

**ASSESSING TRAVEL DEMAND AND PROPOSING ROUTE FOR PUBLIC
TRANSPORTATION- A CASE STUDY OF NAVSARI CITY**Nikunj D. Patel¹, Prof. Nikhil G. Raval²¹M.E Student, Civil Engineering Department, Government Engineering College, Modasa²Associate Professor, Civil Engineering Department, Government Engineering College, Modasa

Abstract - Urban population increases at higher rate every year in the India. The same scenario is also observed at Navsari city of Gujarat State. As per urban planning policy of Gujarat, infrastructure facilities are being developed but transportation facilities are not provided till date. The present study has focused to determine travel demand for the various zones of Navsari city. Travel demand is the important factor for the planning city bus and it is also helpful to suggest route for Public Transport system. The present study is an attempt to develop Origin - Destination matrix and study travel pattern across the city based on the home interview survey. Travel demand is analysed to propose appropriate bus route along the region of higher demand. The present study will be helpful to the local authority in fulfilling the travel demand in present and in future.

Key Words - Travel Demand, Travel route

I. INTRODUCTION

Transportation demand in urban area continues to increase rapidly because of both population growth and changes in travel patterns. Growing vehicle ownership and personalized vehicle use had change the travel behavior in urban areas of developing countries. This change in travel behavior is in the change in number of trips, trips length, purpose wise trips and mode choice. The travel behavior means movement of peoples from one place to other place for them purpose by choosing any travel mode. In any transportation planning process, it is very important for urban planner or transport planner to have statistic of travel pattern of city. The travel pattern of the city depends upon no. of household, family size, personalized vehicles, and majority on land use mix.

II. OBJECTIVE OF STUDY

Following are the objective of the present Study:

- 1) To determine the travel demand in the study area
- 2) To develop Origin-Destination (O-D) matrix for the study area
- 3) To suggest appropriate public transport route to fulfil the O-D demand.

III. METHODOLOGY

Origin and Destination Survey (O & D Survey) is carried out mainly to know the origin and destination of various vehicles. Followings are the methods of O and D study:

- 1) Roadside interview method
- 2) Home interview survey method
- 3) Registration plate method
- 4) Tag and disc method
- 5) Return post card method.

In the present study, Home interview survey is adopted for data collection.

3.1. Home interview survey

A random household sample of the population is selected. The residences are visited to collect the travel data from each member of the house hold. The data collected may be useful either for proposing route for public transportation and other roadway facilities for the vehicular traffic for planning the mass transportation requirements of the passengers. The problem of stopping vehicles and consequent difficulties are avoided altogether. The present travel needs are clearly known and the analysis is carried out. Additional data including socio-economic and other details may be collected so as to be useful for forecasting traffic and transportation growth. But to have complete coverage of the entire cross section of the population is very tedious.

IV. DATA COLLECTION AND ANALYSIS

4.1 Data collection

The study includes the data collection from primary sources and secondary sources. The primary data have been collected by home interview survey while secondary data have been collected by the available sources like census of India, Navsari Nagarpalika etc. The map of Navsari city is given in Figure 1.

