A Study on Service in Public Road Transport: the Border Zone Area of Rajasthan

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ABSTRACT: Public Road Transport Service is the main source of transportation in both urban and rural area of transportation of this zone due t o lack of rail network service and no other modes are available in this zone and approximately 200 km radius for civilians. But due to several meaningful and identical reasons the people was tend to move towards railway or choose their own vehicles i.e. motorbikes and cars. Detailed Traffic data was collected from RSRDC Department. So in this study our motive is to purpose a modified public road transport service system for compensates present and upcoming decade's demands regarding time, speed and money.

Keywords: Public Road Transport

I. INTRODUCTION

In the transportation sector i.e. it is highway, expressway, railway as per the present and future aspect the time is considered a valuable element in socio and economic considerations so it is necessary for the transportation planner to develop and modify the transport network which has enough capability to manage the time difference [1].

Travel time between two particular points depends upon the driver's behaviour nature of traffic condition of the vehicle road surface. We cannot predict the travel time on the basis driver's movement which is more difficult to analyze. The main parameters of travel time are speed, density and flow which are most essential to know before to understand the vehicle flow [2]. With the above three parameters we can design, plan and operate the roadway facility.

Speed. Speed is the rate of movement of traffic it's quite difficult to calculate the speed of each and every vehicle of any site and due to this reason average speed is taken in to account in any kind of related work. Speed may be further classified as per location. Spot speed is the speed of the vehicle at a particular location where it is calculated while vehicle is in motion [3]. Time mean speed is defined as the average of speed of vehicles crossing a particular section with respect to time. Running speed is the average speed maintained by the vehicle when vehicle is in motion.

Running Speed= (Total Distance)/(Journey Time-Delay Time)
Journey speed is the ratio of the total distance and total journey time including delay time
Journey speed=Distance/(Total journey time)
Metric Units: Kilometre per hour

Flow. It is defined as the ratio of number of vehicles crossing a particular section and the time taken by the vehicle to cross that particular section.
Units: vehicles/time

Density. It is defined as after a particular time the number of vehicles which occupy the particular region. The density is generally averaged over certain duration of time.
Units: vehicles/distance

The above mentioned flow parameters are related to a basic equation n

$$q = u*k \quad …(1)$$

From the above equation it can be noted that the speed, density and flow are related to one another. The relations can be produced in the following way
$u = f1(k)$, $q = f2(k)$ and $u = f3(q)$ and plots of the above relations are considered to be as fundamental diagrams. Just by the above equations it is more sufficient to describe the fundamental properties of any vehicle stream.

Problem Statement. In this study our motive is to develop a model having Focus in following and try to compensate the upcoming decade demand:

- ➢ Safe and fast Transport services.
- ➢ Minimise waiting time.
- ➢ Connecting rural area by better transport services.
- ➢ Low Traffic Growth.
- ➢ Stable area Growth.
- ➢ Exist in Moderate weather in terms of rainfall.

In this study a transport model was developed with respect to the above conditions. Pavement conditions are considered as general conditions and all other factors as existing in terms of drainage system, intersection, Signal.

Site Description. The Major District Road103 has situated at N 29.5.6846' to E 73 8.245392' having an length of 54 km out of which 45km in HMH district and 9km in SGNR and connected to super thermal power station, Indian Air Force Station, other Defence ministry offices and NH 15 district. Hanumangarh District Shares its Boundary with Haryana state in east, Sriganganagar district in the west Punjab state in the north and churu district in the south the climate of the district is very dry maximum temperature rises from 18 to 48 Celsius and fall down to 2 Celsius having an average rainfall 225 to 300 mm. The Hanumangarh District is known as "Fruit Basket of Rajasthan" [5].

Sriganganagar district is situated at 28'4 to 30'6 N and 72, 30 to 74'16 E share its boundary with Pakistan on west Punjab on north Bikaner on south and Hanumangarh on east. Sriganganagar is known as "Food Basket of Rajasthan development plan. Although Both district lies in great thar Desert (sri ganganagar) but Gang Canal, IGNP and Ghagar (Hanumangarh) changes the floor area [6].

