



EVALUATION OF EXISTING BUS SERVICE OF GSRTC FOR LUNAWADA DEPOT

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ABSTRACT: Transportation plays an important role in the economic, cultural, and social development of any nation. At regional level mass transportation systems are generally provided by private or Government sector. In Gujarat state, Bus transportation is provided by Gujarat state road transport corporation (GSRTC). GSRTC have ST bus depot on each taluka head quarter. The depot manager fixes the route and schedules of buses to connect the all possible villages. However, Due to rapid growth in population and overall development, demand for travel increases in fast pace. This may not satisfied by existing bus fleet available with depot. Proposed study is aimed to evaluate the existing bus services of GSRTC in Lunawada taluka which is district head quarter Mahisagar District in Gujarat state. Most of the villages are connected by ST bus services, some of the villages may having less frequency of buses of the existing demand. Here study is made to less connected or not connected villages on basis of performance of route and schedule is evaluated.

Keywords: Evaluation, Decision support system, vehicle size, vehicle seating frequency, time, and travel purpose

I. Introduction

Transport is a main component of supply chain competitiveness since it acting a major role in bound inters ability and out-bound ability. In a most of countries transit services are provided by private or government sectors. In these transit sectors provide services to passengers within town or any other place where they can by different modes such as train, bus, car, etc. The main purpose for the survival of a transit system is to move carefully. Bus transport is the most desirable and sustainable system from societal perspective. A well planned bus system can provide a high level of mobility to a large section of the population with least cost. A flexible, easily available and consistent bus service may encourage shift from personal vehicles to public transport. Since travel demand varies over time and space, public transfer systems often have under-utilized capacity at non-peak hours and high load factor in peak hours. Transportation is a non-separable part of any society. It exhibits a very close relation to the style of life, the range and location of activities and the goods and services which will be available for consumption. Advances in transportation has made possible changes in the way of living and the way in which societies are organized and therefore have a great influence in the development of civilizations.

1.1. Problem statement

More than seven to eight thousand passengers are travelling daily form Lunawada bus station to reach their destination. In absence of an efficient bus system in the villages, people switch to other mode of travel like three wheeler, auto-rickshaws, jeep, and chhakdo-rickshaws on various routes by compromising their safety. Most of the GSRTC (Gujarat State Road Transport Corporation) routes are making loss due to several reasons such as insufficient frequency and schedule, in proper management of the bus fleet lack of enforcement among others. To understand the actual problems of existing bus transit routes and to suggest the possible improvement steps the detailed study is necessary, considering this, the present study is focused on the evaluation of existing bus services of GSRTC in Lunawada taluka depot.

1.2. Aim of study

The main aim of the study is to evaluate existing bus services and improvement strategy to enhance the existing GSRTC bus transit system at Lunawada depot.

1.3. Objectives

The main objective of the study is to determine the improvement measures for the existing transport service of S.T.

depots Lunawada using manual analysis technique. Following are the specific objectives.

- To assess the existing bus routes and schedule.
- To determine the existing travel demand on bus routes of Lunawada taluka.
- To suggest profitable bus schedule from Lunawada depot.

1.4. Scope

- This study is limited to the GSRTC bus routes of Lunawada depot.
- This study will give the in depth analysis of the problems in existing bus routes of Lunawada depot.
- Recommendation of this study can improve the GSRTC bus operation in Lunawada depot.

II Review Of Literature

Wren (1972) developed a computer program which takes the list of bus trips to which vehicles are to be allocated as input and produce a schedule covering these trips. At intermediate stages of the solution process infeasible schedules are produced using fewer vehicles than would be necessary for a feasible schedule. These schedules can be revised by the management by incorporating any revisions desired. The method is heuristic, the objectives being first to minimize vehicles, and second, to minimize empty mileage. The solution is optimal, or near optimal and successful applications was described.

Cedar and Wilson (1986) described the bus network design problem, summarized the different approaches that had been proposed for its solution and proposed a new approach incorporating some of the positive aspects of prior work. The proposed approach is intended to be easier to implement and less demanding in terms of both data requirements and analytical sophistication than previous methods. An algorithm is presented that can be used to design new bus routes taking into account both passenger and operator interests; however, this algorithm focuses on only a single component of the overall bus operations planning process.

