ADVANCED RESEARCH & INNOVATIONS
International Journal of Advanced Research & Innovations
Volume 15, Issue-2
October, 2025, P77
ISSN: 2319-9253

International Conference on Emerging Trends in Engineering, Technology & Management (ICETM-2025)
Conducted by *Viswam Engineering College (UGC—Autonomous Institution)* held on 11th & 12th, April- 2025

DESIRE LINE PATTERN AND PUBLIC TRANSIT USAGE STUDY AT PENNYA AREA IN BANGALORE

Mr. Niteen Keerthi
Dept. of Civil Engineering, Viswam Engineering College, Madanpalle, India
Dr. S. Reehana
Dept. of Civil Engineering, Viswam Engineering College, Madanpalle, India

***ABSTRACT*—**Study investigates the desire lines and public transit usage in the Pennya area in Bangalore, with the aim of understanding traffic movement patterns and their implications for optimizing public transportation. A desire line is an informal route traffic take when they seek the most direct, efficient path between two locations, often deviating from established pathways. By analyzing desire lines in conjunction with public transit patterns, this work aims to identify potential improvements in urban design, traffic infrastructure, and public transportation systems to enhance connectivity and mobility in the region. Bangalore, a rapidly growing urban center, faces challenges related to congestion, inefficient transit systems, and traffic safety. Pennya, located in the northern part of the city, presents a unique case study due to its combination of residential, commercial, and industrial areas. The study employed a mixed-method approach that included mapping desire lines through GPS tracking and direct observation, as well as gathering data on public transit usage through surveys and collaboration with the Bangalore Metropolitan Transport Corporation (BMTC). Key metrics such as bus routes, ridership, and stop locations were examined to understand the relationship between traffic movement and transit accessibility. The findings reveal significant gaps between traffic desire lines and existing infrastructure, particularly in high-density areas where people frequently deviate from designated paths. In many instances, the formal traffic routes do not align with the natural movement patterns of residents, leading to inefficiencies in both travelling by own vehicle and transit usage. Additionally, the analysis of public transit routes and bus stop locations highlights areas where transit services are either underutilized or not well-integrated with traffic flow. For instance, certain high-traffic traffic routes are not served by bus stops or have limited bus frequency during peak hours, leading to missed opportunities for seamless multi-modal transport.

Keywords*—Desire lines, Origin and Destination study.*

1. INTRODUCTION

Knowledge of the travel patterns for a defined roadway network is an important aspect in transportation planning. The patterns may include vehicle classifications, trip purposes, travel time, age differentiations, life styles and vehicle occupancy among others. There are different methodologies used in studying traffic patterns, one of them being Origin and Destination (O-D) survey.

In other words, the results from O-D study will need supporting analysis to make final recommendations. The O-D study gives the details of what type of trips in terms of purpose at origin and destination are made by the travellers. Through O-D, one can determine which among home-based, education, shopping, recreational or any other trip purpose are dominant in the area. In case of route relocation study, diversions, road expansion and other similar kind of projects, O-D survey becomes not a stand-alone but a sup porting

DOI: https://doi.org/10.5281/zenodo.17286850

Volume 15, Issue-2
October, 2025, P77
ISSN: 2319-9253

document. Origin is defined as the where the trip begins and Destination is defined as the place where the trip ends.

2. EXPERIMENTATION

2.1 Face-to-face interviews with bus passengers by Questionnaire Survey

These were conducted on subjects, around fifty in number, who rely on the public transport sector (the city bus). Herespecial emphasis was given to the times of the day when the sample was taken, i.e. surveys were conducted both on and off-peak hours.

The conditions under which this sample questionnaire was surveyed have varying characteristics. This was done in order to get a real feel of the public transport system in operation. When the passengers alight at the bus-stop each of them has been requested to get the information and questioned. This method is simpler and informatory.

