Study on Auto-rickshaw (Intermediate public transport) mode of UTS: A case study

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Abstract— Auto-rickshaw which are the family of IPT(intermediate public transport), and they are the major mode of urban transportation specially when the city does not have special and facilitate public transport. Auto-rickshaws provide flexible and affordable trips to trip makers. This paper presents a study on auto-rickshaw mode of urban transportation. During the study attempt has been made to find the social and transport characteristics of auto-drivers in Vadodara city. A city of Gujarat which does not have sufficient public transport facility excluding few city buses. Thus auto-rickshaws are the major mode which providesflexible movements to the passengers. As auto-rickshaw is the major mode in the city there are lots of issues related to them. Attempt has been made to overcome these issues.

IndexTerms—Auto-rickshaw, Intermediate PublicTtransport, Urban Transportation System.

I. INTRODUCTION

The IPT nowadays has become an indispensable mode of transportation across the urban Indian cities. Auto-rickshaw, maruti Omni, mini buses, taxis, have become imperative parts of para-transit system. The service flexibility of PTS makes it a vehicle transport system to fill the gap between the organized public transportation systems. IPT generally emerge out as a lifeline support system to serve growing transport needs among Indian cities. lake of infrastructure, insufficient operational controls, insufficient training ,irregular monitoring, etc. does make IPT unsafe but crucial, further lake of regulatory mechanisms with in these   system may cripple working of the cities. therefore, linkage of the public transportation system with a reliable and passenger friendly para-transit will be essential to reduce the traffic congestion travel times and Reliance on the private transport an integrated approach including all the stakeholders is necessary to make a system save this would need a sound understanding of different Transportation system.

II. STUDY AREA

Vadodara is the third largest city in the Indian state of the Gujarat. It is the administrative headquarters of Vadodara District. It is located on the banks of the Vishwamitri River, southeast of Ahmedabad, 139 km from state capital, Gandhi nagar. Both the railway line and national highway connecting Delhi and Mumbai pass through Vadodara. Vadodara has population of 1.6 million with growth rate of 22.2 (as per census- 2011), Vadodara is connected by the road national highway no. 8 with all the major cities of India, and it is 436 km from the Mumbai and 956 km from the Delhi. Population of Vadodara metropolitan area is around 20 lakh as per 2016statistics. Area of the municipal corporation of Vadodara is around 225 square kilometer. Vadodara is having tropical wet and dry climate. Like any average Indian city, there are three main seasons in Vadodara city summer (March to June), monsoon (July to August) and winter (September to February). The summers are hot and the temperature varies between 37C and 44C. The annual average rainfall is about 625 mm and during the southwest monsoon season, relative humidity touches 70%.

Vadodara has a circular urban form and clear ring-radial pattern in road network. It comprises of 1 complete ring and 2 half rings along with 10 radials. Total major road network in the city is approximately 370 kms. The density of road is 10 km/sq.km. Roads cover an area of 33 sq.km, which constitutes 19 % of developed area. More than 80% of the roads are surfaced mostly black topped. Vadodara's main road network comprises of Harni ring road and New VIP ring road. Radials comprises of GSFC to Makarpura(NH8), Ahmedabad Vadodara expressway, Savli road, Godhra road, Ajwa road, Waghodia road, Dabhoi road, Padra road, Gotri road & Alembic road.

III. IPT OPERATORS SURVEY

The aim of this survey is to access the operational characteristics of the IPT (auto-rickshaw), identify problems and issues as well as to suggest appropriate policies and Strategies for additional development of Transportation system.

The main objectives are
- To study the operational and performance characteristics of intermediate public transportation facilities.
- To study the supply and demand characteristics of intermediate public transportation facilities.
- To study the usual characteristics of IPT facilities.
- To suggest measures in order to improve IPT system.

The survey can be conducted at various IPT stands located within the study area, it provides information relating to trip characteristics in terms of origin and destination of trip, purpose of trip, frequency and cost of trips. A separate survey is need to study IPT operational characteristics in terms of route of operation, vehicle utilization, and passenger carried, operating cost and revenue.

