NECESSITY OF INTEGRATED TRANSPORT SYSTEM TO NAMMA METRO AT BYAPANAHALLI – A STUDY

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Abstract

Mass Rapid Transit is one of the major Transportation system proposed in metropolitan city like Bangalore in order to be beneficial in reducing various traffic problems and result in reduction of Travel time etc. The efficiency of this system can be increased by attracting more number of Trip makers by a suitable Integrated Transport System. Feeder system is one of these techniques proposed for Namma Metro in Bangalore which includes Feeder bus (Minibus) operating throughout the radial areas of Metro stations. The present study includes the necessity of these buses as par with Public Transport Buses currently operating in these areas with respect to the willingness of commuters, Frequency and Travel Time.

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1. INTRODUCTION

Bangalore is the fifth largest metropolis in India. It is not only the administrative and commercial capital of the State but also the IT capital of India. Due to the rapid growth of major cities there has been vast increment in population which has resulted in the traffic growth rate. There has been a 10% fold increase in the number of vehicles in the last 20 years. These have lead to various traffic problems like Narrow roads heavily congested with a mixed type of traffic and little possibility of widening of these roads or laying new roads due to heavily built-up area, frequent traffic jams at road intersections, high atmospheric pollution levels and high rate of accidents. Therefore Mass Rapid Transit is one of the major transport systems which have been proposed in metropolitan cities. The system leads to several positive impacts like Reduction in traffic density on road, Reduction in Travel time and safety, fuel consumption, urban air pollution and road accident, Employment opportunities and improvement in rural economy, Enhanced rural economy, saving in productive man-hours due to rapid mode of transport, reduced need for expansion of roads, laying new roads. The commuters using these systems can then be increased by using proper Transport Integration Technique. Feeder system is one of the Integration Techniques have been implemented to attract more number of commuters from the surrounding radial area so as to increase the revenue of the MRT system and to reduce the traffic problems.

Four Feeder routes has been planned at Swami Vivekananda station and Byapanahalli Metro terminal (two routes connecting each station) where Public transport services are operating on the same routes. Question now arises, why Feeder buses are required when Public transport are already available for the commuters to reach Metro station. Therefore it is necessary to carry on study to support the necessity of Feeder buses with regard to commuter's willingness, Travel time and Frequency.

1.1 Objectives of Study:

The main objectives of this study are:

I. To appraise the necessity of Integrated Transport System with regard to the willingness of commuters in the area.
II. To calculate the Travel time of Feeder Bus.
III. To evaluate the occupancy of Public Transport Trip.
IV. To study the requirement of separate Feeder bus with par to Public Transport service currently operating.

2. APPROACH AND METHODOLOGY

Study on feeder connectivity to metro stations was carried out at Swami Vivekananda station and Byappanahalli Metro Terminal station. Four feeder routes were planned at surrounding areas at a radial area of 3km. These routes were planned keeping in view the commuters likely to be generated for the Metro trip. Locations of stations were done keeping in view the convenience of commuters to walk a maximum distance of 150m to reach feeder bus station and thereby reach Metro station.

The necessity of these feeder buses have to be studied in detail with regard to the travel demand for Public Transport System in the area, the willingness of commuters to use the feeder bus and requirement of these feeder buses par with Public Transport Services currently running in the road networks.

2.1 Study Area and Feeder Routes:

Swami Vivekananda Station and Byappanahalli Metro terminal (Henceforth referred to the site) is located near Byappanahalli region. All areas falling within a radius of 3 kilometers from the Site was considered for the study (radial influential area). The radial influential area was then divided in to four equal parts and named as zone1zone2, zone3 and zone4 respectively. Zone 1 includes Byappanahalli, Railway station, sadanand nagar, New Horizon college, Kasturinagar, Zone 2 includes Navagara, CV Raman nagar, Bairasandra GM Palya, KG Colony, BEML, Suddangonda Palya. Sathiya nagar, Nagannapalya, Maruthi SevaNagar, ITC Colony fall under Zone 3 and Montfort College, Indira nagar I Stage, New Tipsandra, HAL III Stage, HAL II Stage, Indira nagar III Stage are included under Zone 4.