Fig. 1. Map of Study Area.

Table 1: Technical Details of Site.

District Name	Total area	Rail Network Length in km (2012)	Road Network Length in km(2012)	Population in lakh (by 2011)
SGNR	7984 sq. km	265	1994.74	19.48
HMH	9656.09 sq km	306	1972.85	17.76

Data collection and extraction

Traffic volume Count. In this traffic study videography survey was performed with the help of RSRDC for a period of 7days.16 may to 23 may 2016

For this survey video cameras were installed inconspicuously in such a way that traffic movement doesn't effect at both the tall check points situated at 8 km distance from Dabli and 8 km from Surathgarh. The Data Shown in figure: 2 to 5 below.
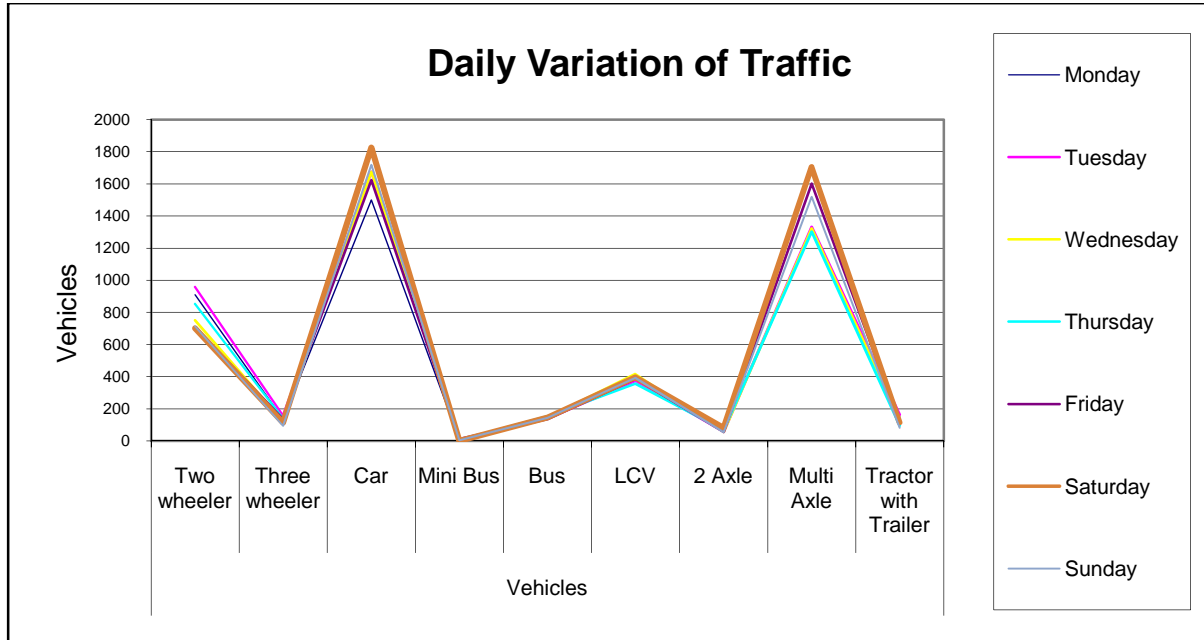

