"ORIGIN AND DESTINATION STUDIES IN ALLAGADDA TOWN"

A Mini Project Report Submitted In Partial Fulfillment Of The Requirements For The Award Of Degree Of

BACHELOR OF TECHNOLOGY

IN

CIVIL ENGINEERING

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CERTIFICATE

This is to certify that the mini Project Report entitled "ORIGIN AND DESTINATION STUDIES IN ALLAGADDA TOWN" that is being submitted by

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in partial fulfillment of the requirement for the award of B.Tech in Civil Engineering in the **RAJEEV GANDHI MEMORIAL COLLEGE OF ENGINEERING AND TECHNOLOGY,**Nandyal (Affiliated to J.N.T University, Anantapur) is a bonafide record of confide work carried out by her under our guidance and supervision. The results embodied in this technical report have not been submitted to any other university or institute for the award of any Degree.

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Dedicated to my beloved parents, and teachers who have worked hard throughout my education.

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Abstract

Allagadda being development in, real estate, health, education, is witnessing rapid growth in the population which has resulted in rapid growth of 'floating population'. This has resulted in high traffic congestion.

Origin-Destination (O-D) trip tables represent the demand-supply information of each directed zonal-pair in a given region during a given period of time. The effort of this research is to develop a linear programming methodology for estimating O-D trip tables based on observed link volumes. In order to emphasize the nature of uncertainty in the data and in the problem, the developed model permits the user's knowledge of path travel time to vary within a band-width of values, and accordingly modifies the user-optimality principle. Some test results on the related models are presented and compared, and different sensitivity analyses are performed based on different scenarios. Finally, several research topics are recommended for future research.

As the part of O-D survey, I have been selected some circles, for the origin and destination studies.
Keywords : Traffic volume, Traffic control, Intersection.

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Chapter 1

INTRODUCTION

1.1 Introduction

In a transportation study, it is often necessary to know the exact origin and destination of the trips. The information yielded by O-D survey includes land-use of the zones of origin and destination, household characteristics of the trip making family, time of the day when journeys are made, trip purpose and mode of travel.

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

Origin-Destination (OD) studies are an important tool for transportation Professionals. OD studies are conducted to understand the pattern of the movement of Persons and goods in a particular area of interest during a particular period of time (Wang, 1997).

The origin and destination study are carried out mainly to know the origin and destination of various vehicle.

In this study the data collected are, number of vehicles, their origin and destination number of passengers in each vehicle, route etc.

1.2 TERMINOLOGY

- **Origin** is the location where a trip begins. It is described in terms of a street address. A monument (e.g.. A well known location, an office building, a school. Etc). a street intersection or a district. All survey origins have been geo coded for precision.
- **Destination** is the location where a trip ends. It has similar attributes as the trip origin.
- **Origin-destination** describes both ends of a single trip. This term is commonly abbreviated to O-D.
- **Trip, or person trip.**Is a single or one directional movement of one person from one point (origin) to a second point (destination).for a single purpose. For example, the commute from home to work represents one trip.
- **Modes** describe the type of transportation services that are used by residents in the region. For the purpose of the survey. They include ,auto driver ,auto passenger(as distinct from the driver).public transit (bus or rail). Para- transit, school bus ,motor cycle ,taxi, ferry ,walking and cycling.
- **Modal share** is the proportion of trips by any given mode out of the total trips by all modes. for a given time period.
- **Purpose** describes the reason that the trip is made. trip purposes comprise work or work related (i.e, going to work or going somewhere outside ones normal place of work to conduct business)

Chapter 2

Literature Review

2.1 General

The problem of origin/destination demand estimation is vital to all aspects of ATMIS (Advanced Transportation Management and Information Systems) research. An origin/destination demand matrix is a vector with components that denote the average number of trips going from an origin to a destination. Traditionally, the method for obtaining an origin/destination matrix for large scale networks is to employ the use of household surveys coupled with roadside surveys. However, this method is expensive and also not feasible for real-time applications. Therefore, there has been research in the static origin/destination demand matrix estimation using network-wide link traffic counts and combining these with other available information. One source of information that we have already mentioned is household activity surveys, another source is the knowledge of the a priori probability distribution of the origin/destination matrix. Yet another is the use of previously estimated origin/destination matrices. When a research area is considered, it is divided into several zones or centroids. The static origin/destination demand matrix consists of all the trips from all the origin zones to all the destination zones. In general, the numbers of origin/destination pairs are greater than the total number of links. This means that by just using traffic counts, the estimation problem is underspecified and there is no unique solution. For this reason additional information is needed to determine a unique origin/destination demand matrix.

There are several methods for formulating estimators for an unique matrix. In transportation and regional planning, the most popular approach is the maximum entropy model (Van Zuylen and Willumsen, 1980). The assumption of this approach is that all of the combina-

tions of individual travel decisions, so called states, are equally likely to occur. The set of origin/destination flows with the highest likelihood of occurring is therefore the set with the maximum number of states. The conventional method uses this maximum entropy consideration to obtain a doubly-constrained gravity model. Another method is classical statistical inference techniques. The two main estimators are the maximum likelihood and the generalized least-squares. The maximum likelihood estimator maximizes the likelihood of observing the experimental data condition on the true trip matrix. For this method, distributional assumptions need to be made for the sample and traffic counts. On the other hand, no distributional assumptions need to be made for the generalized least squares approach. The last method is the Bayesian one, which uses a priori probabilities on the trip demands. By combining these probabilities with the conditional probability on the traffic counts, one can obtain the posterior probability of the demand conditioned on the traffic count. The arguments of this probability can then be maximized by different methods. One critical reference, Van der Zijpp (1997), added partial origin/destination information by using Automatic Vehicle Identification (AVI) technology. An example of an AVI technology is license plate recognition based on image processing. They proposed a method to track time-varying traffic patterns from a combination of link volume counts and trajectory observations obtained from induction loops and AVI equipment at arbitrary (but fixed) locations. They applied the approach to a sing motor-way corridor with no route choice alternative and proposed the Bayesian updating scheme that used multivariate normal and truncated multivariate normal assumptions for the subjective probability distributions. The advantage of this new procedure is that it deals with the inequality constraints in an appropriate statistical manner. The fundamental difference between density and flow is that density is measured over a length of space at a particular instant in time, while flow is measured over a period of time at a particular point in space. In dynamic frameworks, density should clearly be the traffic variable of choice and not flow.

Jayakrishnan et al. (1994) developed DYNASMART (DYnamic Network Assignment Simulation Model for Advanced Road Telematics), an evaluation model that incorporated the driver response to information, the traffic flow behavior, and the resulting changes in the characteristics of network paths, into an integrated simulation.

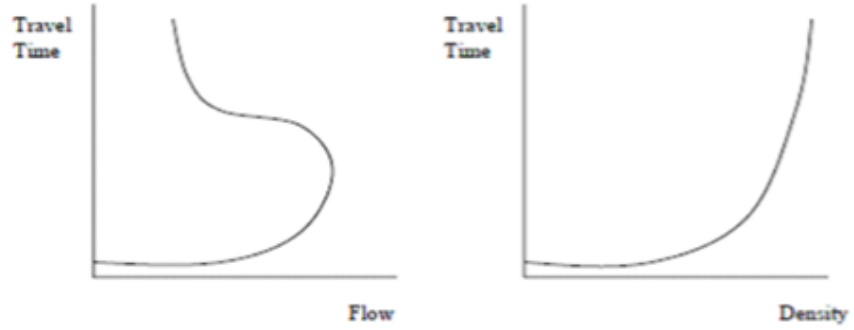

Figure 2.1: Travel Time cost function comparison

2.2 OBJECTIVES OF STUDY

The present study is aimed at the following objectives:

- The main objective of the study is to show the travel pattern and nature of daily trips made by the residents.

- To get the socio-economic characteristics of the household (total trips, purpose of the trips, mode used, trip length, origin and destination etc).

- To get an opinion (of the resident of the study area) regarding general transport problems of the town and the probable areas of improvements.

Chapter 3

SURVEYING METHODS

3.1 INTRODUCTION

3.1.1 Introduction

The purpose of which an O-D survey is required determines the extent of preliminary preparations for organizing the survey. For instance, if the survey is needed as part of an urban transportation planning process for a large town, it will be necessary to define the study area and sub-divide it into zones.

In the study of transportation problems of town, big or small, it is usually necessary to define external cordon lines, which are imaginary lines at the boundary of study area. In big towns, it may also be necessary to select some internal cordon lines, which may be concentric rings. For checking the accuracy of survey data, it may be necessary to have screen-lines which are imaginary lines dividing the area into parts.

In order that may flow as smoothly and safety as possible, it may become necessary to collect data as to where the traffic came from and where it is going. That is the purpose of this type of study.

These studies are time consuming and rather complex. They also require the cooperation and assistance of the public. There are 9 different methods of conducting origin and destination studies.

METHODS OF ORIGIN AND DESTINATION STUDIES

1. Road side interview survey
2. Household survey
3. Telephone surveys
4. Taxi survey
5. Post card questionnaire survey
6. Registration number survey
7. Tag on vehicle survey
8. Public transport survey
9. Commercial vehicle survey

3.1.2 ROAD SIDE INTERVIEW SURVEY

- In this method interview stations are previously decided on the roadway.
- The vehicles are stopped at the interview stations by a group of persons and the answers to prescribed questionnaire are collected on the spot.
- The survey points are selected along the junction of the cordon-line or screen-line with the road.
- Less then 5000 population -external cordon is sufficient.
- For dual carriageways or roads every little traffic the traffic in the both direction is dealt with simultaneously.
- In other cases the traffic in 2 direction will be interviewed at different times.

- If the survey covers most of the day it may be sufficient to interview traffic in one direction only and to assume that the journey in the opposite direction are the same as the direction interviewed.

INFORMATION COLLECTED

- Place and time of origin
- Place and time of destination
- Route
- Purpose of the trip
- Types of vehicles
- Number of passengers in each vehicle

3.1.3 HOUSEHOLD SURVEY

- In this method random sample of 0.5 to 10 percentage of the population is selected and the residence are visited by the trained person who collect the travel data from each member of the household.
- Detailed information regarding the trips made by the members is obtained on the spot.
- The data collected may be useful either for planning the road network and other roadway facilities.

DATA COLLECTION

- Number of trips made
- Origin Destination
- Purpose of trip
- Travel mode
- Number of Residents
- Age

- Vehicle ownership
- Number of drivers
- Family income

3.1.4 TELEPHONE SURVEY

- This method interview are conduct with computer assisted telephone interview technology.
- A complete cati system might include automatic dialing of next household to the interviewer to ask the nest question automatic skipping and branching within the list of questions depending on the answer to the previous question ,immediate logic checks on answer provided.

3.1.5 TAXI SURVEY

- Large urban areas usually have a sizeable amount of travel by taxis.
- In such cases, a separate taxi survey is necessary .
- The survey consists of issuing questionnaires or log sheets to the taxi drivers and requesting them to complete the same.

3.1.6 POST CARD

- In this method reply-paid questionnaires are handed over to each of the drivers at the survey points and requesting them to complete the information and return by post.

3.1.7 REGISTRATION NUMBER PLATE SURVEY

- Registration number plate survey consists of noting the registration number of vehicles entering or leaving an area at survey points located on the cordon line.
- By matching the registration number of the vehicles at the point of entry and exit from the area, one is enabled to identify two points on the paths of the vehicles.

3.1.8 TAG ON VEHICLE SURVEY

- In this method at each point where the roads cross the cordon line, vehicles are stopped and a tag is affixed, usually under a wind screen wiper.
- The tags for different surveys stations have different shapes/colour to
- identify the survey station.
- The vehicles are stopped again at the exit points where the tags are removed.
- The time of entering and leaving the area may be marked on the tags in order to enable the journey time to be determined.

3.1.9 PUBLIC TRANSPORT SURVEYS

- In this method interviewer may enter the vehicle and carry out the interviews when the vehicles is in motion.
- Post-card questionnaires eliminate delays, but are likely to evoke poor response or contain an element or bias.
- These questionnaires may also be collected at the stations inside the survey area.

3.2 USES OF OD SURVEY

- To determine the amount of by passable traffic that enters a town and thus establishes the need for bypass.
- To develop trip generation and trip distribution models in transport planning process.
- To determine the extent to which the present highway system is adequate and plan for new facilities.
- To assess the adequacy of parking facilities and plan for future
- To location of new proposed roads
- To regulate movement of heavy vehicles

Chapter 4

METHODOLOGY

4.1 ROADSIDE INTERVIEW METHOD

4.1.1 ROADSIDE INTERVIEW METHOD

- In this method interview stations are previously decided on the roadway.
- The vehicles are stopped at the interview stations by a group of persons and the answers to prescribed questionnaire are collected on the spot.
- The survey points are selected along the junction of the cordon-line or screen-line with the road.
- Less then 5000 population -external cordon is sufficient
- For dual carriageways or roads every little traffic the traffic in the both directions is dealt with simultaneously.
- In other cases the traffic in 2 direction will be interviewed at different times.
- If the survey covers most of the day it may be sufficient to interview traffic in one direction only and to assume that the journey in the opposite direction are the same as the direction interviewed.