Park and Song (1997) discussed the vehicle scheduling problems with time-varying speeds in which the travel speed between two locations depends on the passing areas and time of day. They developed three heuristics by extending and modifying conventional vehicle scheduling problems

Imam (1998) developed an analytical model to optimize bus service with demand characteristics. The bus service design options include route spacing and headway with and without vehicle capacity constraints. Optimal levels of these variables are obtained analytically for the objective function of profit maximization.

Lin et al. (2008) developed and demonstrated a quality control framework for bus schedule reliability. Automatic vehicle location (AVL) devices provide necessary data; DEA yields a valid summary measure from partial reliability indicators; and panel data analysis provides statistical confidence boundaries for each route-direction's DEA scores. If the most recent DEA score of a route direction is below its lower boundary, it is identified as in need of immediate attention.

III. Methodology

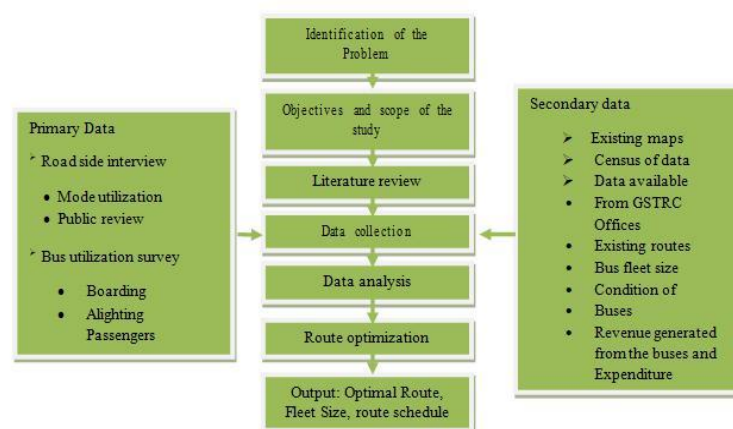


Figure1. Flow Chart of Methodology

3.1. Road-side Interview Survey

This survey helps to know time wise O-D demand on the stops of bus routes. During interview of the users, their opinion and requirements regarding existing bus service can be collected. This information helps to decide how to improve bus facilities, timings and routes for the Lunawada depot.

IV. Study Area

Lunawada exists in Mahisagar district, and total area of Lunawada town is 2557 sq. km. total population of Lunawada is 229,798 as per census 2011. Living in 44,411 houses, spread across total 637 villages and 101 Panchayat. Males are 118,876 and females are 110,922. Total 33,369 people's lives in town and 196,429 live in rural. Lunawada is located in north corner of Gujarat. 113 KM from state capital Gandhinagar towards west, 132 KM from the Ahmedabad, 122 KM from Baroda, 101 KM from Dohod, and 40KM from Godhra. Lunawada taluka is bounded by Virpur taluka towards west, Shehera taluka towards south, Khanpur taluka towards north, Balashinor taluka towards west. The town is center for social, commercial, residential, cultural, political and economic activities of Lunawada taluka

V. Data Collection and Analysis

5.1. Boundary of Taluka

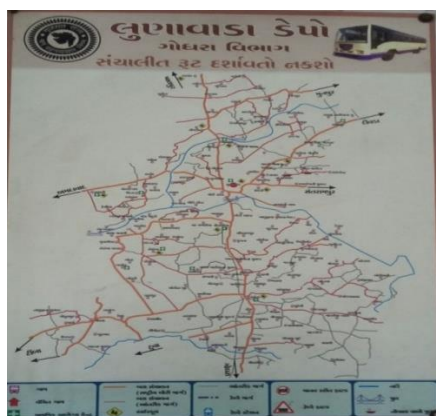


Figure 2. GSRTC buses Lunawada road map

5.2. Analysis of passenger profile

Objective: This survey is purely a part of knowing the problems faced by the passengers in G.S.R.T.C. of their selected bus depot. The response data given by you in this questionnaire will be kept confidential and used only for educational purposes.