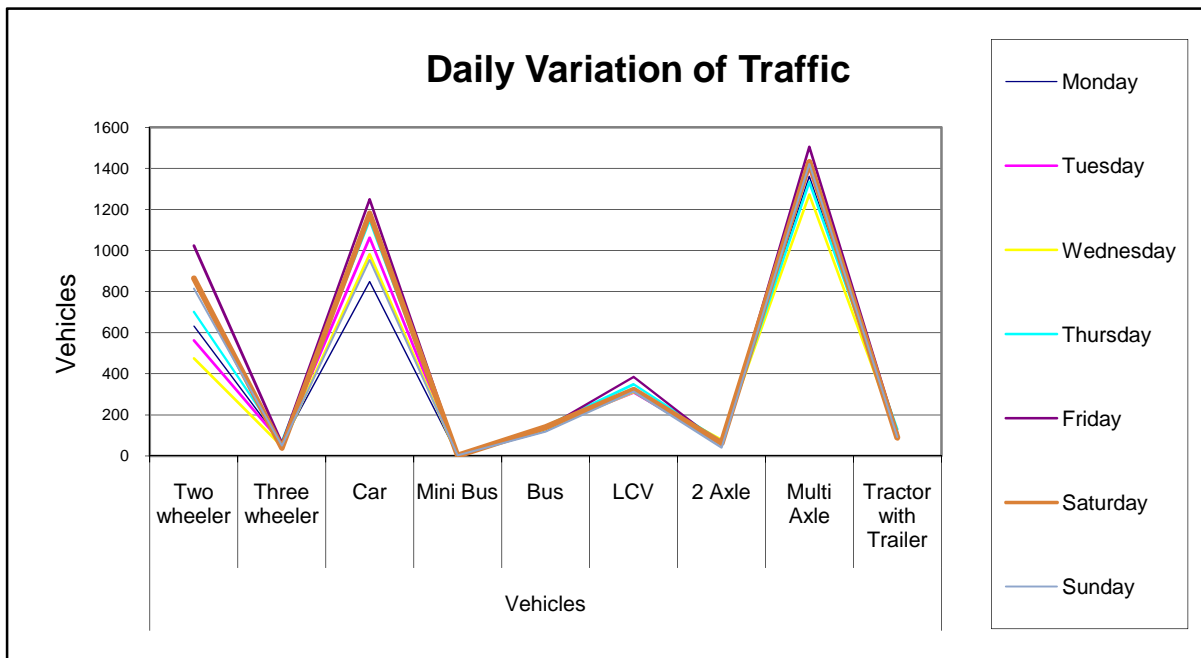**Fig. 2.** Daily Variation of Traffic at Toll 1st.

