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EXECUTIVE SUMMARY

Gangni Upazila is well connected with all types of road network and communication. This area is one of the important Upazilas of Meherpur District where several Zila Roads and Regional Roads have been gone through this Upazila. The Regional Highway R745 has been linked with R746 at Meherpur District and other Zila Roads such as Z7452, Z7456 and Z7466 have been passed through Gangni Upazila. It has 9 Unions and 1 Pourashava.

There are four types of roads namely Upazila, Union, Village-A and Village-B served by LGED. All roads are categorized into Pucca, Semi-pucca and Katcha Road. There are few areas which are important but traffic congestions are occurred lack of maintenance or infrastructural problems.

For exploring the traffic scenario, seven intersections have been surveyed for traffic volume count. Origin and Destination survey has been done in prominent areas. Passenger Interview Survey has been done for Bus, Train and Truck where different glimpses are explored. Regional survey has served for Bus and Truck Terminal from the study can find out the regional linkage of its surrounding Upazilas.

Trip purpose, Types of Mode, Origin and Destination Pattern, Problems, Trip Frequency, Passenger Occupancy etc. scenarios have been drawn out from this survey.

This is a submission of the traffic and transportation survey report as a part of Survey Report as per TOR of the project and mainly describes the traffic and transportation survey activities performed as per TOR.

ABBREVIATION AND ACRONYMS

LGED	Local Government Engineering Department
MV	Motorized Vehicle
NMV	Non Motorized Vehicle
OD	Origin and Destination
PCE	Passenger Car Equivalent
PCU	Passenger Car Unit
PRA	Participatory Rural Appraisal
RHD	Roads and Highway Department
TOR	Terms of Reference
UDD	Urban Development Directorate

CHAPTER 1: INTRODUCTION

1.1 Background of the Study

In the present world countries, the roads within an Upazila are important and fundamental issues for communications and transactions. Thus the roads need to be well efficient and organized to serve the demand. Bangladesh has higher transportation demand and the demand of transports in every Upazila is increasing day by day. Traffic scenario and demand forecasting is essential for the design of transportation facilities and services, and also for planning, investment, and policy development. To determine the future traffic demand, existing traffic exploration is essential. Gangni is an Upazila of Meherpur District in the Division of Khulna, Bangladesh where several places are taking concentration from the administration. Traffic study has been taken for Preparation of Development Plan for Gangni Upazila. It is critical that this study produces an accurate value as these values form the basis for the subsequent steps and the errors in this step can propagate in the entire estimation process.

1.2 Extent and Nature of Traffic and Transportation Study

An inventory of road, railway, water way and airway network, regional transport network system and its linkage with Upazila area, information on pedestrian facilities, bus/ rail/ water way routes and parking facilities has been conducted and the base map will be upgraded with this information for providing traffic and transportation policy. A survey has provided to gather current traffic information not readily available from other sources and other relevant data have been collected from LGED, RHD and Upazila Parishad. Several traffic and transportation surveys have been done for analyzing the existing traffic behavior of Gangni Upazila which will form the basis of traffic forecasting.

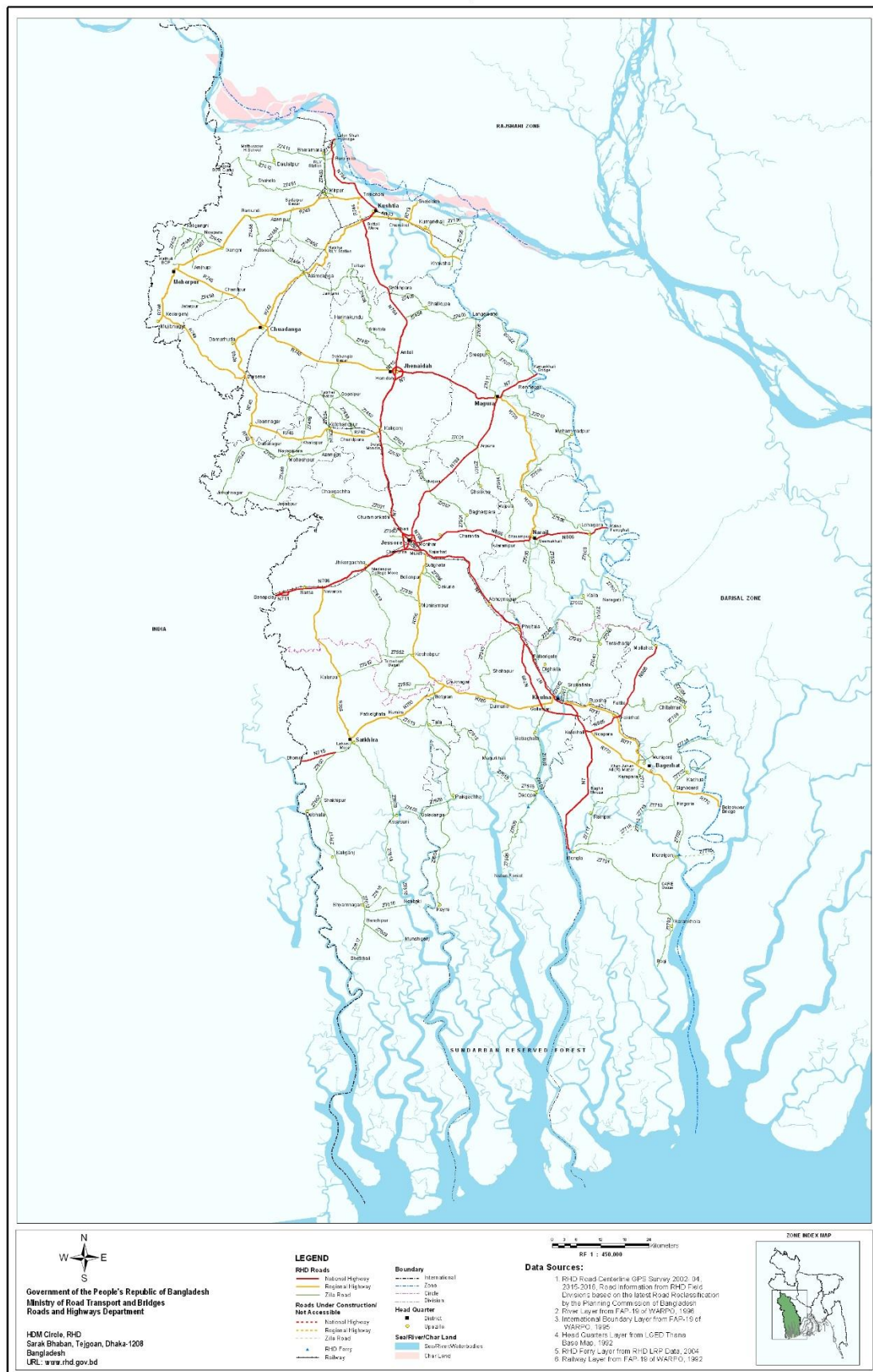
1.3 Study Area Profile

Gangni came into existence in 1923 as Thana. Nothing is definitely known about the origin of the upazila name. It is said that in the remote past the present area of the upazila was intersected by many rivers. The local people call the river as Gang. It is generally believed that the name Gangni might have been derived from the word Gang. It has 9 Unions and 1 Pourashava. Main rivers are Bhairab, Kazla. Dharla and Ilangi Beels are notable. Gangni (Town) consists of 5 mouzas. It has an area of 22.86 km². It has a population of 19126; male 51.48% and female 48.95%. Literacy rate among the town people is 28.8%

1.4 Regional Connectivity

The upazila occupies an area of 363.95 sq. km. It is located between 23°44' and 23°52' north latitudes and between 88°34' and 88°47' east longitudes. The upazila is bounded on the north by Daulatpur

upazila of Kushtia Zila, on the east by Mirpur upazila of Kushtia Zila and Alamdanga upazila of Chuadanga Zila, on the south by Meherpur Sadar upazila and on the west by India. (Please see **Map 1.1 & Map 1.2**)



Map 1.1: Regional Connectivity of Khulna Zone



Map 1.2: Regional Connectivity of Gangni Upazila

1.5 Road Network

1.5.1 Existing Road Network

Gangni Upazila is serving by all types of road category of LGED (Please see **Map 1.3**). According to Banglapedia, 2017; Pucca road 223.59 km, Katcha road 467.25 km. Road network data and other road infrastructure will be updated through physical feature survey.

Table 1.1: Zone wise Road Length of Khulna Zone

Classification	Zone	Length (Km)
National Highway	Khulna	478.642
Regional Highway	Khulna	566.030
Zilla Road	Khulna	1,681.407

Source: RHD, Road Database, 2017.

Table 1.2: Existing Road Infrastructure of Gangni Upazila

Road Type	Earthen Road (km)	Pavement Road (km)	Total Length (km)
Upazila Road	4.89	87.49	92.38
Union Road	33.47	122.58	159.98
Village Road-A	86.80	95.83	182.63
Village Road-B	258.98	77.05	336.04

Source: LGED, 2017.

1.5.2 Major Road Inventory of Gangni Upazila

The Regional Highway R745 has been linked with R746 at Meherpur District and several Zila Roads have been passed through Gangni Upazila. The major roads of Gangni Upazila have shown in Table 1.3.

Table 1.3: Major Roads of Gangni Upazila

Road ID	Name of the Road	Length of Road (km)
R745	Kushtia (Trimohoni)-Maherpur-Chuadanga-Jhenaidah Road	117
R746	Meherpur-Mujibnagar (BRD Camp) Road	16
Z7452	Gangni-Kathuli-Kulbaria Road	20
Z7456	Bamundi-Hatboalia-Alamdanga Road	24
Z7466	Meherpur-North Shalikha-Kaligangni Road	10

Source: RHD, Road Database, 2017.

Table 1.4: Regional Road Information

Road No	Name	Length	Starts at	Ends at
R745	Kushtia (Trimohoni)-Maherpur-Chuadanga-Jhenaidah Road	117	Kushtia (Trimohoni)	Jhenaidah
R747	Kustia(Bottoli)-Poradah-AlamDanga-Chuadanga Road	43	Kustia	Chuadanga

Source: RHD, Road Database, 2017.

Table 1.5: Basic Info of Regional Road

Road No.	R745		
Road Name	Kushtia (Trimohoni)-Maherpur-Chuadanga-Jhenaidah Road		
Class	Regional Highway	Starts at	Kushtia (Trimohoni)
Length	116.818 Km	Ends at	Jhenaidah

Source: RHD, Road Database, 2017.

Table 1.6: Traffic & Other Info of R745

Traffic (AADT)	6242 (Motorized: 3761 , Non-Motorized: 2481)
Average width	5.80 (m)
No. of bridges	24

Source: RHD, Road Database, 2017.

Table 1.7: Basic Info of Regional Road of Meherpur

Road No.	R746		
Road Name	Meherpur-Mujibnagar (BRD Camp) Road		
Class	Regional Highway	Starts at	Meherpur (College more int with R745)
Length	15.636 Km	Ends at	Mujibnagar (Smriti Shoudha)

Source: RHD, Road Database, 2017.

Table 1.8: Traffic & Other Info of R746

Traffic (AADT)	7013 (Motorized: 4119 , Non-Motorized: 2894)
Average width	7.73 (m)
No. of bridges	4

Source: RHD, Road Database, 2017.

