

A Survey on Mumbai Suburban Local Train Travelers

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Abstract

Mumbai is the financial and commercial capital of India. Mumbai wouldn't have achieved this without the lifeline of the city –its local trains. For any large densely populated urban area, the local trains are essential for a speedy cross-over of a large population over long distances. Lakhs of people travel regularly and commute by local trains over varying distances ranging from 10 to 60 kilometer a day.

The Mumbai local railway network branches out through three main lines – Central, Western and the Harbour, each connecting a distinct part of the city to another.. It may be considered as one of the best example of strategic management in transport.

Most commuters use this means of transport to reach the places of their job, profession, business and educational purposes. Most travelers commuting on a daily basis hold season passes that makes the local train travel even more cost-efficient.

The paper brings out the main findings of a field survey on Mumbai Local trains daily travelers that was conducted to have a greater insight into the socio-economic role played by this

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major public transport system in the widespread expansion and economic progress of the city. The field survey tried to capture the various aspects of suburban local train travelers in terms of number of family members travelling by the local trains, the purpose of their travel, average distances covered and number of hours spent per day, number of years travelled by the local trains, extent of socialization that takes place among the regular commuters, the safety and security aspects and provisions for any kind of emergencies that arise in the regular train travel. Around 200 randomly selected respondents were covered in the field survey.

The recent initiatives to ease out the pressure on the suburban local trains and the possibilities of alternative modes of speedy transport for the regular commuters of Mumbai also have been analysed in this paper.

Keywords: Mumbai, Suburban Local Trains, Lifeline, Field Survey

Introduction

Mumbai is the financial capital in India. It is situated in the state of Maharashtra and is connected internally and externally by roadways, railways and airways. Mumbai is an island city in which 88% of the people travel by the local trains.

The first train in Mumbai ran from Chatrapati Shivaji Terminus (CST) to Thane on 16th April 1863. It covered a distance of about 34 kilometers and took about 1 hour and 15 minutes. The Mumbai railway is about 150 years old and it caters to the transport requirement of a population of about 22 million every day.

The Mumbai Suburban Railway branches out into three lines, the Central, Western and the Harbour. The Central local train network connects Mumbai CST in South Mumbai to distant suburbs of Kasara and Karjat, Khopoli. The Western railway, covers the areas from Churchgate to Virar, carries about 2.6 million Passengers per day which is almost 33% of the total suburban Railway traffic. The Harbour line runs between CST and Panvel and CST- Andheri

The south Mumbai Fort area is the down town of the city and all the major Government offices, Secretariats, bank headquarters, corporate offices are located in that area. Due to extremely high real estate prices, people have no option but to stay in the distant suburbs of Mumbai and travel long distances to reach their work places in south Mumbai daily.



The Mumbai Suburban Railway is the oldest in Asia. It is owned by Indian Railways and is operated by Western Railways and Central Railways. These suburban trains are popularly known as *Locals* and they run from 4 AM till 1 AM. In 1992, Mumbai's WR and CR introduced 'Ladies Special' trains. A complete Ladies Special' train that have all its coaches reserved for women passengers.

The Economic Significance of Local Trains:

In India, along with the annual union budget of the central government, the railway budget is announced every year. In the year 2012-2013, around INR 4,410 crore were allocated for capacity augmentation works. An allocation of INR 1102 crore was meant for improving the passenger amenities which was only Rs 762 crore in the previous year 2011-2012 registering a growth of around 30 per cent. This indicates the fact that the government has been taking a lot of initiatives to bring about an improvement in the infrastructure of railways and to make the travel for the commuters more convenient and reliable. In the year 2000, the Indian railways-- the world's second largest railway network under a single management -- had large deficits. Over the next eight years, however, there was a dramatic improvement in its performance. From a cash surplus before dividend of Rs 1,071 crore (Rs 10.71 billion) in 2000, it achieved an estimated surplus of Rs 25,000 crore (Rs 250 billion) - or around Rs 13,000 crore (Rs 130 billion) after accounting for all expenditures, receipts and depreciation -- in 2008. Alongside came a dynamic and differential tariff policy, and technical changes that led to an enhanced carrying capacity.

Recently, the Indian Railways have taken the first step to segregate Mumbai Railways from the national body. The project, undertaken by the city's rail think tank, the Mumbai Railway Vikas Corporation, with financial help from the World Bank, also calls for identification of a possible institutional arrangement and organisational structure of the railway, its legal status, operational responsibility and ownership and maintenance of assets.

Mumbai stretches from north to south, and railways make it possible to connect distant places in a short time.

Taking into account the moderate Per Capita Income of the people and the huge amount of middle class population residing in the suburbs, the only rational choice left to them is to travel by a means of transport that is pocket friendly, convenient and speedy.