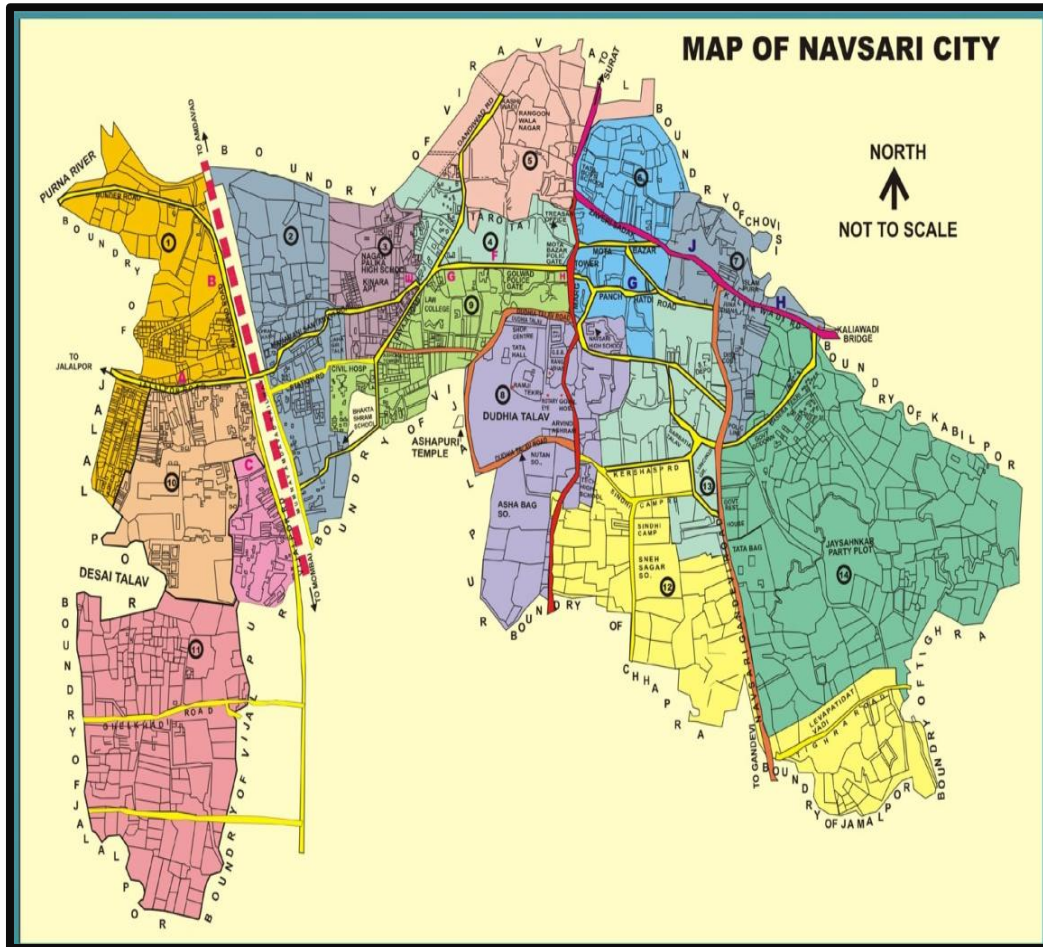
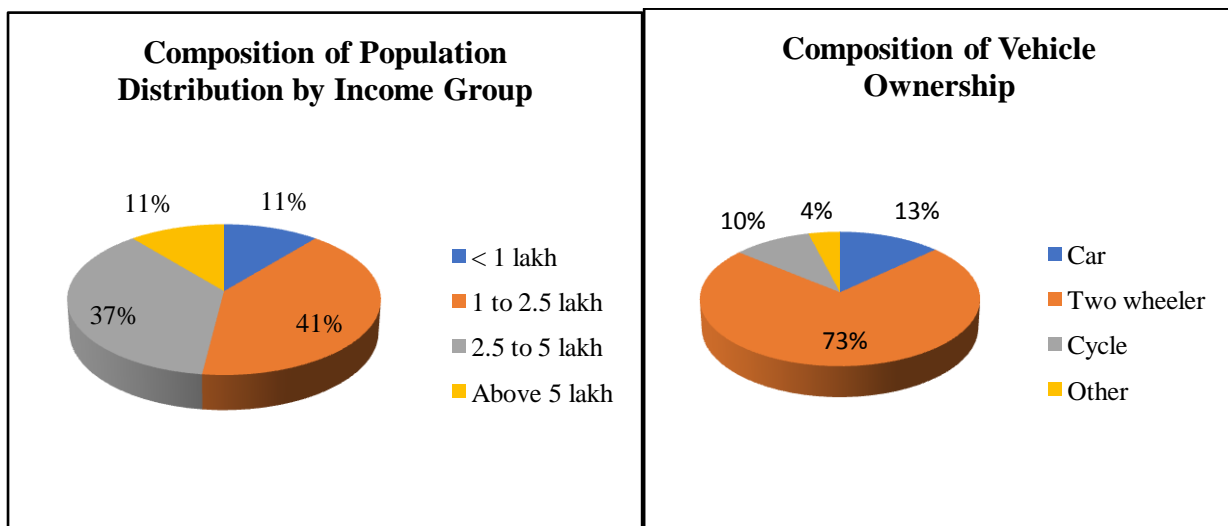
