joewono, 2007 b). It establishes important factors and attributes to explain user perceptions and priorities regarding the service. Its hypotheses explain how users measure paratransit service quality, inferring that they are likely to continue to use it.

Several aspects of both demand and supply sides were analyzed by (Joewono and Kubota 2007c) in order to discuss on the sustainability of paratransit system. Studies on the demand side mainly involves user perception such as user satisfaction, perceived service quality, and behavioral intention (Joewono and Kubota, 2007a; Sumaedi et al., 2012).

The role of paratransit, however, differs in the context of developed and developing countries. In developed countries, paratransit is often used for demand responsive systems such as shared taxis, subscription buses etc. In the developing countries where public transportation system is not so efficient to meet the needs of exceeding demand of transport needs thus various forms of paratransit appears in fulfilling the gaps between public and private modes. Thus paratransit plays an essential role in supporting these less developed countries mobility needs as it involves a large proportion of the public transport system.

Paratransit is used in almost all over in Bangladesh. There are many cities in Bangladesh where paratransit plays significant role in transportation system. Rapid increase in urban population, per capita income along with inadequate existing transport infrastructure has stimulated their usage as a cheap and convenient public transport mode. In almost all cases, the paratransit systems have developed spontaneously in response to local need. There are several factors which often have aggravated the growth of paratransit. Owing to its distinctive features like low carrying capacity, low speed, low energy requirements, higher labor intensity, more dependable and small area coverage paratransit modes are considered as essential component of urban transport system in cities of Bangladesh (Shimazaki and Rahman, 1996). The first is the rapid increase in urban population through both natural increase and rural to urban migration.

2. LITERATURE REVIEW

Majority of people in these countries, especially the poor, could not afford private transport, and hence predominantly rely on paratransit services. Because of its service necessity, the role of paratransit remains inevitable in urban mobility context. In this sense, a number of researches has been carried out to investigate various study fields of paratransit system including physical & operational characteristics, cost & benefit and its sustainability (e.g. Shimazaki and Rahman, 1995; Regidor et al. 2009; Tarigan et al. 2010). Around (20-50)% travel demand is consumed by paratransit (Shimazaki and Rahman, 1996; Joewono and Kubota, 2007b; Cervero and Golub, 2007). Taking advantages of vehicle size and unrestrained operation, paratransit can excellently respond to fluctuate markets, fill voids of areas left by public transport at relatively low fare, and substitute for public transit without subsidies. Paratransit seems to satisfy captive rider's need in terms of mobility especially in feeder function. Paratransit modes play a significant role in the urban transport sectors of developing countries since in many cities more than half of the total public transport demands are carried by them (Joewono and Kubota, 2005).

The qualities of paratransit are acceptable but cannot satisfy the user's need always. This dissatisfaction emanates from unsafe, uncomfortable, inconvenient and unreliable services. A good comprehension about quality of service can guarantee the continuity of the business of public transportation (Hensher and Brewer, 2001), existing customers can be secured, and transit agencies could attract new passengers with a more positive public image (TRB, 1999). If public transport is in general perceived to be good and cheap, it can suppress demand for private cars as shown by Cullinane (2002). Deng and Nelson (2010) further describe that high quality of public transport system can greatly improve the accessibility of its catchment area by shortening time.

The studies on paratransit sector have become more popular in the last two decades. Service quality is an abstract concept that is hard to be defined, and in practice, often used interchangeably with satisfaction (Lien and Yu, 2001; Sumaedi et al. 2011). However, the differences between both variables have been clarified in the literature. Oliver (1997) explains that service quality is more specific and related to cognitive judgments while satisfaction is more holistic and associated with affective judgments.