1.6 Waterway Network

There is only a river passing through the west side of the Tetulbaria Union of Gangni Upazila named Ichamoti River. Besides this, there is no other river in this Upazila except few beels are there like- Ichamoti Beel.

1.7 Railway Network

There is no direct rail road to Gangni. But passenger can use train up to Poradaha of Kushtia or Alamdanga of Chuadanga from Dhaka. From Kushtia, a person can come by Bus to Gangni, Meherpur which takes an hour or so.

1.8 Airways

Nearest Airport of Gangni is Jessore. One can come to Jessore by Air and then take a bus from Jessore to Meherpur or Kushtia to go to Gangni.

1.9 Formulation and Mobilization of Survey Team

1.9.1 Orientation & Meeting

In order to carry out various surveys related with traffic and transportation, at first an orientation program was held at Gangni Upazila Office for giving a clear concept about the objectives of the project and different type of surveys. The Consultant team with expert has attended the orientation program and Mr. Shaheen Ahmed (Project Director and Senior Planner, UDD) was present in field during Survey on the behalf of UDD.

1.9.2 Guidance to the Survey Members

After giving orientation, the consultants have provided guidelines to the survey members who are representatives of the Consultancy firm. The survey members have been guided by proper understanding of Questionnaire formats of different types of Survey, time schedule of conducting Survey, location of conducting Survey etc. Junior Urban Planner, Afnan Mohammad was always with the enumerator to monitor the Transport survey.

1.9.3 Selection of Survey Locations

Considering the intensity, linkage and movement of traffic different survey locations have been selected to conduct different types of survey including Volume Count, O-D Survey, Passenger Survey and Regional Transport Survey which refers as a reconnaissance survey. Major intersections, Major Roads, Bus Terminal have been identified for conducting different types of Survey. Details of survey location have been given in corresponding type of survey.

1.9.4 Formation of Survey Team

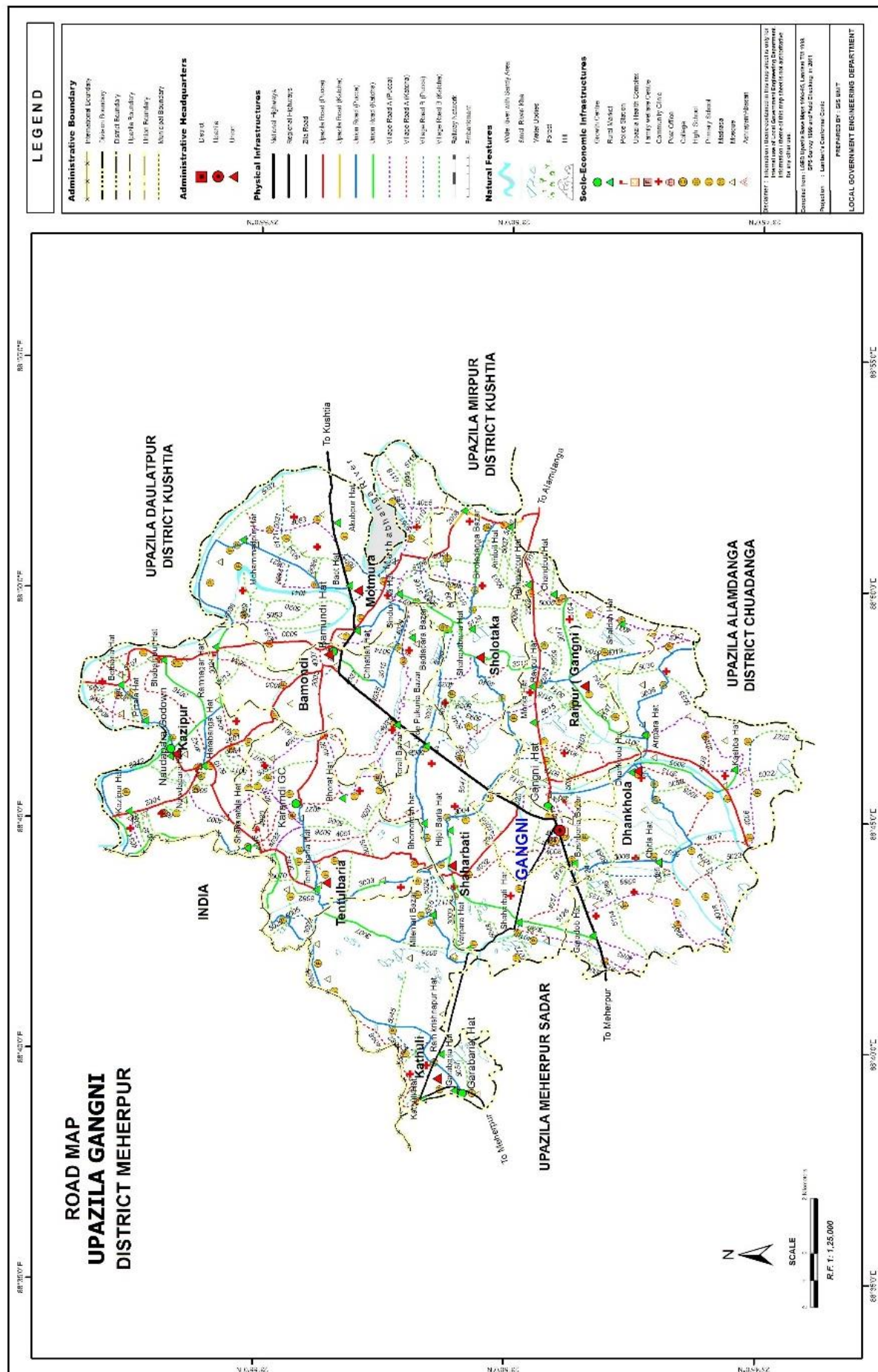
The transport surveys have been carried out according to the consent of Transport Expert. The surveyors were deployed sufficiently according to the need of each survey locations; the

consultant team has considered the previous working experience of similar types of survey activities and educational qualifications. The following table represents the team formations for traffic and transportation survey at Gangni Upazila:

Table 1.9: List of members in Traffic and Transportation Survey

Sl. No.	Name	No.	Activities
1	Transportation Expert Md. Abul Kashem	1	Planning, preparation of questionnaire and overall supervision of the survey activities and subsequent report preparation.
2	Planner Jahidul Ashik, Mehedi Hasan and Afnan Mohammad	3	Training, Monitoring and supervision of field level data collection and survey activities.
3	Mustaq Ahmed & Md. Halim	2	Data base format preparation and supervision of data entry activities according to the guidance of Team Leader
4	Survey Supervisor Md. Polash	2	Inspection at every spots of Field Survey.
5	Enumerators	8	Field Survey at different locations
6	Data Entry	10	Data Entry in Excel, Analysis and presentation in tabular format.
7	Planner Hasnat Arnab and Planner Afnan Mohammad	2	Data checking and reviewing

Source: Traffic and Transportation Survey, 2016



CHAPTER 2: METHODOLOGY

2.1 Introduction

Traffic and Transportation system is the backbone or mirror of an Upazila. It describes about the prospects of an Upazila. For preparation of a Development Plan, Transport is the prime issue for resolving different problems. For knowing different issues and problems, several surveys have been selected for depicting the perfect scenario of the Upazila. To know the different scenario the consultants have conducted a number of surveys on traffic and transportation which are as follows:

- Traffic Volume Count Survey
- Origin & Destination (O D) Survey
- Passenger Interview Survey and
- Regional Transportation Survey

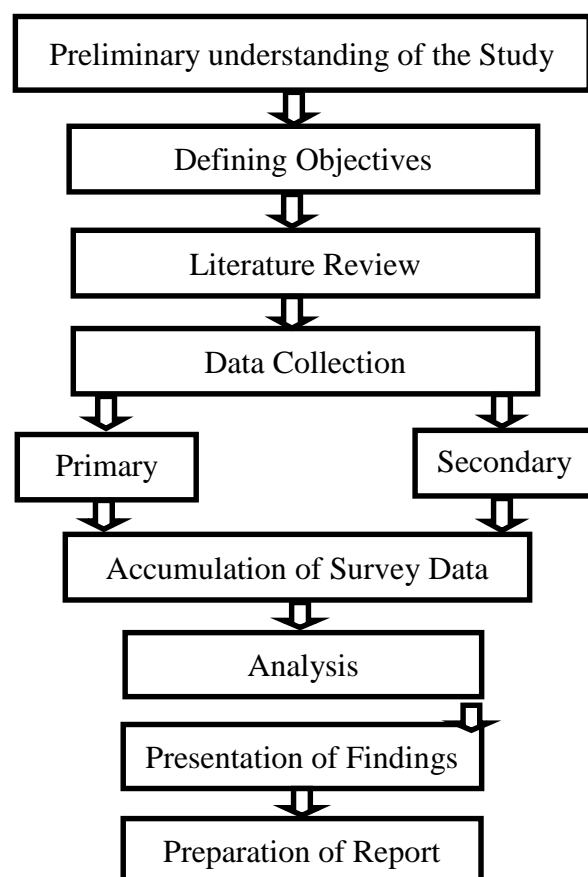


Figure 2.1: Working Methodology in Flow Chart

2.2 Reconnaissance Survey

A reconnaissance survey has been carried out to identify where the above mentioned surveys will be done for having different impact of certain locations. According to the judgment, local knowledge and stakeholder consultation survey locations points has been selected for the above selected surveys. For this study, survey has been done on the basis of Hat Day/On Day and Non Hat Day/Off Day.

2.3 Sample Size Determination

The initial sample size was determined by the following formula

$$n = \frac{z^2 pq}{d^2} \quad \text{Where,}$$

z is the normal variation and which has 1.96 for 95% confidence interval

p is the target proportion. In this case, we have assumed p= 0.5

p+q=1, therefore q=0.5

And d is the desired error which is 0.12.

The initial sample size is therefore:

$$n_0 = \frac{(1.96)^2 \times 0.5 \times 0.5}{(0.12)^2}$$
$$= 67$$

These sample size was adjusted by using the following formula:

$$n = \frac{n_0}{1 + \frac{n_0}{N}}$$

Where n is requiring sample size and N is no. of Population of Upazila.

Here, Gangni Upazila has the population of 2, 99,607. After applying the above formula, it is found that minimum 67 samples will be surveyed for each category of survey. Considering the formula, the sample size of traffic and transportation surveys has been determined.

2.4 Conducted Traffic and Transportation Survey

2.4.1 Traffic Volume Count Survey

Traffic volume studies are conducted to determine the number, movements, and classifications of roadway vehicles at a given location. These data can help to identify critical flow time periods, determine the influence of large vehicles or pedestrians on vehicular traffic flow, or document traffic volume trends. For this study, Manual counting method has been applied for acquiring the required data. Manual counts are typically used to gather data for determination of vehicle classification, turning movements, direction of travel, pedestrian movements, or vehicle occupancy. The selection of study method should be determined using the count period. The count period should be representative of the time of day, day of month, and month of year for the study area. The count period should avoid special event or compromising weather conditions (Sharma 1994). Count periods may range from 5 minutes to 1 year. Typical count periods are 15 minutes or 2 hours for peak periods, 4 hours for morning and afternoon peaks, 6 hours for morning, midday, and afternoon peaks, and 12 hours for daytime periods (Robertson, 1994). For this survey, seven major intersections have been identified. The intersections are: Gangni Bazar, Dhankhola, Shaharbat, Tentulbaria, Raipur, Kazipur and Bamundi. (Please see **Map 2.1**) Hat Day and Non Hat Day have been taken into consideration for each intersection. Peak hour and off peak hour have been varied in each intersection depending on its impact on the Upazila. The volume of traffic using the road in a given interval of time is one of the elemental measures of road traffic that is also termed as flow and expressed in vehicles per hour or vehicles per day. But the roads normally comprise different types of vehicles offering different degrees of interference to other traffic. However, it is obligatory to bring all types of vehicles to a common unit. The normal practice to convert the flow into common unit is Passenger Car Equivalence (PCE) or Passenger Car Unit (PCU) by using certain equivalency factors. The flow is then expressed as PCE /PCU per hour or PCE /PCU per day. The Table 2.1 represents the PCE value for the traffic volume calculation.