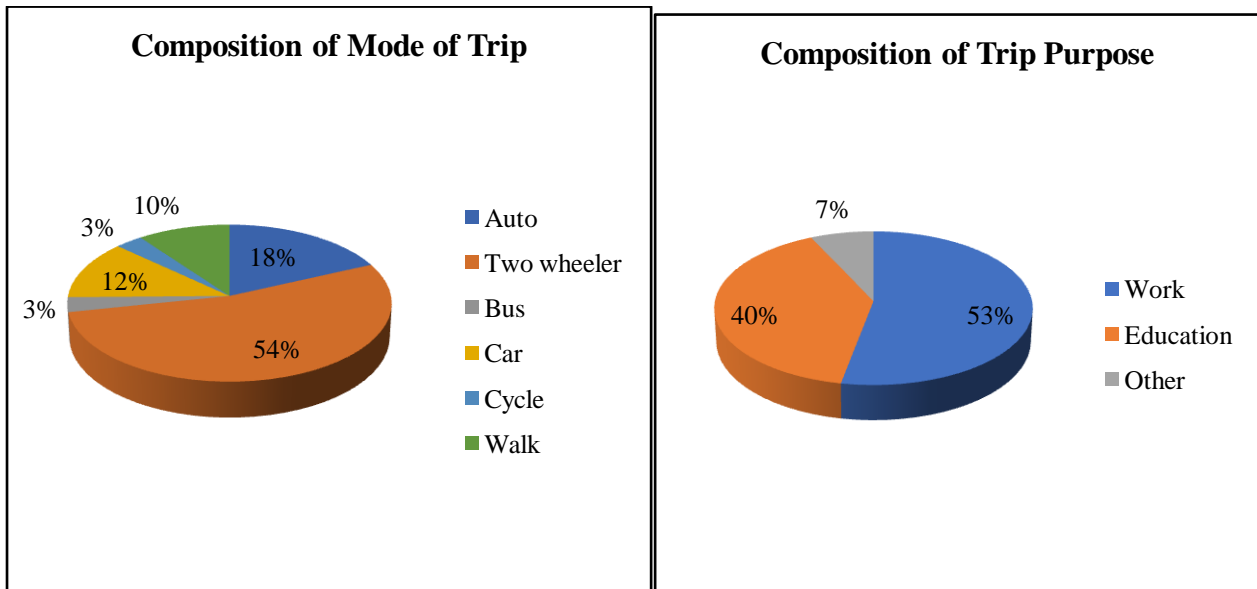