Cervero (2000), Cervero and Golub (2007) compared urban paratransit modes in several cities of developing countries, and discussed relevant transport policy issues. Shimazaki and Rahman (1996) reviewed several paratransit modes in Asian countries from the viewpoint of physical and operational aspects. Joewono and Kubota (2005) summarized characteristics of paratransit as well as non-motorized modes in Indonesia. Phun and Yai (2015) performed a comprehensive review on paratransit literature in Asian developing countries and discussed their definitions, characteristics, and sustainability. Phun and Yai (2015) also included the discussion on the integration of urban paratransit mode with comprehensive urban public transport network. Okada et al. (2003) analyzed passengers' preference for improvement of railway stations in Manila, while Tangphaisankun et al. (2010) discussed paratransit mode as a feeder of mass transit system. Loo (2007) discussed the role of paratransit in Hong Kong and Satiennam et al. (2006) studied the case of BRT introduction and the role of paratransit in Bangkok. According to paratransit's function, many researchers recommended an integration of paratransit as a feeder for public transit systems to enhance performance of urban transportation (Shimazaki and Rahman, 1996; Okada et al.2003; Satiennam et al. 2006).

A number of techniques for evaluating service quality and user satisfaction for public transport are found in literature. Assessing service quality is necessity to afford customer satisfaction. Several studies illuminated the satisfaction and dissatisfaction in public transport to develop and create attractive public transport (for instance, Winder, 2005, and Straddling et al 2007). Very few studies focused on assessing public transport of developing countries (Senbil et al. 2005; Andaleeb et al. 2007). Many studies also have analyzed the role of the paratransit sector in the overall public transport system and its impact on the urban structures where it operates.

The rapid pace of motorization throughout the world has changed travel behavior, which in turn has influenced every aspect of transport operations. This impact has also increasingly challenged the future existence of such road-based urban public transport as paratransit due to its characteristics and problems, especially in developing countries. It establishes important factors and attributes to explain user perceptions and priorities regarding the service. Its hypotheses explain how users measure paratransit quality of service, inferring that they are likely to continue to use it. Even though users are dissatisfied with several aspects of paratransit, and the impact of competition has been strong, loyal users can still be found. By considering the findings, existing problems of inappropriate service quality can be addressed to satisfy user's expectations

3. METHODOLOGY

3.1 Interview Survey Information and Survey Format

An Interview survey is the most prominent survey for any comprehensive transportation study. Considerable amount of information was collected on various aspects of socio-economic characteristics and information of travel attributes by paratransit trips. A 5-page questionnaire, divided into 7 main parts, was designed for this study. The service quality feature questions are designed on a 5-point Likert scale, ranging from excellent (value 1) to very poor (value 5). Part 1 was about demographic information consisting questions about respondents occupation, income, most used route etc. Second part measures quality of transport which consist 6 general questions that capture seat comfort level, fitness, cleanliness, noise level, travel cost and lighting facilities of paratransit. Third part explores service quality, which consist questions about the ticketing system, ease of entry-exit, sitting arrangement, movement flexibility, long route performance, movement flexibility, quality of driver and speed of paratransit. Fourth part is about reliability which involves questions about the availability of paratransit and its integration with supporting modes. Safety and security data is requested in the last part of the questionnaire which includes questions about the security of goods and passengers and riding safety. Nine surveyors distributed the questionnaire on-board. Surveyors requested passengers to fill the questionnaire. 20 locations were selected for the survey. The survey was conducted during both peak and off-peak periods covering weekdays and weekends. This study considers tempo as paratransit. The survey data was collected from 14th June 2015 to 17th June 2015.

3.2 Sample Size

The reliability of factor analysis is dependent on sample size. The sample size necessary for factor analysis and concludes that it depends on many things (Field 2005). In general, over 300 cases are probably adequate but communalities after extraction should probably be above 0.5. In our study, total 2000 sample were face to face interviewed and all the data are collected back But because of some missing data, 1965 data are analyzed in our study.

3.3 General Characteristics

Table 1 shows summary statistics of respondents. Majority of the respondents are male and about 17% respondents are female. Majority respondents are between 20-29 years old and 38% of them have primary education. 38% respondents don't have any specific income. Among all respondents, 28% are students.