ORIGIN AND DESTINATION STUDY

1 Name (ಹೆಸರು) : _____

2 GENDER: MALE (ಪುರುಷ) ☐ FEMALE (ಮಹಿಳೆ) ☐

3 ORIGIN (ಮೂಲದ ವಿಳಾಸ) _____

4 DESTINATION (ತಲುಪುವ ವಿಳಾಸ) _____

5 Purpose of travel (ನಿಮ್ಮ ಪ್ರಯಾಣದ ಉದ್ದೇಶ)

☐ Personal ☐ Education
☐ Work ☐ Other

6 Bus Number You travel by (ಬಸ್ ನಂಬರ್) - _____

7 Where do you Alight the Bus (ಎಲ್ಲಿಂದ ಬಸ್ ಹತ್ತುವಿರಿ) _____

8 Mode of travel to Bus stop (ಬಸ್ ನಿಲ್ದಾಣಕ್ಕೆ ಹೇಗೆ ಬರುವಿರಿ) ☐ Walking ☐ Having someone to drive
☐ Driving myself ☐ Other _____

9 Place of Change of bus if any (ಬಸ್ ಬದಲಾವಣೆ) _____

10 Where will you get down the bus (ಬಸ್‌ನಿಂದ ಎಲ್ಲಿ ಇಳಿಯುವಿರಿ) _____

11 Mode of travel from Bus stop (ಬಸ್‌ನಿಲ್ದಾಣದಿಂದ ಮುಂದೆ) ☐ Walking ☐ Having someone to drive me
☐ Driving myself ☐ Other _____

12 How many days you travel by the Bus (ಬಸ್‌ನಲ್ಲಿ ಪ್ರಯಾಣಿಸುವ ದಿನಗಳು)

☐ One day ☐ Two days ☐ Three days
☐ Four days ☐ Five days ☐ Six days
☐ Seven days ☐ One Two days/Month

13 How do you Rate the PRESENT BUS SERVICE (ಈಗಿನ ಬಸ್ ಸೇವೆಯ ಬಗ್ಗೆ ನಿಮ್ಮ ಅಭಿಪ್ರಾಯ)

ITEM/RATING	VERY GOOD (ತುಂಬಾ ಚೆನ್ನಾಗಿದೆ)	GOOD (ಚೆನ್ನಾಗಿದೆ)	FAIR (ಪರವಾಗಿಲ್ಲ)	POOR (ಚೆನ್ನಾಗಿಲ್ಲ)	DON'T KNOW (ತಿಳಿದಿಲ್ಲ / ಹೇಳಲಾಗದು)
FARE(ದರ)	☐	☐	☐	☐	☐
SERVICE FREQUENCY (ಸೇವೆಯ ಪುನರಾವರ್ತನೆ)	☐	☐	☐	☐	☐
CONDITION OF BUSES (ಬಸ್‌ಗಳ ಸ್ಥಿತಿ)	☐	☐	☐	☐	☐
SCHEDULE RELIABILITY(ಸೇವೆಯ ವಿಶ್ವಾಸಾರ್ಹತೆ)	☐	☐	☐	☐	☐
DRIVER COURTESY (ಚಾಲಕರ ನಡೆನುಡಿ)	☐	☐	☐	☐	☐
DRIVER COMPETENCE (ಚಾಲಕರ ಸಾಮರ್ಥ್ಯ)	☐	☐	☐	☐	☐
BUS ROUTING(ಬಸ್ ಮಾರ್ಗ)	☐	☐	☐	☐	☐
BUS STOP SAFETY(ಬಸ್ ನಿಲ್ದಾಣದ ಸುರಕ್ಷತೆ)	☐	☐	☐	☐	☐

14 The Combined total annual income of your family (ನಿಮ್ಮ ಕುಟುಂಬದ) ☐ Do not Wish to Disclose
☐ Less than Rs 5000 ☐ Rs 5000 to Rs 10,000 ☐ Rs 10,000 to Rs 20,000 ☐ More than Rs 20,000

15 Any Suggestions for improvement (ಸಲಹೆಗಳು) :

Image1: O-D questionnaires

2.2 Field Setup

Origin and Destination study was carried out at Sunkadakatte Stop for 2-3 days by Face-to-Face interview technique with public bus-passenger at stop. Along with O-D data the BUS RATING were also collected. The passenger/commuters at bus stop at the predefined location were questioned.