Table 2.1: List of PCU value for various Vehicles

Sl. No.	Vehicle Categories	PCE
1	Passenger Car	1.00
2	Light Goods Vehicle	1.00
3	Truck	3.00
4	Bus	3.00
5	Auto-Rickshaw	0.75
6	Motor-cycle, moped, scooter	0.75
7	Paddle Cycle	0.50

Source: Ministry of Communications, 2000 (Cited in Roads & Highways, 1994)

2.4.2 Origin and Destination (O D) Survey

Origin Destination (O-D) survey provides a detailed picture of the trip patterns and travel choices of a study area. The survey data related to households, individuals and trips allows stakeholders to understand travel patterns and characteristics; measure trends; provide input to travel demand model development, forecasting, and planning for area-wide transportation infrastructure needs and services; and, monitor progress in implementing transportation policies. The O D Survey has been taken in pertinent locations (Please see **Map 2.2**). The survey has carried out through random questionnaire according to the sample size.

2.4.3 Passenger Interview Survey

Passenger Interview Survey has done to know about the travel behavior of the passengers. In order to ensure the findings of the survey were representative, random sampling method was applied on this on-board face-to-face interview survey. Target respondents were picked by a random process. Passenger Interview Survey has been carried out in Bus Terminal; Bus stoppages etc. (Please see **Map 2.3**)

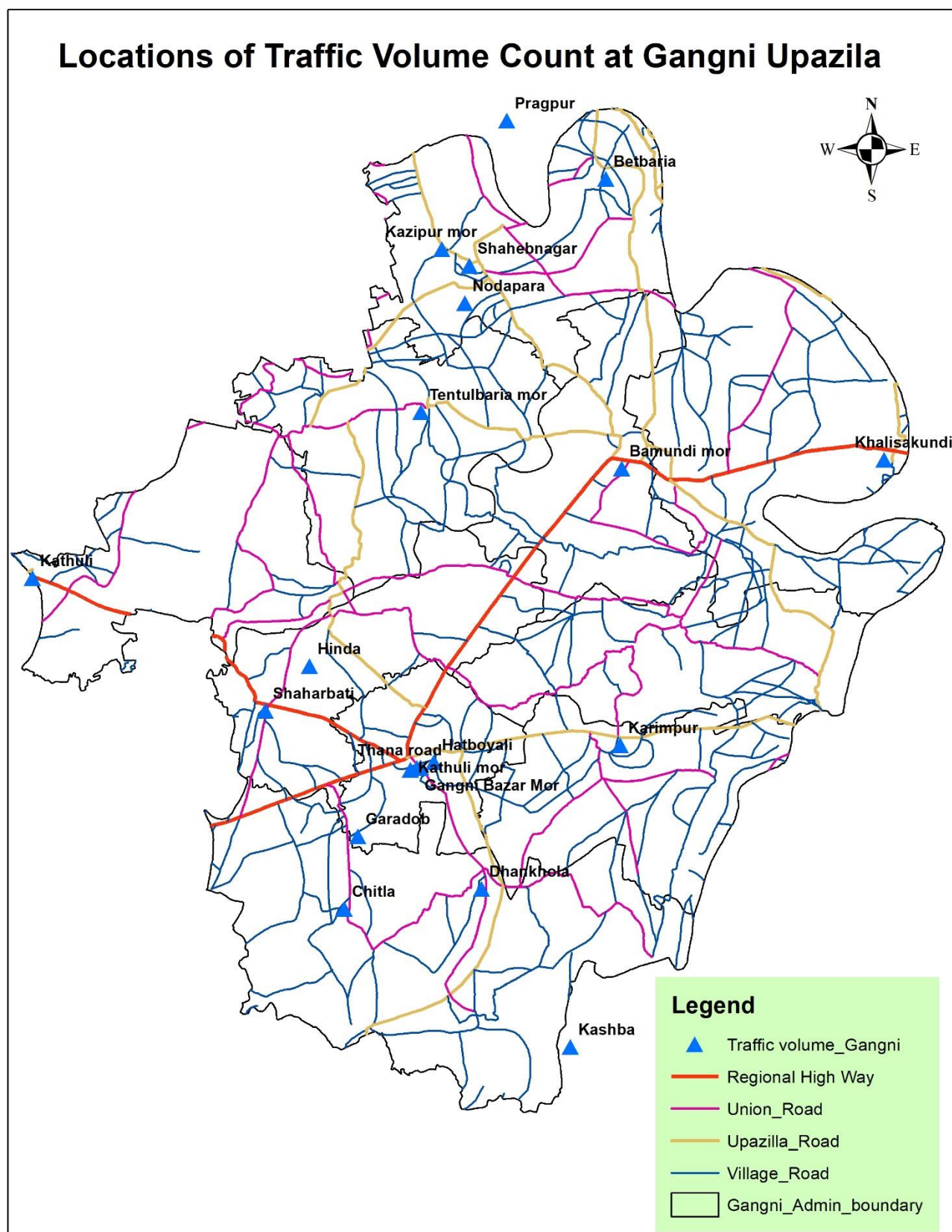
2.4.4 Regional Transportation Survey

Regional Transport is an enabler for growth but it can also be a catalyst for urban sprawl. It has implications not only for mobility and quality of life but also for the economic prosperity of cities. Regional Transport survey has been done to better understand the transport and mobility challenges and priorities for planning, infrastructure and service requirements over the short and longer term. For this survey, few locations have been considered where it will be easy to know the regional impact and regional transport network.

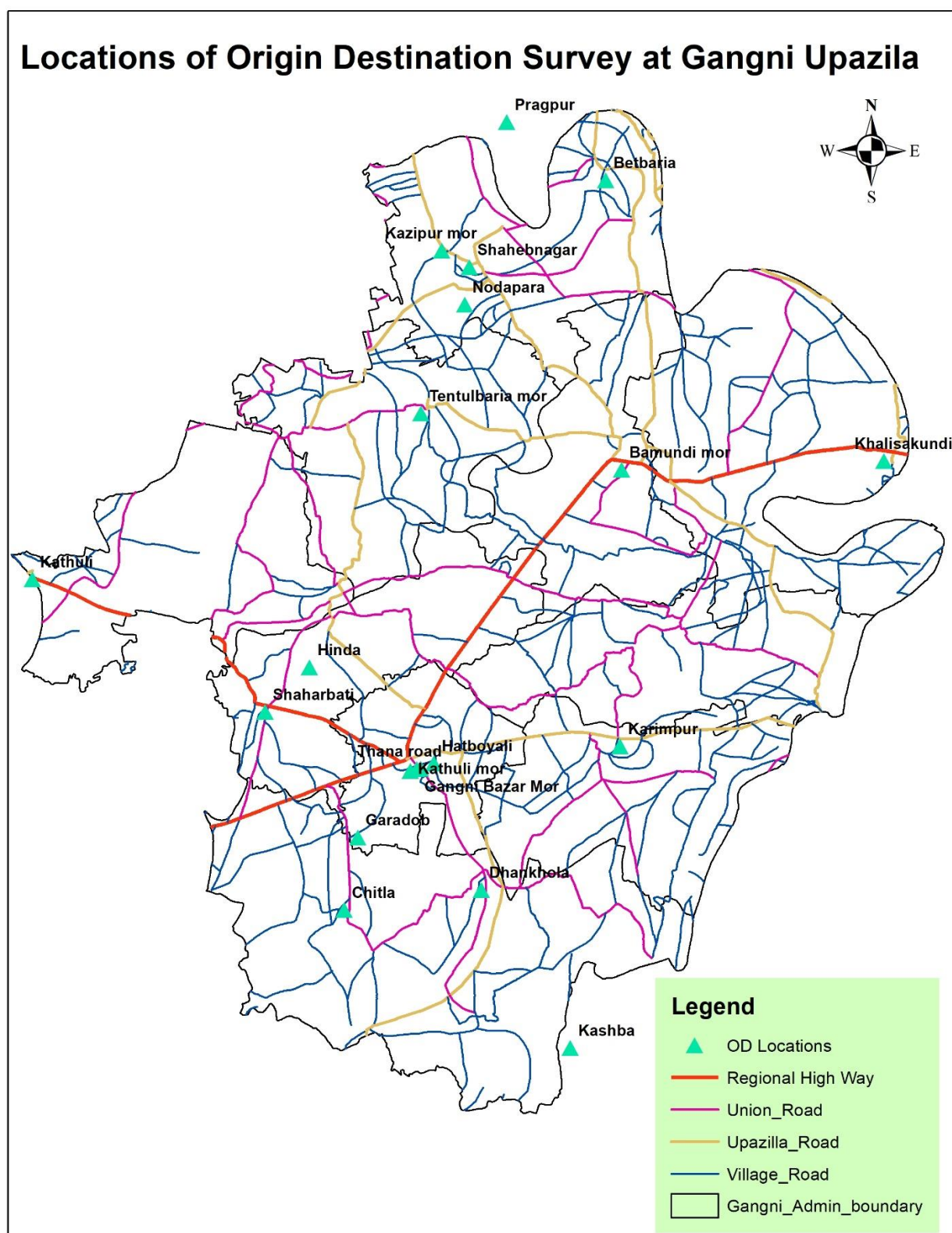
Table 2.2: Output and methodology of the conducted survey

Survey	Data	Methodology
Traffic Volume Count	Details of vehicle classification, fluctuation of flow, specific vehicular movements, road features, no. of vehicle per hour.	<ul style="list-style-type: none"> • Manual counting method • Hat/On Day and Non Hat/Off Day • Peak Hour and Off Peak Hour
O D survey	Origin zones, destination zones, internal and external origin and destinations.	<ul style="list-style-type: none"> • Simple Random Survey after determining the sample size. • Before conducting the