Table 1. General Characteristics of the Respondents

Characteristics	Statistics	No. of Respondents	% of Respondents
Gender	Male	1664	83.20
	Female	336	16.80
Age	< 20 Years old	202	10.10
	20~29 Years old	777	38.90
	30~39 Years old	646	32.30
	40~49 Years old	267	13.40
	50~59 Years old	81	4.10
	>59 Years old	27	1.40
Education	Uneducated	514	25.70
	Primary	768	38.40
	SSC/HSC/Graduate/Post Graduate	718	35.90
Occupation	Service	427	21.40
	Business	275	13.80
	Worker	246	12.30
	Housewife	187	9.40
	Student	576	28.80
	Others	289	14.50
Monthly Income	No Specific Income	763	38.20
	< 5,000 Tk	42	2.10
	5,000~10,000 Tk	115	5.80
	10,000~15,000 Tk	325	16.30
	15,000~20,000 Tk	419	21.00
	< 20,000 Tk	336	16.80

4. DATA ANALYSIS AND MODEL DEVELOPMENT

4.1 Factor Analysis

Factor Analysis (FA) is also known as exploratory factor analysis. This technique is used for dimensionality reduction and finding association between variables as Principal Component Analysis (PCA) but the difference is that it is based on common factor model. This technique tries to identify from a large set of variables, a reduced set of components which summarized the original data. This is done by identifying groups of variables which have a strong inter correlation. Costello and Osborne (2005) on best practices in exploratory factor analysis suggested the use of Principal Component Analysis (PCA) since it has the potency of revealing the underlying structure of the latent variables with an appropriate rotation method. The common factor model assumes that the observed variance in variables is attributed to a small number of common factors and a single specific factor. Ultimately the objective is to identify the common factors and identify the relationship with observed data. Let ξ_1, ξ_2, ξ_i be a set of common factors and δi be the specific factor. Let X is set of observed variables. All the specific factors are mutually uncorrelated. In general, a factor model can be represented as follows:

$X_1 = \lambda_{11}\xi_1 + \lambda_{12}\,\xi_1 + \ldots + \lambda_{1c} + \delta_1$

$X_2 = \lambda_{21}\,\xi_1 + \lambda_{22}\,\xi_1 + \ldots + \lambda_{2c} + \delta_1$

$X_3 = \lambda_{31}\,\xi_1 + \lambda_{32}\,\xi_1 + \ldots + \lambda_{3c} + \delta_1$

$X_n = \lambda_{n1}\,\xi_1 + \lambda_{n2}\,\xi_1 + \ldots + \lambda_{nc} + \delta_1$

Where λ represents the extent to which each measure X reflects the underlying common factor ξ. Hence the variance of Xi is:

$\text{var}\,(X_i) = \text{var}\,(\boldsymbol{\lambda_{12}}\,\xi_1 + + \delta_i) = \lambda i^2 + \text{var}\,(\delta_i) = 1$

Here λi^2 is called the communality of Xi. The relation between the observed variables and the factors is called as factor loadings. The orientation of the axes representing the common factors can be changed which will change the factor loadings.

4.2 Principle Component Analysis

The questionnaire survey dataset has 22 variables and it is difficult to visualize them and find out their associations. PCA is one way of re-expressing the data and allows reorienting the data so that the first few dimensions provide the maximum information possible. All the principal components are uncorrelated with all others. Each principal component is a linear combination of all the original variables. The first component exhibits the maximum variance and so on. PCA is primarily used in the present work for dimension reduction. Small redundancy was observed in the dataset. Let $X = (x_1, x_2, x_3 \ldots x_n)$ be the matrix of original variables in the dataset. Let $u_1 = (u_{11}, u_{12}, u_{13})$ and $u_2 = (u_{21}, u_{22}, u_{23})$ etc. be unit vectors oriented along the ellipsoidal axes and are perpendicular to each other. Let $Z_1 = (z_{11}, z_{12}, z_{1n})$, $Z_2 = (z_{21}, z_{22}, z_{2n})$, etc. be the new transformed variables. Now $Z_1 = Xu_1$, where X is an (n x 3) matrix whose elements are the values X_1, X_2, X_3 etc. Z_1 is the variance accounted for by the first principal component, Z_2 is the variance accounted for by the second principal component not already accounted for by the Z_1 etc., i.e. $\text{var}\,(Z) = u'Ru = \lambda$. The greater this value the more information from the original data is contained in these components although the variance accounted for by Z_2 is smaller than Z_1 and so on. Hence the transformation Z = XU rotates the axes of the original data while preserving their orthogonally. Relationship between Z and original variables X is illustrated with a correlation matrix and are called principal component loadings and they help in interpreting the principal components and how much of variance in each original variable X is accounted for by the principal components. $(R-\lambda I)\,u = 0$ is called as the eigenvalue-eigenvector problem. Here u is called as eigenvector and λ is called as eigenvalue. The solution to PCA consists of positive eigenvalues and associated eigenvectors. PCA can be performed either by eigenvalues analysis of correlation matrix R or singular value decomposition of X.