IV. AUTO-OPERATOR SURVEY

Auto-operator survey has been carried out to know and to understand their social and operating characteristics. In which interviewing the driver personally and questioning them with questionnaire forms, their views and their socio-economic characteristics as well as operating characteristics were discovered. Total 116 auto drivers have been interviewed and their views have been collected. The below graph shows the result of survey conducted of 116 auto-operators. The survey was carried out at various locations of the city like parking lots, auto-stands where the operators are resting.

A set of questionnaire given to the operators at various location parking lots, auto-stands, during the rides, questionnaire was prepared in two languages one is English and another is a Guajarati which is a local language of Gujarat state. A questionnaire contains two types of questions in it, question one to eight contains questions about their social characteristics like age, living place, education, number of family members, and number of earners in the family. Remaining questions was about that operational and transportation characteristics like age of auto, average daily running in kilometer, average daily waiting time, average daily time spent on auto-riding, average daily fuel consumption, average daily income by writing auto rickshaw. A results of the questionnaire survey for auto-operators is describe below.

Social characteristics

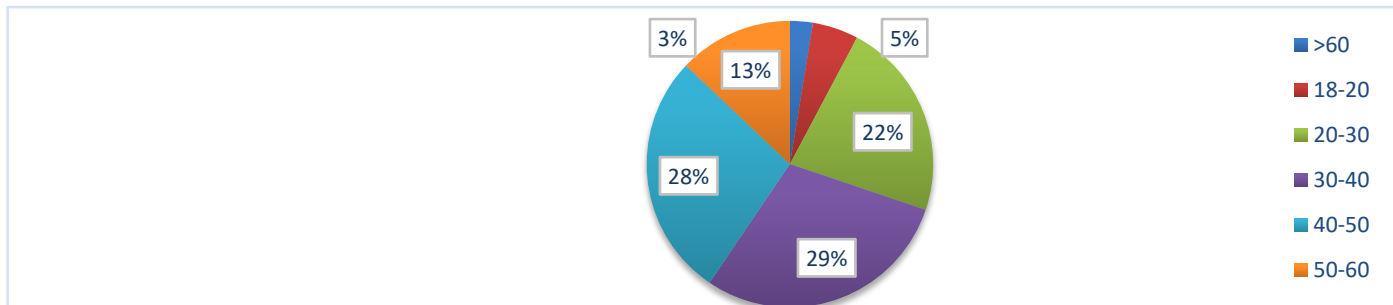1: Age group of drivers

Figure 1:   Age Group of Drivers

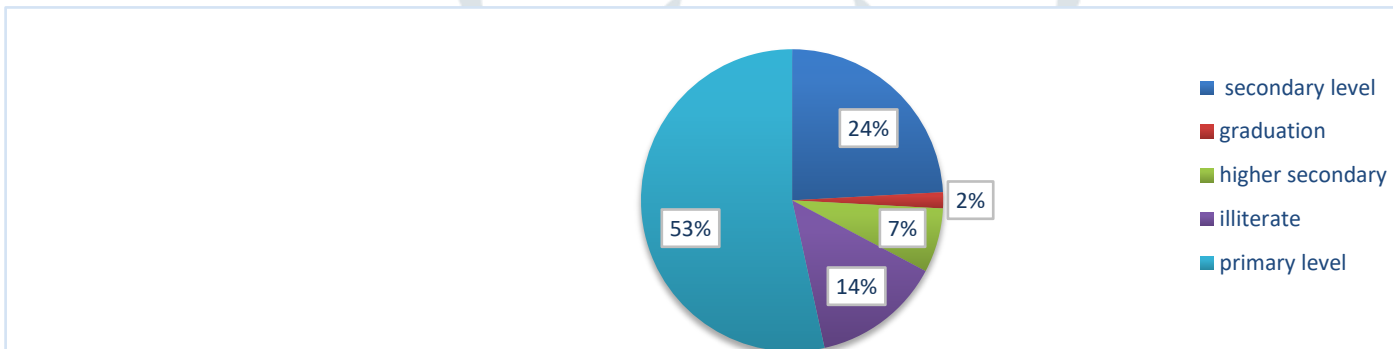2: Education of drivers

Figure 2:   Education of Drivers

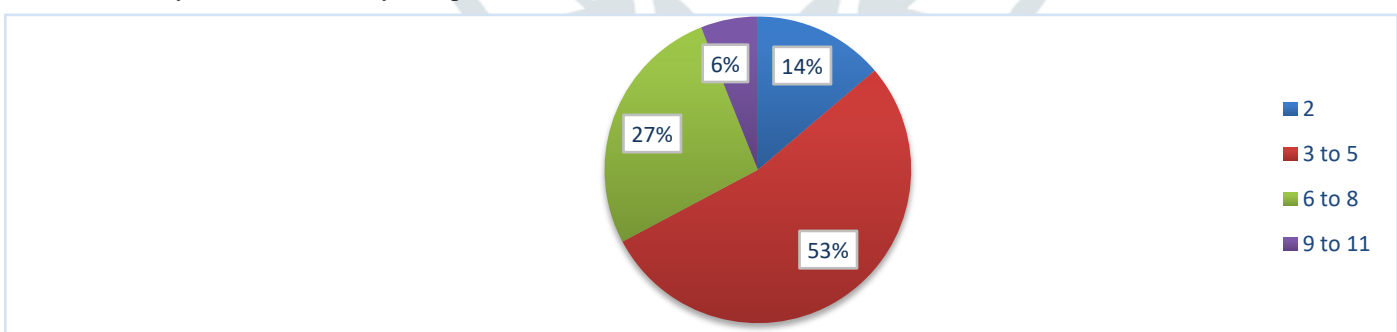3: No of family members in family for operators

Figure 3:   Number of Family Members in the family of operators

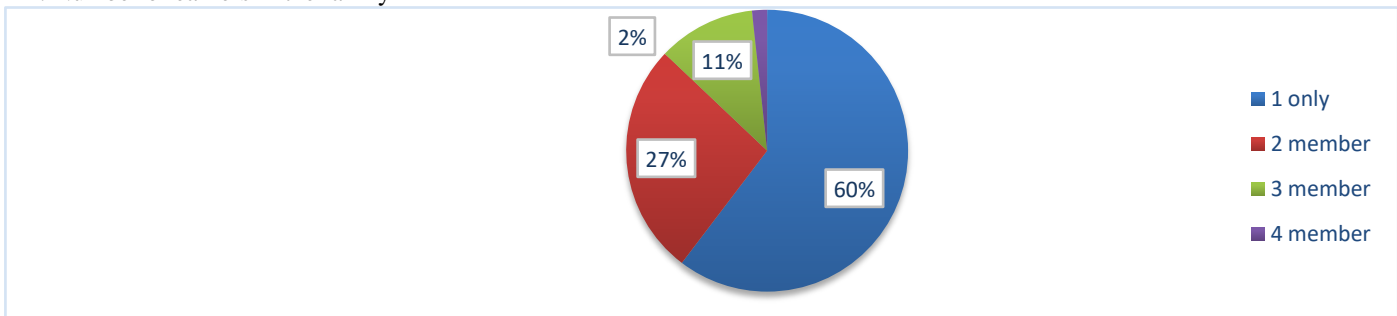4: Number of earners in the family

Figure 4: Number of earners in the family
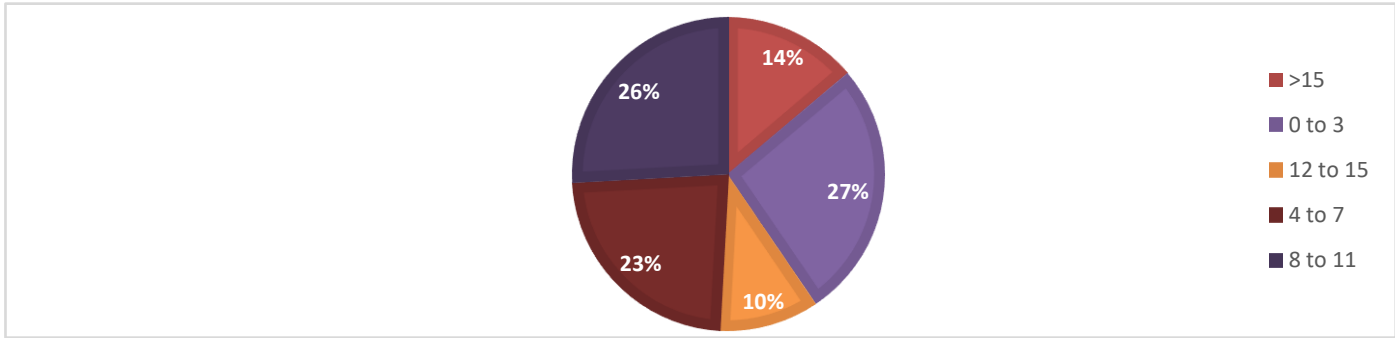
5: Driving experience