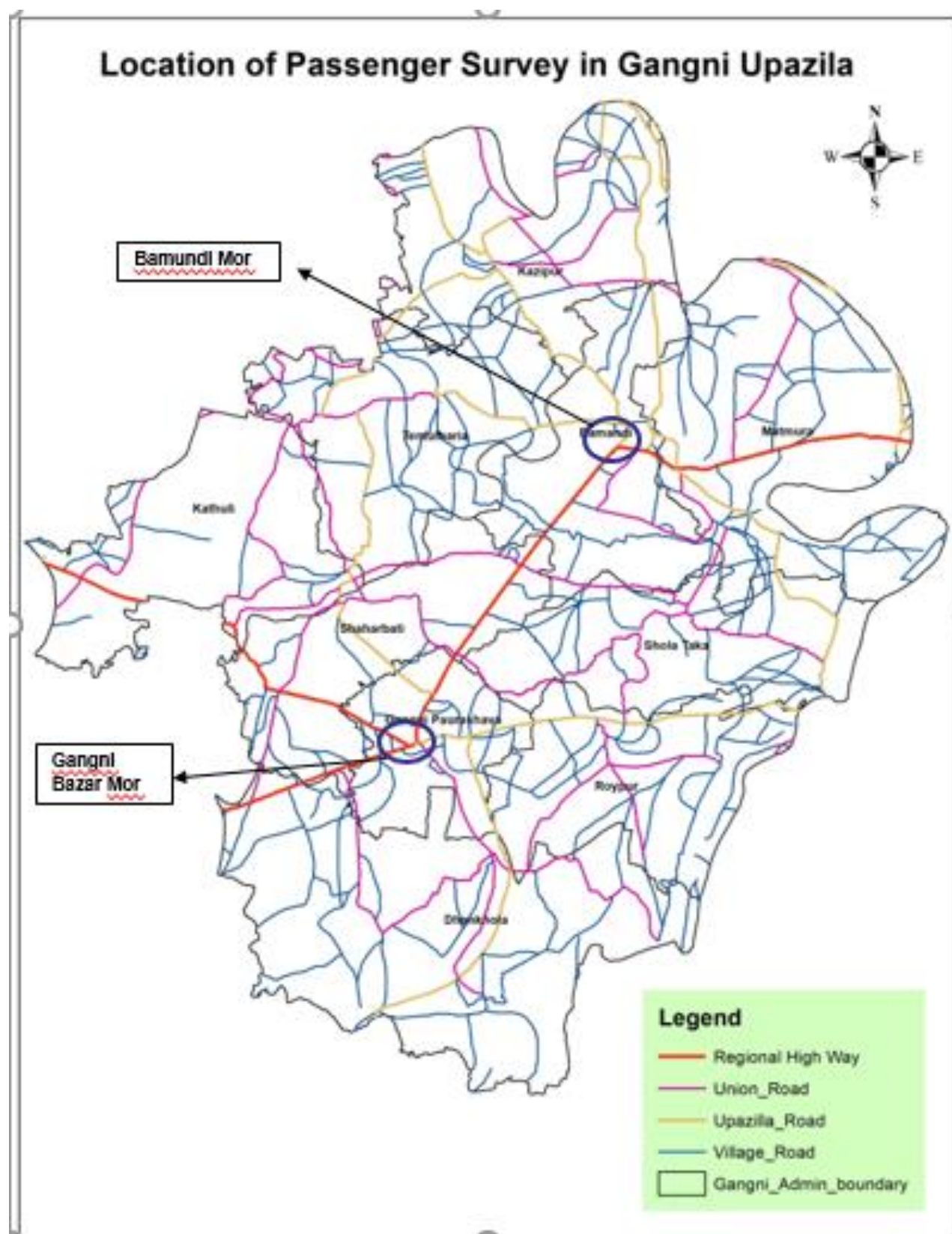
Survey	Data	Methodology
		interview, the questionnaire prepared for interviewing the travelers which is approved by UDD.
Passenger Interview Survey	Trip destination, trip purpose, mode of transport, cost, distance etc.	<ul style="list-style-type: none"> • Simple Random Survey • At first, the questionnaire has been prepared to cover all information required for the survey according to the TOR. • The questionnaire has been approved by UDD and finally a sample of passengers has been selected for collecting data through approved questionnaire.
Regional Transport Network Survey	Urban growth, accessibility with nearer areas, communication and infrastructure facilities, potentiality of the area etc.	<ul style="list-style-type: none"> • Simple Random Survey after determining sample size through approved questionnaire. (Please see Appendix-C for approved Questionnaire Format of all transport Surveys)



Map 2.1: Locations of Traffic Volume Count at Gangni Upazila



Map 2.2: Locations of Origin Destination Survey at Gangni Upazila



Map 2.3: Locations of Passenger Interview Survey at Gangni Upazila

CHAPTER 3: SURVEY FINDINGS AND ANALYSIS

3.1 Traffic Volume Count Survey

Traffic volume count survey has been done in seven important intersections. Peak time and off peak time vary according to the importance of the certain locations. In study area, On Day and Off day has been taken into consideration for depicting the exact scenario of traffic in Gangni Upazila. The surveyed locations are given below:

Table 3.1: Surveyed Traffic Volume Count Locations

Intersection	Date	Remarks
<ul style="list-style-type: none"> • Gangni • Bamundi • Dhankhola 	29-Mar-16	On Day
	30-Mar-16	Off Day
<ul style="list-style-type: none"> • Saharbati • Tentulbaria • Raipur • Kazipur 	30-Mar-16	On Day
	2-Apr-16	Off Day

Source: Traffic and Transportation Survey, 2016

3.1.1 Traffic flow at Gangni Intersection

In Gangni Upazila, two intersections such as Gangni and Bamundi is the most traffic accumulated intersections in respect of other intersections. In Gangni, there are five links like Gangni-Meherpur, Gangni-Kathuli, Gangni-Dhankhola, Gangni-Karimpur and Gangni-Kushtia.

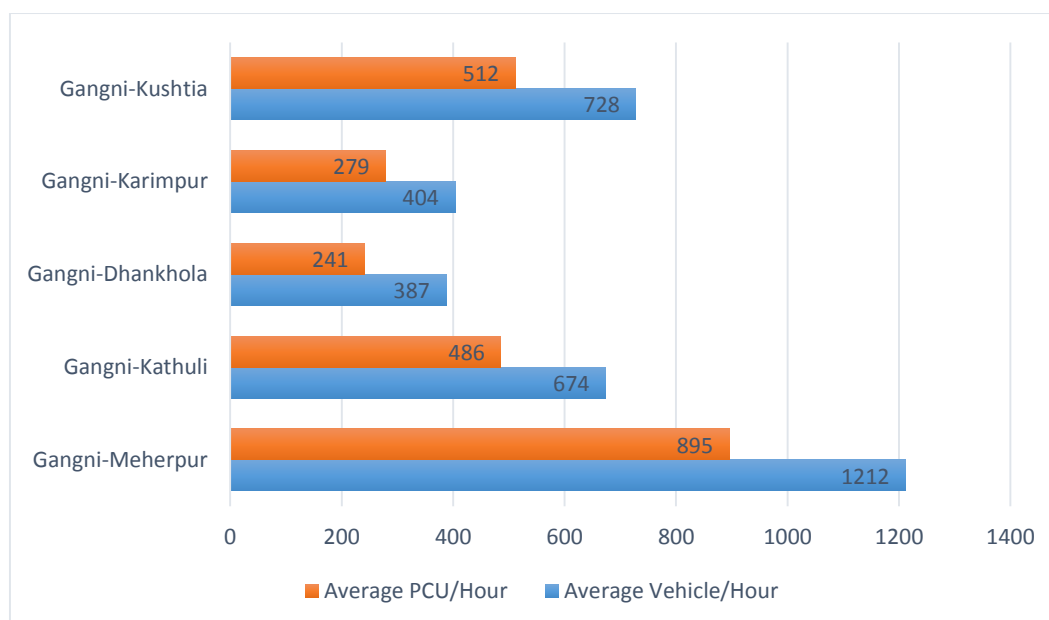


Figure 3.1: Traffic flow at Gangni Intersection

Source: Traffic and Transportation Survey, 2016

The above bar table represents the average vehicle per hour and average PCU per hour after accumulating the survey data. Gangni-Meherpur link is experiencing the most traffic around 900 and Gangni-Kushtia is also busy road. The other road links are relatively less accumulated traffic links.

3.1.2 Traffic flow at Bamundi Intersection

In Bamundi intersection, there are five important links which are Bamundi-Gangni, Bamundi-Khalisha Kandi, Bamundi-Betbaria, Bamundi-Kazipur and Bamundi-Karamdi.

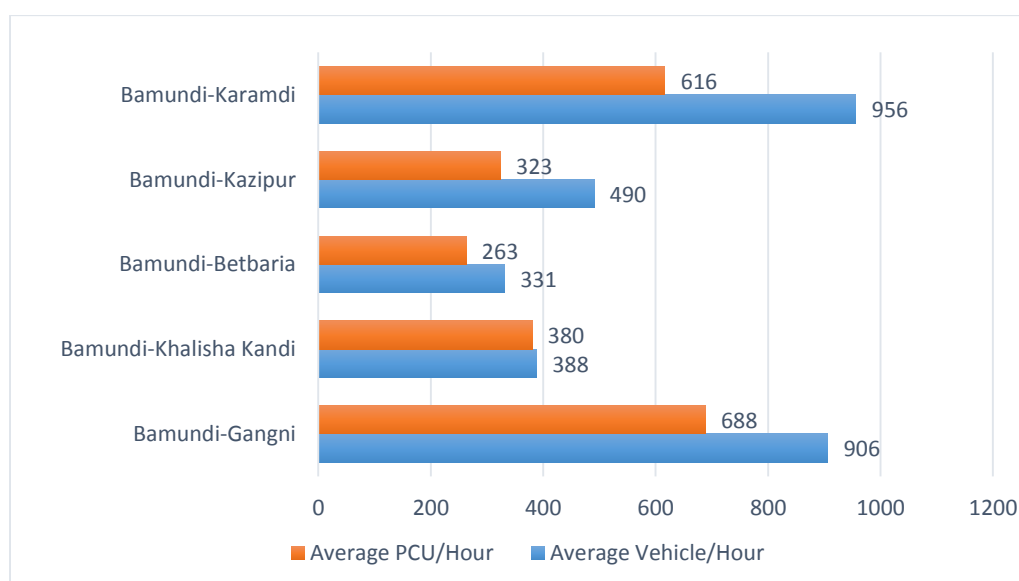


Figure 3.2: Traffic flow at Bamundi Intersection

Source: Traffic and Transportation Survey, 2016

From the above chart, it is seen that Karamdi and Gangni link are the busy links which have more than 600 traffic per hour and PCU is more than 900 per hour.

3.1.3 Traffic Flow Pattern at Surveyed Intersections

In Gangni Upazila, there are different types of vehicle. For acquiring the data, motorized and non-motorized vehicle classifications have been made. Same type of motorized and non-motorized vehicles are plying in different intersections which are shown below figures but having different percentages. For understanding, vehicle types of Gangni and Bamundi are shown in below figures.