4.1.2 Origin-Destination (Roadside Interview) Surveys Analysis - OC Locations

The format used for OD survey included the information relating to the survey location, direction of movements, date and time of survey etc. along with the provision for record-

ing the type of vehicle, place of origin and place of destination, number of passengers travelling, type of goods and quantity of goods etc. Separate forms were used for passenger vehicles, goods vehicles and for buses.

4.1.3 Planning of Surveys

For conducting field survey considerable amount of planning efforts are made. The planning efforts include:

1. A proper place on the ground at the survey location to facilitate the positioning of enumerators and facilities to carry out the survey in the evenings Choosing /early hours/night of the day.
2. The place convenient and safe for stopping the vehicles on the roadside for conducting the interviews.
3. Selecting and training of the enumerators for doing the job. This involves the instructions to enumerators and making them understands the purpose of the survey and the process of conducting the interviews of the travellers/drivers to get the required information from them.
4. Obtaining the help of police to stop the vehicles on the roadside for conducting the interviews on sampling basis.
5. Wherever required lighting facilities are organized for the conduct of the surveys during night time.

4.1.4 Organisation of Surveys

OD surveys are conducted at each of the locations by engaging the required number of trained enumerators and interviewers for each direction of movement. The requirement of enumerators and interviewers was assessed based on preliminary assessment of the volume of traffic flows and the target sample. Field surveys were carried out for 24 hours during June 2019. The surveys are carried out on sampling basis. It is expected that, in road side interviews, it becomes difficult to follow a stipulated sampling procedure because the conduct of survey greatly depends upon the field situations and flow of vehicles and the cooperation extended by the drivers/owners in stopping and answering the interviews. In

view of this, variable sample sizes for each category of the vehicles is obtained which has been normalized. Locations identified on important roads in Allagadda. And locations shown in Table-4.1

Table 4.1: Outer Cordon Survey Locations in Allagadda

S.NO	LOCATION	Date of Survey
R-1	Nandyal -Kadapa Road	20-06-2019
R-2	Koilakuntla-T.B Road Road	20-06-2019
R-3	NH 40 to Allagadda Road	20-06-2019
R-4	T.B Road to Patha Bus stand Road	20-06-2019
R-5	Mayalur to Allagadda Road	20-06-2019
R-6	Nandyal to Allagadda Road	20-06-2019
R-7	Allagadda to Koilakuntla Road	20-06-2019

4.1.5 Quality Checks

In any field survey, appropriate steps are needed to ensure the quality and accuracy of the data. In the field surveys, to ensure the maximum accuracy, checks are made by conducting the Classified Traffic Volume counts personally by supervisors for a limited period at the site a little away from the place of posting of enumerators, without the knowledge of the enumerators. The erring enumerators were warned instantaneously to correct them. Thus, the quality of surveys was ensured in the field. When data comes to office, coding and totaling is done with care. It is checked on sample basis by other person and necessary corrections, if any is made. Some of the half-filled forms in the field or filled with erroneous code/ name of the places etc. has been discarded from the sample.

Table -4.2 presents the traffic moving on various roads of Bhuma Junction in both the directions (from and to) from the study area. Bhuma Junction found to carry the total outer cordon traffic. Out of these, connecting Koilakuntla,Nandyal,Kadapa,NH 40 passing through Bhuma junction carries around of vehicles

Table 4.2: Traffic Handled By Various Road Categories

Road Category	**Traffic Volume In Vehicles**	**% Share**
Nandyal to Kadapa Road	10182	18%
Koilakuntla to T.B Road	10776	19%
NH 40 to Allagadda Road	5605	10%
T.B Road to Patha Bus stand Road	14770	27%
Mayalur to Allagadda Road	3575	6%
Nandyal to Allagadda Road	4084	8%
Allagadda to Koilakuntla Road	6765	12%
Total	55757	100%

4.1.6 O-D Sample Size

Table 4.3 presents the sample sizes of passenger, bus and goods vehicles at each of the location in Allagadda. it can be seen that, the sample size varied from 42% to 70% for passenger vehicles, 4% to 22% for buses and from 10% to 53% for goods vehicles. Location wise sample size achieved varies from 29% to 60%.

Table 4.3: Sample size Interviewed as per Grouped Modes at Outer Cordon Points

Location	**Passenger**	**Bus**	**Goods**	**Total**
R-1	57%	22%	20%	203%
R-2	70%	17%	13%	203%
R-3	42%	31%	22%	203%
R-4	61%	12%	27%	203%
R-5	62%	15%	23%	203%
R-6	64%	15%	21%	203%
R-7	59%	4%	10%	203%

4.1.7 Passenger Movement Analysis

Trip Purpose Private Vehicles (Two wheeler and Car): Location wise trip purpose split of private vehicles i.e. two wheelers and cars at each Outer Cordon location is presented in Figure-1 and considering all the Outer Cordon locations is presented in Figure-1.1 The following inferences are made:

- 48% trips are Home Based work trips and 27% of Home-Based Other trips (which includes Shopping, Entertainment, Medical, Places of Business and others), 14% of the trips are Non-Home-Based Trips and 10% trips are Home Based Education Trips;
- High shares of Home Based Work trips are observed at R-7 route connecting Allagadda To

Koilakuntla with (62%), for R-4 route T.B Road to Patha Bus stand with (60%), for R-2 route Koilakuntla to T.B Road with (50%), R-6 route connecting Nandyal To Allagadda road with (46%), for R-1 route connecting Nandyal To Kadapa road with (45%), for R-3 route connecting NH 40 To Allagadda road with (37%), for R-5 route connecting Mayalur To Allagadda road with (34%).

- High share of Home Based Education trips are observed at R-1 route connecting with Nandyal -Kadapa with (22%),for R-6 route connecting Nandyal To Allagadda road with (15%),for R-7 route connecting Allagadda To Koilakuntla with (10%),for R-2 route Koilakuntla to T.B Road with (8%), for R-4 route T.B Road to Patha Bus stand with (7%), for R-5 route connecting Mayalur To Allagadda road with (4%).

- High share of Home Based Other trips are observed at R-3 route connecting with T.B Road To Patha Bus stand with (52%),for R-2 route Koilakuntla to T.B Road with (37%), for R-6 route connecting Nandyal To Allagadda road with (35%), for R-7 route connecting Allagadda To Koilakuntla with (28%), for R-5 route connecting Mayalur To Allagadda road with (17%), R-1 route connecting with Nandyal -Kadapa with (22%).

- High share of Non Home Based trips are observed at R-5 route connecting with Mayalur To Allagadda with (43%), for R-2 route Koilakuntla to T.B Road with (20%),for R-1 route connecting with Nandyal -Kadapa with (19%), R-3 route connecting with T.B Road To Patha Bus stand with (10%), for R-2 route Koilakuntla to T.B Road with (5%), for R-6 route connecting Nandyal To Allagadda road with (3%).

Occupancy Analysis - Passenger Vehicles (Except Buses):

Table 4.2 presents the occupancy of passenger vehicles (except buses) at different locations of the Outer Cordon. Among these, 7 seaters (3w)/ Maxi Cab have highest average occupancy than auto rickshaws and taxis. These are followed by private vehicles i.e., cars and two wheelers. Figure 4.4 represents the average vehicle occupancy of all locations of different mode at Outer Cordon.

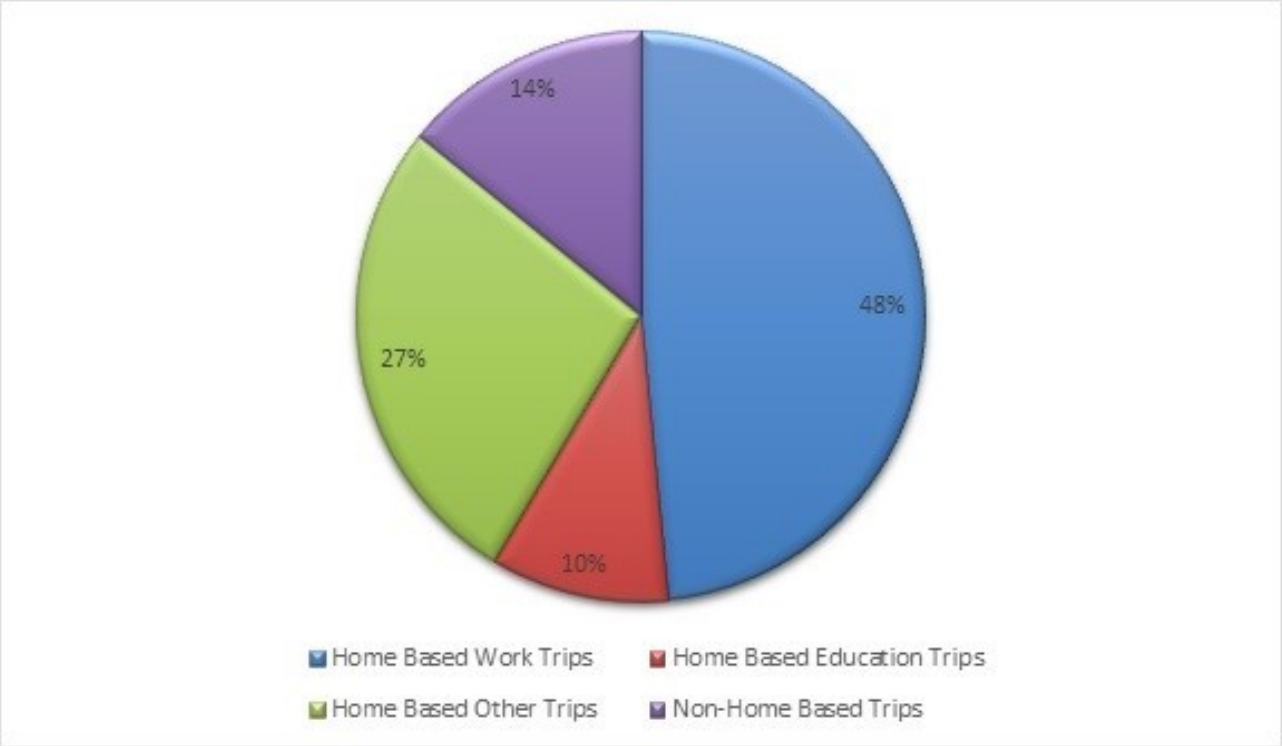

Figure 4.1: Origin Trip Purpose Split for Private Vehicles (Two-wheeler and Cars) at Outer Cordon Locations

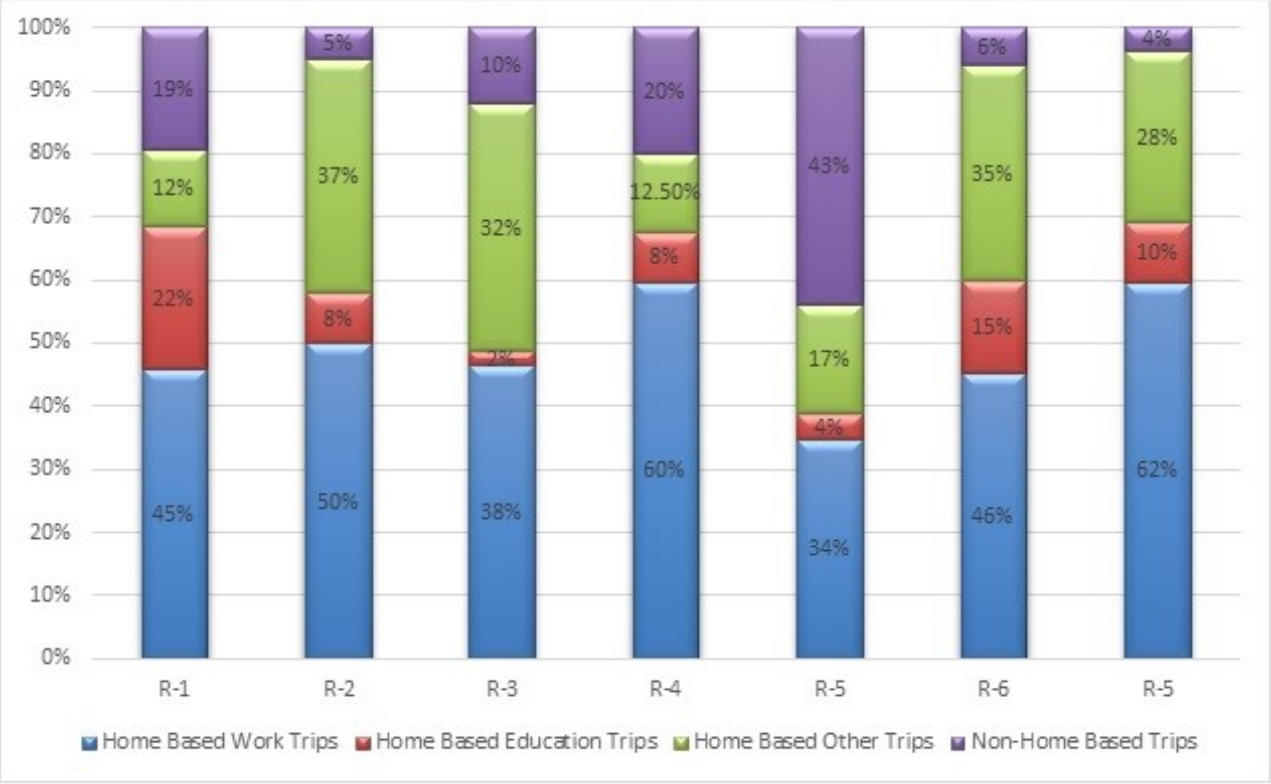

Figure 4.2: Origin Trip Purpose Split for Private Vehicles (Two-wheeler and Cars) at Outer Cordon Locations

