Antecedents of Metro Passenger Gratification Among Public - With Special Reference to Chennai Metro Rail Limited

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ABSTRACT

In accordance with the Companies Act, this Special Purpose Vehicle (SPV), known as "Chennai Metro Rail Limited," was established on December 3, 2007. The Indian and Tamil Nadu governments have now transformed it into a joint enterprise with equal equity and ownership. The extension of the Chennai Metro to the northern areas of the city is currently in the planning stages and is expected to enhance commuter mobility. From the days of bullock carts to today's online cabs, the public transportation of the metropolitan city has been evolving at a more incredible speed; in such an evolution, Metro Trains is a relatively recent milestone. In order to meet the needs of their clients, service providers must stand out in a rapidly changing transportation industry with demanding consumers. In this sense, providing excellent service quality is an area that is getting much attention. The techniques and instruments include factor analysis, regression analysis, test of normality, percentage analysis, and descriptive statistics.

1.0 INTRODUCTION

The Government of Tamil Nadu created a Special Purpose Vehicle (SPV) to implement the Chennai Metro Rail Project. In accordance with the Companies Act, this SPV, named "Chennai Metro Rail Limited," was established on December 3, 2007. The Indian and Tamil Nadu governments have now transformed it into a joint enterprise with equal equity and ownership. In Chennai, there is a fast transportation system called Chennai Metro Rail. It launched its maiden operation in 2015, linking Koyambedu and Alandur over a short distance. As part of its phase I project, it links Chennai Central, Chennai Egmore, Chennai CMBT, and Chennai Airport, covering 45 kilometres of the city. According

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to 2020 statistics, this system typically transports 1.15 lakh people daily, with trains running every five minutes during peak hours. The extension of the Chennai Metro to the northern areas of the city is currently in the planning stages and is expected to enhance commuter mobility.

1.1 Review of Literature

In their study, Appu and Balaji (2022) analysed the fact that the usage of services depends on the service environment and service quality in most cases. Metro rail is one such initiative that was brought into public service in Chennai. In order to conduct the survey, three different divisions of the metro train are selected, and the use of the scientific method determines the sample size of 683. The usage levels observed since inception are pretty fragmented and fluctuating. Hence, the present research is initiated to identify the flaws in the service offering of metro rail and identify the technology factors such as Digital Map, PIDS, and Metro Card with Apna Pay POS Terminal influencing the usage patterns among the sample. A descriptive research methodology is used in the study, and the data collection is done using a structured questionnaire. The reliability alpha of the questionnaire is found at 0.896. In order to obtain the degree of impact of each of the factors of usage, a multiple regression technique is used. The results indicate that PTS environment, service quality, motivation, service environment, and awareness factors showed a moderate level of influence in improving the usage patterns of commuters of metro rail in the study. Commuter friendly environment in the sample area may create better prospects for metro rail in terms of an increased level of loyal customer base in the years to come.

Bhagyalakshmi and Vasudevan (2020) investigated commuter satisfaction and retention. Commuters are stakeholders in the business. In the case of a more modest situation, the satisfaction of commuters becomes the first objective. The CMRL must consistently evaluate and enhance service quality to provide greater commuter satisfaction. CMRL must identify the determinants of commuter satisfaction and continuously monitor and cultivate them. The study data is gathered using a structured questionnaire with a sample size of 220 participants. It assists in identifying the aspects associated with Chennai Metro Rail Limited services that influence commuter satisfaction.

Babu (2018) examined passenger satisfaction, focusing on the primary stakeholder—the customer. This aspect is crucial as it influences market share, customer loyalty, repurchase behaviour, income generation, and productivity and plays a significant role in sustainable development. The company is now concentrating on customer orientation, assessing client satisfaction levels and identifying areas for improvement. Initially, the study used the questionnaire approach to determine the degree of passenger satisfaction with the Kochi Metro Railway System. Subsequently, to identify the various factors influencing passenger satisfaction regarding Kochi Metro Rail Limited. The sample comprises 50 respondents who utilise the services of Kochi Metro Trains.

Appu and Balaji (2017) conducted a study on the Delhi Metro Train Corporation, identifying key determinants of service quality and their impact on commuter satisfaction, which influences the commuting process within the Delhi Metro Rail Corporation. A self-administered questionnaire was used to gather data from 850 commuters travelling from DMRC as part of a comprehensive purposive sampling technique based on a five-point Likert scale. Structural equation modelling was used to confirm the significance of the study model. The study's findings indicate that empathy and security are primary predictors of commuters' friendliness and significant determinants of their satisfaction. The study revealed that increased friendliness among commuters correlates with decreased satisfaction regarding the current metro service quality framework. Additionally, enhanced reliability of the metro system is likely to lead to greater participation in the commuting process.