DOI: https://doi.org/10.5281/zenodo.17286850

ADVANCED RESEARCH & INNOVATIONS
International Journal of Advanced Research & Innovations
Volume 15, Issue-2
October, 2025, P77
ISSN: 2319-9253

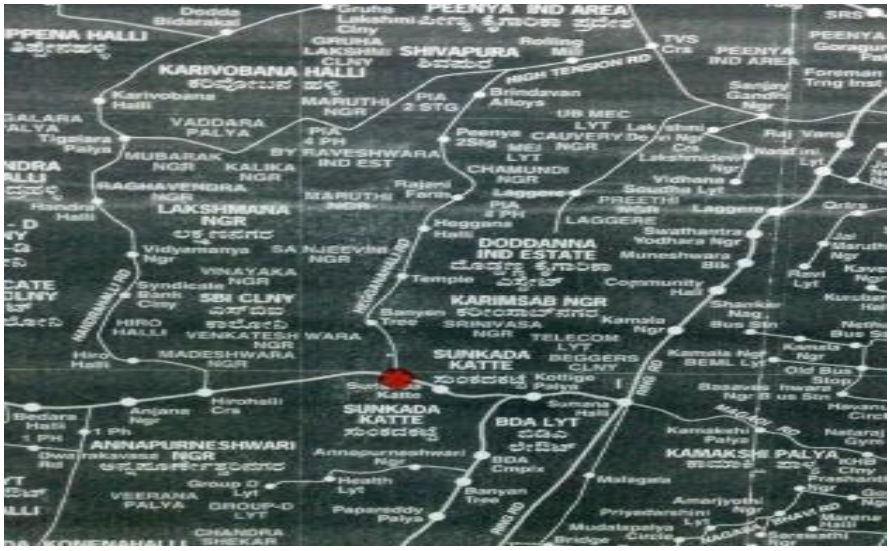
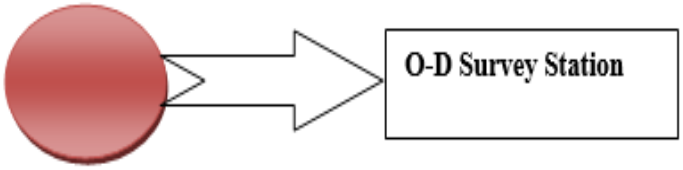


Image2: Selection of O-D Survey Station



2.3 Presentation of results

O-D survey yields a vast amount of data. To understand them it is necessary to present them in convenient tabular or pictorial form.The most convenient form is an O-D Matrix, in which the origin zones and destination zones are represented. The vertical axis represents the destination zones and vertical axis represent the origin zones.The most popular pictorial representation is by means of Desire Line Chart. In this chart, the trips between any pair of zones are represented by a straight line connecting the centroids of the two zones and having a band width drawn to a suitable scale to represent the actual volume of trips. It is also represented in pi chart.

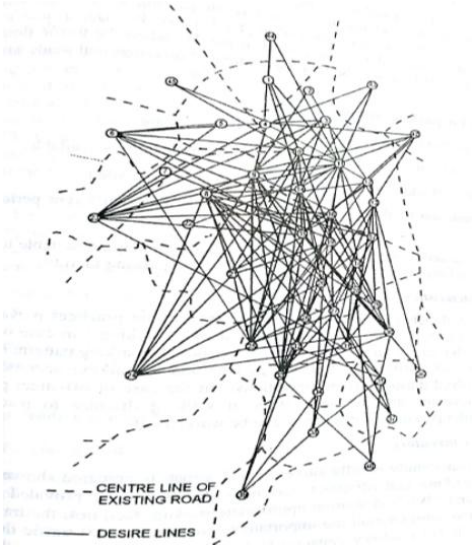


Figure 1: DESIRE LINE

Volume 15, Issue-2
October, 2025, P77
ISSN: 2319-9253

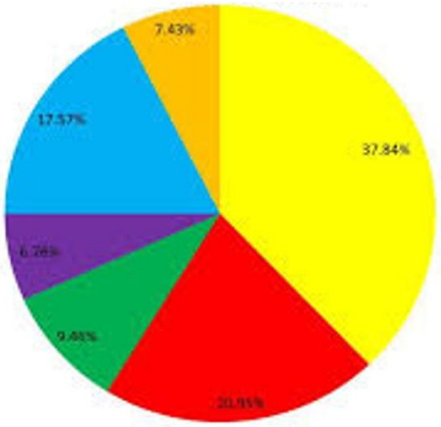


Figure 2: PIE CHART

3. RESULTS AND ANALYSIS

After collection of the O-D data the analysis of the data and its interpretation will then follow. The analyses of the collected information from the questionnaire survey are organized into their representative categories so as to come up with logical results.