1 Age

Age	Below 18	Between 18 to 35	Above 35	Total
Respondents	90	203	7	300
Percentage	30%	67.6%	2.33%	100%

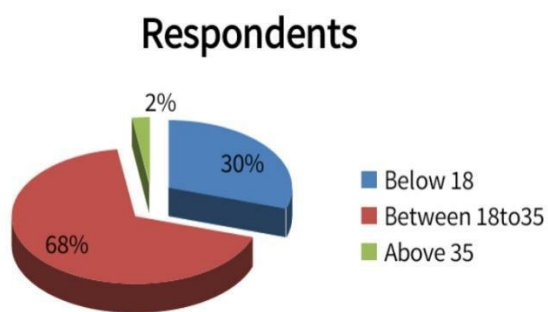


Figure 3. Age of the passengers who travel in Lunawada depot

2 Occupation

Occupation	Student	Service	Other	Total
Respondents	145	70	85	300
Percentage	48.33%	23.33%	28.33%	100%

Respondents

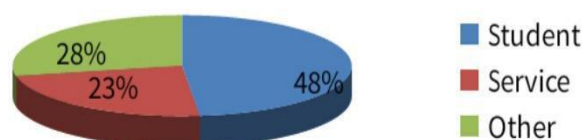


Figure 4. Employment status that travel in Lunawada depot

3 If you travel by G.S.R.T.C then how often do you use this public transport

Use G.S.R.T.C Service	Daily	Weekly	Sometimes	Total
Respondents	150	20	130	300
percentage	50%	6.67%	43.33%	100%

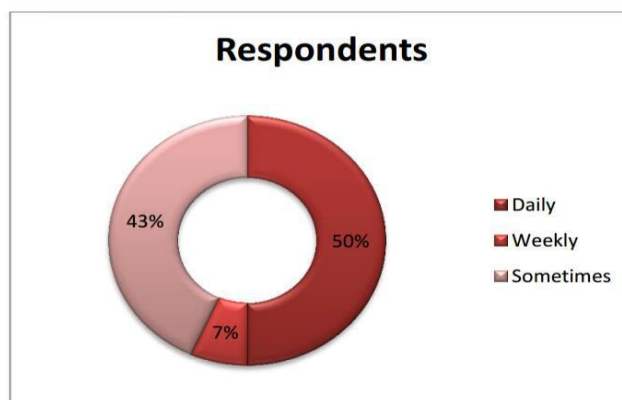


Figure 5. Preference of the Passengers

4 What makes you travel in G.S.R.T.C

Makes you travel	Frequen cy of buses	Time of buses	Cheaper for than others	No other option available	Total
Respondents	23	52	150	75	300
Percentage	7.67%	17.33%	50%	25%	100%

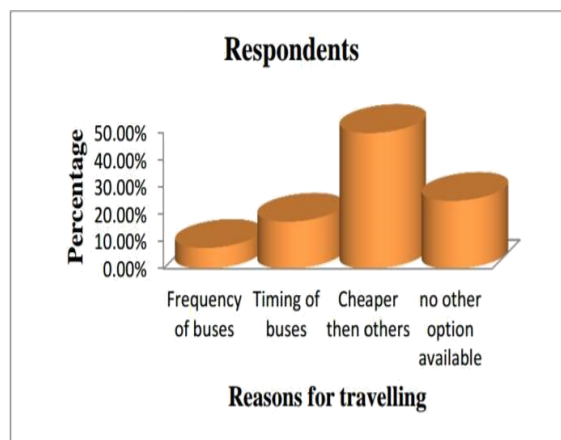


Figure 6. Reasons to prefer travelling in Lunawada depot by passengers

5 There is insufficient capacity in the bus

Insufficient capacity	Strongly agree	agree	disagree	Strongly disagree	Total
Respondents	63	192	38	7	300
Percentage	21%	64%	12.67%	2.33%	100%

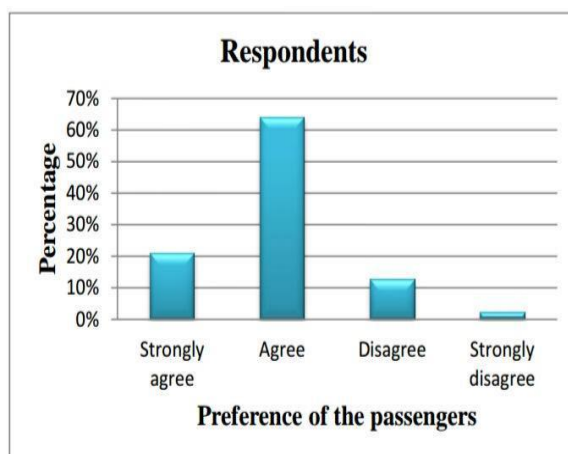


Figure 7. Preference of the passengers in Lunawada depot

5.3. Load Factor

In this study, we highlight the importance of the vehicle load through the study of the load factor and the empty running rate. For each rout factor, we present and analyses, available statistics and data from passenger travel in peak period of Lunawada depot and resulting the variation of the factor with various parameters (e.g. vehicle size, vehicle seating frequency, time, and travel purpose).