Frequency Analysis - Passenger Vehicles (Except Buses):

Figure 4.4 presents the frequency distribution of passenger vehicles (except buses) at

Table 4.4: Mode wise Occupancy at Different Locations on Outer Cordon

Locations	**2-Wheelers**	**Auto-Rickshaw(3W)**	**(car, jeep, taxi)**
R-1	1.7	3.5	4.2
R-2	1.8	4.1	3.9
R-3	2.1	7.1	3.7
R-4	1.4	3.6	4.8
R-5	2.1	7.1	3.4
R-6	1.9	6	4.9
R-7	1.9	5.6	3.3

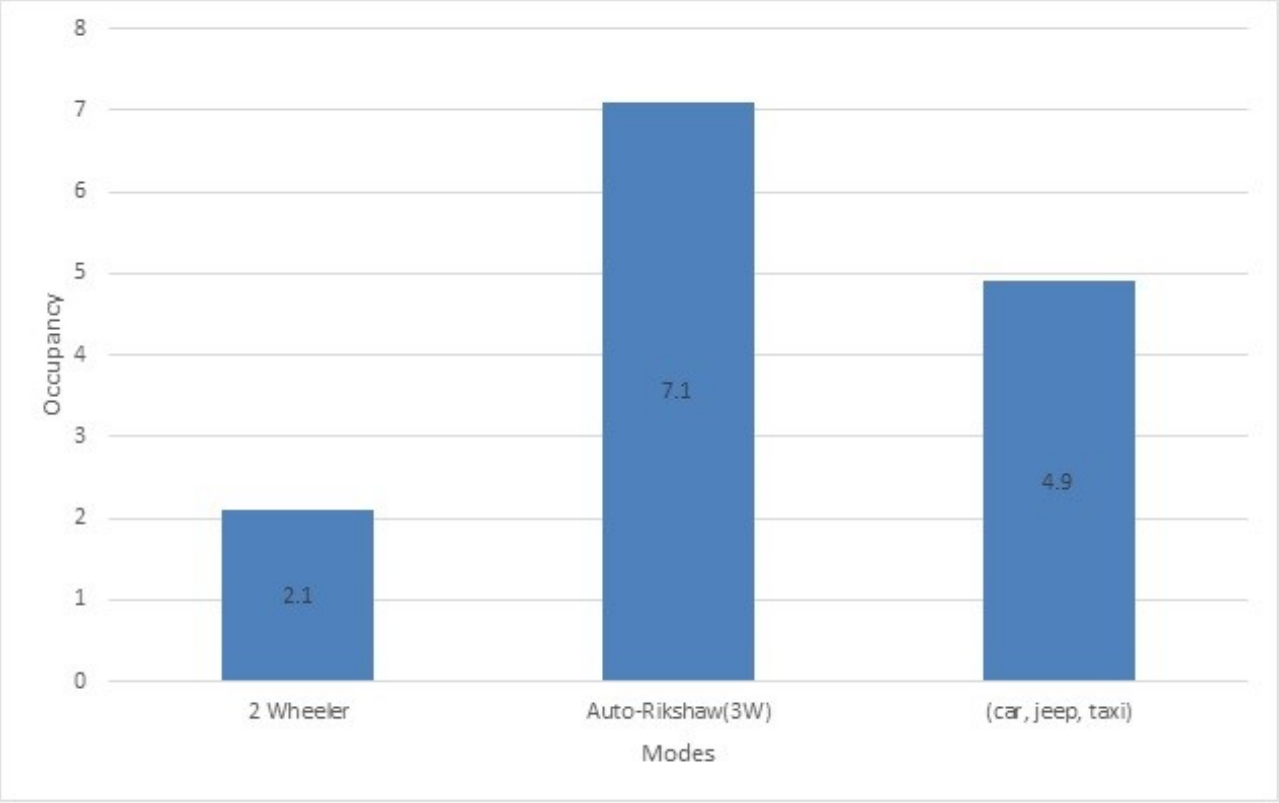

Figure 4.3: Vehicle Occupancy for Various Modes at Outer Cordon

different locations of the Outer Cordon. In trip frequency, at all outer cordon locations of ALLAGADDA area shown in Figure 4.5 Daily (Up/Down) are predominant, these trips are around 48 percent followed by Weekly trips in the range of 22 percent of the trips respectively.

Sub Regional Analysis - Passenger Vehicles (Except Buses):

Table 4.5 presents the total number of person trips produced and attracted to the study area by passenger vehicles (except buses) to different regions of the study area on an average day. Table 4.6 presents the vehicular movement pattern at the Outer Cordon.

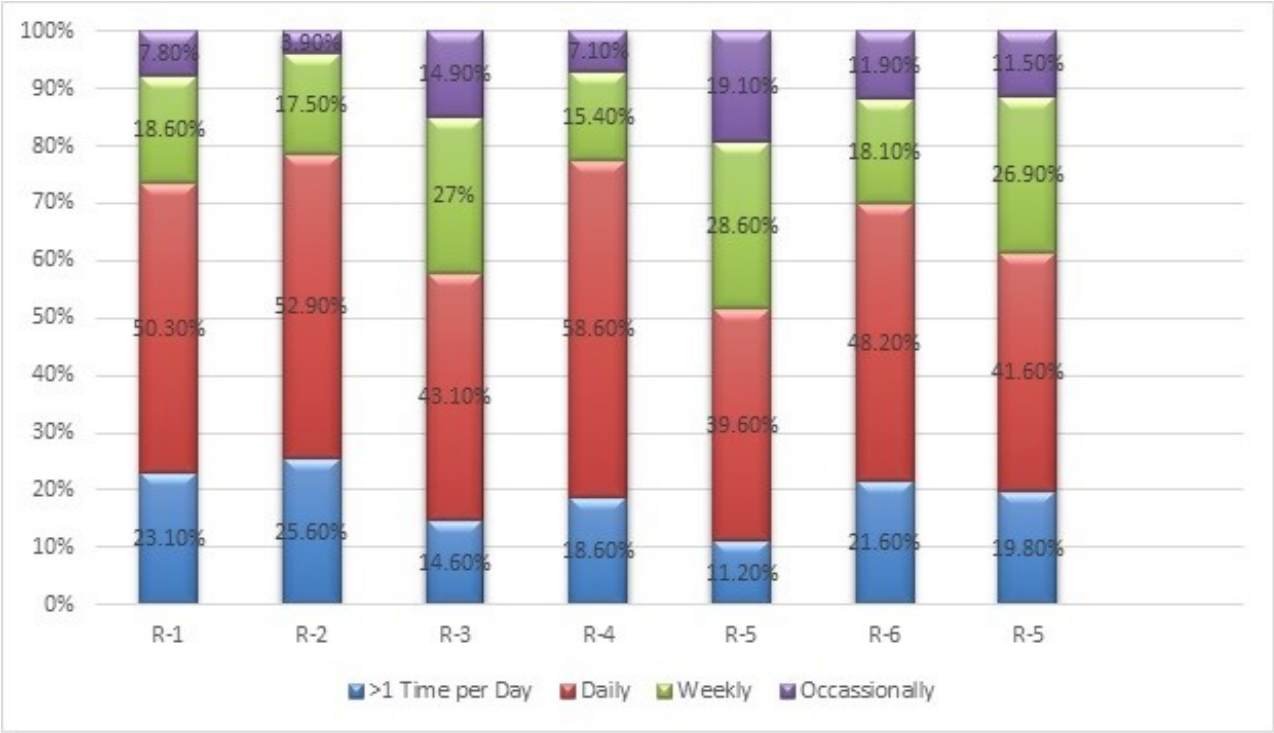

Figure 4.4: Frequency-wise distribution of passenger trips intercepted at Outer Cordon

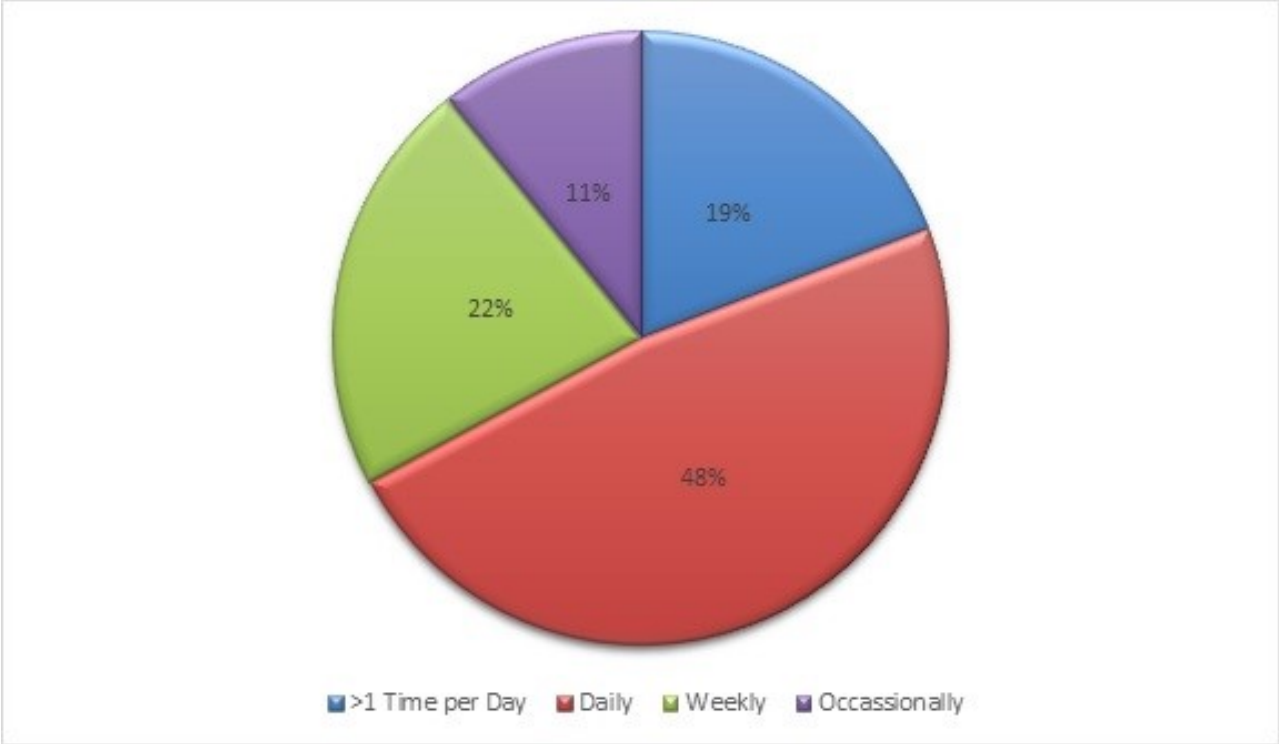

Figure 4.5: Trip frequency with Allagadda area at all outer cordon locations

Trip Length Analysis

The average trip lengths in km of each mode at all the locations are presented in the Table 4.7 . It can be inferred that the average trip length of Car/Jeep. Auto-Rikshaws is higher

Table 4.5: O-D Characteristics of Passengers (In Persons): Passenger Vehicles (except Buses) Region

Region	**Attraction**	**Production**
Allagadda	896	1064

Table 4.6: Vehicular Movement Pattern - Passenger Vehicles (Excluding Bus) at Outer Cordon

Movement	**Vehicles**	**%**
External-External	118	35.10%
External-Internal	91	27.00%
Internal-External	127	37.79%
Grand Total	336	100%

followed. It can be inferred that, 46% of the passenger vehicles have trip length with 10-50 km. Figure 4.8 represents the trip length frequency distribution and cumulative frequency distribution.