Figure 5:　Driving Experience
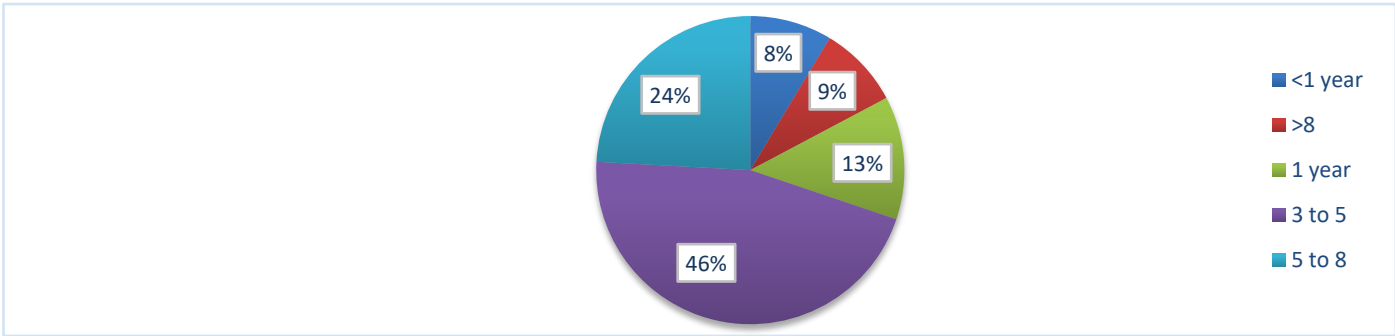
6: Age of auto-rickshaw