The study conducted by Bachok *et al.* (2013) examined passengers' satisfaction levels with a range of trip-making factors on board KTM Commuter trains, a commuter service run by Kuala Lumpur, Malaysia-based heavy rail operator Keretapi Tanah Melayu Berhad (KTMB). A systematic probabilistic sampling questionnaire survey was performed among users from December 2011 to March 2012. A total of 1000 completed questionnaire forms were collected from respondents to evaluate overall satisfaction levels and analyse specific performance indicators. The findings indicate that most respondents viewed KTM Commuter services as falling short of their expectations, particularly regarding adherence to published schedules and travel times, frequency or headways, capacity, the physical condition of rail coaches, and the provision of information on delays. Many anticipated that improved services would enhance their satisfaction levels. In conclusion, for rail public transportation to achieve sustainability and ongoing relevance, the operator must improve the effectiveness and efficiency of KTM Commuters or ensure that the services remain appealing to current users.

1.2 Research Gap

From the days of bullock carts to today's online cabs, the public transportation of the metropolitan city has been evolving at a more incredible speed; in such an evolution, Metro Trains is a relatively recent milestone. In all the times of evolution, researchers have identified its scope and studied its services in different verticals, such as tram transportation, long-distance railways, mass rapid transport systems, flyover mass rapid transport systems, metro trains abroad stations, etc. Likewise, now, the newly added feather to Indian public transportation is Chennai Metro trains. Thus, this study is undertaken to inspect its satisfaction determinants among the users in the study area.

1.3 Statement of the Problem

Public transportation greatly influences every state and nation's overall development. The development of an effective transportation network is mainly dependent upon advancements in the social, cultural, political, and economic spheres. In India, both the Public Sectors (Indian Railways) and the Quasi-Public Sectors (Metro Trains) offer public transportation services. With the arrival of Metro Train operators, traffic is gradually decreasing in response to rising demand. In order to meet the needs of their clients, service providers must stand out in a rapidly changing transportation industry with demanding consumers. In this sense, providing excellent service quality is an area that is getting much attention.

1.4 Objective of the Study

1) To identify the personal profile of the metro rail respondents in Chennai Central.
2) To examine the underlying dimensions of Metro Rail (MTRL) Variables
3) To analyse the influence between Service Factor (SF) and other factors, Infrastructure Factor (IF), Quality Factor (QF), Accessibility Factor (AF) and Price Factor (PF).

2.0 RESEARCH METHODOLOGY

This study is empirical since it uses a survey approach. The principal source of information was the young people gathered from the public in Chennai Central metro. Because the researcher adopted a convenient sampling method, the study's sample size consisted of just 113 respondents. Secondary data was collected from various sources, including books, journals, magazines, periodicals,

and websites. The techniques and instruments include factor analysis, regression analysis, test of normality, percentage analysis, and descriptive statistics.

2.1 Questionnaire Design

Table 1

Questionnaire Design

Section	Particulars	Nominal Scale	5-point Likert Scale	Total
I	Personal Profile	7	-	7
II	Metro Rail (MERL)	-	20	20
	TOTAL	7	20	27

3.0 RESULTS AND DISCUSSION

Table 2

Demographic and Travel Behaviour Analysis of Metro Users

Demographic Profile (N = 113)	Description	Frequency	Percentage
Age	Below 18 years	11	9.7
	18 years - 25 years	85	75.2
	26 years - 40 years	10	8.8
	Above 40 years	7	6.2
Gender	Male	102	90.3
	Female	11	9.7
Occupation	College Student	87	77.0
	Private Employee	18	15.9
	Professional	8	7.1
Income	Less than ₹20,000	90	79.6
	₹20,000 - ₹30,000	9	8.0
	₹30,001 - ₹40,000	9	8.0
	₹40,001 - ₹50,000	1	0.9
	More than ₹50,000	4	3.5
Route of Metro Travel	Green line route	21	18.6
	Blue line route	26	23
	Both the routes	66	58.4
How frequently do you travel on a metro train?	Every day	33	29.2
	Once in a week	31	27.4
	Once in a month	16	14.2
	Rarely	33	29.2
What is the purpose of your travel on a metro train?	Official purpose	58	51.3
	Unofficial purpose	55	48.7

Table 2 indicates that the majority of the respondents are male 18 years - 25 years (75.2%), majority of the respondents are male (90.3%), majority of the respondents are college students (77.0%), majority of the respondents are college students (77.0%), majority of the respondents are less than Rs. 20,000 (79.6%), majority of the respondents are Both the routes (58.4%), majority of the respondents are every day (29.2%) and majority of the respondents are official purpose (51.3%).