The people of Mumbai are dependent on local trains so much that even the terror attacks of 2006 didn't affect the number that still chose to travel by the local trains the very next day.

Problems of Local train Commuters:

But the *Mumbaikars*, i.e. the people of Mumbai have to face a number of difficulties in their daily local train travel. The main problem being that of over-crowding. Due to over-crowding, the commuters travel into jam pack compartments with no chance to have a place to sit and have to cover the distance all the time standing in the compartment. At times they get into first, second or any compartment due to lack of space. As around 22 million passengers travel daily it becomes very difficult to get hold of ticketless travelers and the Indian railways and the government loses a big chunk of their income due to this.

At the railway stations, sufficient number of ticket windows, wash rooms- particularly for the ladies travelers, sufficient eating and resting provisions are lacking and as a result of this, during the days of heavy rains, water logging, trains running late, mishaps, the commuters suffer a lot. Over-crowding, illegally crossing the railway tracks, standing on the foot boards of the doors of the compartments, leads to a lot of accidents during the crowded hours.

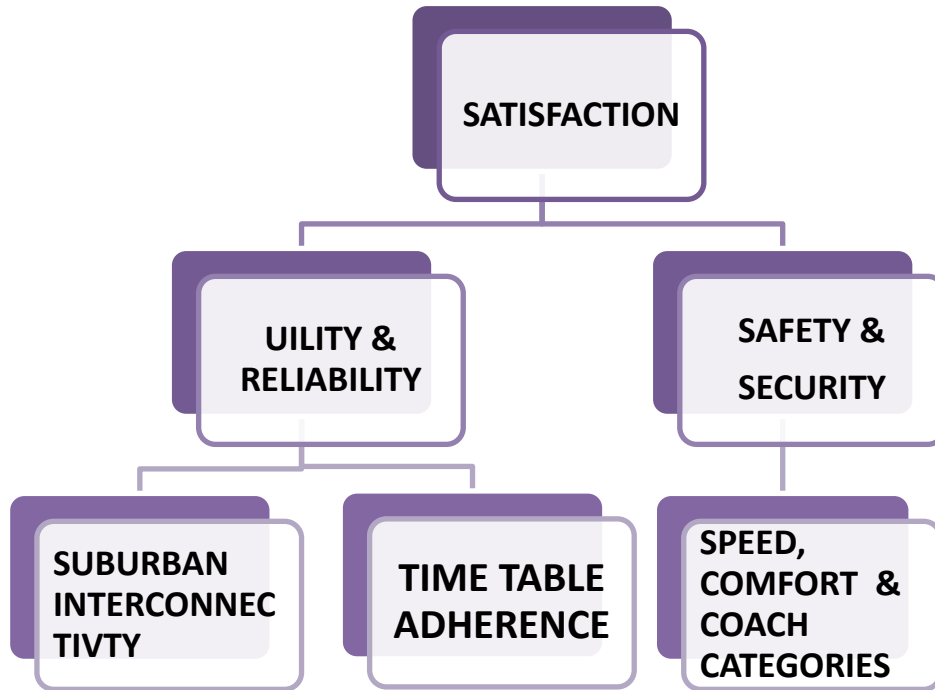
Occasionally the indicators on the platforms do not function and display the time table and it results in a lot of inconvenience to the commuters.

Field Survey:

Therefore, a field survey was undertaken with help of a questionnaire to study the extent of satisfaction among the regular local train commuters with regard to the services of the trains. The questionnaire was administered to around 200 randomly selected respondents, men, women and students in the city of Mumbai. On the basis of these questionnaires factual information was obtained.

The first part of the questionnaire pertained to personal identification data. The second part of the questionnaire had more specific questions. The field survey tried to capture the various aspects of suburban local train travelers in terms of number of family members travelling by the local trains, the purpose of their travel, average distances covered and number of hours spent per day, number of years travelled by the local trains, extent of socialization that takes place among the regular commuters, the safety and security aspects and provisions for any kind of emergencies that arise in the regular train travel. Around 250 randomly selected respondents were covered in the field survey.

PURPOSE OF THE FIELD SURVEY



DESCRIPTIVE STATISTICS

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Variable	Obs	Mean	Std. Dev.	Min	Max
sat	170	1.947059	.5680004	1	3
age	170	38.77059	12.22909	11	70
maritalstatus	170	.6764706	.4816508	0	2
sex	170	.4529412	.4992511	0	1
edu	170	2.817647	.9463322	1	4
occup	170	2.011765	.4740389	0	3
fammem	170	4.094118	1.689673	1	16
tramem	170	1.982353	1.057369	0	5
child	170	.8117647	1.008768	0	8
old	170	.5764706	.8267205	0	4
earnmem	170	1.982353	.8666983	0	5