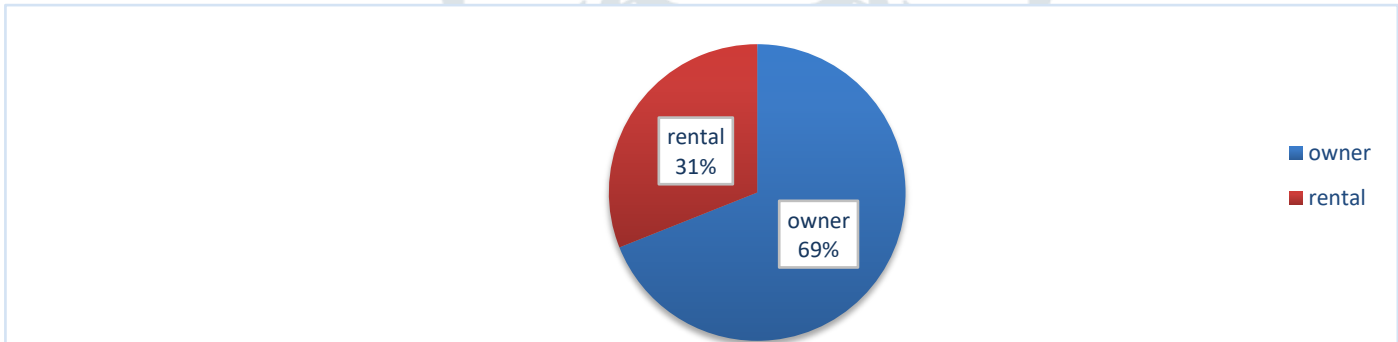
Figure 6:　Age of Auto-rickshaw

7: Owner/rental

Figure 7:　Owner/rental

Operational characteristics
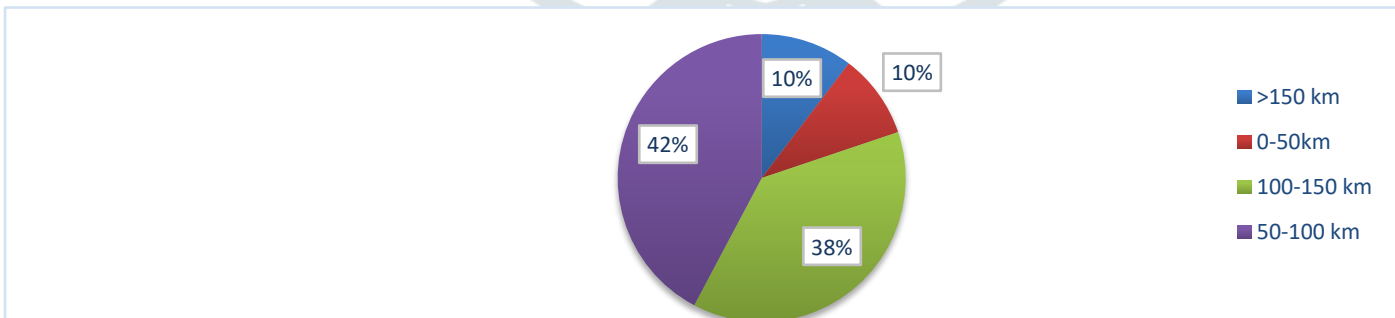
8: Average daily running in kilometer

Figure 8:　Average daily running Auto in kilometer

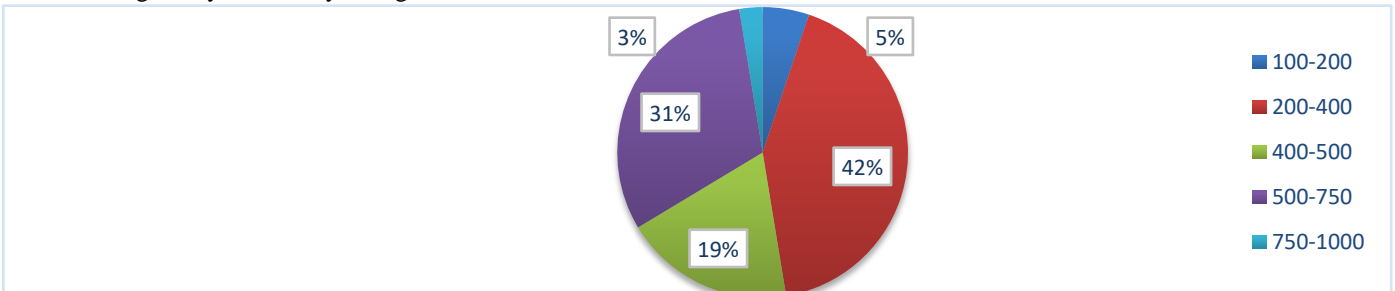9: Average daily Income by riding Auto-rickshaw