Table 3

Exploratory Factor Analysis of Metro Rail Passenger (MTRL)

Items	Mean	SD	Communalities	Variance (Eigen Value)	Loadings	Cronbach's Alpha
Service Factor (SF)						
MERL (19)	3.903	1.085	0.782		0.795	
MERL (18)	4.009	1.082	0.740		0.784	
MERL (20)	3.673	1.106	0.720	21.678	0.776	
MERL (13)	3.717	1.081	0.590	(4.336)	0.720	0.895
MERL (14)	3.496	1.151	0.627		0.670	
MERL (09)	3.779	1.108	0.797		0.557	
Infrastructure Factor (IF)						
MERL (05)	4.319	1.046	0.772		0.822	
MERL (04)	4.283	0.986	0.749		0.803	
MERL (10)	4.372	0.793	0.706	16.832	0.668	
MERL (11)	4.221	1.024	0.765	(3.366)	0.638	0.856
MERL (12)	4.159	0.978	0.796		0.586	
MERL (06)	4.274	1.029	0.669		0.571	
Quality Factor (QF)						
MERL (17)	4.265	0.945	0.616		0.743	
MERL (15)	4.327	0.871	0.409	13.174 (2.635)	0.595	0.671
MERL (16)	3.991	1.082	0.629		0.531	
Accessibility Factor (AF)						
MERL (07)	4.150	1.046	0.753		0.839	
MERL (08)	4.106	1.137	0.790	10.240 (2.048)	0.650	0.687
MERL (02)	4.416	0.863	0.548		0.586	
Price Factor (PF)						
MERL (01)	3.204	1.269	0.737	7.203	0.783	
MERL (03)	2.726	1.345	0.632	(1.441)	0.579	0.543
Total Variance = 69.126% and Cronbach's Alpha = 0.903 for 20 items						
KMO and Bartlett's Test						
Kaiser-Meyer-Olkin Measure of Sampling Adequacy. = 0.796 (Bartlett's Test of Sphericity Approx. Chi-Square = 1361.315; df = 190; Sig. = 0.000)						

Table 3 reveals that Bartlett's Test of Sphericity, with an approximate chi-square value of 1361.315, df = 190, and p = 0.000, is statistically significant at the five per cent level. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy is 0.796. Consequently, it is suitable for preliminary factor analysis, and the variances in communalities across the 20 items range from 0.409 to 0.797. Five predominated groups were also formed from the reduction of the 20 variables. It is discovered that the variable reveals 69.126% of the overall variance.

High Mean value of employment metro train passengers' usage among the public. The standard deviation values are very low. MERL (15) Mean=(4.327), SD=(0.871), followed by MERL (02) Mean=(4.416), SD=(0.863); MERL (13) Mean=(3.717), SD=(1.081); MERL (17) Mean=(4.265), SD=(0.945); MERL (14) Mean=(3.496), SD=(1.151); MERL (16) Mean=(3.991), SD=(1.082); MERL (03) Mean=(2.726), SD=(1.345); MERL (06) Mean=(4.274), SD=(1.029); MERL (10) Mean=(4.372), SD=(0.793); MERL (20) Mean=(3.673), SD=(1.106); MERL (01) Mean=(3.204), SD=(1.269); MERL (18) Mean=(4.009), SD=(1.082); MERL (04) Mean=(4.283), SD=(0.986); MERL (07) Mean=(4.150), SD=(1.046); MERL (11) Mean=(4.221), SD=(1.024); MERL (05) Mean=(4.319), SD=(1.046); MERL (19) Mean=(3.903), SD=(1.085); MERL (08) Mean=(4.106), SD=(1.137); MERL (12) Mean=(4.159), SD=(0.978); MERL (09) Mean=(3.779), SD=(1.108).

The most dominant factor is factor 1, which has a variance of 21.678 and an Eigenvalue of 4.336. It has six variables associated with metro rail passengers: "MERL (19), MERL (18), MERL (20), MERL (13), MERL (14) and MERL (09)." It has been labelled "Service Factor (SF)."