income	170	2.123529	1.319866	1	5
frequency	170	1.123529	.4378936	1	3
hours	170	2.347059	1.32013	0	10
kms	170	2.841176	1.347168	0	5
-----+					
line	170	2.005882	.839111	1	3
purpose	170	1.429412	.9219639	1	5
years	170	4.8	1.819032	1	7
pass	170	.9352941	.2696506	0	2
class	170	1.441176	.5212171	0	2
-----+					

paassdura	170	1.635294	.6939648	0	3
commut	170	.6882353	.4645827	0	1
friend	170	.6	.4913452	0	1
celebrate	170	.2941176	.4569912	0	1
eatables	170	.2	.4011817	0	1
-----+					
vegfruit	170	.1882353	.4068676	0	2
earbang	170	.3823529	.4993905	0	2
hcdress	170	.1941176	.3966883	0	1
timetables~d	170	2.7	.978164	1	4
accident	170	.3823529	.4873977	0	1
-----+					
emergency	170	1.735294	1.040847	0	4
stopmid	170	2.458824	.6353109	0	4
safety	170	.9117647	.4965947	0	3
othermod	170	1.417647	.7432022	0	3

Consolidated Data Tables:

Sr.No.	Variable	M	F			
1	Sex	77	93			
2	AGE	less than20	20-40	More than 40		
		19	64	87		
3	MARITAL STATUS	MARD	UNMARD			
		114	56			
4	OCCUPATION	Education	Service	Business		
		16	135	39		
5	EDUCATION	I	II	III	IV	
		24	22	84	40	
6	No. Of Members in Family	UP TO 4	> 4			
		123	47			
7	Travelling Members	UP TO 2	> 2			

		132	38			
8	Earning Members	I	II	III	IV	V
		48	86	28	7	2
9	INCOME	I	II	III	IV	Y
		72	52	18	9	19
10	Travelling Hours	Up to 2	> 2			
		105	65			
11	Travelled kms	I	II	III	IV	V
		29	43	39	38	29
12	Local line	I	II	III		
		59	51	60		
13	PURPOSE	I	II	III	IV	V
		134	9	21	2	4
14	No. Of years Travelled	≤ 5	> 5			
		93	77			
15	Friends made	Yes	No			
		102	68			
16	Time table	I	II	III	IV	
		30	24	83	33	
17	SAFETY	I	II	III	IV	
		26	136	5	3	

LINEAR REGRESSION RESULTS

. regress sat occup tramem kms purpose friend timetablesfollowd emergency stopmid safety

Source	SS	df	MS	Number of obs = 170		
Model	10.7954936	9	1.19949929	F(9, 160)	=	4.39
esidual	43.7280358	160	.273300224	Prob > F	=	0.0000
				R-squared	=	0.1980
				Adj R-squared	=	0.1529
Total	54.5235294	169	.322624434	Root MSE	=	.52278

sat	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
occup	.1806215	.0880794	2.05	0.042	.0066734	.3545697
tramem	.0227551	.0387232	0.59	0.558	-.0537194	.0992295
kms	-.0184152	.0313523	-0.59	0.558	-.0803329	.0435025
purpose	-.0862029	.0465171	-1.85	0.066	-.1780695	.0056638
friend	-.1240568	.0874238	-1.42	0.158	-.2967102	.0485966
timetable	.1119132	.0429599	2.61	0.010	.0270716	.1967547
emergency	.0509869	.0417063	1.22	0.223	-.0313789	.1333528
stopmid	.1791661	.069791	2.57	0.011	.0413358	.3169964
safety	-.2958893	.0836976	-3.54	0.001	-.4611839	-.1305947
_cons	1.227157	.3406063	3.60	0.000	.5544935	1.899821

A detailed Questionnaire was administered to around 200 respondents randomly.

Linear Regression Results

Regressand (Dependent Variable): Satisfaction of the commuters regarding the regular suburban local train travel

Regressors(Independent Variables):Occupation, No. Of Travelling members, kms travelled, purpose of travel,whether made any friends during regular travel, timetable followed or not, in case of emergency what mode of transport is followed, whether the trains stop midway and get delayed and safety were considered

The regressors, **Occupation, purpose of travel, timetable, stop midway and safety** were found to be statistically significant

Multinomial Logit Models:

When there is no clear ordering of the outcome variable, multinomial logit model may be used.

The regressors may vary or may not vary with the regressand.

For example , travel time , cost will vary with choice of mode of transport where as age is choice invariant. Accordingly, Alternative- Varying Regressor Model and Alternative- Invariant Regressor Models may be used.

When the regressors do not vary over alternatives, the **multinomial logit model** is used.

$$P_{ij} = \frac{e^{x_i \beta_j}}{\sum_{l=1}^m e^{x_i \beta_l}} \quad , \quad j = 1 \dots\dots\dots m \tag{I}$$

where $\sum_{j=1}^m P_{ij} = 1$, a restriction needed to ensure model identification and the usual restriction $\beta_1 = 0$

In terms of the MNL technique, the model was fitted with help of a software (STATA 11), after five iterations.