Seating Capacity:

Express Bus: 56
 Local Bus : 52
 Mini Bus : 32
 (E) Express bus, (L) Local bus, (M) Mini bus

1 Lunawada to Godhra route

Table1. Lunawada to Godhra route peak period Load factor

Time	No. of buses			Total seated pass. capacity	Actually seated pass.	Actually standing pass.	Total observation pass.	Average load factor of buses	Excess demand of bus no.
	Ex.	Lo.	Min.						
8-9	1	1	4	240	240	73	313	1.30	1L+1M
9-10	3	4	2	456	456	105	561	1.24	2L
10-11	1	1	-	112	112	27	139	1.24	1M
11-12	3	3	4	464	464	90	554	1.20	1L+1M
1-2	4	3	1	424	424	41	465	1.10	1L
2-3	1	2	2	232	232	49	281	1.20	1L
4-5	1	-	3	152	152	66	218	1.44	1L+1M
5-6	-	1	2	120	120	45	165	1.35	1E+2L

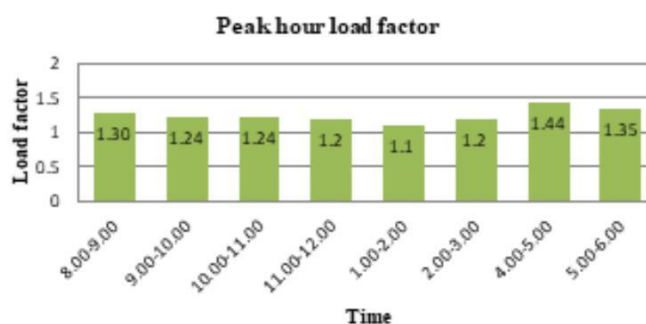


Figure 8. Lunawada to Godhra route peak Hour load factor

2 Lunawada to Ahmadabad route

Table2. Lunawada to Ahmadabad route peak period load factor

Time	No. of buses			Total seated pass. capacity	Actually seated pass.	Actually standing pass.	Total observation pass.	Average load factor of buses	Excess demand of bus no.
	Ex.	Lo.	Min.						
8-9	3	-	-	168	168	41	209	1.25	1L
9-10	-	1	-	56	56	16	72	1.21	1M
10-11	2	-	-	112	112	37	149	1.31	1L
11-12	1	1	-	112	112	34	146	1.3	1L
1-2	2	-	-	112	112	25	137	1.22	1M
2-3	2	2	-	224	224	38	262	1.16	1L
4-5	1	-	-	56	56	23	79	1.41	1M
5-6	1	-	-	56	56	22	78	1.39	1M

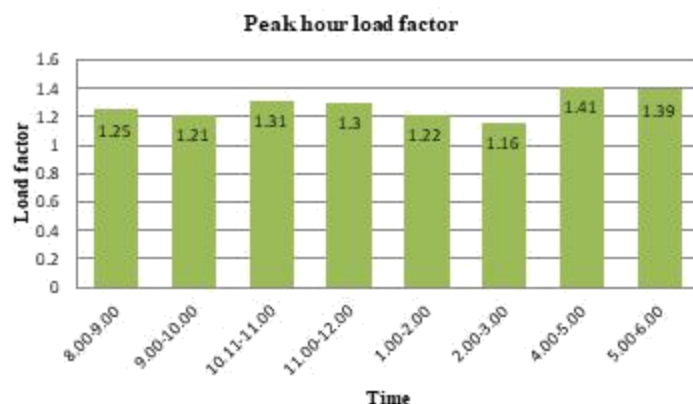


Figure9. Lunawada to Ahmadabad route peak hour load factor

3 Lunawada to Modasa route

Table3. Lunawada to Modasa route peak period load factor

Time	No. of buses			Total seated pass. capacity	Actually seated pass.	Actually standing pass.	Total observation pass.	Average load factor of buses	Excess demand of bus no.
	Ex.	Lo.	Min.						
8-9	1	8	-	504	504	15	519	1.02	1M
9-10	-	2	-	112	112	43	155	1.38	1L
10-11	-	3	2	232	232	74	306	1.31	1L
11-12	2	5	-	392	392	27	419	1.24	1M
1-2	-	5	1	312	312	82	394	1.25	1L+1M
2-3	-	3	1	200	200	56	256	1.30	1L
4-5	-	4	-	224	224	81	305	1.35	1L+1M
5-6	-	4	1	256	256	23	279	1.01	1M

