Studying the Public Transport User Preferences in a city and the People's Willingness to Shift to Metro: The Case of Jaipur

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1. Introduction

In modern times, urbanisation is the fastest growing phenomena globally which necessitates an efficient transport system. As a solution, the new concepts of public transport like BRTS and MRTS are being introduced. Metro Rail has gained immense popularity due to its high carrying capacity, cost effectiveness and most importantly providing security and comfort in daily travel. The introduction of such projects is associated with the risk of public acceptance and usability. Thus the new systems besides being innovative, effective and efficient, also need to be user-friendly and easily acceptable by the public.

2. Aim

The research aims on analysing the public transport user preferences and commuter satisfaction levels in the city and emphasizing on factors that affect people's preferences by giving recommendations for functioning of Metro to aid its better usability and acceptance. The case of Jaipur, capital of the Indian state of Rajasthan, has been taken up for study as a similar situation of introduction of Metro for addressing demand is observed.

3. Methodology and Data Collection Strategy

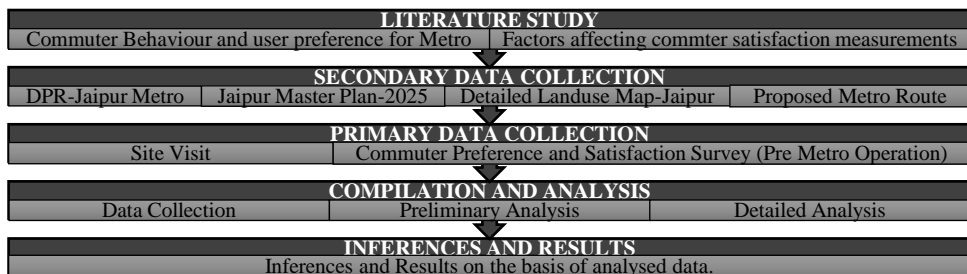The stepwise methodology followed in carrying out the study is as follows

Figure 3 Methodology

A stage wise strategy was adopted for the Primary Data Collection including the three following stages,

- Questionnaire Design – Public Transport Commuter Preference Questionnaire, designed based on Literature Study.
- Survey Sampling – Total Number of Samples (280) calculated based on categories of income groups in the study area.
- Selection of Survey Locations – Locations selected (4) along the metro corridor, based on the land use and predominant activity. Samples divided equally among all four locations.

4. Analysis

The extensive study done on preferences of public transport users involved information collection at the household level about the mode choices and commuter satisfaction with the present public transport in the city (bus system). Collected data was analysed graphically by representing the relations between various parameters. Further, analysis of factors considered for commuter satisfaction measurement was carried out. Rigorous analysis has been done under the following heads:

Table 4 Primary Survey Analysis Parameters

PARAMETERS	SUB-PARAMETERS ANALYZED
Personal and Household Information	Income, Expenditure on Transport, Vehicle Ownership, Household Size
Mode Choice Information	Modal Split, Travel Cost & Travel Time Distribution, Waiting Time Distribution, Reasons for Preference for various modes, Mode Preferences for varying Trip Lengths – Travel Costs – Trip Purposes
Commuter Satisfaction Measurement Analysis	Scoring of Factors, Factor Importance Calculation, Composite Factor Score Calculation, Willingness to Shift to Metro

Source:Singh. A, 2015

4.1. Personal and Household Information

The method of analysis adopted for various sub-parameters under the head (listed in Table 1), has been shown below taking one sub-parameter (similarly done for all other sub-parameters),

Table 5 Monthly Household Expenditure on Transport

| CATEGORIES (in Rs.)	BADI CHOPAR		MANSAROVAR		SINDHI CAMP		SHYAM NAGAR		OVERALL (4 Locations)	
	No. of Households	Percentage (%)	No. of Households	Percentage (%)	No. of Households	Percentage (%)	No. of Households	Percentage (%)	No. of Households	Percentage (%)
< or = 2,000	5	7	17	27	4	5	9	13	35	13
2,001-8,000	37	53	43	67	37	49	45	64	162	58
8,001-15,000	22	31	4	6	32	42	15	21	73	26
> 15,000	6	9	0	0	3	4	1	1	10	4
TOTAL	70	100	64	100	76	100	70	100	280	100
MEAN MONTHLY HOUSEHOLD EXPENDITURE	8085		4310		8130		5945		6820	
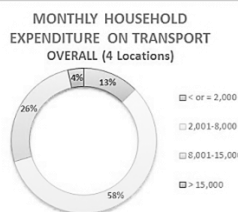
Figure 4 Categorical Distribution