Figure 1. Navsari City Ward wise map

4.2 Data Analysis

After data collection, from interview survey, the socio-economic characteristics as well as trip characteristics have been identified.





4.3 Trip Analysis

The O-D matrix is prepared from home interview survey. In survey, questions were asked about their trip origin and trip destination so the trips which were within the zones were calculated. From the data analysis, the following observed trip matrix is generated and by applying multiplication of matrix with total trip and the expanded O-D matrix has been generated which has been shown in Table 1.

Table 1: Observed O-D Matrix

O\D	1	2	3	4	5	6	7	8	9	10	11	12	Total
1	104	25	13	21	11	11	16	16	21	14	62	10	768
2	19	56	32	51	25	42	32	42	39	37	27	42	629
3	14	35	9	24	5	21	10	19	14	9	16	9	500
4	20	45	18	27	14	22	22	15	28	33	36	35	492
5	12	30	5	21	6	23	18	14	15	9	15	9	482
6	11	46	16	22	17	24	30	31	26	33	25	24	597
7	16	36	6	22	15	42	23	34	22	24	30	22	637
8	18	46	14	15	13	25	29	24	39	42	38	42	693
9	25	40	12	24	12	26	26	33	23	38	45	44	735
10	12	42	10	26	8	30	21	43	55	54	52	34	775
11	69	22	17	32	11	19	24	36	48	60	19	31	836
12	12	61	10	42	11	32	38	49	71	38	52	32	4406
Total	332	484	162	327	148	317	289	356	401	391	417	334	11550

Table 2: Expanded O - D Matrix

O\D	1	2	3	4	5	6	7	8	9	10	11	12	Total
1	4940	1188	618	998	523	523	760	760	998	665	2945	475	15390
2	903	2660	1520	2423	1188	1995	1520	1995	1853	1758	1283	1995	21091
3	665	1663	428	1235	238	1045	475	903	665	475	855	475	9120
4	950	2138	855	1283	665	1045	1045	713	1330	1568	1710	1663	14963
5	570	1425	238	998	285	1093	855	665	713	428	713	428	8408
6	523	2185	760	1045	808	1140	1425	1473	1235	1568	1188	1140	14488
7	760	1710	285	1045	713	1995	1093	1615	1045	1140	1425	1045	13870
8	855	2185	665	713	618	1188	1378	1140	1853	1995	1805	1995	16388
9	1188	1900	570	1140	570	1235	1235	1568	1093	1805	2138	2090	16530
10	570	1995	475	1235	380	1425	998	2043	2613	2565	2470	1615	18383
11	3278	1045	808	1520	523	903	1140	1710	2280	2850	903	1473	18430
12	570	2898	475	1995	523	1520	1805	2328	3373	1805	2470	1520	21280
Total	15770	22990	7695	15628	7030	15105	13728	16910	19048	18620	19903	15913	188342

4.4 Validation of O-D matrix using screen line analysis

Screen line survey refers to volume count conducted at different locations in the study area at crossings along natural barriers like river, canals and railway lines. The main purpose of this survey is validation of model developed.

Based on home interview survey, trip assignments are made which would give the volume of traffic on different routes, from which the trip going across the screen lines can be determined. This is cross checked with data on counts made at the screen line locations. A screen line survey identifies major traffic movements between two areas divided by a screen line. The results of the trip assignment are compared with the traffic counts on roads in the screen line analysis. Screen line analysis was conducted to compare the directional sum of ground count traffic volume with the directional sum assigned traffic volume. Observed value at screen line location is nearly 90% of the assigned trip volume. It is inferred that assigned trip is validated.

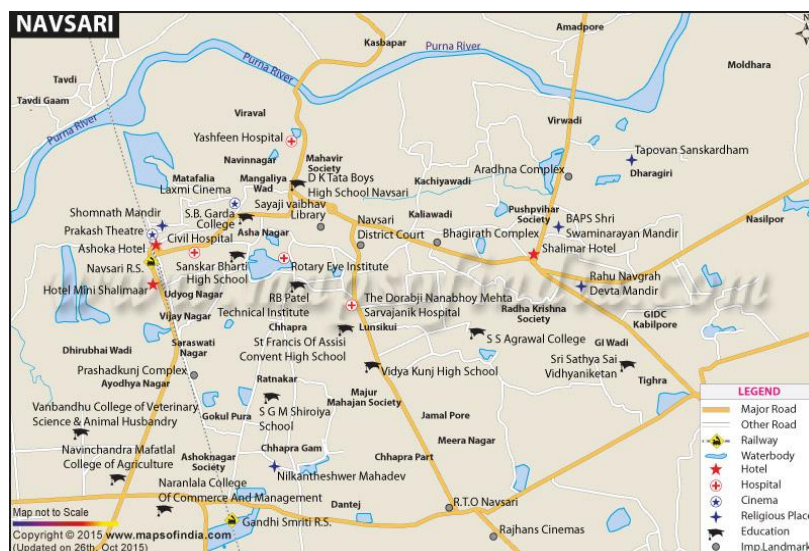


Figure 2. Screen line Survey location

The ward wise map is shown in Figure 3.