Figure 9:Average daily Income by riding Auto-rickshaw

10: Average daily working time per day
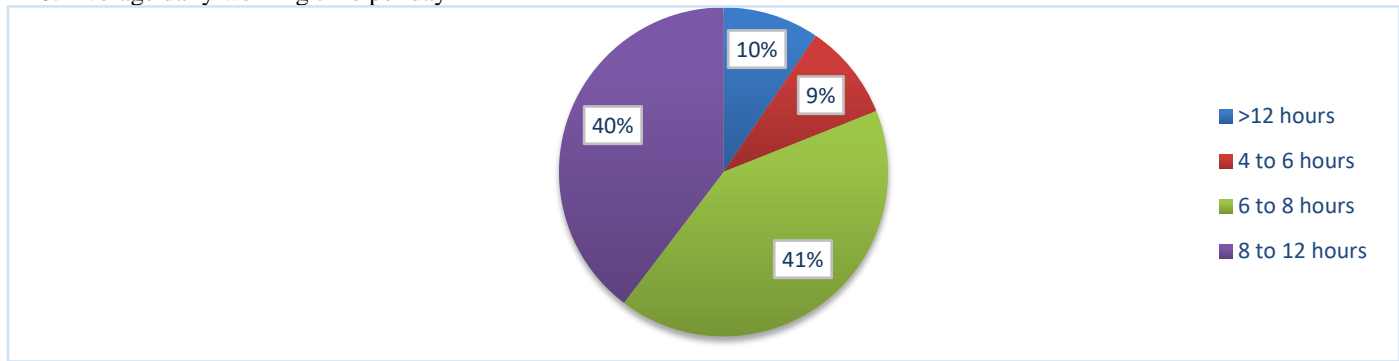

Figure 10:   Average daily working time per day
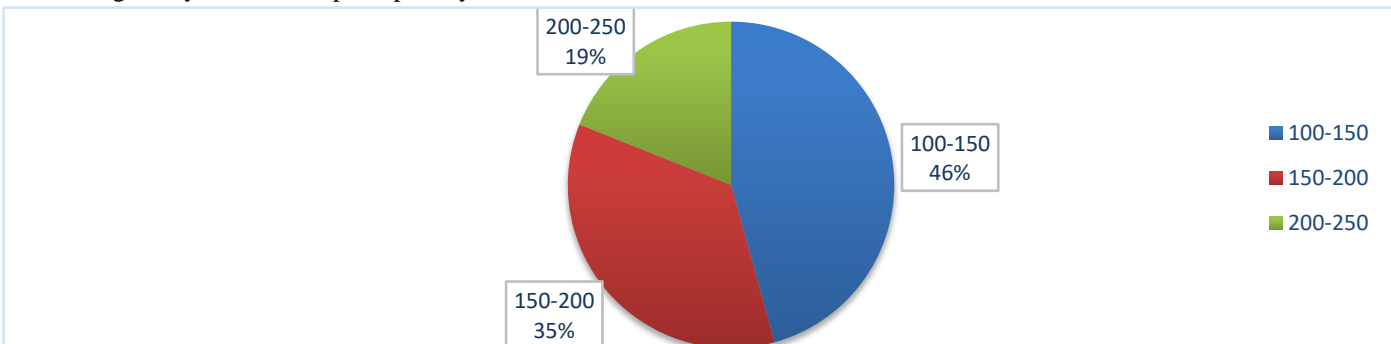
11: Average daily fuel consumption per day

Figure 11:   Average daily fuel consumption per day
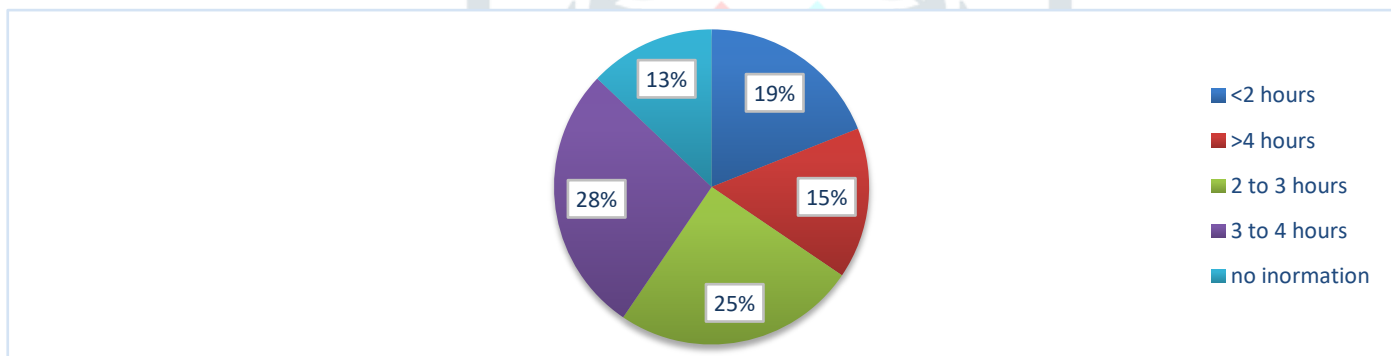
12: Average daily waiting time

Figure 12:   Average daily waiting time

Result Discussion

Fig. 1 indicates the age group of driver's respondents, from the fig.1 we can see that most of the drivers are between 20 to 40 years of age, only 5% of the drivers are between 18-20 years. Fig 2 represents Education of the driver's respondents, from the fig.2 we can see that 53 % of driver's education is up to primary level. Fig. 4 presents a number of earners in the family of driver's respondents, from the fig.4 we can see that 60 % of the driver's family have only one earner. Fig. 5 presents a driving experience of driver's respondents, from the Fig. 5 we can see that 26% of driver's having driving experience of 8 to 11 years. As well as 14% of the drivers are running auto-rickshaw since more than 15 years. Fig. 6 presents age of auto-rickshaw, from the chart 6 we can see that 46% of the auto-rickshaws are between 5 to 8 years of age.