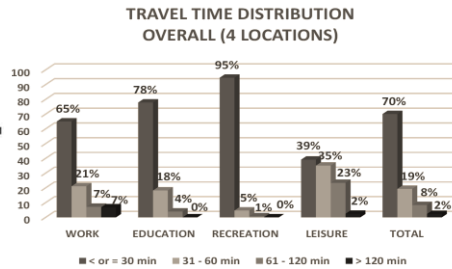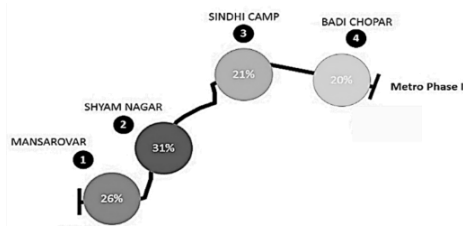## 4.2. Mode Choice Information

Figure 5: Public Transport Share Figure 6Travel Time in relation to Trip Purposes Across locations

Various factors affecting the choice of mode of an individual (listed sub-parameters in Table 1) have been analysed, out of which the analysis of 'Travel Time' has been shown above in Figure 4. On a broader scale, the Public Transport Share in the study area (shown in Figure 3) was calculated based on Modal Split data obtained from Secondary Sources, which is observed to be low.

4.3. Commuter Satisfaction Score

Factors considered for measurement are, Transit Stop within walking distance, Schedule and Route Information Availability, Timely Operation and Punctuality, Seat Availability, Cost, Comfort and Convenience, Safety and Security, Aesthetics of Built Environment, and Overall Satisfaction. *[Singh.A, 2015]*
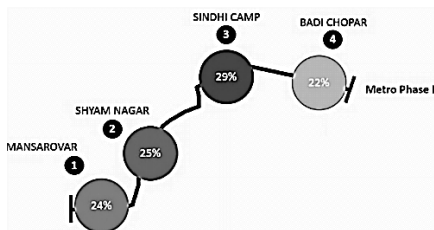
Table 6 - Parametric categorization of Scores

Figure 7 Commuter Preference Scores across locations

FACTOR	COMPOSITE FACTOR SCORE	%
FACTOR 1 - Transit Stop within walking distance (500m) of Trip Origin	1362	4
FACTOR 2 - Schedule and Route Information Availability	2987.5	8
FACTOR 3 - Timely Operation and Punctuality	4803	13
FACTOR 4 - Seat Availability	1617	4
FACTOR 5 - Cost	3952	11
FACTOR 6 - Comfort and Convenience	1429.5	4
FACTOR 7 - Safety and Security	13175	36
FACTOR 8 - Aesthetics of Built Environment	955	3
FACTOR 9 - Overall Satisfaction	5980	16
TOTAL SCORE OF ALL FACTORS	**36261**	**100**

5. Conclusion

The inferences drawn from the study show the usability pattern of public transport, as well as the flaws in the existing system and people's requirements which need to be met by the metro to make people shift from private modes to public transport. The results show that people having higher incomes contribute least to the public transport share. People spend a considerably high share of their income on transport. The commuter satisfaction analysis indicates that factors like safety and

security, schedule information and route availability are assigned the highest importance. A majority of people, i.e. 91%, are willing to shift to metro, which shows that the metro is most likely to functionally succeed in the city.

6. Recommendations

Based on the significant inferences, certain specific recommendations for functioning of the metro are given which are as follows:

- *Reducing People's Monthly Expenditure on Transport* – Calculated Mean Daily per person per direction expenditure is Rs. 23.5. It is recommended to keep the metro fares considerably lower than Rs. 23.5 to attract commuters to opt for metro, increasing its footfall.
- *Variation in Metro Fares* – Calculation of Average length of public transport trips shows public transport is used majorly for higher trip lengths. Attracting commuters to opt metro for shorter distances is recommended by designing the revenue generation strategy to be based on distance and frequency of passengers within stations.
- *Ensuring Safety and Security* – To Children, Women, Elderly and Disabled by facilitating the metro and its stations with Feeder bus service for schools, CCTV Surveillance, Barrier-free environments etc.
- *Last Mile Connectivity* - Providing Feeder Service at each station covering all areas falling within a range of 500m from metro stations.
- *Improve Comfort and Convenience* – Providing adequate number of seats based on demand calculation. To attract HIGs, it is recommended to have a few luxury coaches with high comfort and higher fare which would also aid in better revenue generation.
- *Encouraging Metro* – Reduce waiting time of commuters with shorter headway, increasing reliability by timely and scheduled operation, aesthetically pleasing environment, Park and Ride facility at stations.
- *Towards Smart Metro* – Integrated Transit Systems, Integrated fare Collection System and Real Time Traffic Management.

Hence, these recommendations would aid in the better usability and acceptance of the Metro by city residents. The research can also be adopted as a pilot study to be taken up before proposing any other Metro System.

Keywords: *Public Transport, User Preferences, Commuter Satisfaction, Metro Rail.*