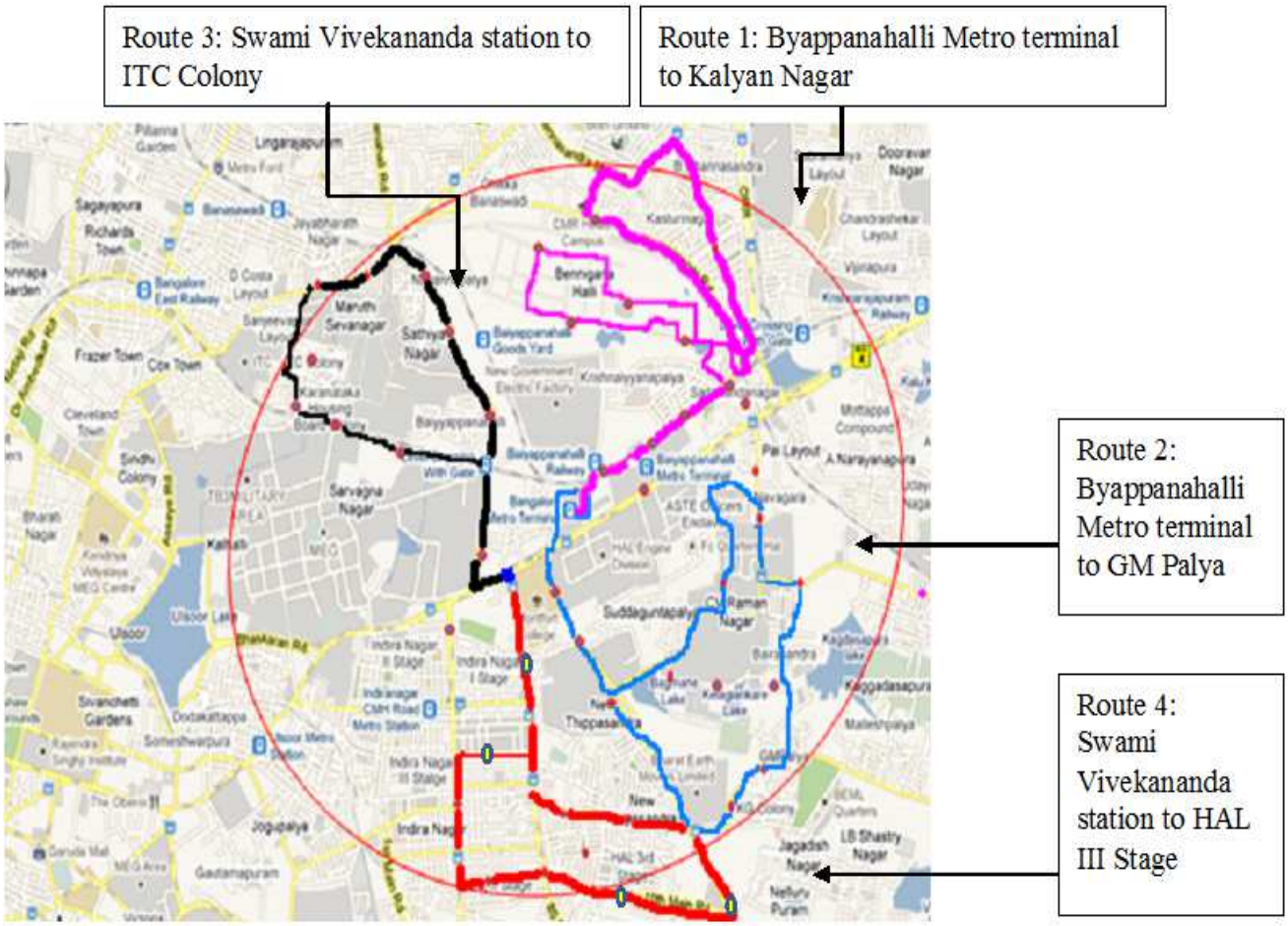

Fig1: Proposed sketch of the feeder routes

2.2 Opinion Survey:

Opinion survey elucidates the opinion of the people regarding their willingness to use the feeder service to catch the metro. It also includes their opinion regarding the type of feeder service they are likely use so as in the case Minibus or Share Auto, and the amount they would like to pay for the journey. This survey plays an important role in deciding the probable loadings in the area.

2.3 Bus Occupancy Survey:

The overall objective of the survey was to assess the extent to which public transport operators across the study areas were meeting legal requirements and operational policy guidelines. Specifically the surveys sought to identify, how many buses exceed the legal maximum capacity? This survey is carried by travelling in the bus from the starting point noting down, the no of persons travelling and the no of occupants Boarding and