Fig. 3. Daily Variation of Traffic at Toll 1st.
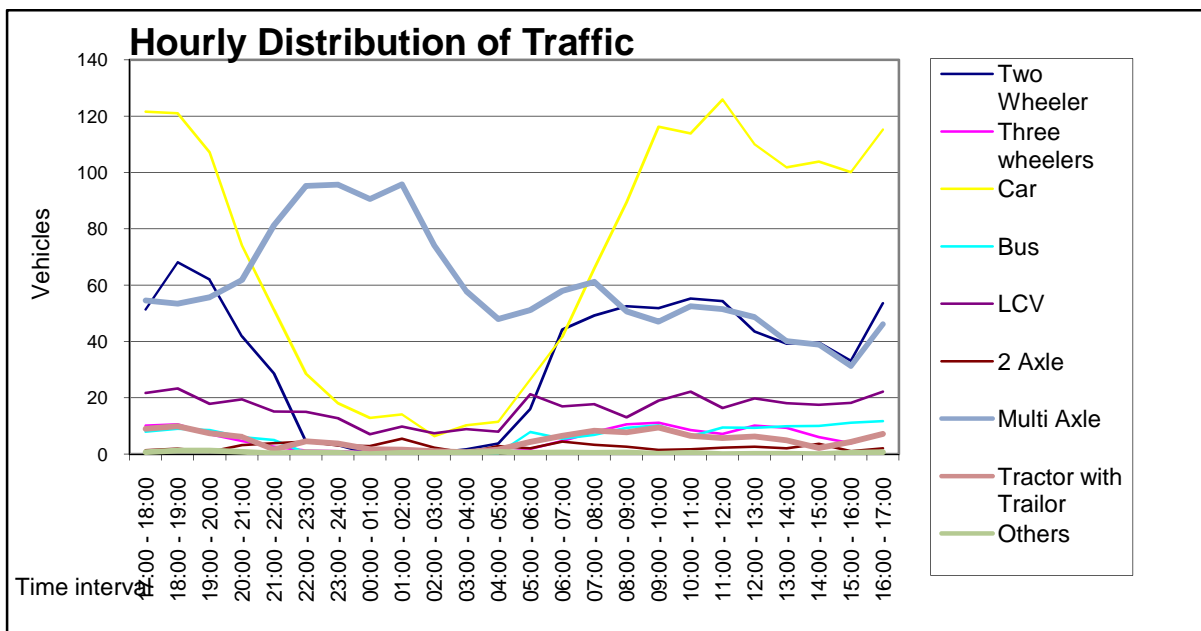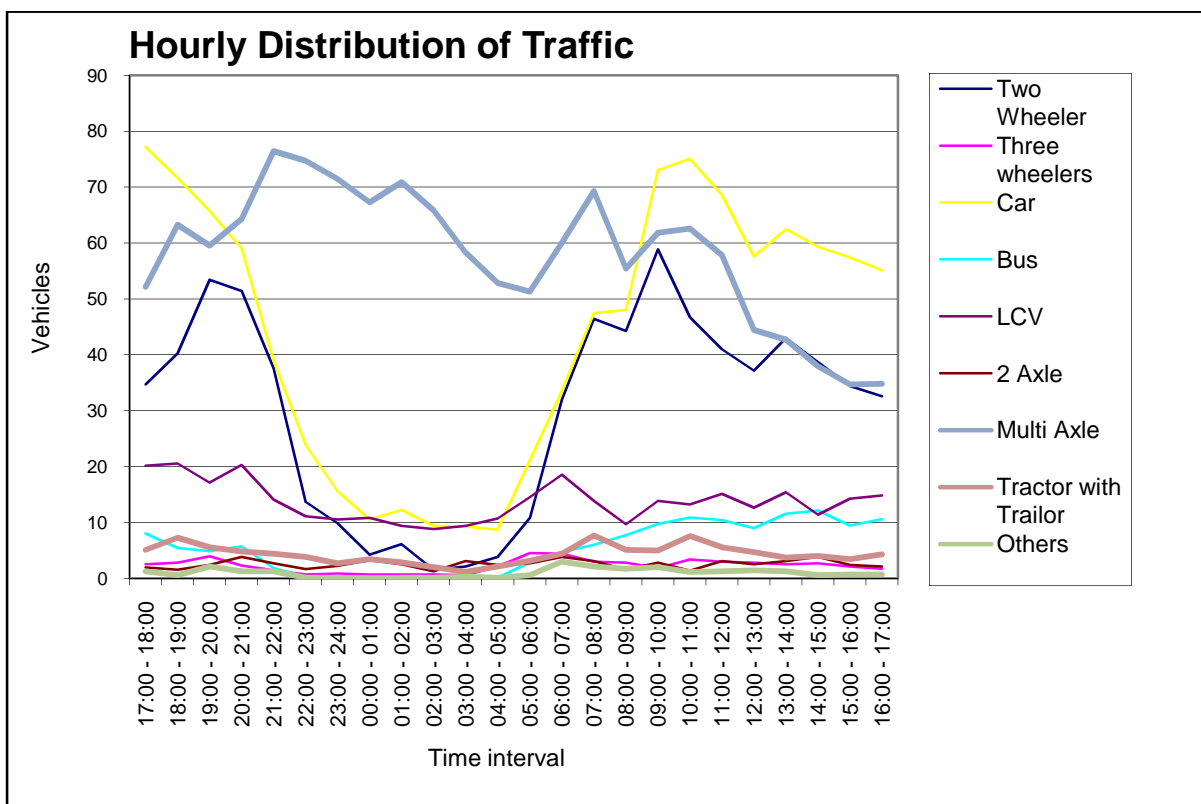
Fig. 4. Hourly Distribution of Traffic at Toll 1st.