4.3 Kaiser's Varimax Rotation

In this research, Kaiser's Varimax Rotation has been used in FA. Since the common factors are uncorrelated, the total variance of all common factors is given by the sum of squared loadings i.e. $h_i^2 = \sum_k a^2_{ik}$ where a_{ik} is the correlation between variable I and common factor k. The aim is to find a rotation so that a^2_{ik} are close to 1 or zero. The varimax procedure chooses a rotation matric T to maximize the total column variance of a^2_{ik}. The k^{th} column variance is given by

$$V_k = \frac{1}{p}\sum_{i=1}^{p}(a_{ik}^2)^2 - \frac{1}{p}\left(\sum_{i=1}^{p} a_{ik}^2\right)^2$$

Maximizing the sum of these column variances V_k for all factors k is nothing but maximizing the following expression

$$V = \frac{1}{p}\sum_{k=1}^{c}\sum_{i=1}^{p}(a_{ik}^4) - \frac{1}{p}\sum_{k=1}^{c}\left(\sum_{i=1}^{p} a_{ik}^2\right)^2$$

The location of each of the original observations in the reduced factor space is called factor scores. Hence factor analysis was found suitable for further analysis.

4.4 Reliability

Cronbach's alpha is a measure of internal consistency, that is, how closely related a set of items are as a group. It is considered to be a measure of scale reliability. The theoretical value of alpha varies from zero to one. There has a commonly accepted rule of thumb for describing internal consistency. Values greater than 0.9 is excellent, values between 0.9 to 0.8 is good, values between 0.8 to 0.7 is acceptable, values between 0.7 to 0.6 is questionable, values between 0.6 to 0.5 is poor and values less than 0.5 is unacceptable. Table 1 shows that, the value is 0.832 that falls in the range of being good. Table 2 shows the Kaiser-Meyer-Olkin measure of sampling adequacy and Bartlett's test of sphericity. The KMO statistic varies between 0 and 1. A value of 0 indicates that the sum of partial correlations is large relative to the sum of correlations, indicating diffusion in the pattern of correlations (hence, factor analysis is likely to be inappropriate). A value close to 1 indicates that patterns of correlations are relatively compact and so factor analysis should yield distinct and reliable factors. Kaiser (1974) recommends accepting values greater than 0.5 as acceptable (values below this should lead you to either collect more data or rethink which variables to include). Furthermore, values between 0.5 and 0.7 are average, values between 0.7 and 0.8 are good, values between 0.8 and 0.9 are great and values above 0.9 are excellent. For these data the value is 0.834, which falls into the range of being great. So, it can be said positively that factor analysis is appropriate for these data.

Table 2. KMO, Bartlett and Reliability Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy	.834
Bartlett's Test of Sphericity Approx. Chi-Square	11496.771
Cronbach's Alpha	.833

5. VARIABLES USED IN FACTOR ANALUSIS AND FACTOR ANALYSIS OUTPUT

22 variables are used in the analysis. These are prevailing paratransit quality, seat comfort level. fitness of vehicle, noise level, lighting facilities, cleanliness, ticketing system, ease of entry and exit, sitting arrangement, movement flexibility, quality of driver, speed of paratransit, travel time on office day, travel time on holiday, integration of supporting modes, security of goods, security

of passengers, riding safety, travel cost comparing with other, performance for long route movement, movement flexibility in any road and these variables are main variables used in factor analysis. Statistical software SPSS was used for this study. A number of goodness-of-fit indices can be employed to measure the reliability of the data. Cronnbach's alpha is considered for homogeneity of the model.