ORIGIN AND DESTINATION STUDY

ADVANCED RESEARCH & INNOVATIONS
International Journal of Advanced Research & Innovations
Volume 15, Issue-2
October, 2025, P77
ISSN: 2319-9253

Image3: Sample of Passengers O-D questionnaire

3.1 O-D Matrix

From O-D matrix it is observed that PEENYA being an industrial area attracts and generates a greater number of trips. Next to it JALAHALLI CROSS generates greater number of trips.

3.2 Desire Lines

It is a graphical representation. Desire lines are straight lines connecting the origin with destination points. The width of such desire lines is drawn proportional to the number of trips in both directions. The desire line density map helps to decide the actual desire of the road users and thus help to find the necessary of new road link, improvement of the route, diversion.

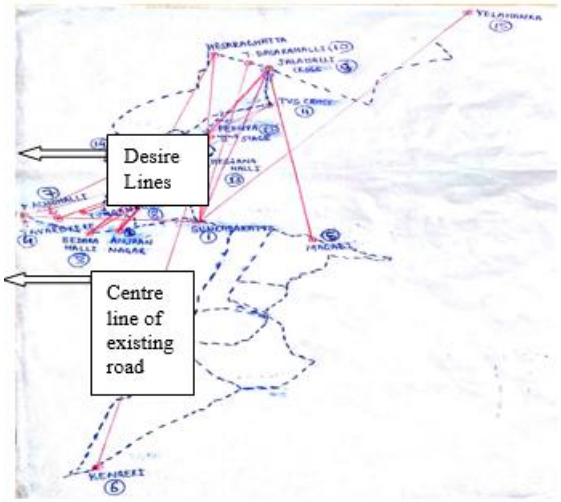


Image4: Desire lines drawn at O-D Station

DOI: https://doi.org/10.5281/zenodo.17286850

Volume 15, Issue-2
October, 2025, P77
ISSN: 2319-9253

1. SUNKADAKATTE
2. ANJAAN NAGAR
3. BEDARAHALLI
4. TAVAREKERE
5. MAGADI
6. KENGERI
7. MACHOHALLI
8. TUNGANAGAR
9. JALAHALLI CROSS
10. T.DASRAHALLI
11. T.V.S CROSS
    BRINDAVAN
12. PEENYA 2ND STAGE
13. HEGGANAHALLI
    NELAGIRI TOPU
14. HANDRAHALLI
15. YELAHANKA
16. HESARAGHATTA

AS PER THE DESIRE LINES SUNKADAKATTE ATTRACTS AND GENERATES A GREATER NUMBER OF TRIP AND A GREATER NUMBER OF TRIPS ARE TOWARDS HEGGANAHALLI, JALAHALLI CROSS AND PEENYA INDUSTRIAL AREA.