Table 4.7: Mode wise Average Trip Length (Km) at different Location

Locations	**2-Wheelers**	**Auto-Rickshaw(3W)**	**(car, jeep, taxi)**
R-1	11.5	8.8	24.3
R-2	16.6	10.1	18.6
R-3	11.6	8.7	12.5
R-4	4.6	5	6.4
R-5	14.6	8.6	11.6
R-6	10.6	9.6	12.9
R-7	9.8	12.6	14.6

4.1.8 Passenger Movement Analysis-Bus

Occupancy Analysis - Buses:

Average occupancies of buses at different locations on Outer Cordon are presented in Table 4.8 and shown in Figure 3-26. Overall average occupancy of buses is 30. Occupancy of Other buses (32) followed by APSRTC buses (29) and APSRTC buses (26).

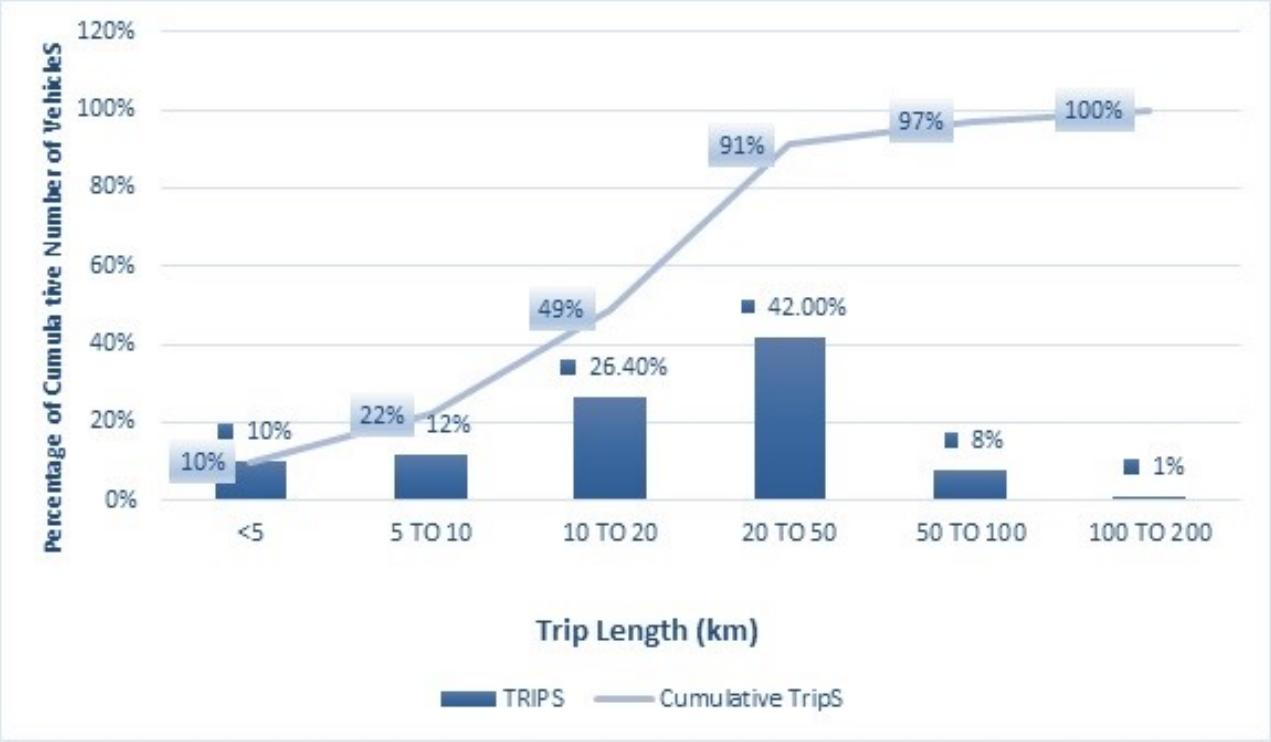

Figure 4.6: Trip Length Frequency Distribution for Passenger Vehicles

Table 4.8: Mode wise occupancy of Buses at different Locations on Outer Cordon

Locations	**Mini Bus**	**APSRTC Bus**	**Other Bus**
R-1	33	43.1	20.6
R-2	21.2	46.3	25.6
R-3	23.3	51.4	18.6
R-4	36.3	48.6	21.2
R-5	28.8	41.6	24.6
R-6	32.5	49.4	17.4
R-7	26.4	45.6	21.8

Sub Regional Analysis -Buses:

Table 4.9 presents the total number of person trips produced and attracted by buses to Allagadda on an average day.

Table 4.9: O-D Characteristics of Passengers (In Persons): Buses

Region	**Attraction**	**Production**
Allagadda	2079	3146

Trip Frequency Characteristics of Goods Vehicles:

Figure 4.8 and Figure 4.9 presents the trip frequency distribution of goods vehicles of all Outer Cordon locations. Goods vehicle trips moving daily are highest with 36 percent

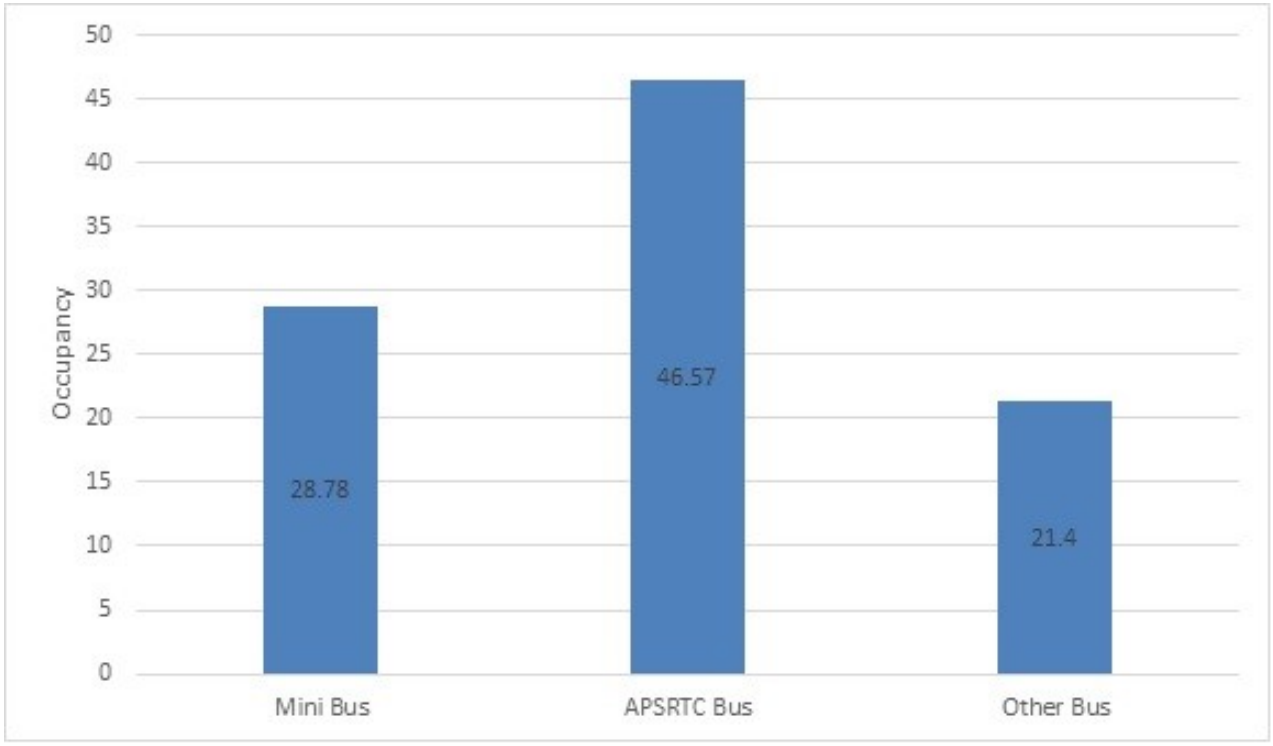

Figure 4.7: Average Occupancy of different types of buses at Outer Cordon

of trips at the Outer Cordon Locations. These are followed by weekly trips and less than once per day trips in the range of 32% and 18% of the total goods vehicle trips respectively.

Figure 4.8: Trip Frequency Distribution of Goods Vehicles at all Outer cordon Locations

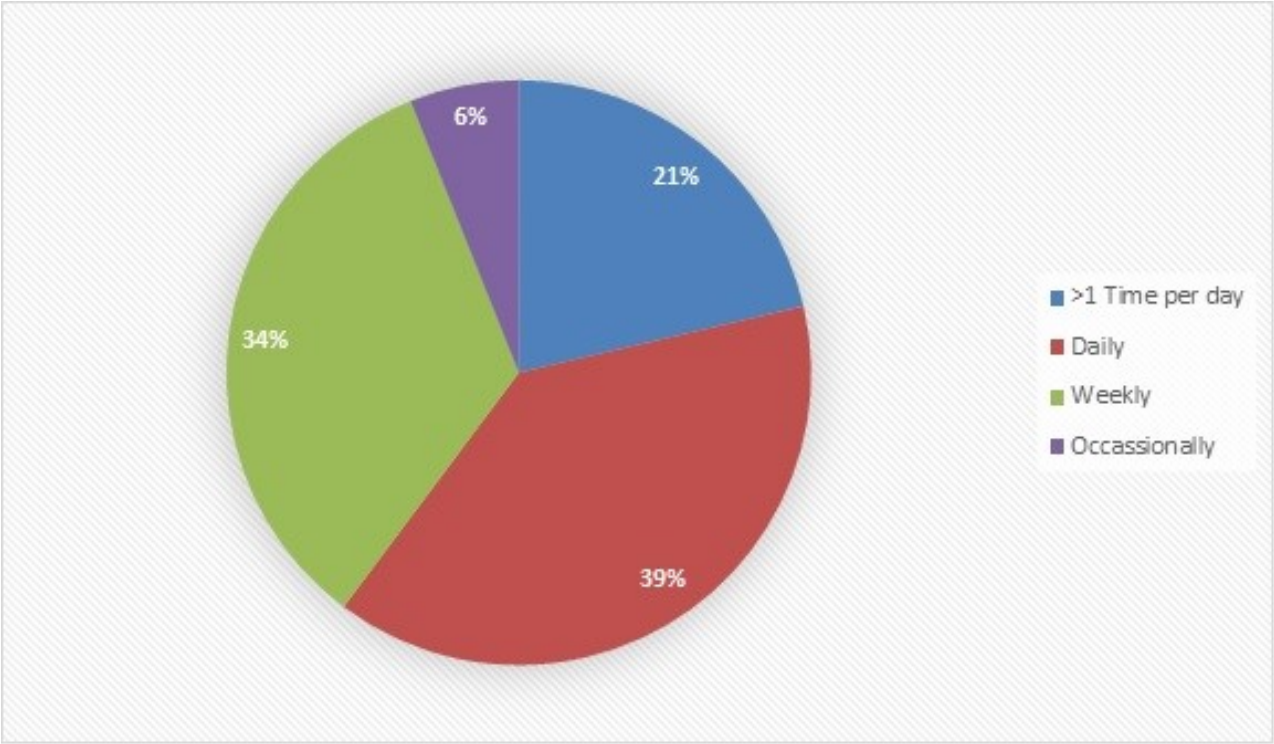

Figure 4.9: Frequency-wise distribution of Goods trips intercepted at Outer Cordon

Distribution of Goods Vehicular Trips by Commodity Type:

Figure 4.10 and Figure 4.11 presents the commodity shares of goods vehicles at Outer Cordon with empty vehicles and without empty vehicles respectively. Nearly 46% of the trucks are empty. The major commodities carried are Building materials (15%) followed by Food Grains (12%) and Fruits and Vegetables (7%).