The results of factor analysis are reported in Table 3 up to Table 6. The highest loading value can be explicated as the most significant feature. Table 3 lists the eigenvalues associated with each linear component (factor) before extraction, after extraction and after rotation. Before extraction, 22 linear components were identified within the data set. The eigenvalues associated with each factor represent the variance explained by that particular linear component and SPSS also displays the eigenvalue in terms of the percentage of variance explained (so, factor 1 explains 23.046% of total variance). It should be clear that the first few factors explain relatively large amounts of variance (especially factor 1) whereas subsequent factors explain only small amounts of variance. SPSS then extracts all factors with eigenvalues greater than 1, which outcomes with six factors. They are prevailing paratransit quality, seat comfort level, fitness of vehicle, noise level, lighting facilities, and cleanliness.

TABLE 3 Factor Loadings and Reliability of Paratransit Users Satisfaction Variables

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	5.070	23.046	23.046	5.070	23.046	23.046	2.433	11.058	11.058
2	2.076	9.439	32.485	2.076	9.439	32.485	2.293	10.421	21.479
3	1.786	8.118	40.602	1.786	8.118	40.602	2.220	10.092	31.570
4	1.452	6.601	47.204	1.452	6.601	47.204	1.993	9.059	40.629
5	1.203	5.468	52.672	1.203	5.468	52.672	1.835	8.339	48.968
6	1.015	4.614	57.286	1.015	4.614	57.286	1.830	8.318	57.286
7	.956	4.347	61.632						
8	.877	3.985	65.617						
9	.755	3.431	69.048						
10	.724	3.290	72.339						
11	.692	3.144	75.483						
12	.644	2.927	78.410						
13	.609	2.770	81.180						
14	.594	2.698	83.879						
15	.548	2.491	86.369						
16	.529	2.407	88.776						
17	.501	2.276	91.052						
18	.483	2.197	93.250						
19	.459	2.086	95.336						
20	.401	1.824	97.160						
21	.322	1.465	98.625						
22	.303	1.375	100.000						

From the scree plot of figure 1 it can be seen that six factors have eigenvalue greater than 1. The Eigen values associated with these factors are again displayed (and the percentage of variance explained) in the columns labelled Extraction Sums of Squared Loadings in Table 3. The values in this part of the table are the same as the values before extraction, except that the values for the discarded factors are ignored (hence, the table is blank after the sixth factor). In the final part of the table (labelled Rotation Sums of Squared Loadings), the eigenvalues of the factors after rotation are displayed. Rotation has the effect of optimizing the factor structure and one consequence for these data is that the relative importance of the six factors is equalized. Before rotation, factor 1 accounted for considerably more variance than the remaining five (23.046% compared to 9.439, 8.118, 6.601, 5.468 and 4.614%), however after extraction it accounts for only 11.058% of variance (compared to 10.421, 10.092, 9.059, 8.339 and 8.318 respectively). Before rotation, most variables loaded highly onto the first factor and the remaining factors didn't. However, the rotation of the factor structure has clarified things considerably: there are six factors and variables load very highly onto only two factors. Hence a two factor solution was obtained. TABLE 4 represents that two factors were extracted and each one accounted for a larger percentage of the variability.