3.3 PI-CHARTS

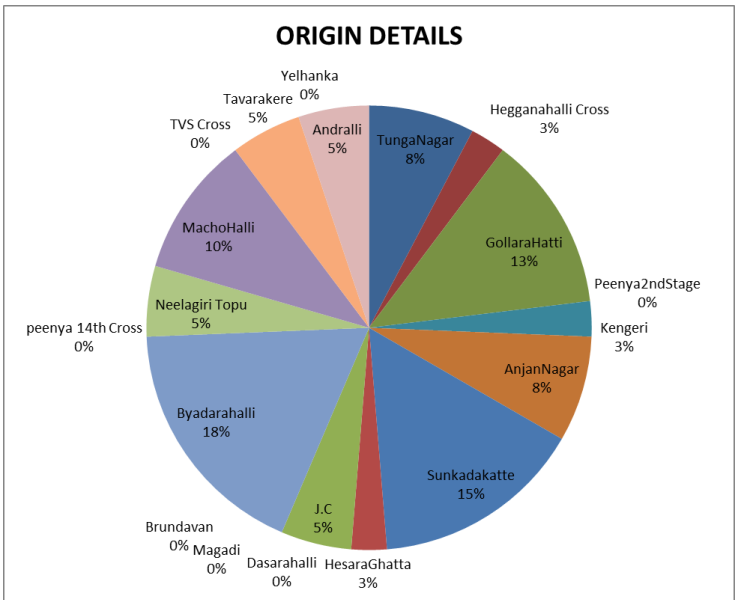


Figure 3: PI-CHARTS OF ORIGIN

DOI: https://doi.org/10.5281/zenodo.17286850

ADVANCED RESEARCH & INNOVATIONS
International Journal of Advanced Research & Innovations
Volume 15, Issue-2
October, 2025, P77
ISSN: 2319-9253

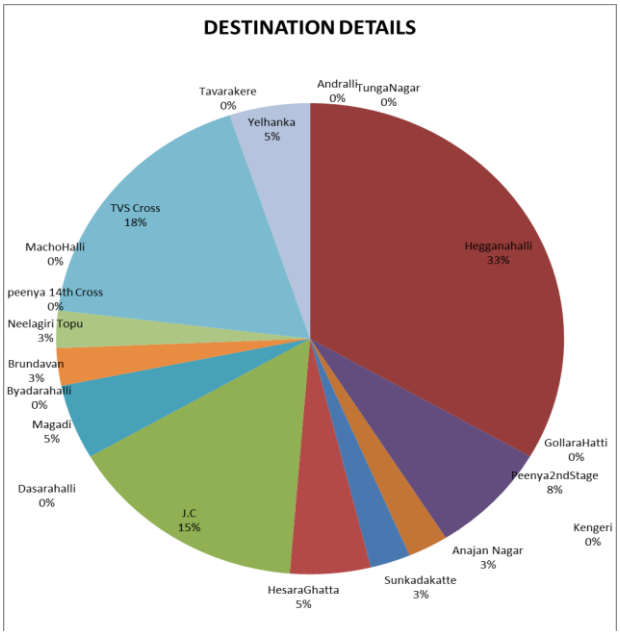


Figure 4: Pi-Charts of destination

3.4 Level of Service of BMTC Buses:

Table 1: L.O.S of Bmtc Bus Rates

ITEM/RATING	FARE	FARE %
VERY GOOD	2	5
GOOD	12	31
FAIR	17	44
POOR	2	5
DON'T KNOW	6	15
Total	39	100

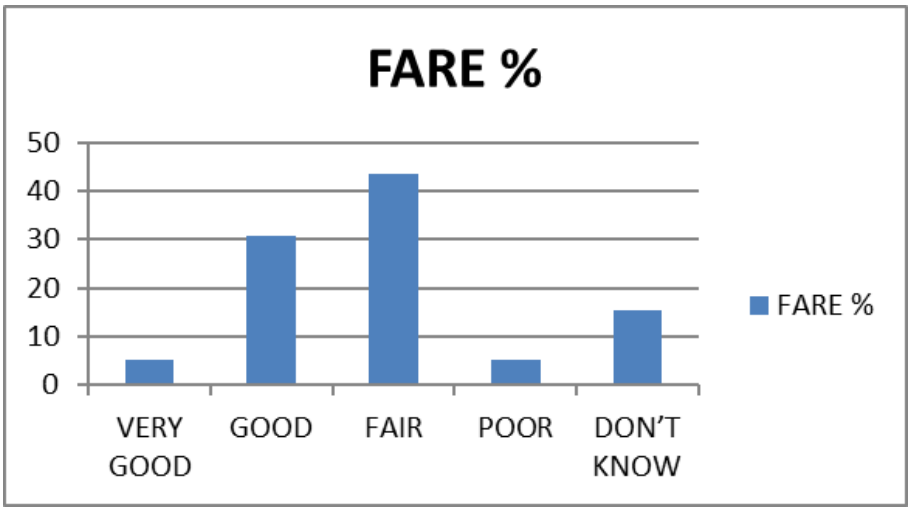


Table2: BMTC BUS SCHEDULE

Volume 15, Issue-2
October, 2025, P77
ISSN: 2319-9253

ITEM/RATING	SCHEDULE RELIABILITY	SCHEDULE RELIABILITY%
VERY GOOD	1	3
GOOD	29	74
FAIR	5	13
POOR	4	10
DON'T KNOW	0	0
Total	39	100