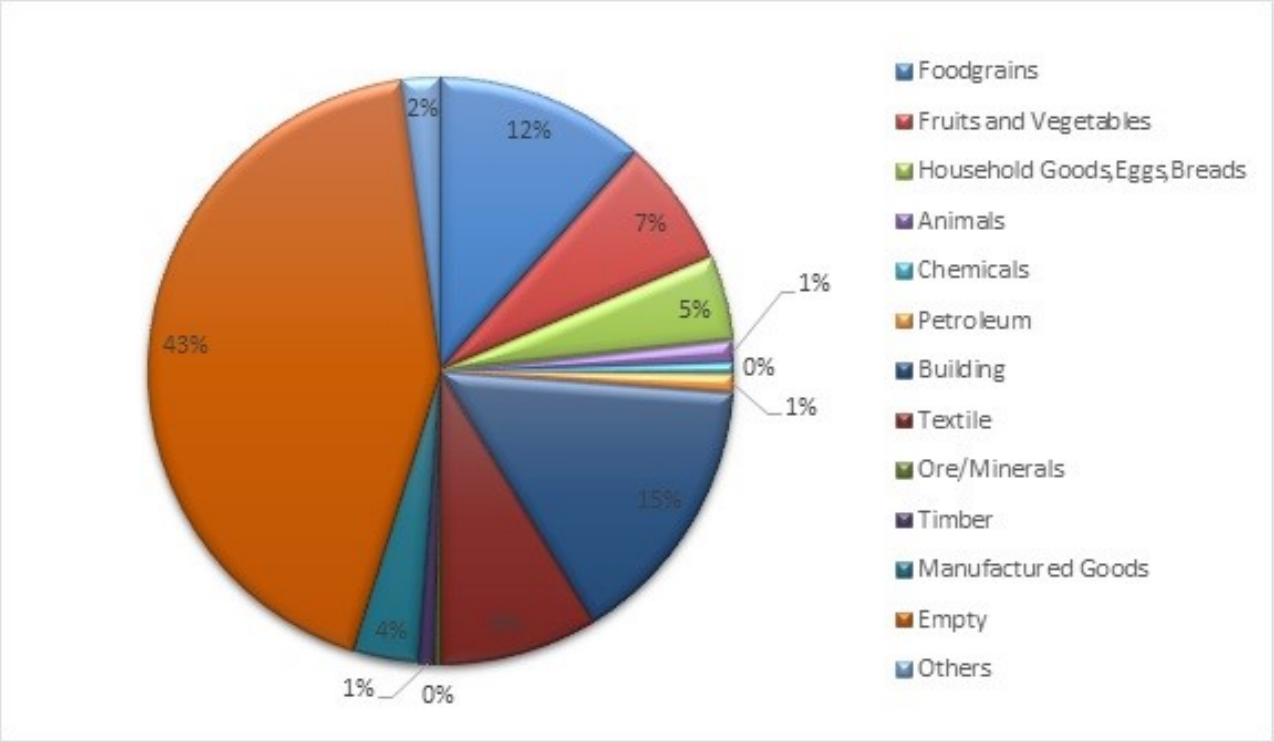

Figure 4.10: Commodity Share of Goods traffic at Outer Cordon (including empty vehicles)

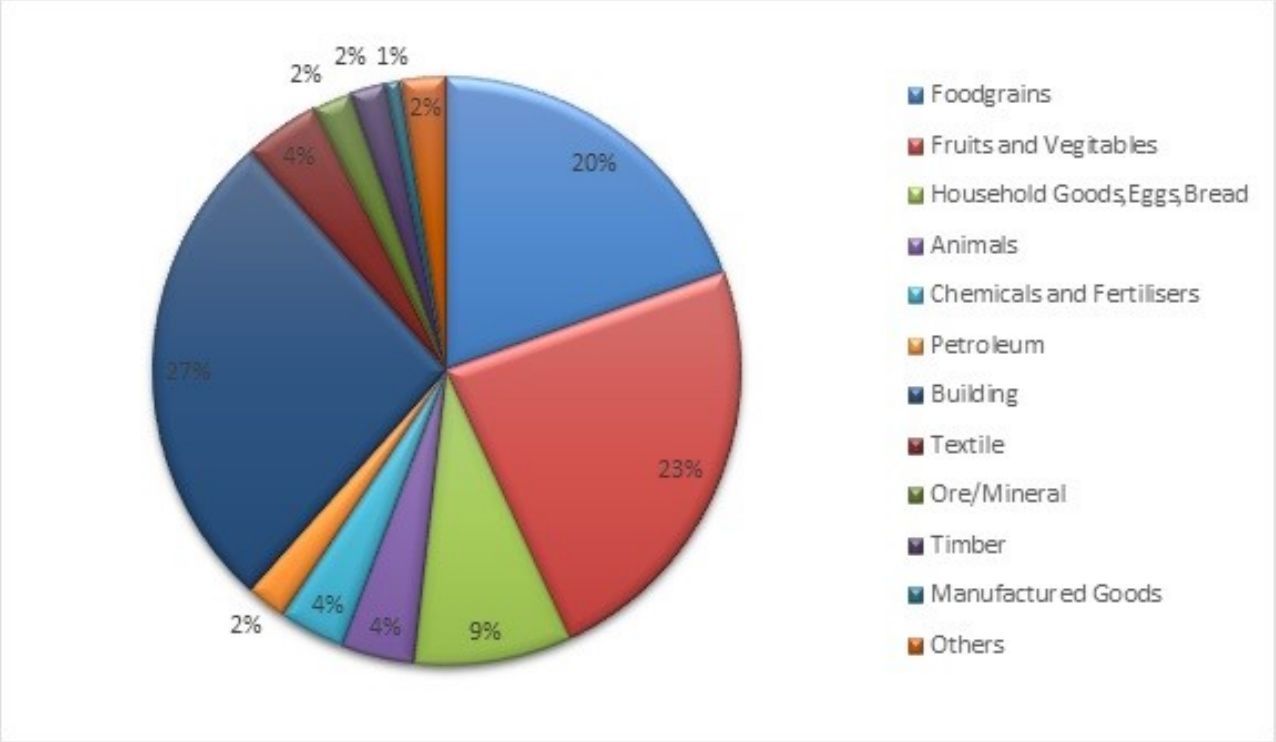

Figure 4.11: Commodity Share of Goods traffic at Outer Cordon (excluding empty vehicles)

Trip Length frequency distribution of Goods.

Average trip length of various types of goods vehicles is shown in Figure 12. It is observed that MAV trucks have highest average trip length of 145 km followed by 3-Axle trucks

with 131.5km. Tractors have the least trip length of 44 km. Trip frequency distribution of goods vehicle is shown in Figure 4.13. It is observed that 92% of trips have trip length less than 100 km.

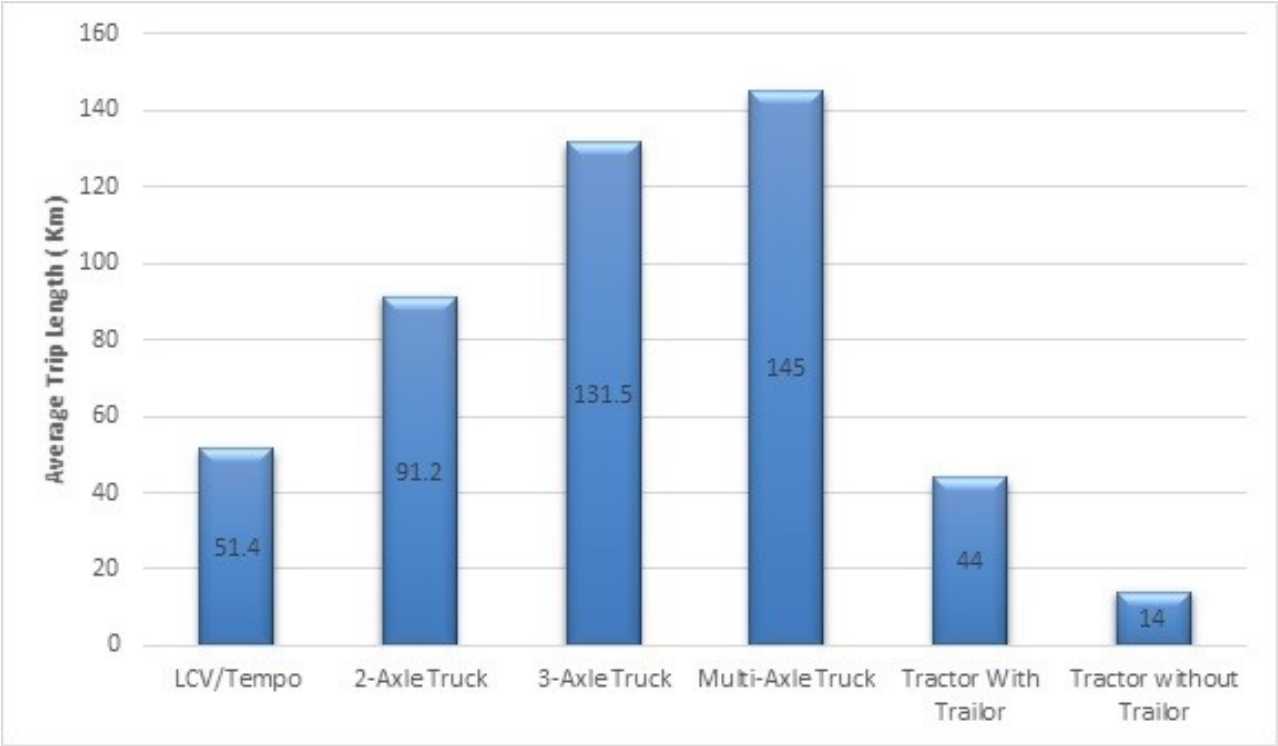

Figure 4.12: Average Trip Length (km) of Goods Vehicles

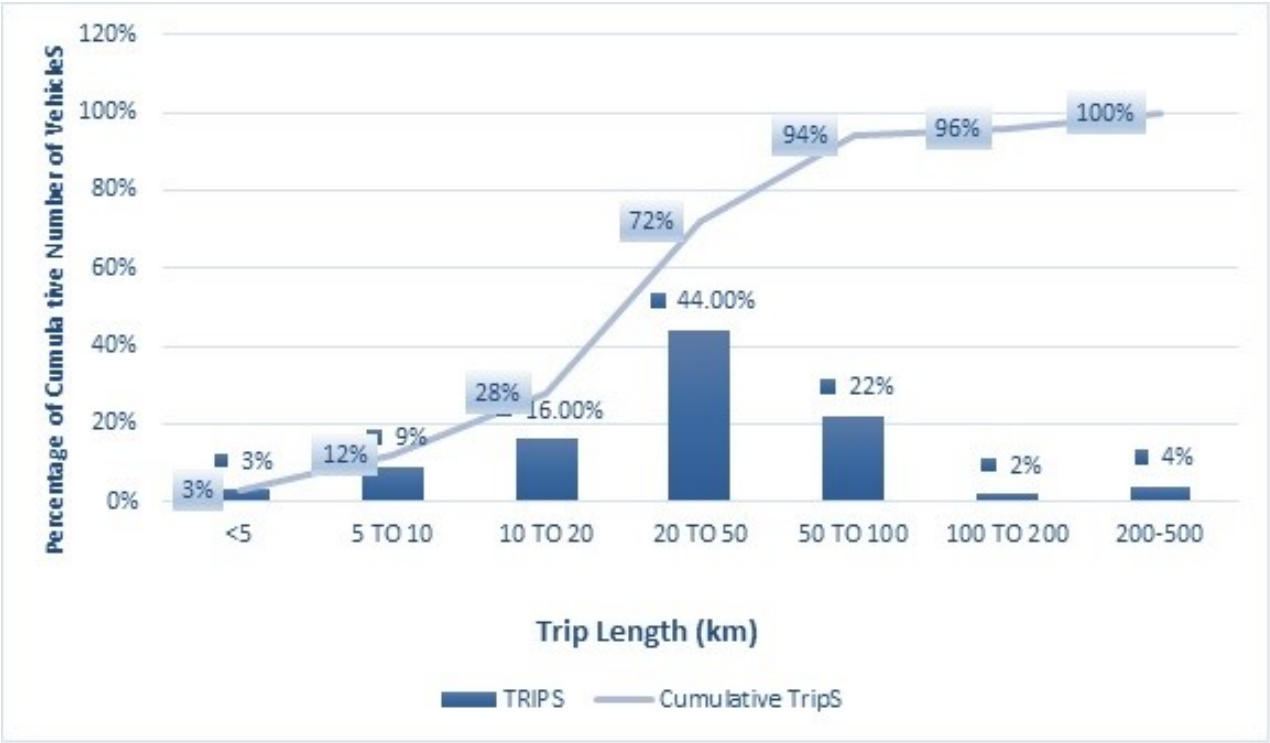

Figure 4.13: Trip Length Frequency Distribution for Goods Vehicles

4.2 HOUSEHOLD INTERVIEW SURVEY

1. In this method random sample of 0.5% to 10% of the population is selected and the residence are visited by the trained person who collect the travel data from each member of the household.
2. Detailed information regarding the trips made by the members is obtained on the spot.
3. The data collected may be useful either for planning the road network and other roadway facilities.