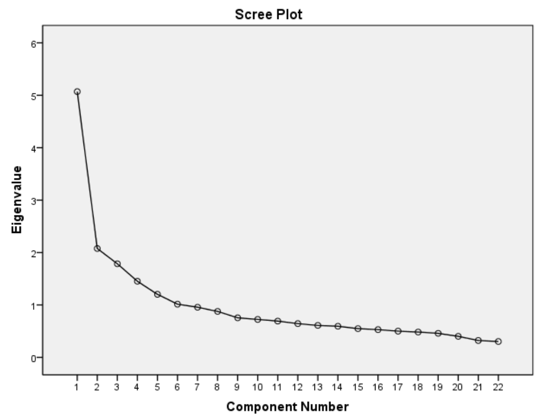

Figure 1. Scree Plot showing components with Eigen values

Table 4. Rotated Component Matrix

Variables	Components					
	1	2	3	4	5	6
Security of Passengers	.780	.149	-.029	.216	.044	.150
Security of Goods	.761	.225	-.070	.115	.009	.178
Riding Safety	.675	.056	.051	.330	.105	.048
Travel Cost Comparing With Other	.460	.136	.372	-.156	.300	.090
Lighting Facilities	.136	.699	.147	.069	.227	-.147
Fitness of Vehicle	.054	.658	-.058	.093	-.168	.354
Noise Level	.137	.643	-.081	-.109	.111	.206
Cleanliness	.292	.564	.190	.097	.053	-.130
Performance for Long Route Movement	-.023	.009	.836	.098	.071	.069
Movement Flexibility in any Road	.040	.024	.831	.033	.128	.069
Quality of Driver	-.008	.408	.418	.310	.108	.108
Travel Time Office Day	.067	-.105	-.006	.754	.253	-.076
Sitting Arrangement	.246	.063	.101	.668	-.059	.286
Movement Flexibility	.318	.191	.079	.662	.019	.143

Travel Time Holiday	-.083	.025	.113	.186	.728	-.036
Availability	.223	-.033	.184	.168	.653	.058
Integration of Supporting Modes	.020	.329	-.099	-.173	.567	.066
Speed of Para Transit	.275	.082	.306	.030	.473	.264
Ease of Entry and Exit	.160	-.186	-.165	.147	.078	.628
Seat Comfort Level	.074	.289	.181	.289	-.037	.586
Prevailing Para transit Quality	.010	.292	.368	-.080	.138	.566
Ticketing System	.347	.075	.284	-.002	.085	.541

Table 5 represents revised factor loadings where two factors namely prevailing paratransit quality and seat comfort level emerged more strongly. On the basis for selecting factor loading, generally factor loading above 0.6 is considered high while factor loading greater than or equal to 0.3 is considered moderately high (Klien 2005). Therefore the cut-off for analyzing factor loading was 0.50 ± 0.03. Table 5 shows that component 1 and 2 that means prevailing paratransit quality and seat comfort level have factor loading avobe 0.5 for 11 variables. security of passengers, security of goods, riding safety, movement flexibility, sitting arrangements, these five variables are stronglt correlated with prevailing quality of paratransit and movement flexibility in any road, performance for long route movement, prevailing paratransit quality,

speed of paratransit, quality of driver, travel cost comparing with other, these six variables are strongly correlated with seat comfort level. There were several passengers who expressed about improvement process and explicated their dissatisfaction about paratransit.

Table 5. Rotated Component Matrix (Revised)

	Components	
	1	2
Security of Passengers	.755	.094
Security of Goods	.729	.079
Riding Safety	.663	.129
Movement Flexibility	.656	.149
Sitting Arrangement	.624	.106
Seat Comfort Level	.459	.318
Fitness of Vehicle	.412	.160
Ticketing System	.398	.395
Ease of Entry and Exit	.389	-.038
Travel Time Office Day	.376	.051
Noise Level	.302	.261
Movement Flexibility in any Road	-.084	.723
Performance for Long Route Movement	-.097	.689
Prevailing Para transit Quality	.174	.558
Speed of Para Transit	.249	.558
Quality of Driver	.225	.525
Travel Cost Comparing With Other	.228	.519
Availability	.196	.473
Travel Time Holiday	-.016	.450
Lighting Facilities	.236	.445
Cleanliness	.327	.350
Integration of Supporting Modes	.035	.344

6. CONCLUSION

In developing cities paratransit provides the essential movement demands especially for the poor. Paratransit usually fulfills the gap between the mobility needs which is increasing considerably and the insufficient capacity on community transport system supplied by government. Considering the fares and flexibility paratransit supply, for the low income people paratransit is best in convening the transport requirements (Kaltheier, 2002). Paratransit is also significant to satisfy to mobility needs in areas needing conventional public transport (Tarigan, 2010).