alighting at every intermediate station, and finally making a note of the people inside the bus at the end point of the radial area. The number of occupants at the final point indicates the type of occupancy in the route. The Table 1 indicates the values of the type of occupancy. The routes opted for the Bus occupancy survey has been shown in Figure 2.

Table .1: Type of occupancy indicated with their values

Type of occupancy	Value
Very small occupancy	0-15
Small occupancy	16-30
Medium occupancy	31-49
Full occupancy	50 & above

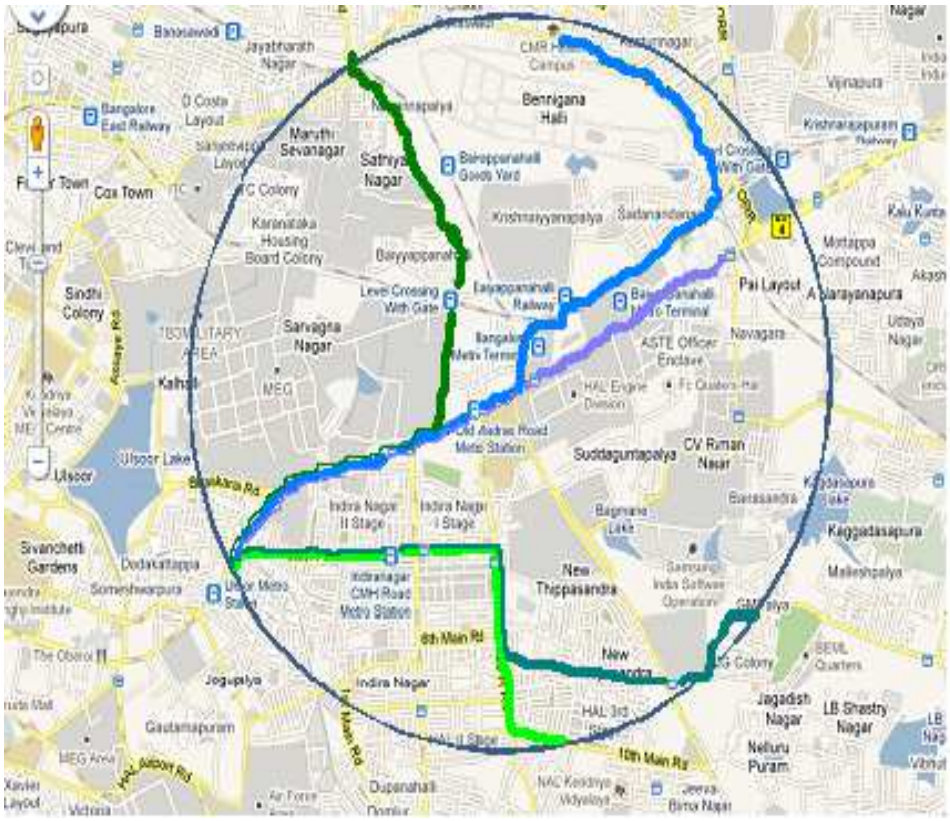

Fig 2: Routes opted for bus occupancy survey

2.4 Travel Time:

The time required for the feeder bus from the farthest distance of the proposed route to the metro satation is essential in order to know, wheather the time taken by the feeder bus to reach the metro station is less than the currently running public transport,so that the commuters will not make use of the public transport service to catch the metro.