4.2.1 Introduction

(a) Home interview survey (HIS)/Household Survey is the most standard way to collect socio-economic and travel characteristics of population living in an area/region. As per Terms of Reference of the Master Plan Study, 2 to 2.5% of the households living in the municipal area as per 2011 Census, which is estimating to nearly 400 households, has been interviewed in this survey. They have been surveyed to assess socio-economic, travel characteristics and internal travel pattern. A systematic random sampling technique has been adopted to arrive at number of households to be interviewed in the whole Project Area. It represents all the wards of the municipal area.

(b) The questionnaire used for conduct of HIS is presented in Annexure 26. Both English and Telugu HIS formats are used to collect accurate details and are documented in the later sections of this chapter. HIS survey has been done in the month of August, 2019.

4.2.2 METHODOLOGY

The survey was primarily intended to draw out a socio - economic profile of the households, mobility levels and travel demand. There are three sections covering these aspects - Household level data, access to basic facilities and Person and regular travel data. In order to achieve this, Random Sampling method was adopted to select households in wards of the ULB. The total universe was split based on the

proportionality of households in terms of wards of Allagadda. In municipality, the samples are covered across all wards due to the heterogeneity underlying within it.

4.2.3 SAMPLE DISTRIBUTION AND SAMPLING STRATEGY

Household surveys have been conducted with a sample size of 400 households which is 2% of the total number of houses (as per Census, 2011). The samples have been distributed over the wards to have a stratified sampling.

Table 4.10: Sampling for Household survey in Allagadda

Ward No.	**Population**	**Households**	**Sample size (2%)**
1	**71**	**20**	**0.5**
2	**68**	**20**	**0.5**
3	**91**	**20**	**0.5**
4	**73**	**20**	**0.5**
5	**94**	**20**	**0.5**
6	**70**	**20**	**0.5**
7	**64**	**20**	**0.5**
8	**80**	**20**	**0.5**
9	**75**	**20**	**0.5**
10	**82**	**20**	**0.5**
11	**92**	**20**	**0.5**
12	**89**	**20**	**0.5**
13	**70**	**20**	**0.5**
14	**97**	**20**	**0.5**
15	**85**	**20**	**0.5**
16	**105**	**20**	**0.5**
17	**70**	**20**	**0.5**
18	**89**	**20**	**0.5**
19	**58**	**20**	**0.5**
20	**55**	**20**	**0.5**
TOTAL	**1578**	**400**	**10**

4.3 OUTSOMES OF HOUSEHOLD INTERVIEW SURVEYS

4.3.1 Socio-Economic Profile

This section presents the existing socio-economic profile of people living in Allagadda area. It consists of Household size, occupation structure, marital status, education etc.

4.3.2 Household Size

The average household size as per the HIS is 3. To understand the various groups and characteristics of the samples, household sizes are classified into 6 categories based on the sizes starting from 1 to 10. Out of these, 40% of the households have a size of 4 followed by 3 with 20% as shown in the Figure 4.14. As per the data given in Census 2011, the average household size of Allagadda is 3.5, which is slightly greater than the size arrived from HIS.

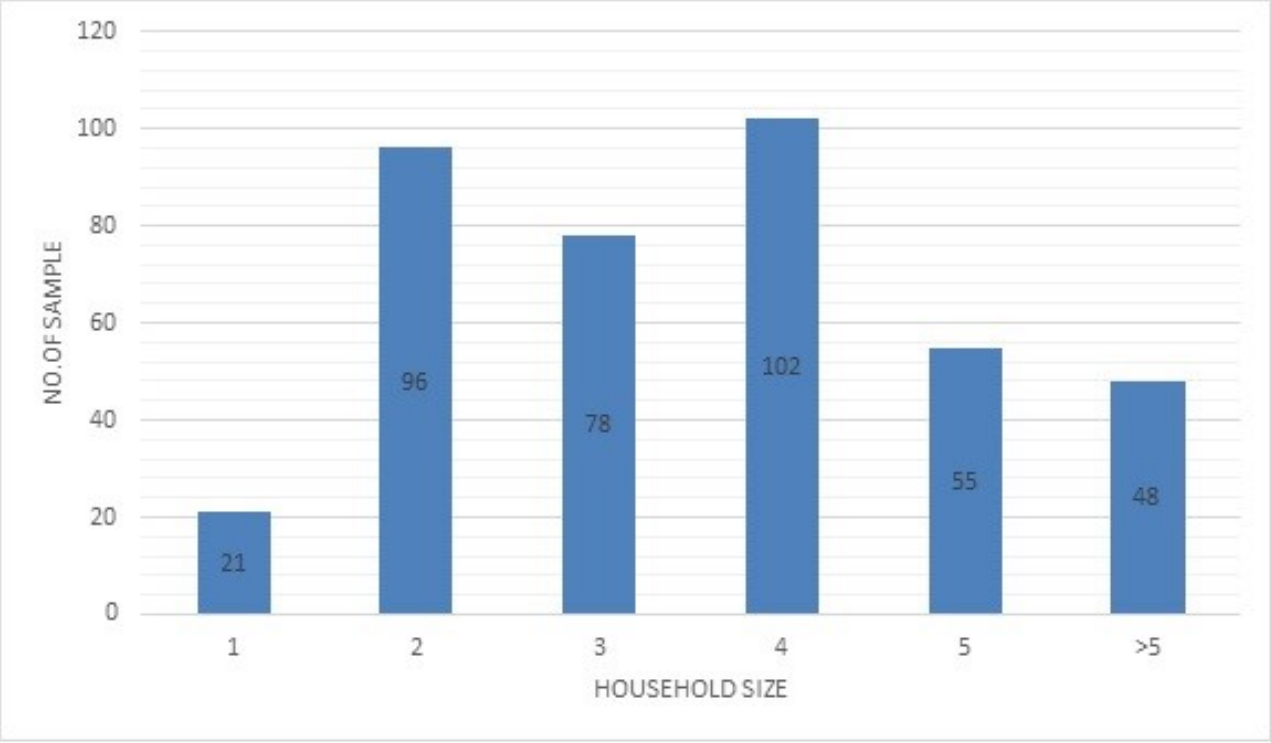

Figure 4.14: Distribution of Household sizes

4.3.3 Occupation structure

The occupation status is categorized based on the state of being occupied with. There are eight categories made based on the level of occupation. They are Employed (Full and Part time), Self Employed, Daily wage workers, and resident workers. These form the workforce of Allagadda. Rest of the categories consists of students, employment seekers, retired persons and homemakers. From the analysis, it is found that Daily wage workers make huge share of 35 percent followed by homemakers with 31% and 24% of students as presented in the Figure 4.15. The working categories contribute to 40 percent of the samples.

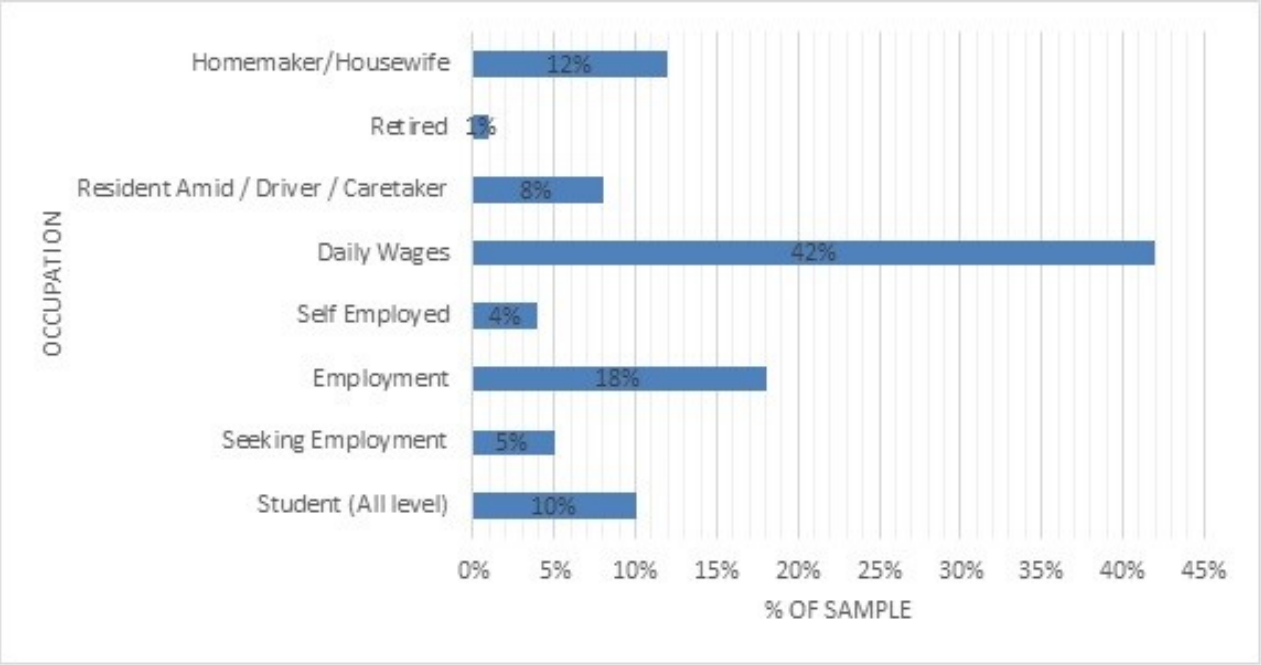

Figure 4.15: Occupation structure of Allagadda

4.3.4 Household Income

As part of the Home Interview survey, one of the important information sought was household income. Since prosperity is directly related to consumption levels, demand for travel also follows similar pattern. For this reason, following sections relates important variables collected as part of the survey with income groups. Instead of asking precise individual or household income, data was collected under nine income categories as presented in Table 4.11 .

Maximum samples are coming under category C, which is a monthly income of ?10,001 to ?15,000 per month. Overall, the monthly income of all surveyed samples is below 20,000. The distribution of monthly income as per above categories is presented in.

Table 4.11: Income Categories

Monthly Household Income	**Category**
Up to 5000	A
5001-10000	B
10001-15000	C
15001-20000	D
20001-30000	E
30001-40000	F
40001-60000	G
60001-100000	H
¿100000	I

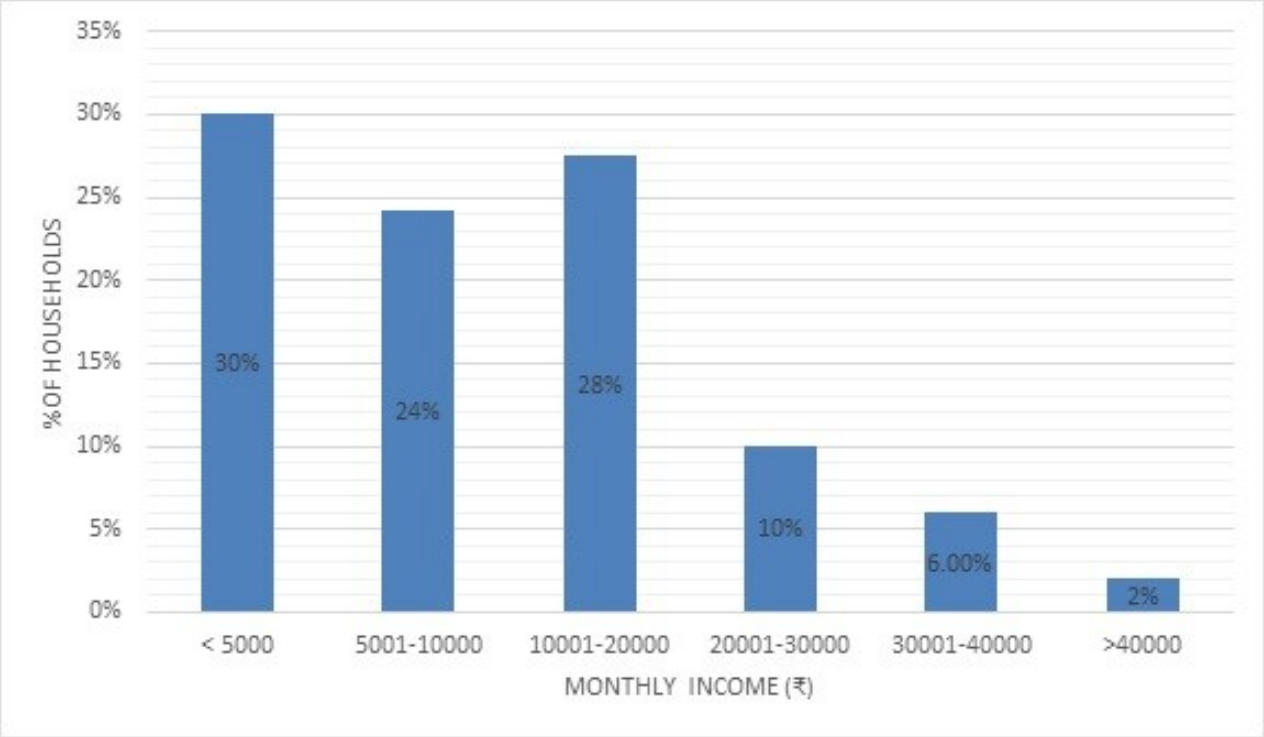

Figure 4.16: Monthly income of households

4.3.5 Housing Profile

The types of housing have been categorized in four types which are pucca, semi-pucca, kuccha and others. Majority of the sampled houses (80%) are pucca in

nature as shown in Figure 4.17. This is similar to the Census 2011 data which shows 87% of the houses are in good condition.