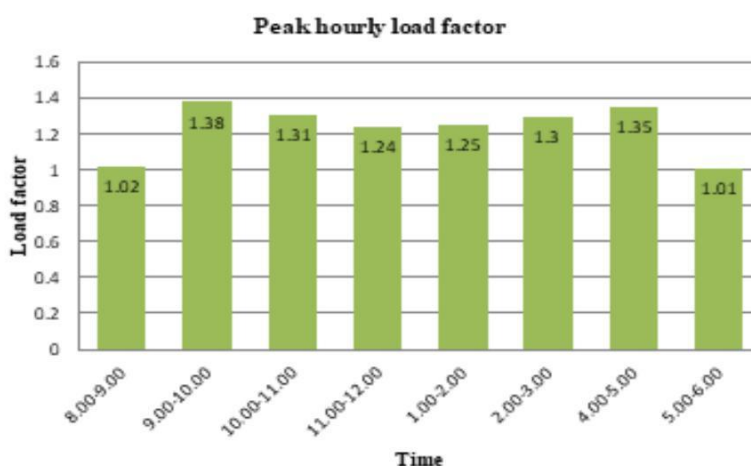


Figure 10. Lunawada to Modasa route peak hour load factor

4 Lunawada to Dahod route

Table 4. Lunawada to Dahod route peak hour load factor

Time	No. of buses			Total seated pass. capacity	Actually seated pass.	Actually standing pass.	Total observation pass.	Average load factor of buses	Excess demand of bus no.
	Ex.	Lo.	Min.						
8-9	2	2	-	224	224	5	229	1.16	1M
9-10	-	3	-	168	168	33	201	1.19	1M
10-11	-	1	2	120	120	49	169	1.40	1L
11-12	3	4	-	392	392	105	497	1.25	1E+1L
1-2	4	2	1	368	368	103	471	1.27	1E+1M
2-3	2	-	-	112	112	45	157	1.39	1L
4-5	3	1	-	224	224	73	297	1.32	1L+1M
5-6	4	-	1	256	256	80	336	1.27	1L+1M

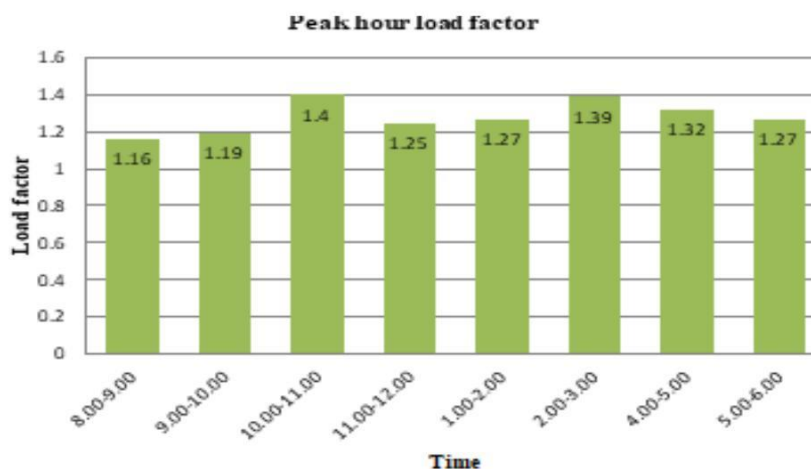


Figure11. Lunawada to Dahod route peak hour load factor

Four route Maximum and Minimum Load factor shown figure Lunawada to Godhra(1.44,1.20), Lunawada to Ahmadabad(1.41,1.21), Lunawada to Modasa(1.38,1.01), Lunawada to Dahod(1.40,1.16).

