

Exploring New Services for Effective Service Delivery: The Case of Public Transportation.

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ABSTRACT

Public transportation is one of the most important and wide spread transportation system and it creates very important impact over society, economy and environment. Most of the public transport organizations are using customer centric approach and becoming market oriented organization due to significant and radical changes in public transport industry across the world. Delhi Metro is significant addition to existing public transport system of Delhi and NCR and it appreciably changed the travelling experience of commuters. It significantly reduced traffic congestion, travel time, pollution and frequency of accidents on the road. The present study was undertaken to explore the new services for Delhi Metro and for the said purpose total 1015 sample were taken from all the 160 metro stations. In this study total tennew services were explored through qualitative research techniques such as depthinterview, focus group interview and extensive review of literature in order to improve service quality and effectiveness of service delivery from passenger's perspective. The data were analyzed by using SPSS.20 statistical software and measure of location, measure of variability, Chi Square test wasadministered for processing of the data. The result of this study reveals that commuters are very much agreed to introduce eight new services out of ten proposed services which were explored in this study.

Key words: *Proposed services, Service Quality, passenger satisfaction, Service Delivery, Public Transportation.*

INTRODUCTION:Public transport industry in India is going through transition phase due to variety of the reasons such as emergence of new mode of public transportation, exponential increase in travel demand, increasing traffic congestion, pollution and accident rates, infrastructure constraint, growing population etc. In the last tenyears, people started to avoid public transport facility due to unreliable services, delay in departure and arrival timing, poor hygiene and uncomfortable journey experience. As public transportation is essential to address multiple issues so government must encourage public to use more and more public transport facility.

Delhi Metro is significant addition to existing public transport system and it is one of the finest projects of the world. Delhi Metro Rail Corporation offers multiple services such as Platform services, Train Specific Services, Ticketing Services, Security Services and Employees Driven Services. These services are given particular names which are derived from factor analysis. The present paper is part of the comprehensive study which was conducted for measuring satisfaction level of commuters of Delhi Metro for five different kinds of services. Platform Services are concerned with lift facility on the platform, Wheel chair facility for differently abled person, food and drinking facility on the platform, seating facility on the platform, escalator facility and connectivity of Platform with road.

Train Specific Services are associated with proper ventilation and cleanliness inside the train, announcement inside the train, effectiveness of public information display system, safety of the coaches and provision of seats for senior citizen, women and differently abled persons. Security Services are related to alertness and preparedness of security forces, women safety, safety of the luggage of passengers, effectiveness and adequacy of CCTV camera and metal detectors etc.

In order to offer tickets tomillions of passengers , Delhi Metro offers multiple options such as token, smart card, tourist card and group travel ticket. Ticket reader machine and token dispensing machines are installed at different metro stations. Delhi Metro has introduced automatic fare collection system first time in the

country to monitor high customer traffic on the platform and for collecting fare. The blue print of ticketing services is specifically designed by Metro Railway which identifies important touch points of the services.

The last and fifth dimension of services deals with responsiveness of the employees, reliability of the employees, prompt services and effectiveness of customer care services. Apart from these services which are offered by Delhi Metro, ten additional services were proposed in this study to improve the service quality and for offering defect free services to commuters. The responses of respondents were measured to assess utility of these services from customer's perspective. *Although services of Metro Railway are designed by putting the customer at the center of the business still few additional services need to incorporate keeping in mind exponential increase in customer traffic.*

REVIEW OF LITERATURE: Numerous researchers put their energy and efforts to analyze the satisfaction of commuters for different modes of transportation. Majority of these studies were conducted on Roadways, Airways, and Railways and insignificant study was found on light/metro rail. It was also found that SERVQUAL, modified SERVQUAL and SERVPERF were used for assessing perception of the customers for different modes of transportation.

Yuan Chih Huang, Chih-Hung Wu et al. (2006), assessed the service quality of medium and long distance railway services of Taiwan. They collected total 1950 questionnaires and used SERVQUAL model for conducting the research.

Due to variability of the services, it is extremely difficult for service provider organization to provide defect free services to customers. The dominance of human element is very high in the service delivery despite increasing usage of automation and mechanization in the service delivery. This makes the services more humanistic rather than mechanical. Designing service standard and maintaining consistency in service quality is challenging task for organization as priority and expectation of customers vary significantly. The acceptable level of performance of service provider for the customer may be unacceptable to same customer in different situation. The satisfaction level of customers' decreases when there is decline in the performance of service provider or when there is increase in the expectation of customers.