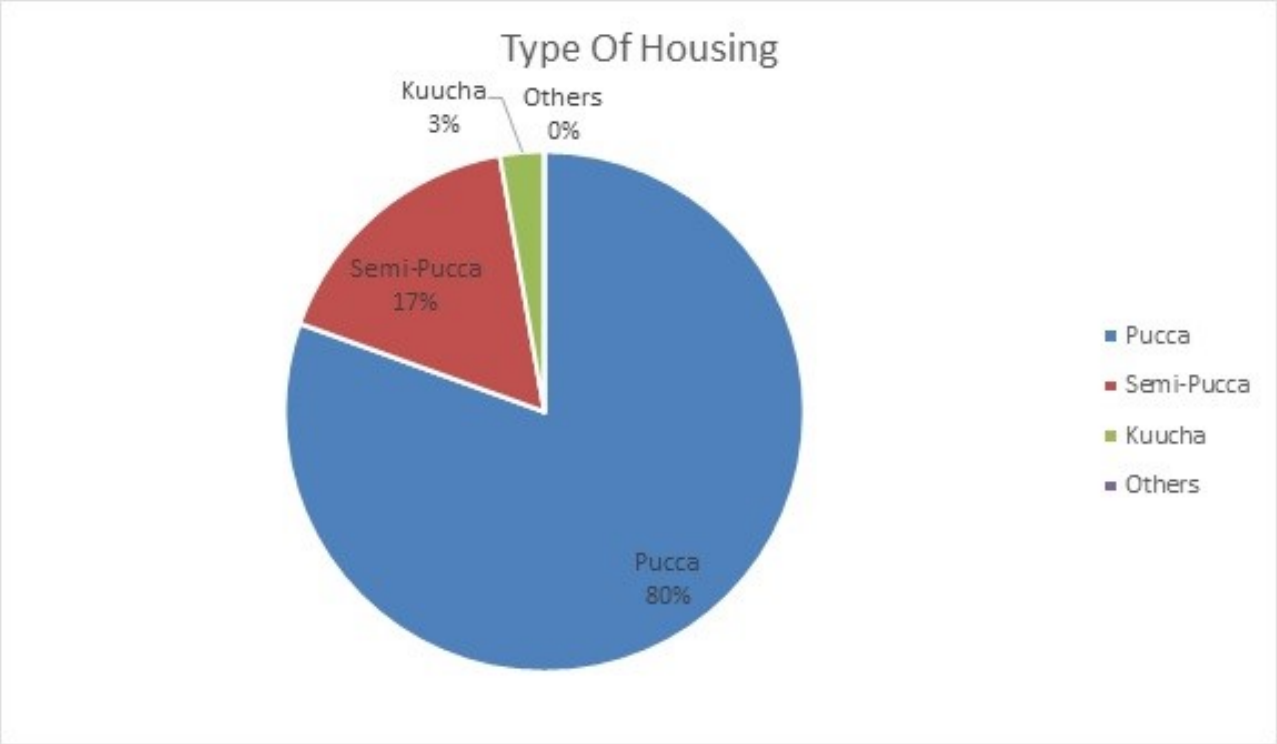

Figure 4.17: Housing typology in Allagadda

4.3.6 Access to facilities

Water Supply

When coming to the water supply status, it is seen that the Municipal tap system is found to be 8% while those who are dependent on the community level taps is 92%. The water supply distribution in the sampled households is shown in Figure 4.18 .

4.3.7 Sanitation and Sewerage

Toilet connection showcases not just a facility but also hygiene situation in the area. From the analysis, it is observed that 93% of the houses got septic tank facilities and there is no sewer connection in the town as shown in the Figure 4.19.

Recreation

The population of Allagadda finds the recreational facilities in the town sufficient for the presence of multiple theatres and function halls, and do not need to depend

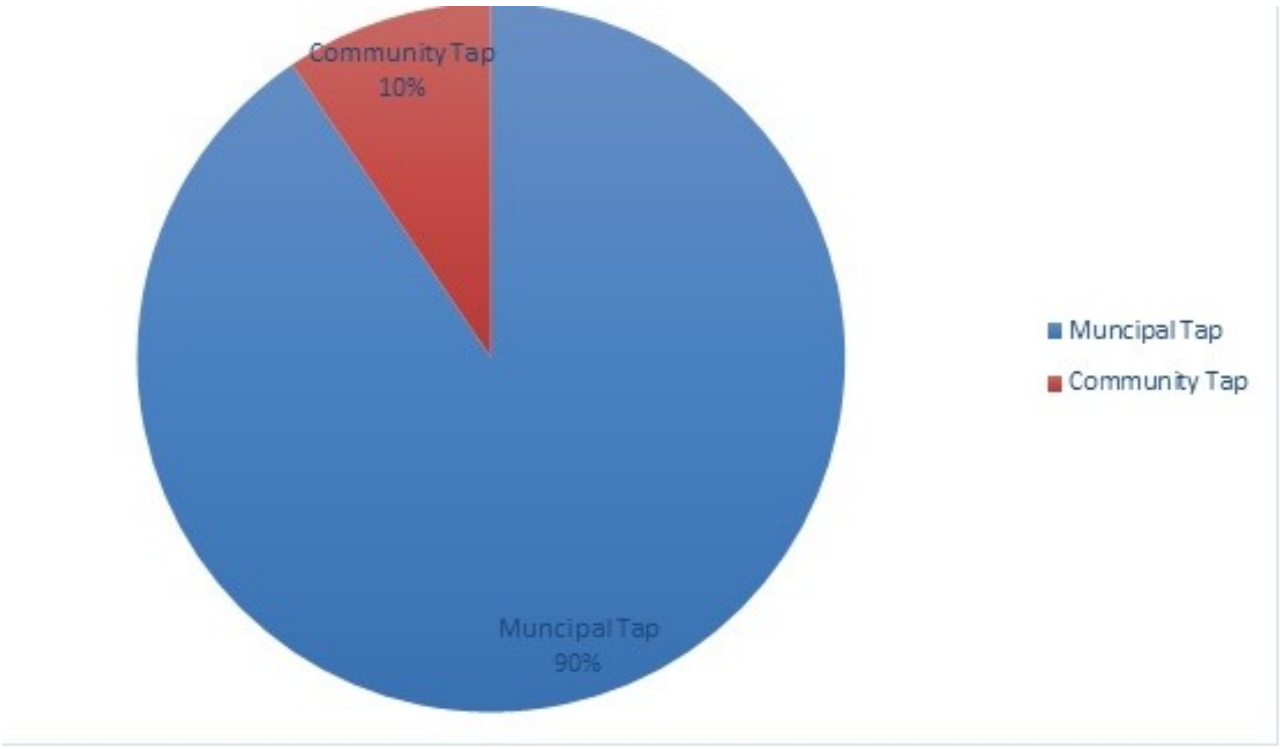

Figure 4.18: Water supply facility

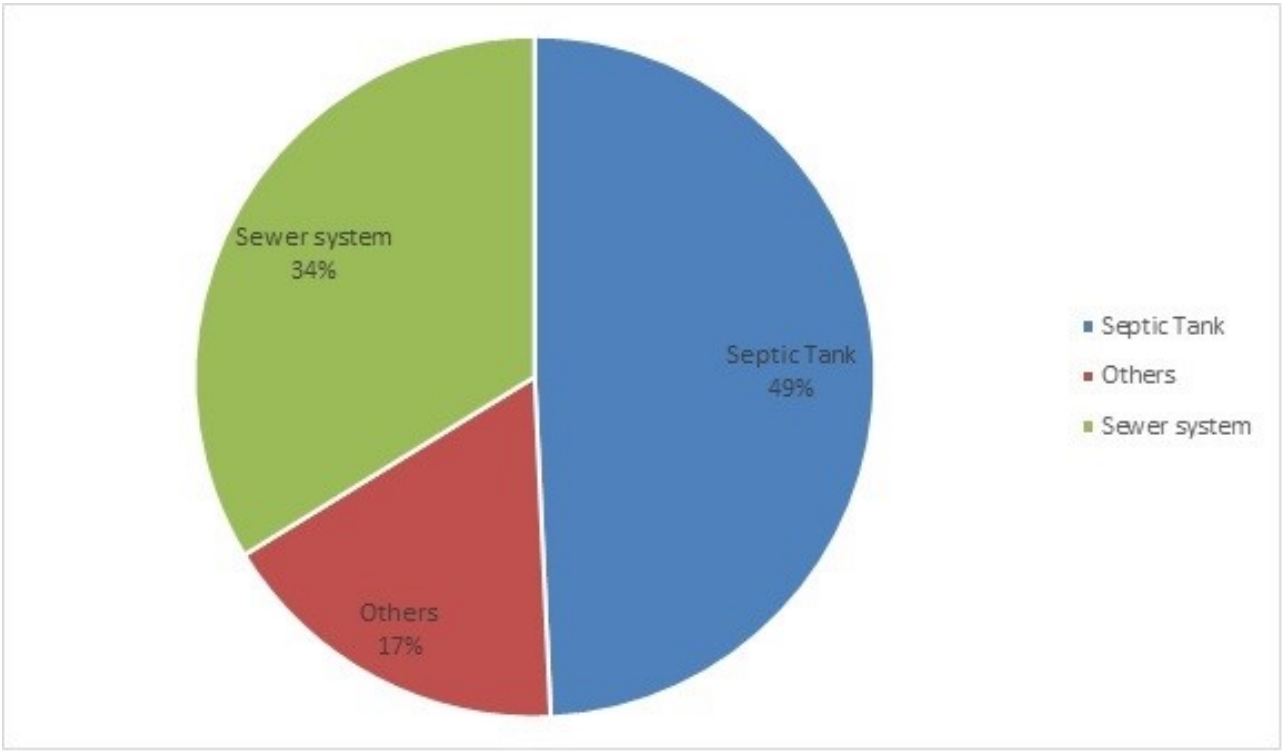

Figure 4.19: Sanitation facilities

on other towns for the same.

4.3.8 Regular Travel Pattern

The analysis for average monthly expenditure for travel and their trip durations are shown in Figure 4.20 and Figure 4.21 .