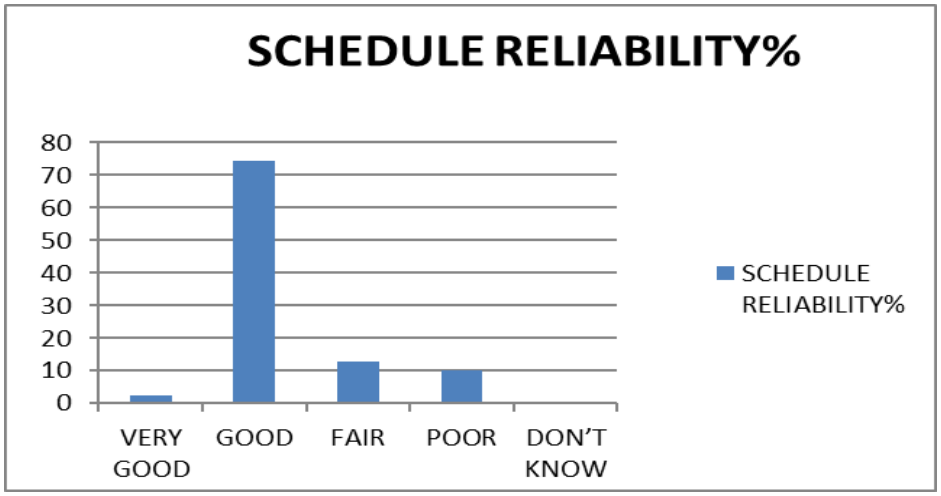


FIGURE 6: BAR CHART OF BMTC BUS SCHEDULE

TABLE 3: BMTC BUS SERVICE FREQUENCY

ITEM/RATING	SERVICE FREQUENCY	SERVICE FREQUENCY%
VERY GOOD	2	5
GOOD	27	69
FAIR	7	18
POOR	2	5
DON'T KNOW	1	3
Total	39	100

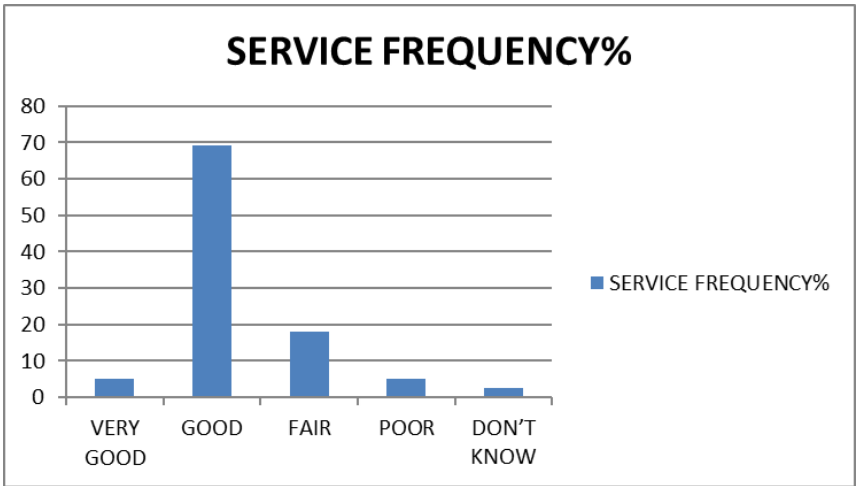


FIGURE 7: BMTC BUS SERVICE FREQUENCY

TABLE 4:BMTC BUS ROUTING

DOI: https://doi.org/10.5281/zenodo.17286850

Volume 15, Issue-2
October, 2025, P77
ISSN: 2319-9253

ITEM/RATING	BUS ROUTINGS	BUS ROUTINGS%
VERY GOOD		0
GOOD	9	23.07692308
FAIR	8	20.51282051
POOR	22	56.41025641
DON'T KNOW		0
Total	39	100