Parsuraman, Zeithmal and Bitner (1998), proposed SERVQUAL Model for measuring service quality. This model is widely used to assess quality gap of the service firms. Cronin and Taylor (1992), proposed SERVPERF Model after assessing SERVQUAL Model. This model is used to analyze the quality of service organization based on performance of service provider.

In the context of Platform Services, Givoni, Moshe, Rietveld and Piet (2006) examined the impact of accessibility of railway station over satisfaction level of the customers. Christian M. Ringle, Marko Sarstedt et al. (1998), Scalea et al. (2005), Bridget M. Hutter (2008), C.M. Khosla (2000), Pierre Antoine Benatar (1990), Johan M. Sanne (2008), discussed *safety and security* issues for different modes of transportation other than light rail/metro rail.

Several researchers such as Jusoh Yacob, Wan et al. (2010), Todd Litman (2010), P. C. Sehgal and Teki Surayya (2011), John Disney (2000), Davood Feiz, Morteza Maleki et al. (2010), Yuan Chih Huang, Chih-Hung Wu et al. (2006) tried to analyze train specific services for analysing satisfaction level of commuters.

OBJECTIVES OF THE STUDY: Followings are main objectives of this study.

- 1- To propose new services to Delhi Metro for increasing satisfaction level of commuters.
- 2- To analyze relative importance of each proposed services from passenger's perspective.
- 3- To arrange the recommended services in hierarchical order based on relative importance of each recommended services.

HYPOTHESES OF THE STUDY: In this study non directional hypothesis was used. The hypothesis was tested at 5% level of significance. Chi square test was used for testing the hypothesis.

Following null hypotheses are framed keeping in mind objectives of the study.

H₀₁. There is insignificant relationship between Gender and recommendation for exclusive train ‘SAHELI’ for ladies in the peak hours.

H₀₂. There is insignificant relation between income of commuters and recommendation for daily pass of Rs.50.

RESEARCH METHODOLOGY: In this study survey method was used for collecting the data and total 1015 sample were collected from all the metro stations. Data were collected in normal time period not during the peak hours or holidays. For collecting the data, non-disguised structured questionnaire was used and responses of respondents were measured on 1 to 5 point likert scale right from strongly agree to strongly disagree.

During initial stage of the study, validity of the questionnaire was tested by content validity test while reliability of the data was tested by Cronbach alpha test. Both quantitative and qualitative research technique was used for analysis of the data.

In order to explore the proposed services, qualitative research techniques such as depth interview and focus group interview was conducted. To administer focus group interview for proposing new services, 17 frequent travelers of Delhi Metro are gathered at one place. The objective of the meeting was explained to respondents and they were encouraged to express their feeling and thoughts freely. Total ten new services are proposed based on depth interview, focus group interview, extensive review of literature and gap analysis. Data were analysed by SPSS.20 statistical software

DATA ANALYSIS: Descriptive statistical tools such as Chi square test, measure of location and measure of variability, Bivariate correlation were used for processing of the data. In order to test the reliability of the data, Cronbach alpha test was administered.

RELIABILITY TEST: In order to test reliability of data, internal consistency reliability test or cronbach alpha test was chosen out of three reliability test. Cronbach alpha is different from correlation coefficient and higher value of cronbach alpha is indicator of reliability.

Table-1(Cronbach Alpha test)

SN	No of items	Cronbach Alpha
1	10	.782

The above table shows that data is reliable by 78.2% and there is less percentage of error variance in the data.

DESCRIPTIVE ANALYSIS OF PROPOSED SERVICES: In the current section of the study, proposed services are recommended based on the opinion of respondents. Some of the proposed services emerged in focus group interview and few proposed services came into the force due to the gap analysis. These services are recommended to improve the services of Delhi Metro. *These proposed services are based on opinion of respondents only and technical feasibility analysis is not carried out as it is not part of the study.*

Table 2: Descriptive Statistics (Proposed Services)