Following assumptions are made to calculate the travel time:

- Speed of the feeder bus is 20KMPH.
- Additional 5 minutes has been considered as time elapsed in stoping the vehicle at the feeder bus station.

Travel Time is calculated using the relation:

$$\text{TIME} = \frac{\text{DISTANCE}}{\text{SPEED}} \times 60 + 5$$

3 RESULTS

3.1 Opinion Survey

Opinion survey was conducted to get the percentage of people willing to use the Feeder service to catch a Metro rail. This survey was carried through road side interview method. Their opinion were mainly concerned to their willingness to use the feeder service, the amount they would likely to pay for the trip and the type of feeder service they would like to use (Minibus or service Auto

Table 2: Percentage of citizens opted to use the feeder service

Mode	% Yes	% No
Tw	81.1	18.9
Car	76.39	23.61
Bus	76.67	23.33
Auto	81.82	18.18
Total	79	21

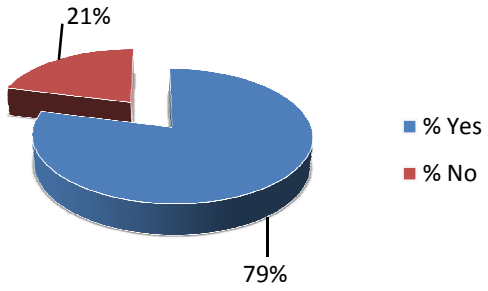

Fig 3: Graphical representation of the opinion survey (Total result)

3.2 Bus Occupancy Survey:

The Bus occupancy survey was conducted along the various routes of the study area to assess the extent of travel by the commuters were generating using the Public transport. This survey was carried out both at peak hour and off peak hour. Table 3 and Table 4 shows the details of occupancy of the study area at off peak hour and peak hour respectively

Table 3: Details of the occupancy of study area (Peak hour)

Feeder Connectivity to Metro at Baiyapanahalli																		
Bus Occupancy Survey (Peak Period)																		
				IS1*		IS2		IS3		IS4		IS5			Type of Occupancy				
NO	Bus	Route	First	B*	A*	B	A	B	A	B	A	B	A	FS	Very Small	Small	Medium	Full	Frequency (min)
1	314	JBN-MJ	44	6	0	4	3	3	0	6	2	5	8	55				1	30
2	315	KN-MJ	32	5	0	4	2	5	0	9	1	0	0	52				1	30
3	313	KN-MR	28	3	0	5	0	6	2	10	1	0	0	50				1	30
4	138	JBN-MR	32	4	0	6	0	7	3	8	2	4	3	53				1	30
5	314-B	DRDO-MJ	20	6	0	2	1	7	2	9	1	0	0	40			1		40
6	314-B	DRDO-MJ	22	8	0	4	0	2	1	7	1	0	0	41			1		40
7	317	KR-MJ	37	6	2	6	3	8	2	11	5	0	0	56				1	30
8	316	KR-MR	33	7	2	3	1	6	0	8	1	0	0	53				1	30
9	8	KLN-IG	27	13	0	6	10	13	0	10	0	0	0	59				1	60
10	314-D	GM-SHN	46	3	0	8	0	3	0	6	0	0	0	66				1	40

11	314-D	GM-SHN	24	4	0	3	0	1	0	6	4	0	0	34			1		40
Total															0	0	3	8	
%															0	0	27.3	72.7	

Note:

In the above table 3 and 4 the Route code stands for the following designation.