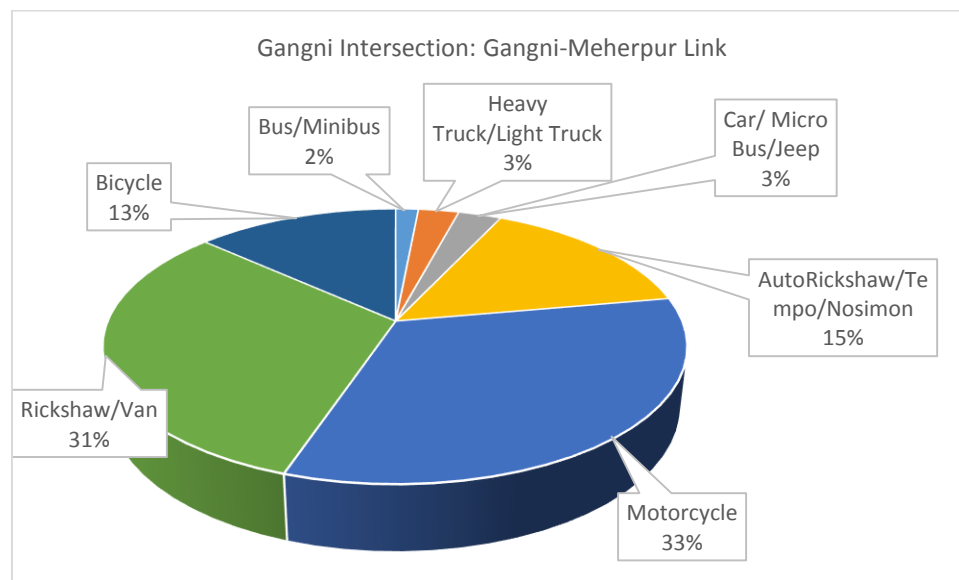


Figure 3.3: Vehicle type at Gangni Bazar Intersection

Source: Traffic and Transportation Survey, 2016

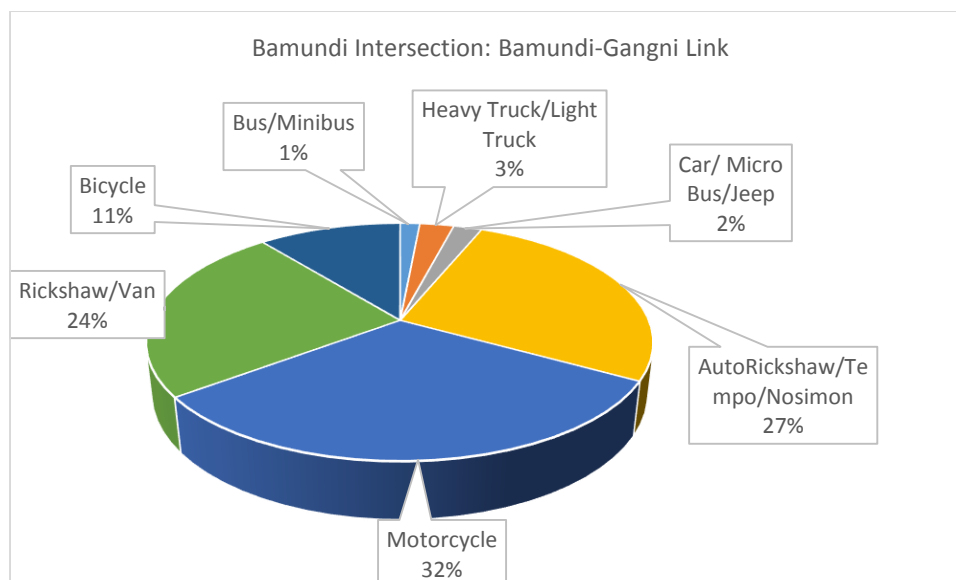


Figure 3.4: Vehicle type at Bamundi Intersection

Source: Traffic and Transportation Survey, 2016

From the above chart, it can depict that Motorcycle and Nosimon/Auto Rickshaw are the main modes of travelling which has been responded by around 50% and 60% of the passengers respectively in Gangni and Bamundi. They also use rickshaw for their shorter distance of travelling. The other modes are visible but comparatively lower impacts.

3.1.4 Motorized Vehicle (MV) and Non-Motorized Vehicle (NMV)

From the surveyed seven intersections, five intersections except Gangni and Bamundi are experiencing more non-motorized vehicles than these two busy intersections. At a glance, it can delineate that Gangni and Bamundi have motorized vehicles from 60% to 70%, on the contrary in case of other intersections it holds 50% to 55%. Motorized and non-motorized link wise percentages in surveyed intersections are shown in Appendix-A. For example, some scenarios have been given in below charts.

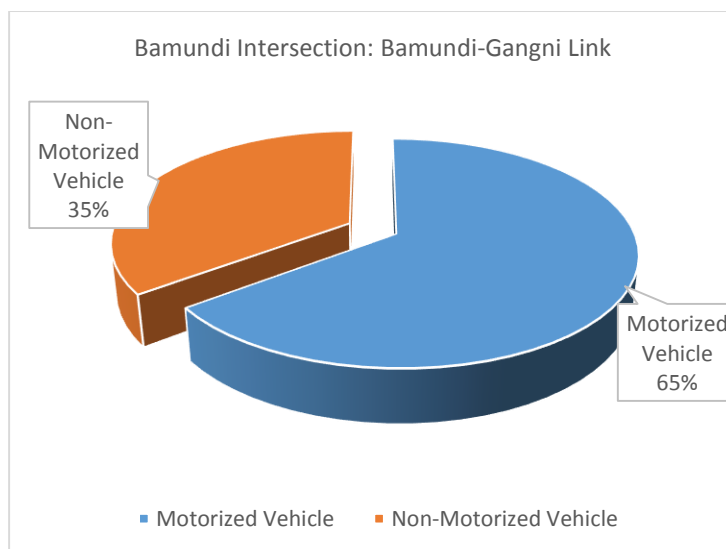


Figure 3.5: MV and NMV at Bamundi Intersection

Source: Traffic and Transportation Survey, 2016

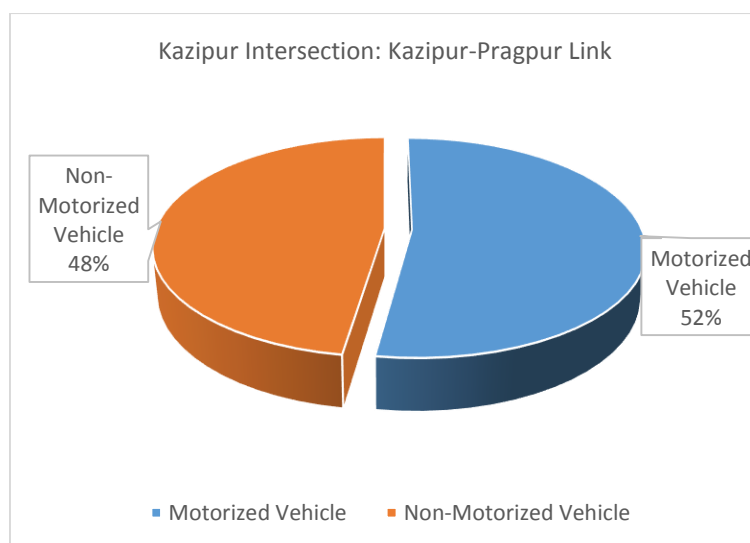


Figure 3.6: MV and NMV at Kazipur Intersection

Source: Traffic and Transportation Survey, 2016

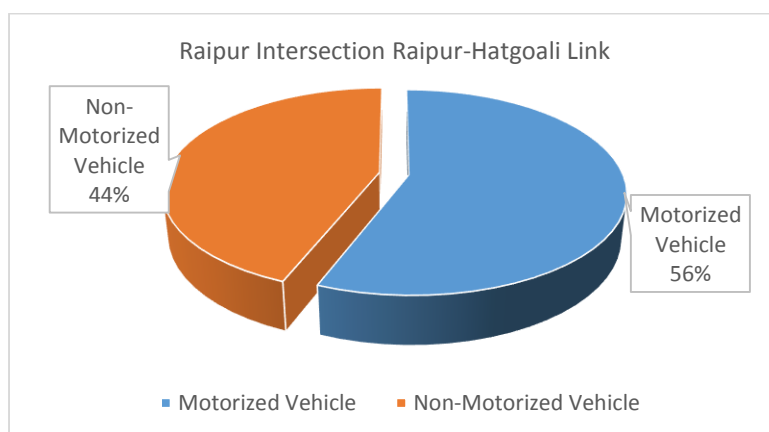


Figure 3.7: MV and NMV at Raipur Intersection

Source: Traffic and Transportation Survey, 2016

From the above figures, it is seen that motorized and non-motorized vehicles are dominating according to the importance of the area. As Bamundi intersection is busy area, Bamundi-Gangni Link is experiencing MV and NMV percentages respectively 65% and 35%. In Kazipur-Pragpur Link of Kazipur intersection and Raipur-Hatgoali Link of Raipur intersection motorized vehicle percentages down to respectively 52% and 56%.

3.1.5 Traffic flows at Intersections

Traffic flows are occurred in different ways at every intersection. Traffic flows are varied from time to time. The significant intersections are summarized in **Appendix-A**. The Average PCU and Vehicle have been shown in below table at a nut shell.

Table 3.2: PCU and Traffic Volume at Intersections

Intersection	Link	Average Vehicle/Hour	Average PCU/Hour
Gangni Bazar	Gangni-Meherpur	1212	895
	Gangni-Kathuli	674	486
	Gangni-Dhankhola	387	241
	Gangni-Karimpur	404	279
	Gangni-Kushtia	728	512
Bamundi	Bamundi-Gangni	906	688
	Bamundi-Khalisha Kandi	388	380
	Bamundi-Betbaria	331	263
	Bamundi-Kazipur	490	323
	Bamundi-Karamdi	956	616
Dhankhola	Dhankhola-Chitla	83	56
	Dhankhola-Koshba	75	57
	Dhankhola-Shaldah Hat	105	77
	Dhankhola-Gangni Bazar	133	98
Saharbari	Saharbari-Gangni	151	126
	Saharbari-Kathuli	306	320
	Saharbari-Hinda	198	155
	Saharbari-Garadob	360	243
Tentulbaria	Tentulbaria-Kathuli	141	89
	Tentulbaria-Saharbari	59	46
	Tentulbaria-Bamundi	134	103
	Tentulbaria-Kazipur	78	49
Raipur	Raipur-Hatgoali	291	206
	Raipur-Alangi	154	95
Kazipur	Kazipur-Bamundi	307	212
	Kazipur-Shabenagar	256	169
	Kazipur-Nodapara	192	121
	Kazipur-Pragpur	243	160

Source: Traffic and Transportation Survey, 2016

The above table represents the individual link wise data of every surveyed intersection. From where it can depict that more concentration should be provided for Gangni and Bamundi intersection. The other intersections have lower traffic volume. After accumulating the link wise data of five intersections such as Dhankhola, Saharbari, Tentulbaria, Raipur and Kazipur, the following results have been found.