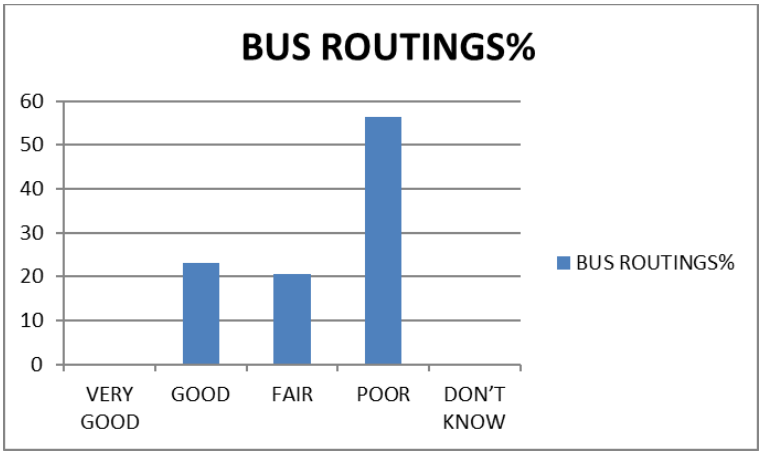


FIGURE 8: BAR CHART OF BMTC BUS ROUTING

ITEM/RATING	CONDITION OF BUS ROUTE	CONDITION OF BUS ROUTE %
VERY GOOD		0
GOOD	8	20
FAIR	7	18
POOR	24	62
DON'T KNOW		0
Total	39	100

TABLE 5: BMTC BUS ROUTE CONDITIONS

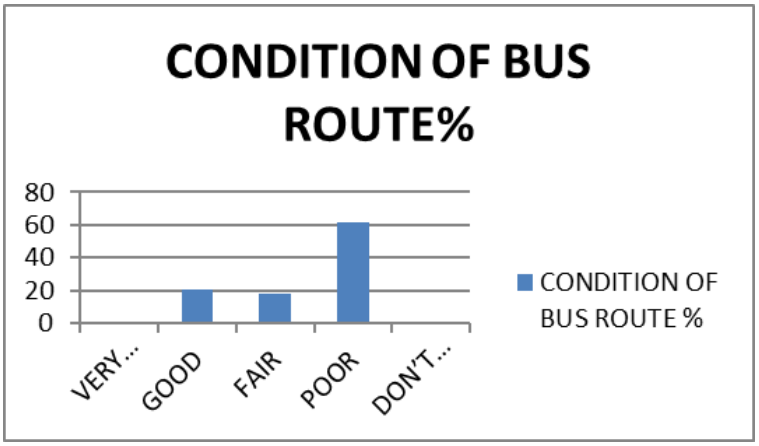


FIGURE 9: BAR CHART OF BMTC BUS ROUTE CONDITIONS

4. DISCUSSIONS & CONCLUSIONS

As it has been discussed in depth the O-D Study on public transport, maximization ofmobility in urban areas

Volume 15, Issue-2
October, 2025, P77
ISSN: 2319-9253

heavily relies on the capacity of the existing public transport. Inlight of this fact, it can be said that the ability of the public transport system as it exists now, to meet this goal of maximizing urban mobility is very limited.

While compiling or data analysis for the set of questions geared toward assessing the travel behavior of the subjects of the study there were only two broader purposes of travel namely, “Work” and “Education” have been seen. This shows that the predominant purposes of travel are work/ Education based. So there should be dense concentration of BUSES and BUS ROUTES than the existing one.

Since the LEVEL OF SERVICE of the BUSES and BUS ROUTES is in critical condition. And problems seem to emanate from undeteriorated pavement condition, the lack of properly paved pedestrian walkways, the ever-increasing distance between work places and residence areas, the illegal use of sidewalks for business transaction.Therefore, it is firmly believed that step by step improvement plans like improving the pavement condition, new road links must be devised to mitigate design and implementation problems of the road network

REFERENCES

1. Highway Engineering – S.K.Khanna&C.E.G.Justo, Nemchand& Bros., 7th edition (2000).
2. Traffic Engineering and Transportation Planning by L.R.Kadiyali and Lal- Khanna Publications 9th edition
3. Transportation Engineering, R Srinivas Kumar, Universities Press, 2020
4. Highway Engineering – Dr.S.K.Sharma, S.Chand Publishers 2014 edition
5. Official website BMTC- https://mybmtc.karnataka.gov.in/