Multinomial Logit Results:

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. mlogit sat occup timetablesfollowd purpose friend emergency stopmid
safety
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Iteration 0: log likelihood = -144.39862
Iteration 1: log likelihood = -123.4303
Iteration 2: log likelihood = -119.72727
Iteration 3: log likelihood = -119.38112
Iteration 4: log likelihood = -119.37716
Iteration 5: log likelihood = -119.37716
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Multinomial logistic regression      Number of obs   =      170
LR chi2(14)                          =      50.04
Prob > chi2                            =      0.0000
Log likelihood = -119.37716          Pseudo R2       =      0.1733
```

sat	Coef.	Std. Err.	z	P> z	[95% Conf.Interval]	
-----+-----						
1						
occup	-.6880893	.4553225	-1.51	0.131	-1.580505	.2043265
timetable	.6193716	.2226755	-2.78	0.005	-1.055808	-.1829356
purpose	.2113514	.2306131	0.92	0.359	-.240642	.6633448
friend	1.126825	.5050803	2.23	0.026	.1368861	2.116764
emergency	-.0123229	.2220947	-0.06	0.956	-.4476205	.4229746
stopmid }	-.5410056	.3727024	-1.45	0.147	-1.271489	.1894776
safety	1.19212	.5257512	2.27	0.023	.1616671	2.222574
_cons	.7523827	1.667691	0.45	0.652	-2.516231	4.020997
-----+-----						
2	(base outcome)					
-----+-----						
3						
occup	2.607516	1.216466	2.14	0.032	.2232866	4.991746
timetable	.0635855	.292399	0.22	0.828	-.5095061	.6366771
purpose	-1.567124	.7475628	-2.10	0.036	-3.03232	-.1019276
friend	.0264431	.5636906	0.05	0.963	-1.07837	1.131256
emergency	.5380687	.2611006	2.06	0.039	.0263209	1.049816
stopmid	1.087364	.542449	2.00	0.045	.0241838	2.150545
safety	-1.515758	.5721581	-2.65	0.008	-2.637168	-.3943493
_cons	-7.900554	2.803404	-2.82	0.005	-13.39513	-2.405984
-----+-----						

The level of satisfaction among the regular local train commuters (with its three underlying responses)- 1 Extremely Satisfied, 2 Fairly Satisfied, and 3 Not Satisfied, have been considered as the regressand (dependent variable). As there are multiple of response, multinomial logistic regression i. e. Multinomial Logit has been used to analyse the data.

The regressors (independent variables) – No. of members in the family, age, education, sex, occupation, purpose, frequency, time taken, distance travelled, friends made, emergency, time table and punctuality and safety during travel have been considered. Out of these independent or determining variables- time table followed, friends made during the regular local train travel, occupation, purpose, emergency, stop mid way and safety were found to be statistically significant.

Among all the commuters covered in the survey, those who were fairly satisfied with the suburban local trains formed the base category.

For the second category of commuters who were Extremely satisfied, time table followed, friends made during the regular local train travel and safety were found to be the statistically significant determinants.

For the third category of not satisfied commuters, occupation, purpose, emergency, stop mid way and safety were found to be statistically significant determinants.

In Mumbai, commuters belonging to various socio-economic strata of society travel by trains. According to the field survey that was undertaken, the question pertaining to the monthly incomes of the commuters revealed that, around 43% of the commuters had a monthly income from INR 0-50,000, around 20 per cent had a monthly income of INR 50,000- 1,00,000 and around 27 per cent daily commuters had a monthly income in the range of INR 1,00,000- 5,00,000 .

The Mono and Metro Rail:

Due to increasing population in the trains and the problem of overcrowding, initiatives have been taken up by the MMRDA.(Mumbai metropolitan region development authority) in terms of the two major developments in the railway sector for the city of Mumbai that includes the Monorail and the Metro.

Some of the advantages of monorail include its efficiency, its speed as it can run at a speed of 81 kms per hour (on a narrow track) whereas normal trains run at 35 kms per hour, it produces less noise and is eco friendly.

The Mumbai monorail system is currently under construction and once it is completed it will be the second longest railway corridor and will ease out the pressure on the local trains. The Mumbai Metro will provide the much needed east to west connectivity and will carry about 6 lakh

commuters per day initially and that too, at very affordable fares. The biggest advantage would be the substantial reduction in travel time from the current 90 minutes to about 20 minutes along with much improved and comfortable traveling experience.

Whatever be the present status of the Mumbai suburban railways, the fact that millions of people have their lives dependent on it and the essence and flavour it carries along with it truly and exclusively belongs to 'Mumbai'.

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