Route Code	Route Designation
JBN	Jeevan Bhima nagar
MJ	Majestic
MR	K R Market
KR	KR Puram
IG	Indiranagar
KLN	Kalyannaar
DRDO	DRDO Township
GM	GM Palya
SHN	Shivajinagar

Table 4: Details of the ocupancy of study area (Off peak hour)

Feeder Connectivity to Metro at Baiyapanahalli																			
Bus Occupancy Survey (Peak Period)																			
				IS1*		IS2		IS3		IS4		IS5			Type of Occupancy				Frequency (min)
NO	Bus	Route	First	B*	A*	B	A	B	A	B	A	B	A	FS	Very Small	Small	Medium	Full	
1	314	JBN-MJ	30	6	0	10	3	3	0	1	1	5	2	50				1	30
2	315	KN-MJ	6	3	0	4	0	6	2	10	2	-	-	25		1			30
3	313	KN-MR	15	2	0	5	0	2	2	8	1	-	-	29		1			30
4	138	JBN-MR	10	4	0	3	0	6	2	2	1	4	1	25		1			30
5	314-B	DRDO-MJ	12	8	0	3	1	6	2	8	1	-	-	33			1		40
6	314-B	DRDO-MJ	16	8	0	2	0	2	1	6	1	-	-	32			1		40
7	317	KR-MJ	40	6	2	6	3	8	2	6	5	-	-	54				1	30
8	316	KR-MR	35	7	2	3	1	6	0	8	1	-	-	55				1	30
9	8	KLN-IG	22	6	0	6	5	3	1	10	0	0	0	41			1		60
10	314-D	GM-SHN	21	3	0	9	0	3	2	5	3	0	0	36			1		40
11	314-D	GM-SHN	25	2	0	6	0	1	2	9	4	0	0	37			1		40
Total															0	0	3	8	
%															0	0	27.3	72.7	

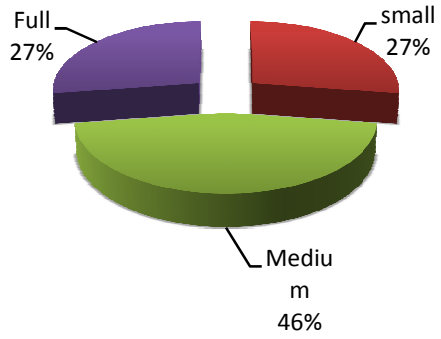

Fig4: Graphical representation of occupancy (Off peak hour)

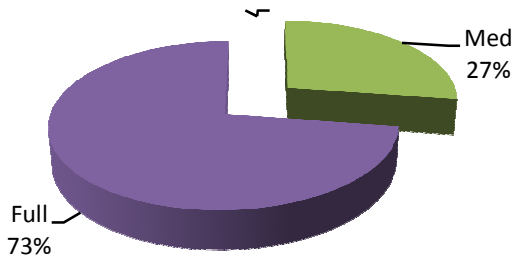

Fig5: Graphical representation of occupancy (peak hour)

3.3 Travel Time:

Travel times of each feeder route were calculated from farthest distance to the Metro station to compare with the frequency of Public transport Services in the study area. It was found that the travel time of feeder bus was much less than the frequency of public transport service.

Table 5: Comparison of Feeder Bus Travel Time and Frequency of Public Transport

Feeder Route No	Distance from farthest Point to metro station (KM)	Travel Time (Min)	Frequency (Min)
1	4.5	19	30
2	4.9	20	30
3	4.54	19	60
4	4.65	19	40

CONCLUSIONS

Following conclusions are drawn from the various studies conducted and the analysis done for the study area:

- Majority of commuters traveling by Metro are willing to use the feeder service from their origin point.
- The bus occupancy survey focused on the type of occupancy in the study area in both peak and off peak hour. Thus it was concluded that there was a full occupancy of commuters using the public transport at peak hours and medium occupancy at off peak hours.
- The travel time of feeder bus was found to be less than the frequency of BMTC buses. Thus we conclude that commuters will make use of feeder bus to catch a metro.

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