In this article users' perception was examined by conducting a questionnaire survey. As a mode of transportation paratransit plays a significant role in Dhaka city. There will be various types of transport but paratransit is very reliable because it is cheap and convenient public transport modes. This study evaluates how respondents think about the paratransit and its relationship with other policy. This study also identified the important variables that need to be improved. This analysis will help other researcher to know about the present condition of paratransit and users' perception. Although paratransit is considered partly responsible for road accidents, traffic congestion and air pollution it fulfills a type of demand that generally can only be met by the paratransit sector.

SPSS software was employed to develop the factor analysis model by using Principal Component Analysis (PCA). General characteristics demonstrated that majority of the respondents were male and most of them are student. 28% of the paratransit users are students. 38.9% of them are between 20-29 years old. The monthly average income is found to be not specific for 38% of the respondents. 38% of the respondents have primary education.

In the present study, user perception regarding paratransit quality of transport, service quality, reliability, and safety and security has been investigated through passenger interview survey. About thirty percent of the respondents know very little about the paratransit and seventy percent of them had no idea regarding the paratransit. Comfort in the paratransit transport and good waiting as well as boarding alighting facilities in stoppage area are very much required for the passengers. Majority of the respondents had termed them as very poor. Some passengers were not satisfied about driving skills of paratransit drivers. Most of the cases the drivers had no professional license and many of them learnt driving from their elder ones. Sometimes it causes a severe accident. During this survey several of the respondents expressed that the safety and security condition was not good enough. Sometimes the customers lost their valuable belongings.

Cronbach's alpha (α) is a measure of internal consistency, that was, how closely related a set of items were as a group. It was considered to be a measure of scale reliability. The theoretical value of alpha varies from zero to 1. The value of Cronbach's alpha was $0.9 > \alpha \geq 0.8$, which indicates that the internal consistency value was good. For identifying the reliability statistics: The alpha coefficient for the 22 items was .833, falls into the range of good and suggesting that the items have relatively high internal consistency. KMO statistic varied between 0 and 1. In our analysis the value was 0.834, which falls into the range of great. Initial factors were obtained using Principal components analysis. In principal components analysis, linear combinations of the observed variables were formed.

From the factor analysis model six factors were obtained which are more significant and strongly correlated with others. They are prevailing paratransit quality, seat comfort level, fitness of vehicle, noise level, lighting facilities, and cleanliness. Factors with a variance less than 1 are no better than a single variable, since each variable was expected to have a variance of 1. Thus finally, we got two components which are most significant. These two components are prevailing paratransit quality and seat comfort level. These two service quality attributes should be improved in order to improve the users' satisfaction about the paratransit. These two attributes are strongly correlated with others like security of passengers, security of goods, riding safety, movement flexibility, sitting arrangement, seat comfort level, prevailing paratransit quality, quality of drivers, and travel cost comparing with others. There were several passengers who expressed about improvement process and explicated their dissatisfaction about paratransit. There were several factors like divers' skills, cleanliness, safety factors that caused dissatisfaction among the passengers.

The entire challenge of enhancing schemes is therefore to find the suitable action levers and the appropriate regulatory structures to maintain the advantages of paratransit services. While in many countries organized transport appears inadequate and expensive paratransit is acclaimed for its flexibility, meeting a large part of demand, and its low cost to the user. Improving paratransit service quality as well as filling service necessaries remains the major focus to deal with for public transit authorities and paratransit service providers. Prevailing inadequate service quality of paratransit can be focused by taking into account the outcomes of this study. The research results will assist in recommending measures to improve the existing system with necessary modification. It is expected that the outcome of this research work will facilitate identification of the best process to implement effective paratransit mode in Dhaka city.

Further research will identify more variables, which will become more beneficial and advantageous, especially in the context of developing countries like Bangladesh. Future study may compare between developing and developed countries paratransit users' perception, paratransit characteristics and expectation.

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