Variables	N	Minimum	Maximum	Mean	Std. Deviation
More coaches for ladies	1015	1.00	5.00	4.32	.9143
Daily pass of Rs _50	1015	1.00	5.00	3.9369	.78444
More vendors selling eatables	1015	1.00	5.00	3.9675	.88930
Saheli_train	1015	1.00	5.00	4.4690	.59648
Group ticket	1015	1.00	5.00	4.2887	.54612
E_PURSE	1015	1.00	5.00	4.2374	.76006
Double-decker Train	1015	1.00	5.00	4.5429	.57896
Regular services	1015	1.00	5.00	4.6768	.55471
Lady police	1015	1.00	5.00	4.4640	.87505
Announcement	1015	1.00	5.00	4.3389	.79905

The above table No- 2 shows the descriptive statistics of proposed services; total 10 services are proposed to commuters. Except two recommendations, daily pass of Rs 50 and more vendors selling eatables, all the proposed services received high rating (more than four). It is clear from the table that customers are demanding for more coaches for ladies (presently there is only one coach for ladies). Respondents are also very much agreed to run the train SAHELI exclusively for ladies in the peak hours. Commuters are also in the favour of ladies police in the ladies coach on regular basis.

Commuters also suggested that there should be provision of group travel ticket so that group travelers could travel conveniently at lesser price. In this study, survey was completed in the year 2012 and Delhi Metro allowed group travel facility in the year 2014 for foreigners, private school, government school and NGO associated with differently abled persons. The minimum and maximum size of the group should be 45 passengers and 150 passengers. The fare is charged on the basis of number of passengers. This facility is available only in long distance metro trains which consist of eight coaches. (Times of India, 23 March-2014). There is also suggestion to introduce E-purse facility (multi-purposesmart card) so that commuters of Delhi Metro could use smart card for shopping, booking the ticket and for withdrawing the money from ATM. Delhi Metro has already allowed the passengers to use the smart card in Delhi Transport Corporation buses for travelling purpose. Customer wants to extend this facility.

Interestingly majority of the respondents are in the favour of regular services of Metro railway (24*7) and Double Decker Train. Respondents strongly feel that Double Decker train is the only solution to address high customer traffic, so technical feasibility analysis should be carried out by the Metro railway to review the viability of suggestions.

On the basis of responses of respondents regarding proposed services, the relative importance of each service can be analysed from passenger's perspective and these services can be arranged in hierarchical order. It is clear from the above table that respondents gave highest rating to regular services followed by double Decker train and exclusive train SAHELI. Refer objective No-2 &3.

CHI SQUARE TEST: Chi square test is used for qualitative data; qualitative data may be nominal data, ordinal data or combination of both. In this study Chi square test is used to analyze the relationship between demographic variables and proposed services.

Lim, Bennett, and Dagger (2008) identified the importance of demographic variables in measuring service quality and passenger satisfaction. Snipes, Thomson et al. (2006) stated that "significance appears to exist between opinions of customers across various demographical characteristics for service fairness".

In the present section of the study, null hypotheses are tested at 5% level of significance. In Chi square test, relationship between the variables are established when significant difference is found between observed frequency and expected frequency or in other words if p-value is less than 5% level of significance. "Higher the difference between observed frequency and expected frequency, Greater would be value of Chi square". The value of Chi square would be equal to zero if there is no difference between observed frequency and expected frequency.

Following null hypotheses are going to be tested by Chi square test.

H₀₁. There is insignificant relationship between Gender and recommendation for exclusive train 'SAHELI' for ladies in the peak hours.

H₀₂. There is insignificant relation between income of commuters and recommendation for daily pass of Rs.50. For conducting the Chi square test, data were randomly collected from the population. Chi square test was administered to analyze the relationship between the variables only rather than assessing strength of relationship between the variables.

H₀₁. There is insignificant relationship between Gender and recommendation for exclusive train 'SAHELI' for ladies in the peak hours.

Table-3(Chi Square Test)

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	28.758 ^a	4	.000
Likelihood Ratio	28.660	4	.000
Linear-by-Linear Association	21.731	1	.000
N of Valid Cases	1015		

The above table No-3 shows that there is difference between observed frequency and expected frequency. It is also apparent from the above table that value of Chi square is significant at 5% level of significance as p-value is less than 5% level of significance. This shows that null hypothesis is rejected and alternate hypothesis is accepted. This confirms that there is significant relationship between gender and recommendation for exclusive train 'SAHELI' for ladies in peak hours.