Fig. 5. Hourly Distribution of Traffic at Toll 2nd.

Peak Hours

<p align="center">Table 2: Peak Hours Traffic at Toll 1st.</p>

Peak	Time	Total No. of Vehicles
Evening	18:00 -19:00	299
Evening	10:00-11:00	267

<p align="center">Table 3: Peak Hours Traffic at Toll 2nd.</p>

Peak	Time	Total No. of Vehicles
Evening	19:00 -20:00	215
Morning	09:00-10:00	229

Public Road Transport Service Study. In Public transport service study our focus is to analyse traffic flow factors (speed, travel time) and other identical requirements. For speed analysis first the data was collected from respected departments first of all traffic volume data was collected from RSRDC [7]. Department corresponding to the study area for finding the total no of bus service available, time schedule, fare charges and other service benefits given by the department to the passenger [8]. From the data it is clear that there is no flexibility of service in case of peak hour and non peak hour. The service management is based on rigid model that in duration of 06:00hrs to 20:00hrs bus service is available in every 20 minutes in both the direction

Speed and Travel Time analysis. On the basis of detailed bus data bus analysis was performed by Moving observer method for a period of 7 days in both peak and non peak hours. Randomly no of buses were observed and based on the observations Running speed and journey speed was calculated. The reason for selecting this method is to known information about other factors. The observed and calculated data is mentioned in below tables.

Speed and Time Study HMH to SOG. For This analysis randomly buses were selected in 7 days period including vacation day, Working days.

By using Moving Observer Method and data are tabulated in Table: 4 to5.

<p align="center">Table 4: Speeds and Time Study from HMH to SOG.</p>

Bus no.	Bus Type	Bus Origin & Destination point	Running Speed (kmph)	Journey Speed (kmph)	Delay	Total time taken for selected site	Total Stops
RJ-07 PA 5036	Express	HMH to BKNR	49	34.08	25 Minutes	1hr35minutes	12
RJ-19 PA8810	Express	HMH to ANPH	49	33.64	26Minutes 30 seconds	1hr 36 minutes 30 second	11
RJ – PA 8667	Local	HMH to SOG	45	28.77	32 Minutes 36 seconds	1 hr 52 minutes 36 seconds	17
HR – 39C 9518	Express	Hisar to Khajuwala	49	44	1 Minutes 15Seconds	1hr 11 minutes 15seconds	5
RJ – 31PA 3300	Express	HMH to SOG	49	30.49	36 minutes 15 Seconds	1 hr 46 minutes 15 seconds	13

**Speed and Time
Analysis from SOG to HMH**

Table 5: Speeds and Time Analysis from SOG to HMH.

Bus no.	Bus Type	Bus Origin & Destination point	Running Speed (kmph)	Journey Speed (kmph)	Delay	Total time taken for selected site	Total Stops
RJ -31 PA 1813	Express	SOG to HMH	49	33.48	26 Minutes 45 Seconds	1hr 36 minutes 45 seconds	13
RJ-07-PA 5036	Express	BKNR to HMH	49	32.89	28 Minutes 30 Seconds	1hr 38 Minutes	8
RJ – 31-PA-	Express	ANPH to	49	32.56	29 Minutes	1hr 39 Minutes 30 seconds	10
RJ -31 PA 1218	Express	SOG to HMH	49	34.46	24 Minutes	1hr 34 minutes	12
RJ – 31 PA 1813	Express	GHNR to HMH	49	33.21	27 minutes 15 seconds	1hr 37 minutes 15 seconds	13

COMAPRISON OF DATA

Comparison of travel time. For this comparison minimum actual travel time from all the observed value is considered to overcome all the facts like particular time period, seasonal variations etc.

Table 6: Comparison of Travel Time.