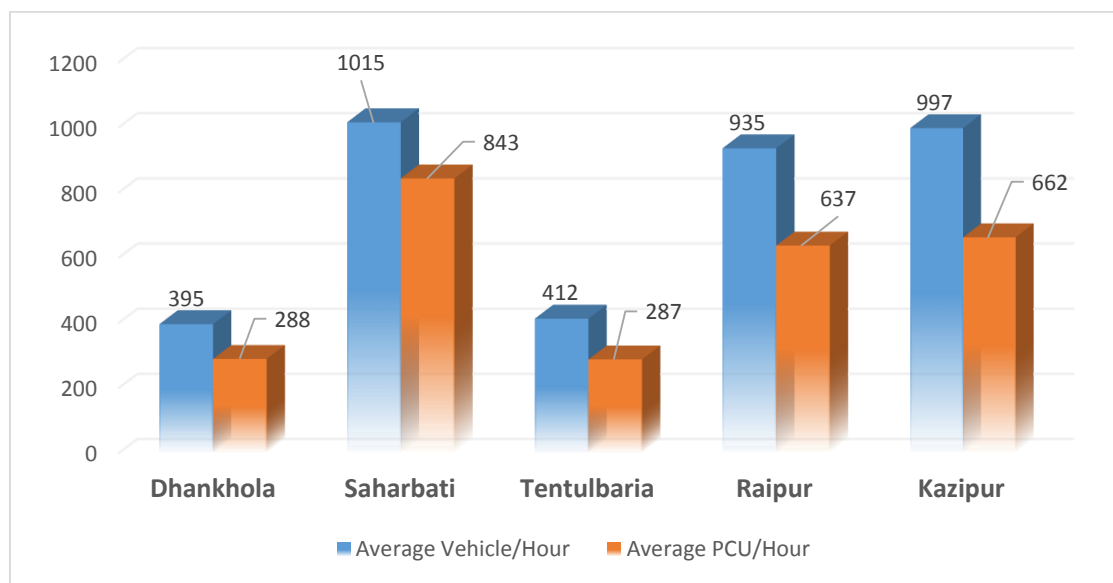


Figure 3.8: Traffic Volume of Less Important Intersections

Source: Traffic and Transportation Survey, 2016

3.2 Origin and Destination Findings

Origin and Destination Survey has been reflected different desired issues such as types of mode used in study area, origin and destination pattern, behavior etc. The output of the O D Survey has been depicted in below paragraphs.

3.2.1 Mode Choice

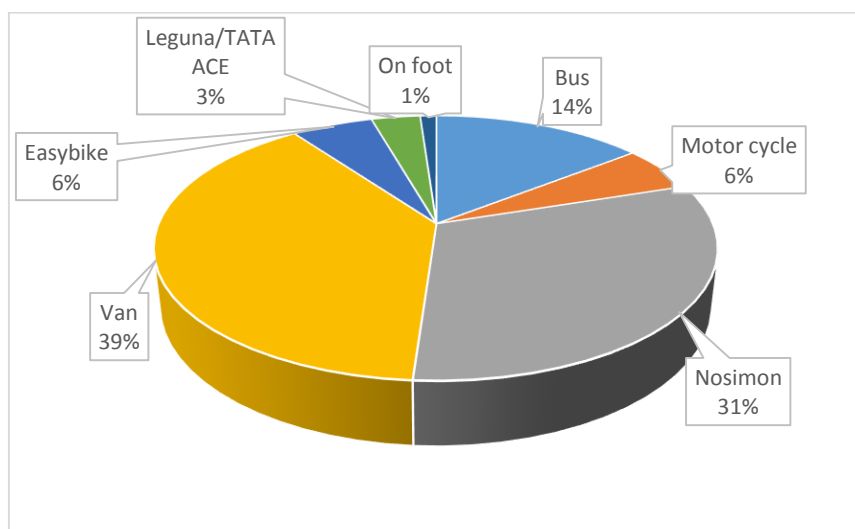


Figure 3.9: Types of Mode

Source: Traffic and Transportation Survey, 2016

The pie chart shows that the available modes which are roaming in this upazila and their percentages of usages. There are 7 types of mode of transport in this area. People use them according to their convenience. 31% people choose Nosimon to reach to their destinations and it is the demanding mode in this area. Van is also used in these area in a considerable rate. These modes are used depending on need of the passengers such as they can be used for shopping purpose, education purpose, business purpose, etc.

3.2.2 Purpose of Trip

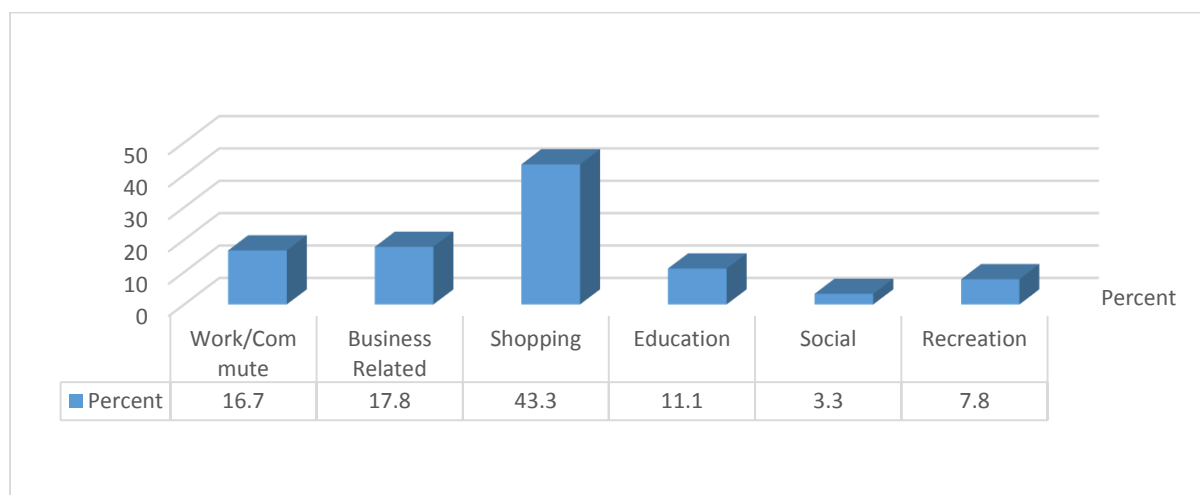


Figure 3.10: Purpose of Trip

Source: Traffic and Transportation Survey, 2016

The bar chart represents the origin destination behavior of the passengers. From the data it is shown that people mostly travel for shopping purposes. 17% passengers travel due to work purpose. For the purpose of business, shopping, education and social are experiencing almost the similar percentages.

3.2.3 Origin Destination Behavior

Table 3.3: Origin Destination Behavior

Origin \ Destination	Destination	Residence	Workplace	Shopping	School/College/University	Social	Recreational	Total
Residence	Frequency	10	23	22	6	4	2	67
	Percentage	14.90 %	34.30%	32.80 %	9.00%	6.00 %	3.00%	100.00%
Workplace	Frequency	4	4	2	0	1	0	11
	Percentage	36.40 %	36.40%	18.20 %	0.00%	9.10 %	0.00%	100.00%
School/College/University	Frequency	0	0	0	1	0	0	1
	Percentage	0.00%	0.00%	0.00%	100.00%	0.00 %	0.00%	100.00%
Social	Frequency	0	0	0	0	2	0	2
	Percentage	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	100.00%
Recreational	Frequency	8	0	0	0	0	1	9
	Percentage	88.90 %	0.00%	0.00%	0.00%	0.00 %	11.10%	100.00%
Total	Frequency	22	27	24	7	7	3	90
	Percentage	24.40 %	30.00%	26.70 %	7.80%	7.80 %	3.30%	100.00%

Source: Traffic and Transportation Survey, 2016

From the cross tab chart, it can depict that trip origin purposes are mostly occurred for work and shopping purpose. People commute within or outside Upazila for their working purpose which is 34.30% from their residence. The others trip purposes are fluctuating. And, it is also seen that some people have to move from one work place to other work place which percentage is 36.40%. So, people's daily trip purposes are mostly related to residence and work place.

3.2.4 Passengers density in different vehicle mode

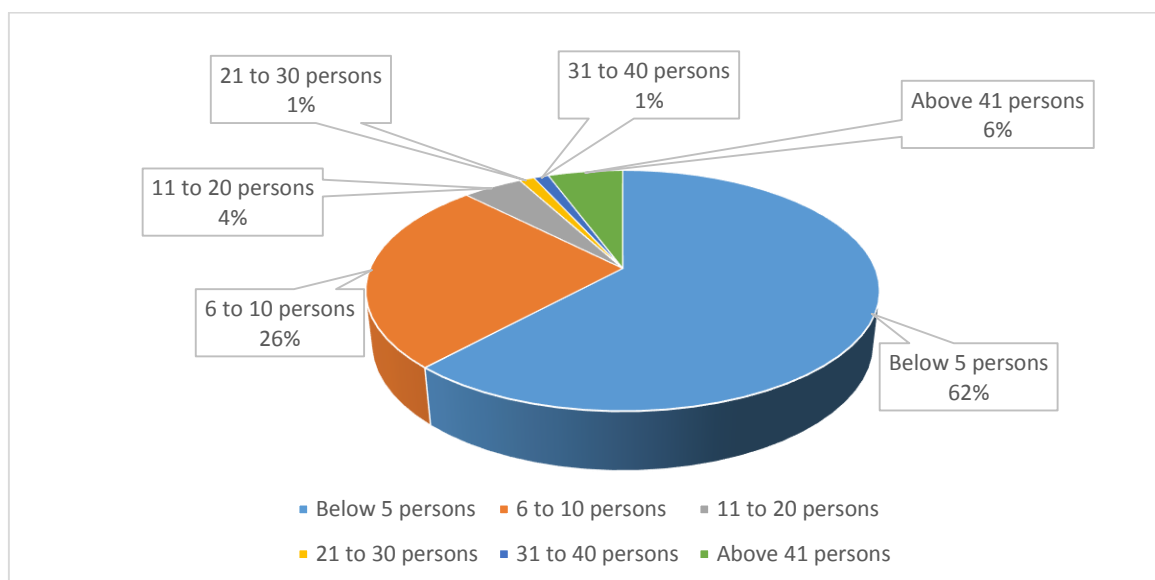


Figure 3.11: Occupancy of passengers in vehicle

Source: Traffic and Transportation Survey, 2016.

The graph shows that passengers mostly choose those vehicles which can hold a small number of passengers like within 5 persons that may be auto rickshaw for short time of travelling and the percentage is 62%. Data shows that 6 to 10 persons are willingly to travel and the percentage is 26%. Less than 10% people travel by those vehicles which can hold between 11 to 40 persons.

3.2.5 Major Prioritized Problems

From the survey, different problems have been drawn and the main problems which are facing most are categorized below.

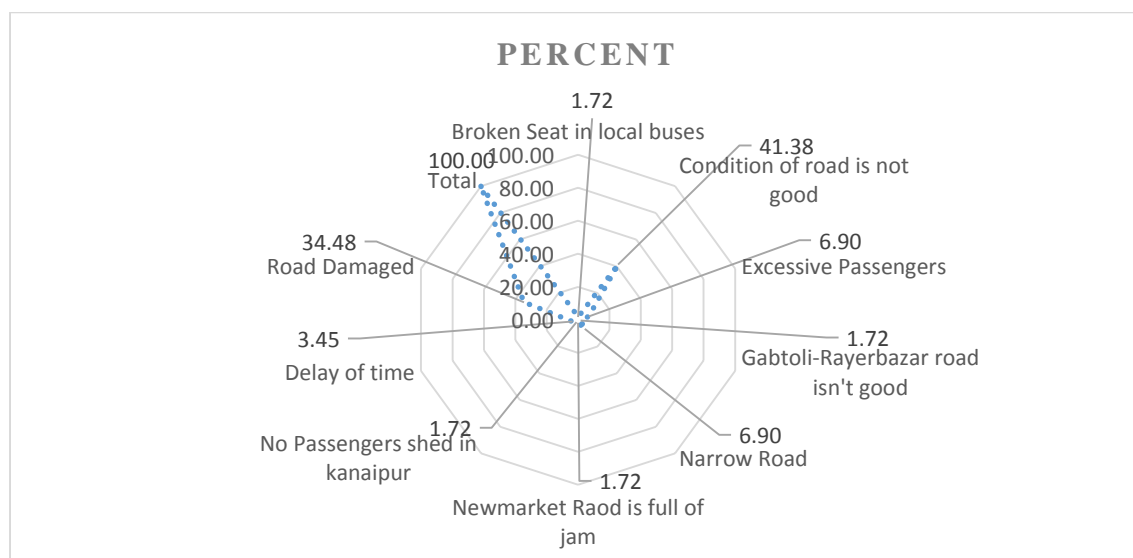


Figure 3.12: Facing problems in Transportation

Source: Traffic and Transportation Survey, 2016.