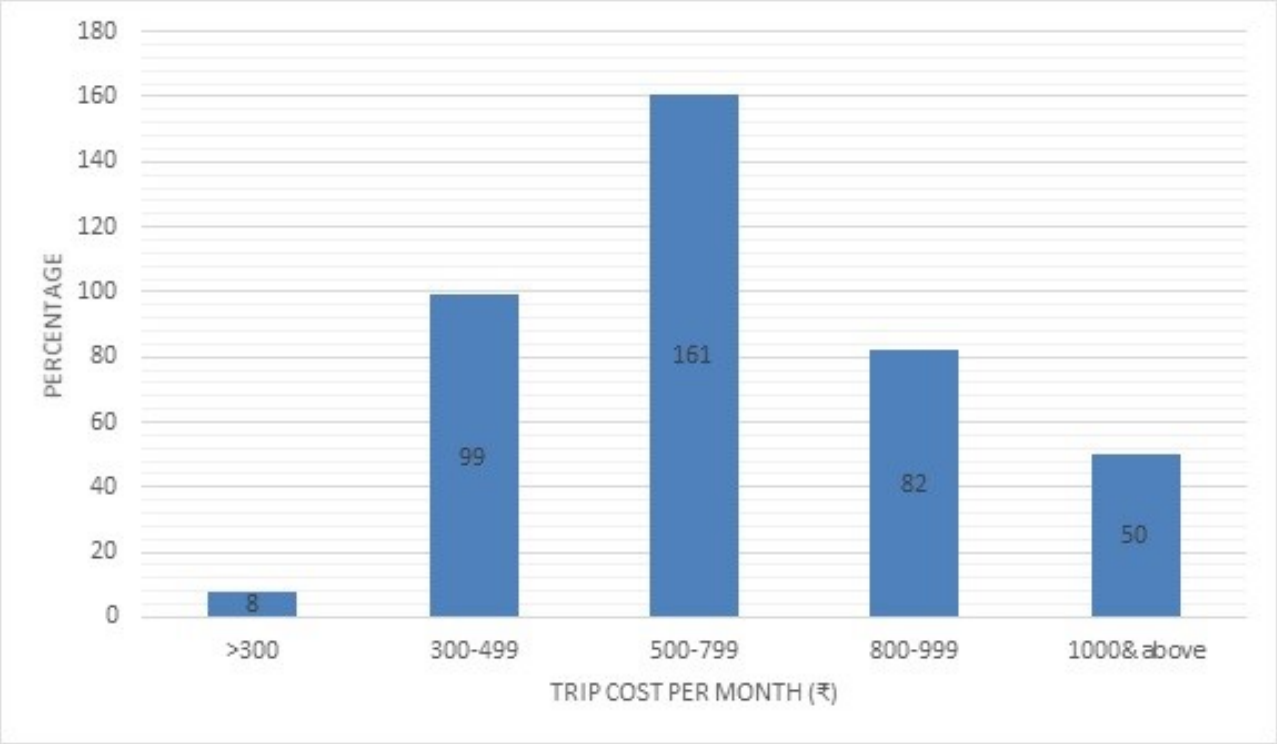

Figure 4.20: Distribution of Trip cost per month

The mode used by the people has a high correlation with the income. So, an analysis has been done to study the mode of transportation opted by people and we can see that 67% of the people either use cycle or walk for various purpose of the trips. The modal share is shown in Figure 4.21 .

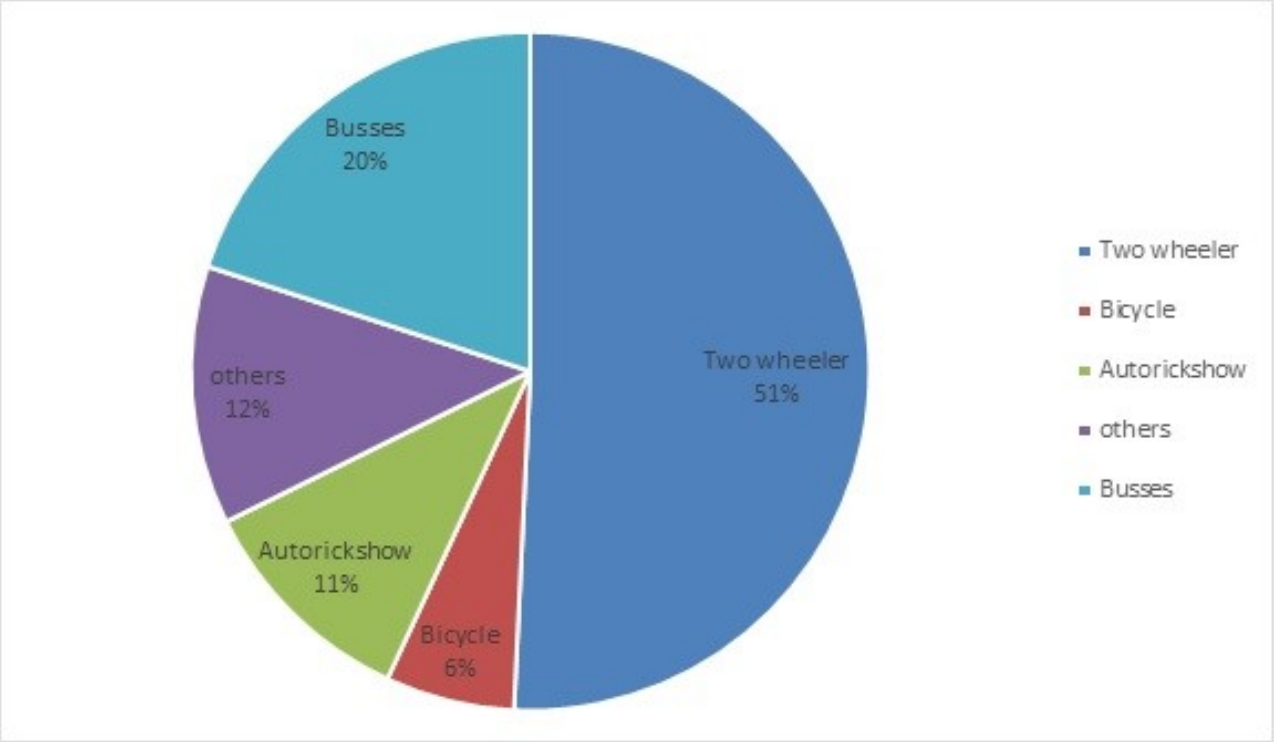

Figure 4.21: Modal share of travel pattern in Allagadda

4.3.9 SUMMARY

Allagadda predominantly exhibits a middle-aged and middle-income profile across the people in town. The family sizes are either predominantly three or four persons. The housing conditions and access to basic amenities are fair for liveable conditions, but there is a necessity for improvement and upgradation of the facilities and infrastructure.

Majority of people in Allagadda are dependent on Two-wheeler and busses as mode for travel. The dependency of public transport is only for inter-city or regional travel of passengers. This shows the need to improve the facilities for road networks to transport.

Chapter 5

RESULT

Showing the road networks and travel patterns by using Origin and Destination studies

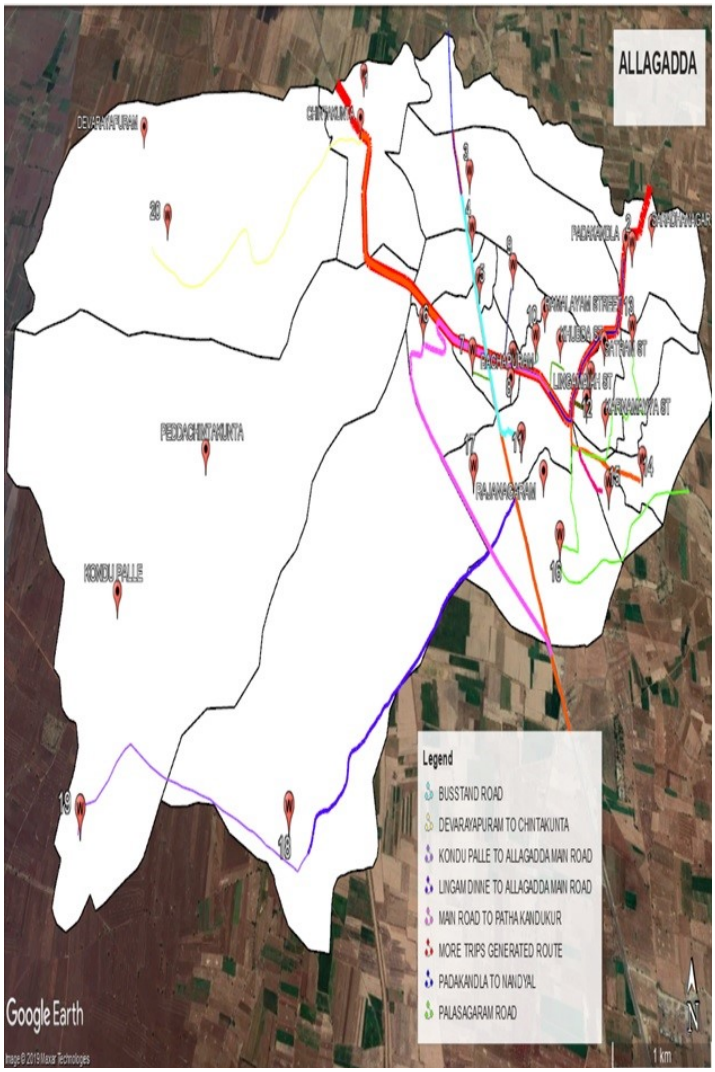

Figure 5.1: Showing the road networks and travel patterns by using Origin and Destination studies

Showing the road networks and travel patterns by using Origin and Destination studies

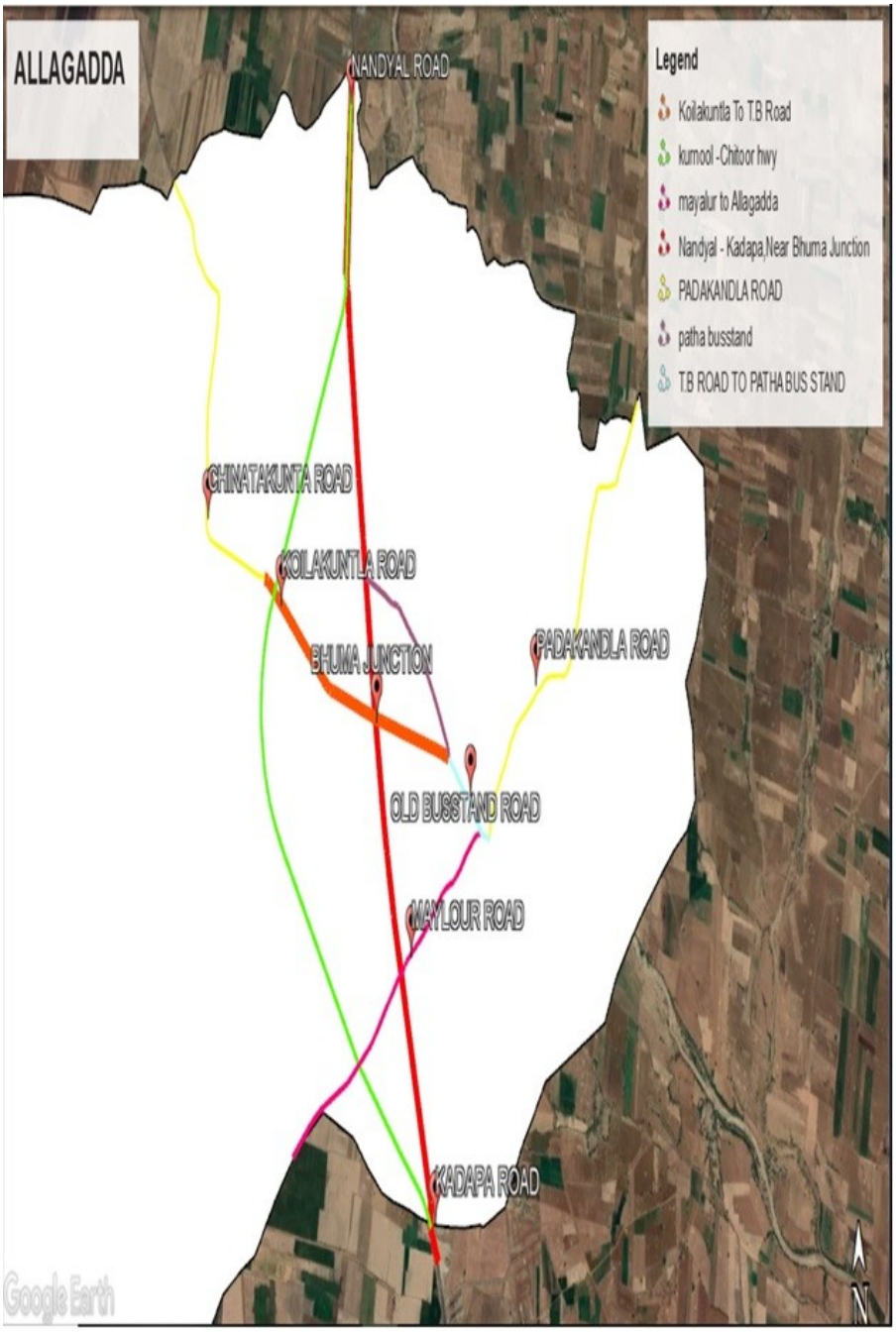

Figure 5.2: Showing the road networks and travel patterns by using Origin and Destination studies

Chapter 6

CONCLUSION

Following are the conclusions drawn from the study

As careful study of Origin and Destination Survey in Allagadda Town. The major trips are generated at Bhuma junction road connecting with (Nandyal to Allagadda Road, Koilakuntla to Allagadda Road, Allagadda to Ahobilam Road, Allagadda to Kadapa Road) and suggesting to provide an Intersection at Bhuma junction with a view to improve traffic flow.

References

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(c) Marcelle D. Ribeiro, Ana M. Larranaga, and Helena B. B. Cybis GPS-Recorded and Self-Reported Data in Surveys of Origin and Destination

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(f) Abrahamson, N.A., and Litehiser, J.J., (1989), Attenuation of vertical p