Bus No.	Service type	Minimum Actual Travel Time (Hr: Minute: Second)	RSRTC Standard (Hr: Minute: Second)	Difference (Hr: Minute: Second)
RJ-31 PA-8667	Local	01:52:36:	01:20:00	00:32:36
RJ-31-PA-1218	Express	01:34:00	01:10:00	00:24:00

Comparison of speed. For this comparison maximum observed speed is taken to overcome the effect of Stop time

Table 7: Comparison of Speed.

Bus No.	Service type	Maximum Actual speed observed (km per hour)	RSRTC Standard (km per hour)	Difference (km per hour)
RJ-31-PA-8667	Local	28.27	45	16.63
RJ-31-PA-1218	Express	34.46	49	14.54

MODIFIED AND PROPOSED MODEL

From the above study it is clear that safety, speed, time are the main parameters in present transport system but time spent on all services is more so the people forcely tend to use motor vehicle In this study we purposed to modification in the above system.

Neat & Clean System. A Chargeable use and throw paper bag will be given to the passenger by the conductor for collecting wastage of fruits, groundnuts, water bottles etc which was used for eating or drinking purposes during journey specially in bus Services which has travel more than100 km in single direction .

Modification in Sign Board. During the detailed survey respondents have faced a problem that there is no display of timetable of both rural and urban bus stand for express and rural service.

Permanent sign boards are replaced by Digital Display system is purposed specially in urban bus stand having a more than 3 platforms.

Table 7: Digital Display Pattern.

Bus no	Destination	Via	Bus type	AAT	ADT
Rj-31 SB5621	HMH	PLB	Fast	22.00	22.05

Identification Mark - During the study it was observed that there is no identification particular of the particular bus service so the study purposed a centralised colour difference in the particular service as shown in table 8.

Modification in time system. The opinion of the respondent is mostly negative towards the service system as in case of waiting time the study purposed a token system to known actual time of arrival and departure use it in display. Thus the waiting time is converted to useful time.

Modification in Bus Service. The scaling of respondents shows the main factor is that there is no such a major difference in local and express bus service as in case of fare, stops etc. so the study purposed three different types of bus services having following tabulated characteristics shown in Table 9.

Table 8: Colour Specifications.

Colour	Yellow	Purple	Blue
Service quality	Inter city (Local)	Fast	Express

Table 9: Modifications in Bus Service.

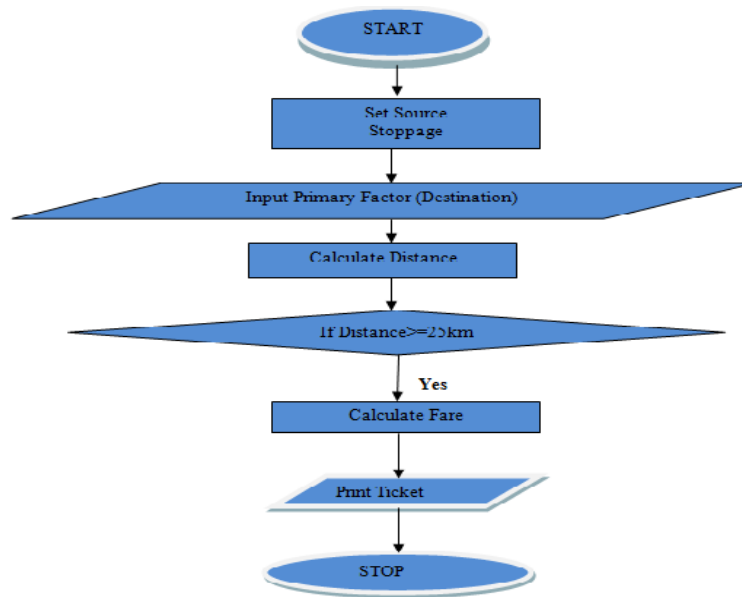| Service title	Local	Fast	Express
Minimum Distance of stop & speed	>=3 km	>= 10km	>= 25km
Colour	Yellow	Purple	Blue

Modifications in Express Service. Study recommend ate minimise no of stops in express bus service travelling more than 100 km in one direction. Study also suggest a Request stop having minimum distance of 12 km from first stand in between two particular stops in case of public demand in future but the minimum ticketing formula is same as suggest in flow chart one. Study recommended provides more facility in case of display system as problem faced by the respondents.