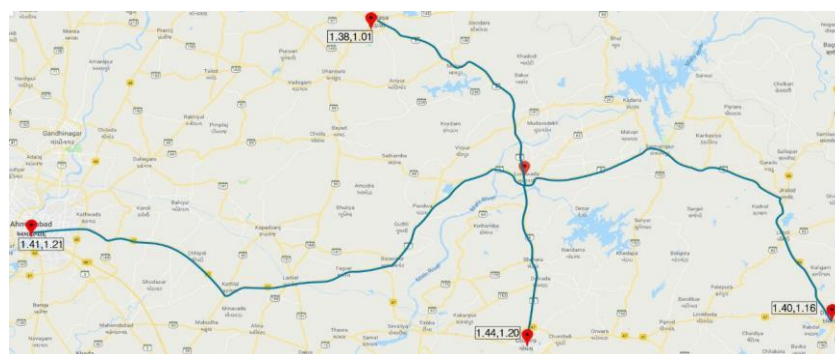


Figure 12. Major city connected route max. & min. load factor

5 No. of buses required for each route

Table 5. No. of buses required for each route

Sr no.	Route name	No. of buses required
1	Lunawada to Godhra	14
2	Lunawada to Ahmedabad	8
3	Lunawada to Modasa	10
4	Lunawada to Dahod	12
Total No. buses required		44

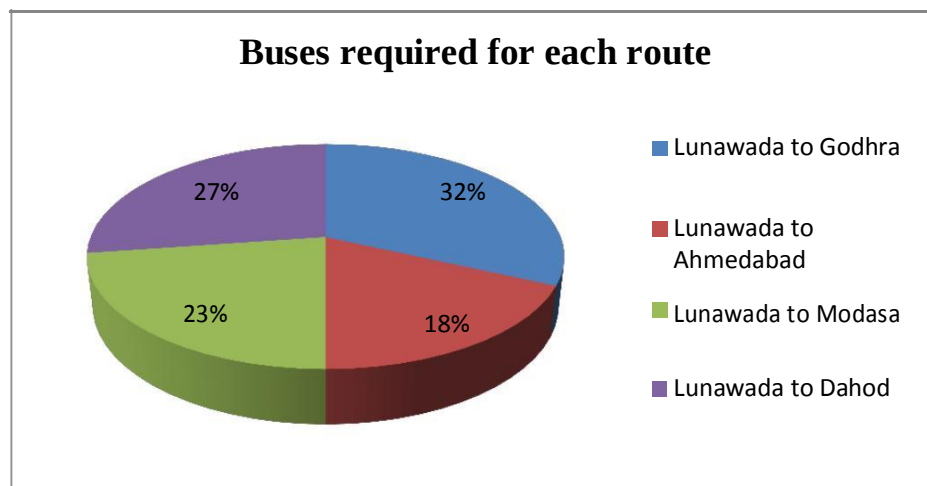


Figure13.Buses required for each route

IV. Conclusion

- As per questionnaire survey interpretation of passengers profile the age of below 18 are 30%, between 18 to 35 are 67.6%, above 35 are 2.33% passengers are daily travelling in Lunawada bus depot.
- As per questionnaire survey interpretation of passengers profile occupation status of the passengers is student is 48.33%, service is 23.33%, other is 28.33%.
- As per questionnaire survey interpretation of passengers profile use this public transport is daily 50%, weekly 6.67%, sometimes 43.33%.
- As per questionnaire survey interpretation of passengers profile passengers make a travel in G.S.R.T.C is frequency of buses is 7.67%, time of buses is 17.33%, cheaper for than others is 50%, no other option available is 25%.
- As per questionnaire survey interpretation of passengers insufficient capacity in the bus is strongly agree is 21%, agree is 12.67%, disagree is 12.67%, strongly disagree 2.33%.
- As for the boarding and alighting survey for the route no.1 (Lunawada to Godhra) 14 buses are required in peak period, 29% buses required to compare to other three route.
- As for the boarding and alighting survey for the route no.2 (Lunawada to Ahmedabad) 8 buses are required in peak period, 16% buses required to compare to other three route.
- As for the boarding and alighting survey for the route no.3 (Lunawada to Modasa) 10 buses are required in peak period, 20% buses required to compare to other three route.
- As for the boarding and alighting survey for the route no.4 (Lunawada to Dahod) 12 buses are required in peak period, 25% buses required to compare to other three route.
- As for the survey comparison between four route resulting Lunawada to Godhra is bussey route compare to other three route.

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