The above chart represents the most faced problems during travelling. Road maintenance work is limited that's why condition of road is not good which is responded by respondents around 40% and damaged of road around 35%. The other problems is also visible from the chart.

3.3 Passenger Interview Survey

Passenger's Interview Survey has been conducted for Bus, Boat and Train. As people mostly travel by bus, the findings reflect the transport communication through bus. The findings are when people prefer buses, travel cost, travel distance, types of modes for getting into buses through Bus terminal or bus stoppages

3.3.1 Trip Purpose

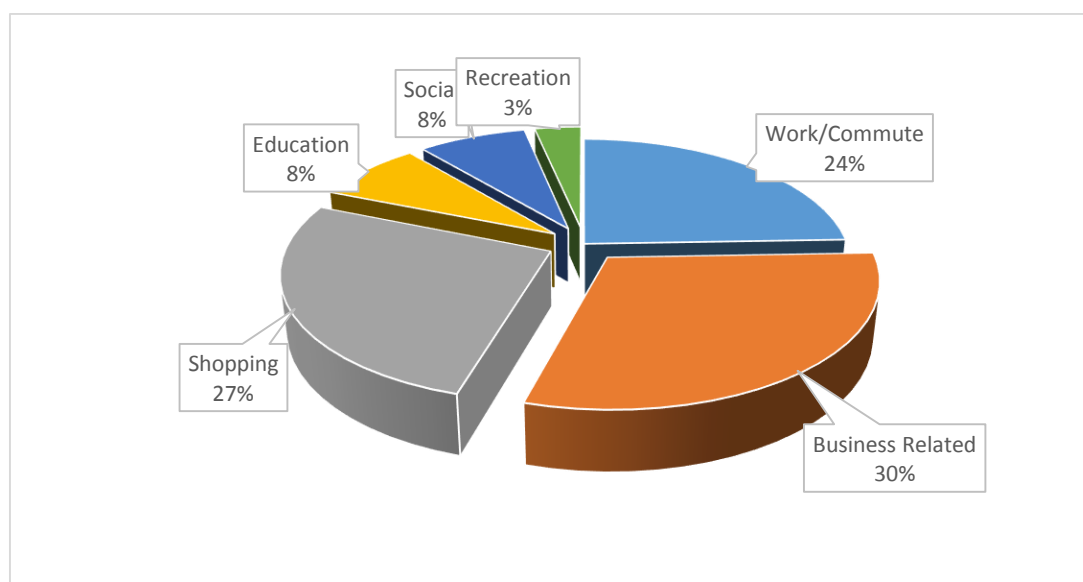


Figure 3.13: Percentages of trip purpose

Source: Traffic and Transportation Survey, 2016.

The chart displays that people prefer buses for Education, Shopping, Social, Business and work purposes. Most of the trips have been made for business and work purposes which is more than 50%. And the other purposes are also flown randomly.

3.3.2 Respondents Distribution

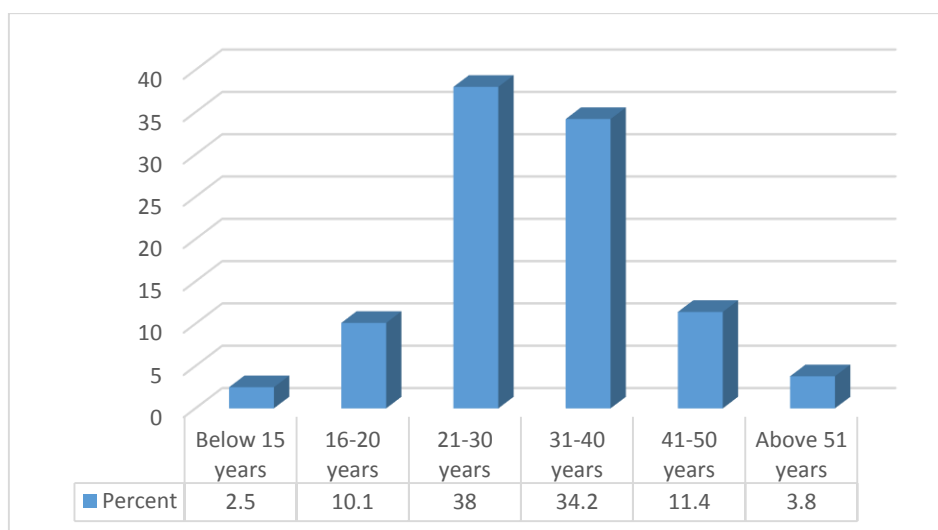


Figure 3.14: Percentages of Age Distribution of Passengers

Source: Traffic and Transportation Survey, 2016.

The above bar chart represents the respondent's percentage distribution during the survey period. The survey has been taken randomly but having reasonable sample size. It covers different ages of people where 38% are 21 to 30 years and around 34% are 31 to 40 years people.

3.3.3 Age Distribution according to the Gender

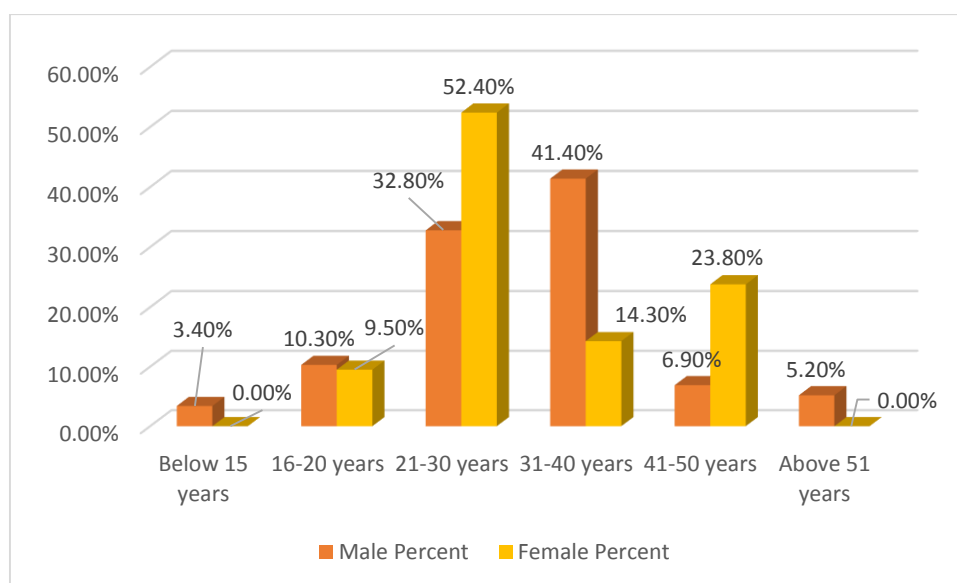


Figure 3.15: Percentages of Age Distribution of Passengers according to Gender

Source: Traffic and Transportation Survey, 2016.

The bar chart illustrates the percentages of male and female travelling by different types of vehicle. In a comparison it can be seen that male travel more in certain age group than female and other cases

vice versa has shown. If we see the data, it will be more representative. Almost 40% males of 31 to 40 age group are daily travelers for different purposes. But females are also travelling in a reasonable rate where more than 50% females are travelling where age group is 21 to 30 years. The data also shows that the comparison between different age ranges according to gender.

3.3.4 Age group and trip purpose

Table 3.4: Trip production purpose according to the age group

Age		Below 15 years	16-20 years	21-30 years	31-40 years	41-50 years	Above 51 years	Total
Trip Purpose	Frequency	2	2	5	4	4	2	19
	Percent	10.50%	10.50%	26.30%	21.10%	21.10%	10.50%	100.00%
Business Related	Frequency	0	2	8	11	2	0	23
	Percent	0.00%	8.70%	34.80%	47.80%	8.70%	0.00%	100.00%
Shopping	Frequency	0	1	10	8	1	1	21
	Percent	0.00%	4.80%	47.60%	38.10%	4.80%	4.80%	100.00%
Education	Frequency	0	0	2	3	1	0	6
	Percent	0.00%	0.00%	33.30%	50.00%	16.70%	0.00%	100.00%
Social	Frequency	0	3	4	0	0	0	7
	Percent	0.00%	42.90%	57.10%	0.00%	0.00%	0.00%	100.00%
Recreation	Frequency	0	0	1	1	1	0	3
	Percent	0.00%	0.00%	33.30%	33.30%	33.30%	0.00%	100.00%
Total	Frequency	2	8	30	27	9	3	79
	Percent	2.50%	10.10%	38.00%	34.20%	11.40%	3.80%	100.00%

Source: Traffic and Transportation Survey, 2016.

The people travel places for different purposes. Their trip purposes are varied according to their age range. From the chart, it is clear that where and what types of aging people mostly involve in travelling. It is seen that for business and work purposes trips are made around 65% by 21 to 40 age

group people. From the above chart, it can depict easily individual age purpose of trip and for specific purposes how much people are travelling in different ages.

3.3.5 Number of Modes to complete a trip

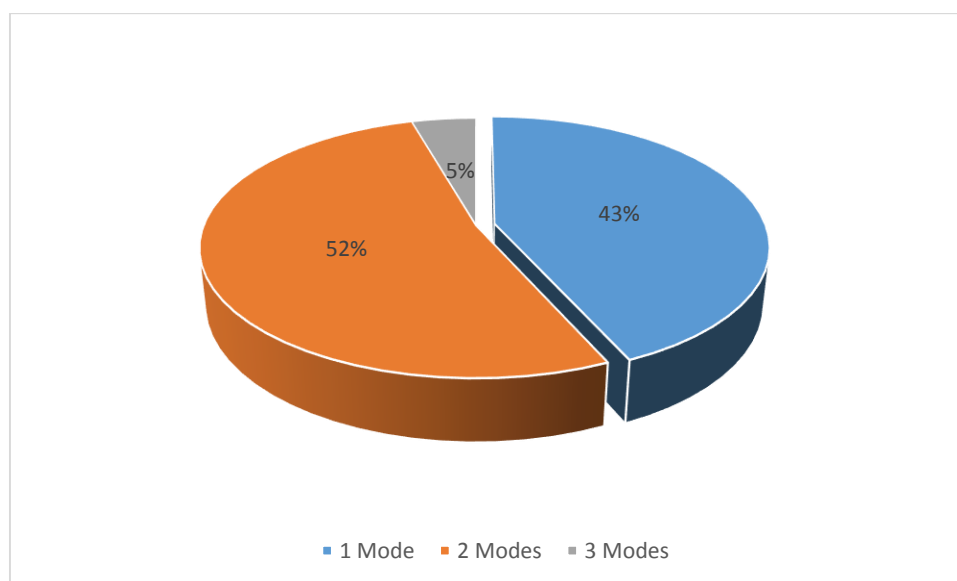


Figure 3.15: Number of Modes to complete a trip

Source: Traffic and Transportation Survey, 2016

The above pie chart depicts the usage of multiple modes to complete a trip. The people of this upazila at least use two modes to complete their trip. From the data it is visible that 52% people use 2 modes to complete their trip whereas 43% use 1 mode to complete a trip. It can be by bus, then by rickshaw, by on foot or by other means of transportation. Only 5% people use 3 types of mode to complete their trip.