Modifications in Fast services. Study recommendate minimise stop in case of fast bus service which travel minimum 50km distance in one direction but fast service doesn't required request stops. Study also purposed difference in ticketing charges in comparison with express and Intercity transport service.

Modification in rural transport Service. Study also purposed to develop an intercity transport service based on public private Partnership Model with a working principal of city coach service Jaipur to provide rural area connectivity with the objective of economical benefits of waiting time.

Flow chart
Express Bus Service

```
              START
                │
                ▼
         ┌──────────────┐
         │  Set Source  │
         │  Stoppage    │
         └──────────────┘
                │
                ▼
    ╱─────────────────────────────╲
    Input Primary Factor (Destination)
    ╲─────────────────────────────╱
                │
                ▼
         ┌──────────────┐
         │ Calculate Distance │
         └──────────────┘
                │
                ▼
      ◇  If Distance>=25km  ◇
                │
               Yes
                │
                ▼
         ┌──────────────┐
         │ Calculate Fare │
         └──────────────┘
                │
                ▼
         ┌──────────────┐
         │  Print Ticket │
         └──────────────┘
                │
                ▼
              STOP
```
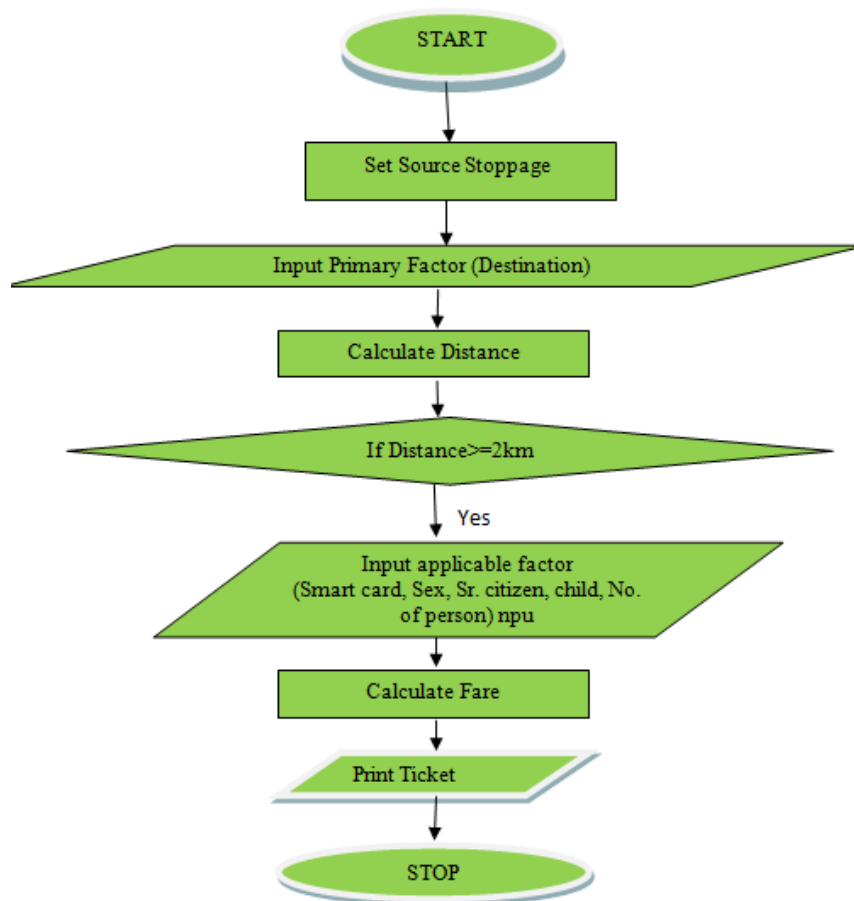
Fast Bus Service

```
              START
                │
                ▼
         ┌──────────────┐
         │ Set Source  Stoppage │
         └──────────────┘
                │
                ▼
    ╱─────────────────────────────╲
    Input Primary Factor (Destination)
    ╲─────────────────────────────╱
                │
                ▼
         ┌──────────────┐
         │ Calculate Distance │
         └──────────────┘
                │
                ▼
      ◇  If  Distance>=10km  ◇
                │
               Yes
                │
                ▼
    ╱─────────────────────────────────────────╲
    Input applicable factor
    (Smart card, Sex, Sr.citizen,child,No.of person)
    ╲─────────────────────────────────────────╱
                │
                ▼
         ┌──────────────┐
         │ Calculate Fare │
         └──────────────┘
                │
                ▼
         ┌──────────────┐
         │  Print Ticket │
         └──────────────┘
                │
                ▼
              STOP
```
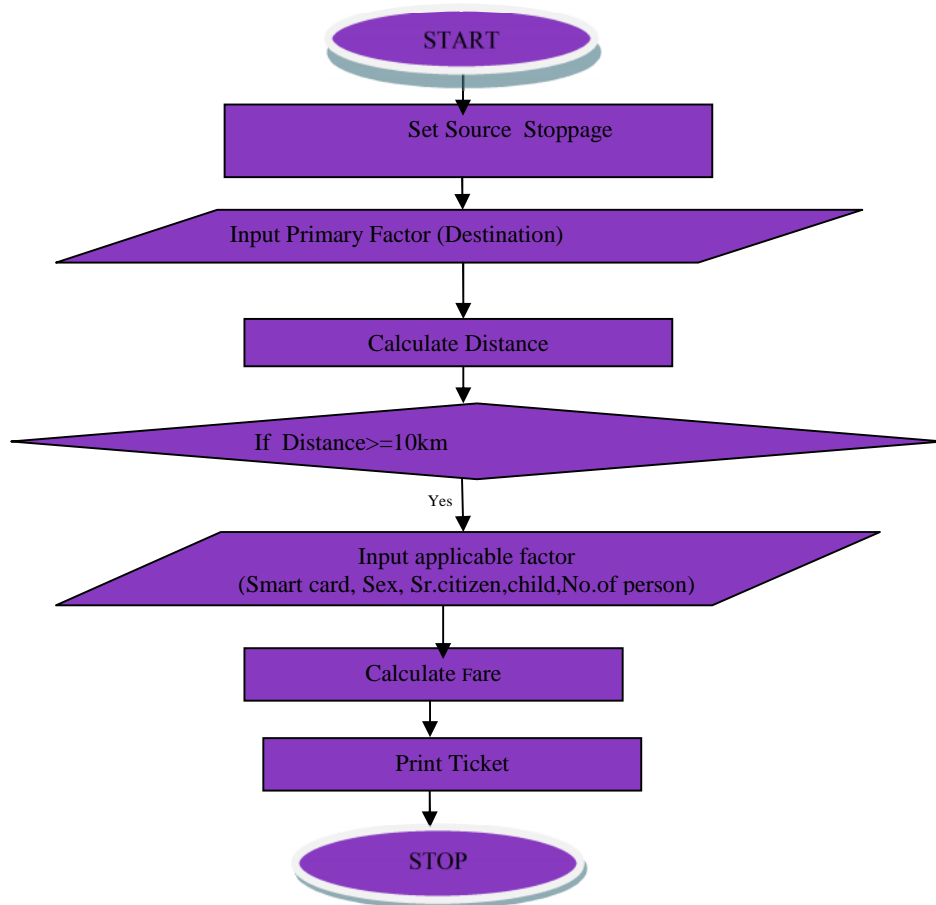
Local Bus Service

Algorithm of C Language

-Input Source Stoppage.
-Input Primary Factor and calculate the distance.
-Compare the distance with model value.
-Input secondary factor and calculate fare.
-Print ticket.

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