The following dominant factor is factor 2, with the described variance of 16.832 and an Eigenvalue of 3.366. It has six variables associated with metro rail passengers: "MERL (05), MERL (04), MERL (10), MERL (11), MERL (12) and MERL (06)." It has been labelled as an "Infrastructure Factor (IF)."

The following dominant factor is factor 3, which has the described variance of 13.174 and an Eigenvalue of 2.635. It has three variables associated with metro rail passengers: "MERL (17), MERL (15), MERL (16)." It has been labelled as a "Quality Factor (QF)."

The following dominant factor is factor 4, which has a variance of 10.240 and an Eigenvalue of 2.048. It has three variables associated with metro rail passengers: "MERL (07), MERL (08), MERL (02)." It has been labelled as the "Accessibility Factor (AF)."

The following dominant factor is factor 5, which has the described variance of 7.203 and an Eigenvalue of 1.441. It has two variables associated with metro rail passengers: "MERL (01), MERL (03)." It has been labelled as "Price factor (PF)."

Table 4

Descriptive Statistics and Test of Normality (MERL)

MERL	Mean	SD	Variance	Skewness	Kurtosis	Kolmogorov-Smirnova		Shapiro-Wilk	
						Statistic (df = 113)	Sig.	Statistic (df = 113)	Sig.
SF	22.575	5.354	28.675	-0.503	-0.213	0.109	0.002	0.950	0.000
IF	25.628	4.480	20.075	-1.286	1.586	0.165	0.000	0.862	0.000
QF	12.584	2.258	5.102	-.0774	-.028	0.151	0.000	0.892	0.000
AF	12.672	2.403	5.776	-1.169	0.955	0.170	0.000	0.858	0.000
PF	5.929	2.165	4.691	-0.025	-0.659	0.124	0.000	0.959	0.002
Lilliefors Significance Correction									

Table 4 illustrates the value of descriptive statistics in the study of passengers on metro rails. Lower standard deviations and higher mean values suggest a regular distribution of the data. The results of the Kolmogorov-Smirnova and Shapiro-Wilk normalcy tests show that the data are normal and appropriate for use in higher-order multivariate analysis. In terms of variance, skewness, kurtosis, mean, standard deviation, and variance, the passenger distribution on metro rail is normal.

Table 5

Regression Analysis of MTRL

Dependent Variable	Significant Predictors	Mean (SD)	F-Value	R	R^2	Adjusted R^2	β (t-Value)	Sig.
SF		22.575 (5.354)	28.303	0.715	0.512	0.494		
	IF	25.628 (4.480)					0.195 (2.279)	0.025
	QF	12.584 (2.258)					0.337 (4.103)	0.000*
	AF	12.672 (2.403)					0.313 (4.008)	0.000*
	PF	5.929 (2.165)					0.127 (1.773)	0.079
P Value of >0.05* - (IF, QF and AF Factor significantly influencing the SF)								
Notes: *Significant @ 5% Level								

Table *5* R = 0.715, R Square = 0.512, and R Square Adjusted = 0.494 are the values that are shown above. This suggests that the independent factors, Infrastructure Factor (IF), Quality Factor (QF), Accessibility Factor (AF), and Price Factor (PF), have an impact on the dependent factor, Service Factor (SF), which measures public satisfaction with metro rail passengers. The preceding table shows that F = 28.303 and P = 0.000 are statistically significant at the 5% level. Therefore, one may argue that there is enough information on independent factors to support an investigation into the public Service Factor (SF). A strong regression fit suggests the existence of individual impact over the dependent components. The coefficients for IF (t = 2.279, β = 0.195, p = 0.000), QF (t = 4.103, β = 0.337, p = 0.000), and AF (t = 4.008, β = 0.313, p = 0.000) are all statistically significant at the 5% level, according to the table. Therefore, it can be argued that in the case of metro train passengers, the public Infrastructure Factor (IF), Quality Factor (QF), and Accessibility Factor (AF) influence their Service Factor (SF).

4.0 CONCLUSION

Chennai Metro Rail Limited is performing successfully in Chennai because metro trains enable the public to reach their destination on time, bypassing the heavy traffic on the roads. Commuters are satisfied with factors such as service, infrastructure, quality, and accessibility, whereas they are least confident with price. Perhaps CMRL could consider this to improve the current traffic. Among all Metro trains in various metropolitan cities, the Chennai metro train is the latest, which is still in progress with 2 more phases under construction. Commuters are overwhelmed by welcoming the full-fledged metro train services across all the phases and believe the ticket fare will eventually be reduced. This study has been done only with blue corridors and green corridors. The same analysis could be repeated with all upcoming corridors in operation.

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