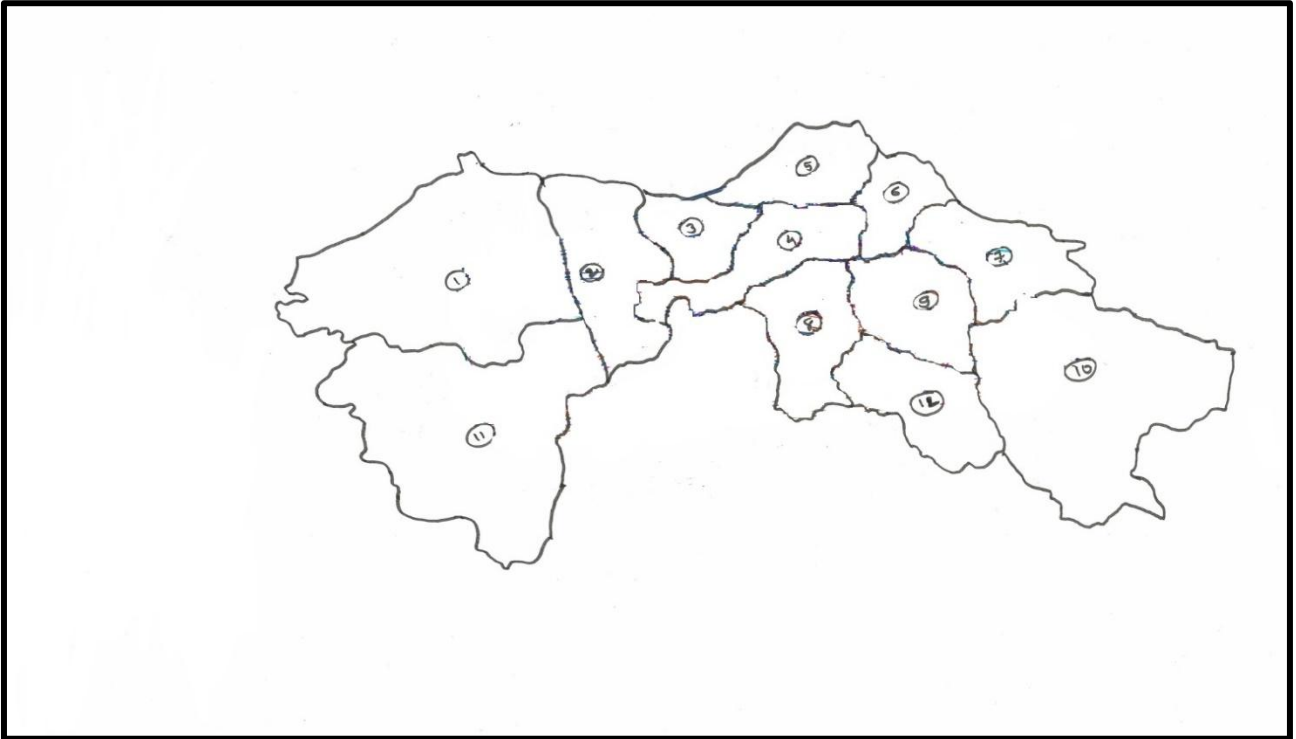


Figure 3. Ward wise map

4.5 Desire Line Diagram

The desire line diagram shows the no of trip moving from one zone to another, by the line shown in the diagram we can identify the travel demand, the more the thicker line the more will be trip in that respective zones.