Fig. 7 presents a chart of owner and rental ratio. From the fig. 7 we can see that 69% of driver's respondents own the auto-rickshaw. And remaining 31% of driver's ride the auto on rent. Fig. 8 presents average daily running in kilometer. From the fig.8 we can see that 42% driver's average daily running in kilometer is between50-100 km, where 38 % of the driver's average daily running in km is between100-150 kilometer. Fig. 9 presents a chart on average daily earning of auto-drivers. From the fig.9 we can see that 42 % of the drivers earning 200-400 rupees where 31 % of drivers are earning 500-750 rupees per day. Fig.10 presents average daily working time per day and from the fig.10 we can see that 41 % of the drivers are working for 6 to 8 hours. Fig. 11 presents average daily fuel consumption per day. From the fig.11 we can see that 46% driver's average daily fuel consumption is between100-150. And 35 % of drivers use 150-200 rupees for fuel consumption. Fig.12 presents average daily waiting time for passengers. From the fig. 12 we can see that 25 % of drivers waits for 2 to 3 hours.

From the statistics we come to know that around 70 % of auto-drivers are driving their auto-rickshaw on shuttle system. So that we have asked a question about reason behind not using meter system   and in the answer of this question we get majority answers as "FARE COLABRTATION IS LOW" so that next question was meter down fare demand. As per continues fare card meter down fare for 1.2 kilometer distance is 13 rupees. In response to the question for meter down fare demand 49 % of driver's wants 20 rupees as a base fare.

Fare study

Vadodara city meter down fare is 13 rupees for 1.2 km, and 8 rupees per km length. Were in Vadodara one private company namely jugnoo running with 6 rupees per km. Here we took 90 km average running per day by auto-drivers for easy calculations. The average trip size considered is 6 km. The state government fixed the meter down price at Rs 13 for the first 1.2 km and Rs 8 for every subsequent kilometer. This calculates to Rs 810 a day, out of which rent and fuel amount to Rs 200 and Rs 250 per day, respectively. The driver is left

with Rs 360 per day. Considering expenditure on the auto-rickshaw to amount to Rs 1,000 to Rs 4,000 per month, the government-prescribed fare is hugely inadequate and needs to be revised at the earliest. In lieu of the same, the table below sheds light on prospective incomes that drivers can earn at different fares - a study on the rates the current fare should be revised.

Table 1: Fare calculation for same Distance with variation in per km fare

Average kilometers driven per day (km)				
Average no. of trips per day				
Meter down fare for 1.2 km (Rs)	Per km fare (Rs)	Average no. of trips	Average size of trip (km	Daily Gross earning (Rs)
13 Rs	8 Rs	15	6 km	810
At fare demanded by drivers				
15	9	15	6 km	873
15	10	15	6 km	945
15	12	15	6 km	1089
15	15	15	6 km	1305
15	20	15	6 km	1665
15	25	15	6 km	2025
20	9	15	6 km	948
20	10	15	6 km	1020
20	12	15	6 km	1164
20	15	15	6 km	1380
20	20	15	6 km	1740
20	25	15	6 km	2100
25	9	15	6 km	1023
25	10	15	6 km	1095
25	12	15	6 km	1239
25	15	15	6 km	1455
25	20	15	6 km	1815
25	25	15	6 km	2175

As per the existing fare card, auto-drivers takes 50 % extra charge during night trips. Below table shows the Comparative study of fair for same distance with different auto-rickshaw services like govt. fixed fare card, Ola, jugnoo, ext.

Fare comparison for the known distances

Table 2: Fare Comparison for same Distance Trips

Fare comparison for same distance trips.			
Trips distance	Fare by existing fare system	Jugnoo fare charges	Ola fare charges
4 km	37 Rs.	29 Rs.	41
6 km	54 Rs.	50 Rs.	62

V. **CONCLUSION OF THE STUDY**

1. It is observed from the study that majority drivers use shuttle system so that drivers stops their auto-rickshaw for collecting the passenger's at anywhere, where there is no stop points so that the auto-rickshaw are creating congestion on the roads of city.
2. Government prescribed fare is highly inadequate and too old and needs to be revised at the earliest.
3. As private companies like jugnoo is charging lower fare than government prescribed charges, the fare revision should be done keeping in mind all these things.
4. Due to shuttle system majority drivers are running with over seating capacity, the traffic police should take strict action against them.
5. Digital meters should be implant so that the customers/passengers can understand and calculate the fare.
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