H₀₂. There is insignificant relation between income of commuters and recommendation for daily pass of Rs.50.

Table-4 (Chi Square Test)

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	41.650 ^a	12	.000
Likelihood Ratio	45.303	12	.000
Linear-by-Linear Association	2.015	1	.156
N of Valid Cases	1015		

The above table suggests that value of Chi square is significant at 5% level of significance as p-value is less than 5%. This shows that null hypothesis is rejected and alternate is accepted. This indicates that there is significant association between income and recommendation for daily pass of Rs 50 for commuters of Delhi Metro.

POLICY IMPLICATIONS:

The recommended services are based on opinion survey, gap analysis, and extensive literature review. *The economic and technical viability of the recommendations are excluded from the study.* After formal and informal discussions and interpretation of the result, various issues were emerged. Followings are important recommended services.

- E- Purse should be added in the smart card so that customer could use the same card for paying parking charges, online shopping and for buying goods and services.
- Train SAHELI should run exclusively for women in the peak hours.
- There should be more than one coach for ladies and lady police should be available in ladies coach on regular basis.
- Announcement at metro station should be made at all the metro stations before arrival and departure of the train.

❖ **RECOMMENDATION BASED ON NON GROUNDED THEORY-** Certain issues were emerged due to formal and informal discussions with commuters. Few additional suggestions are given based on the observation and feedback of commuters. *Here it is important to mention that these issues are not covered in the study and suggestions are based on observation only.*

- *Delhi Metro should set up water points at metro station to offer pure and fresh water at concessional rate.* Contract might be given to the mineral water companies. This suggestion may come under platform services in further research.
- Need additional ticket counter and vending machine to minimize the length of the queue at ticket counter.
- Exclusive counter for ladies and senior citizen should be opened.
- All the important phone number such as women help line number, emergency number, police control number, and fire control number should be displayed at important points of metro station using **glow signboard**.
- It is found that CISF finds unwanted materials such as knife, cigarette, lighter, matchbox etc from the passengers. Commuters are carrying such items due to unawareness. Awareness programme should be started by Delhi Metro to stop the movement of such items through metro.
- It is observed that length of the queue is very long at exit points at busiest metro stations such as Botanical garden, Kashmiri gate, Rajeev Chowk. In order to address this problem, Delhi metro should use RFID (Radio frequency identification devise) technology for initiating *contactless ticketing system*. Road and transport ministry is already using this technology for taking toll tax on highway. Moscow metro is already using the same technology to minimize length of the queue at entry and exit points.

LIMITATION OF THE STUDY:The proposed and recommended services to Delhi Metro is based on opinion survey only as technical feasibility analysis and economic viability of the proposed services was not carried out in this study. Secondly 1015 sample taken for the study are not true representative of population as 28 lakh commuters' travel through Delhi Metro. This increases the possibility of sampling error.

CONCLUSION: Delhi Metro is one of the finest projects of the world and it is changing shape and direction of public transport services in India. DMRC offers five different kinds of services. These services are acknowledged in a comprehensive study which was carried out for measuring satisfaction level of commuters of Metro Railway for different kinds of services. In this study total 1015 sample were taken from all the 160 metro stations to propose new services, total 10 new services are proposed to Delhi Metro and it is found that except two services customers are very much agreed to introduce remaining eight services. These services are proposed on the basis of gap analysis, extensive review of literature, depth interview and focus group interview. Respondents were asked to indicate their degree of agreement or disagreement on 1 to 5 point Likert scale for total 10 identified proposed services.

On the basis of responses of respondents, recommended services are arranged in a hierarchical order. In the present section of the study, Chi square test is also performed because nominal variables significantly influence the expectation of the customers and they rate the services based on their expectation. Moreover expectation of the customer is influenced by his knowledge, exposure, income level and past experience. The result of Chi square test reveals that there is significant relationship between demographic variables and proposed services.

This study also attempts to give few additional suggestions based on non grounded theory. These suggestions emerged due to formal and informal discussions with commuters and observational study. Some of these important suggestions are set up of water points at metro stations, use of RFID technology at entry and exit points to reduce the length of the queue and opening of additional ticket counter for ladies and senior citizen.

It was found from existing review of literature that very insignificant study was conducted on light rail/metro rail. Moreover no detailed study is available in Indian context on Delhi Metro. This makes this study significant and different as compared to other existing study.

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