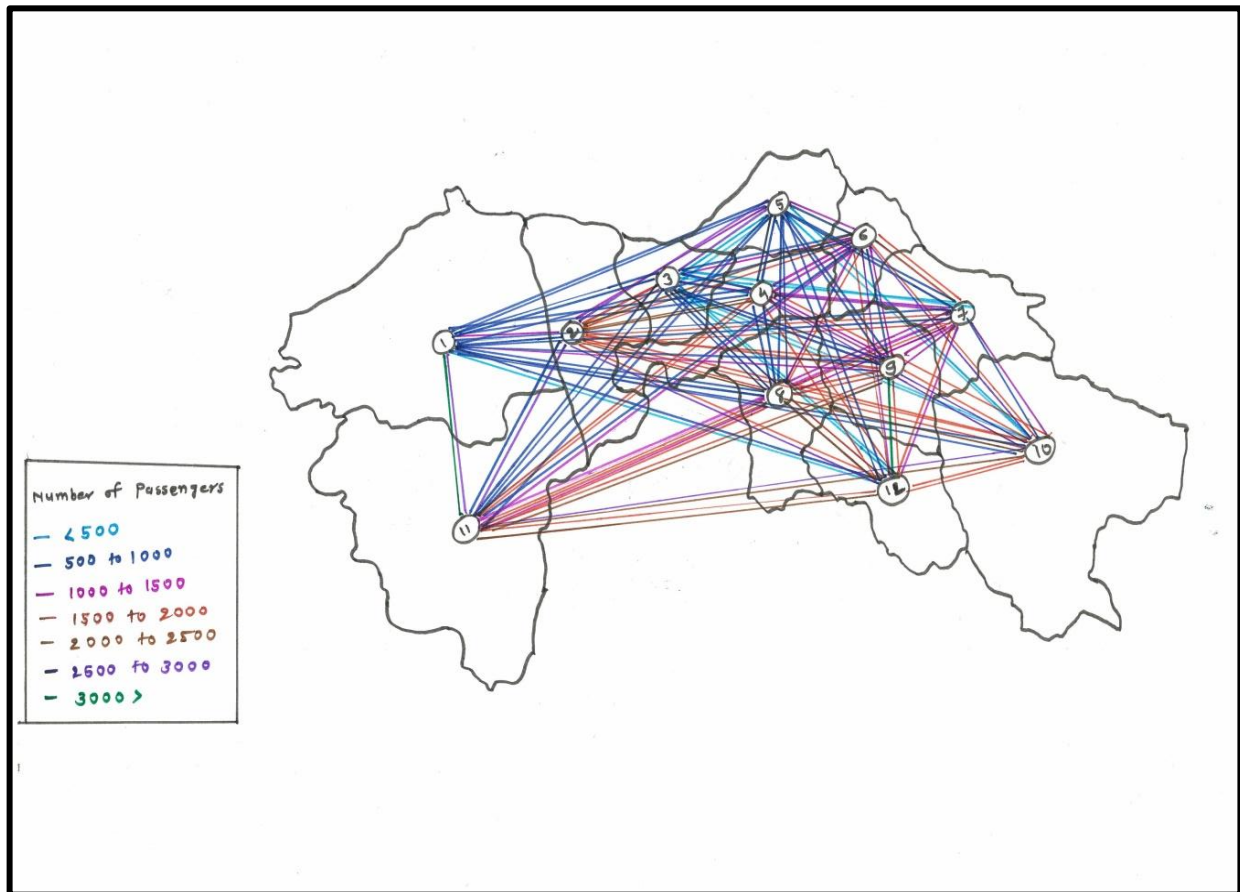


Figure 4. Desire line diagram

4.6 Proposed Route

Routes are suggested using kruskal's algorithm to accomplish the maximum demand and to cover maximum traffic of passenger. Finalized route for the public transportation shown in below:

Route 1 is 1-2-3-4-8-9-12-10

Route 2 is 1-11-2-3-4-5-6-7

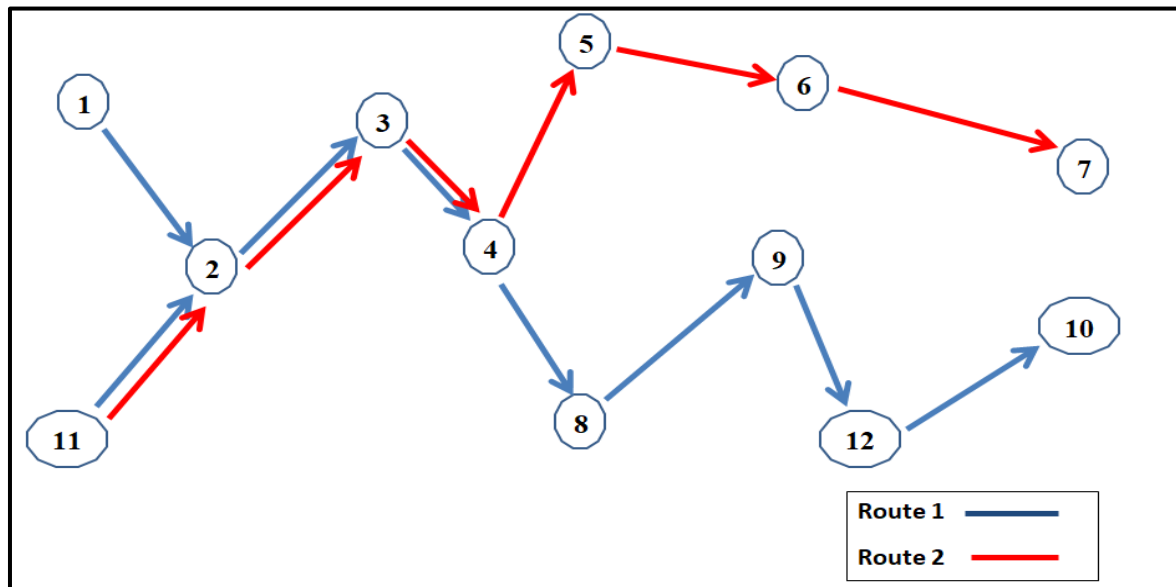


Figure 5. Proposed routes for Navsari city

V. SUMMARY AND CONCLUSION

Assessing travel demand is the one of the important phase of transportation planning. Travel demand has been generated by considering various parameters based on the existing condition of area. Among various methods home interview survey of origin and destination survey has been selected for assessing travel demand. By home interview survey the household information and trip information have been collected. This research concludes that there is a deficiency of transit system in the study area and there is inefficient transportation system. Travel demand is found out increased in both commercial and educational purpose by the home interview survey. For this assigned value validated by using Screen Line Survey. This is cross checked with data on counts made at the screen line locations. Observed screen line value is nearly 90% of the assigned trip volume, validating the assigned trip. Public transportation route is suggested for the Study area with the help of Kruskal's algorithm.

V. REFERENCES

- [1] 4th International Symposium of Transport Simulation-ISTS'14, 1-4 June 2014, Corsica, France.
- [2] 9th International Conference Interdisciplinary in Engineering, INTER-ENG 2015, 8-9 October 2015, Tirgu-Mures, Romania.
- [3] 41st European Transport Conference 2013, ETC 2013, 30 September – 2 October 2013, Frankfurt, Germany
- [4] Department of Science and Technology, Linköping University, 601 74 Norrköping, Sweden.
- [5] Mashayekhi, Ali N., 2003, System Dynamics and Product-Market Matrix for Strategic Planning, Proceedings of the 21st International System Dynamics Conference.
- [6] School of Traffic and Transportation, Lanzhou Jiaotong University, Lanzhou 730070, China, Graduate School for International Development and Cooperation, Hiroshima University, Japan, 739-8529
- [7] Sources : U.S.Census Bureau, 1960-2000 population. MACORTS 2030 Long Range Transportation Plan, 2010-2030population.
- [8] Tehran Comprehensive Transportation and Traffic Studies Company (TCTTS), Metropolitan Tehran Transportation and Traffic Information at a glance, 2004.