3.3.6 Number of Trips

The above bar chart depicts the frequency of no. of trips in a week made by passengers. Most of the passengers are travelling one time per week around 48% (Please see Appendix-B). It can be illustrated by many reasons may be they have to move for work purposes in other places that's why they can make only 1 trip per week. But 15 passengers around 17% are travelling daily except holiday. In other cases, trip frequency is fluctuating.

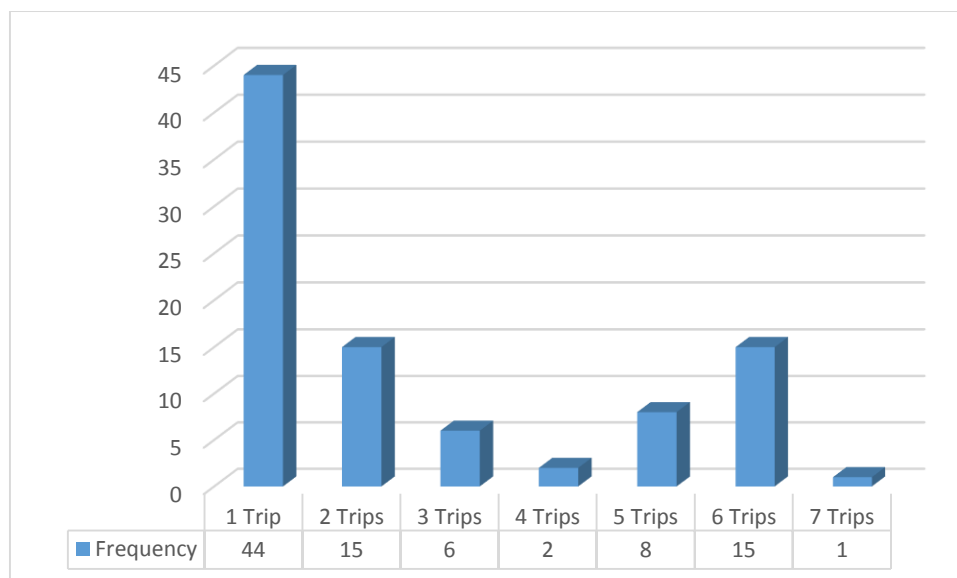


Figure 3.16: Number of Trips

Source: Traffic and Transportation Survey, 2016

3.3.7 Travel cost and travel distance

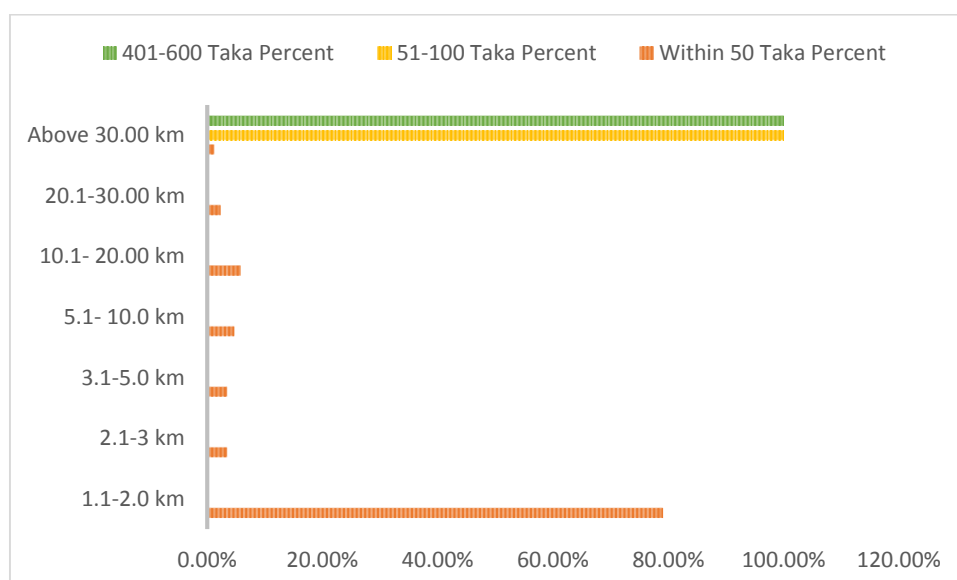


Figure 3.17: Travel Cost according to the Distance

Source: Traffic and Transportation Survey, 2016.

The above chart illustrates the distance and cost relationship of this upazila. The data shows that the travel distance of the people of this upazila is above 30 km. But it is remarkable that to travel to this distance they pay different fare. Most people pay within 50 taka for travelling different places. The information clearly represents that people mainly pay within 50 taka to cover the distance of 1 km to

30 km. The rate is varying because of no. of mode and types of mode. For that reason, they are travelling in different distances by certain amount of money. (Please see Appendix-B)

3.4 Regional Transport Survey

Regional transport network survey has been done for Buses and Trucks which are coming into study area and going out form study area. From the survey, we can know the carrying capacity of the buses, types of goods carrying by trucks, connectivity pattern with other Upazilas and Districts.

3.4.1 Regional connectivity with surrounding regions

Table 3.5: Regional Road Information of Meherpur, Gangni

Division	Length (Km)
Kushtia	23.78
Meherpur	45.73
Chuadanga	27.29
Jhenaidah	20.02

Source: RHD, Road Database, 2017.

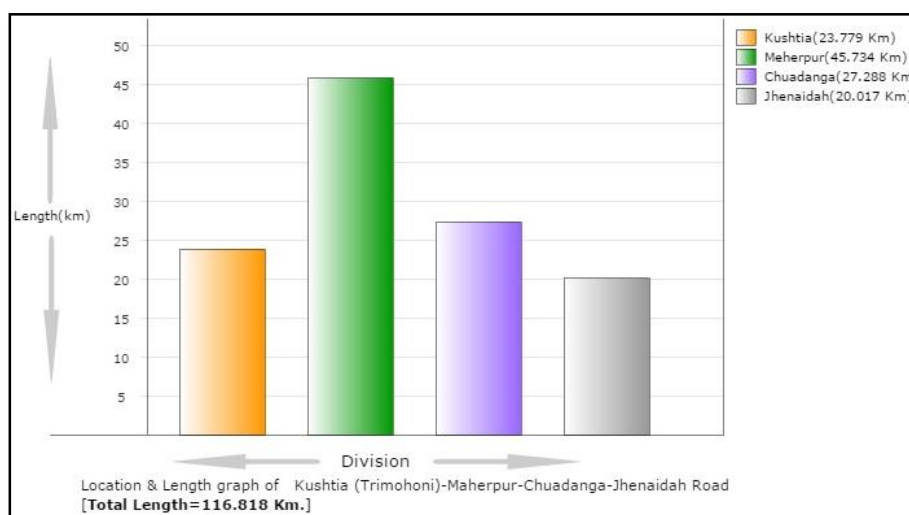


Figure 3.18: Bar Diagram of Regional Road Network

Source: RHD, Road Database, 2017.

The above bar diagram chart represents the importance road link of Gangni Upazila. From the table, it is seen that Kushtia, Meherpur, Chuadanga and Jhenaidah are important regional road where Meherpur occupies 45.734 kilometer.

3.4.2 Travel pattern of Buses

People choose travel in case of long distances. Buses passenger's occupancy varies from 30 to 40 persons. Buses make their trip from 1 to 3.

3.4.3 Travel pattern of Trucks

Trucks are coming into study area or going out form study area for goods carrying purposes such as vegetables, agricultural products like paddy, departmental products etc.

CHAPTER 4: CONCLUSION

Gangni Upazila has great potentiality because of having regional connectivity with other regions and place of interest with several important regions. The growth of a region depends mostly on transportation. In the preparation of Development Plan for Gangni Upazila, this transportation survey has inevitable impacts. This survey attempts to describe existing conditions of this upazila from different aspects. The survey data represents the present transport facilities of this upazila, the conditions of the vehicles, and the traffic flows of vehicles at different intersections depending on peak hour. The total study on the transportation of this upazila will help to prepare a comprehensive development plan for this upazila which will be a sustainable one.

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TRAFFIC VOLUME CALCULATION

A) Gangni Bazar

Table A-1: Hourly Traffic Volume according to the Vehicle Types for Gangni-Meherpur link during On Day, 29th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Meherpur to Gangni	Gangni to Meherpur			
MV	Bus/Minibus	3	8	10	18	55	1.50
	Heavy Truck/Light Truck	3	14	18	32	97	2.67
	Car/ Micro Bus/Jeep	1	11	24	34	34	2.83
	Auto Rickshaw/Tempo/Nosimon	0.75	62	122	184	138	15.20
	Motorcycle	0.75	181	219	400	300	32.98
NMV	Rickshaw/Van	0.5	197	184	381	191	31.47
	Bicycle	0.5	77	85	162	81	13.35
	Animal Cart/Push Cart	3	0	0	0	0	0.00
Total MV					669	624	55.18
Total NMV					543	272	44.82
Grand Total					1212	895	100.00

Table A-2: Hourly Traffic Volume according to the Vehicle Types for Gangni-Kathuli link during On Day, 29th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Gangni to Kathuli	Kathuli to Gangni			
	Bus/Minibus	3	7	4	10	31	1.53
	Heavy Truck/Light Truck	3	12	6	18	54	2.67
	Car/ Micro Bus/Jeep	1	15	8	23	23	3.39

APPENDIX-A

MV	Auto Rickshaw/Tempo/Nosimon	0.75	34	36	70	52	10.32
	Motorcycle	0.75	117	80	197	148	29.29
NMV	Rickshaw/Van	0.5	104	88	192	96	28.48
	Bicycle	0.5	79	85	164	82	24.32
	Animal Cart/Push Cart	3	0	0	0	0	0.00
Total MV					318	308	47.20
Total NMV					356	178	52.80
Grand Total					674	486	100.00

Table A-3: Hourly Traffic Volume according to the Vehicle Types for Gangni-Dhankhola link during On Day, 29th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Gangni to Dhankhola	Dhankhola to Gangni			
MV	Bus/Minibus	3	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	1	1	3	0.26
	Car/ Micro Bus/Jeep	1	1	1	2	2	0.52
	Auto Rickshaw/Tempo/Nosimon	0.75	31	23	54	41	13.95
	Motorcycle	0.75	63	60	123	92	31.68
NMV	Rickshaw/Van	0.5	64	53	117	59	30.31
	Bicycle	0.5	48	43	90	45	23.29
	Animal Cart/Push Cart	3	0	0	0	0	0.00
Total MV					180	138	46.41
Total NMV					208	104	53.59
Grand Total					387	241	100.00

Table A-4: Hourly Traffic Volume according to the Vehicle Types for Gangni-Karimpur link during On Day, 29th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Gangni to Karimpur	Karimpur to Gangni			
MV	Bus/Minibus	3	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	5	4	9	26	2.15
	Car/ Micro Bus/Jeep	1	2	2	4	4	1.03
	Auto Rickshaw/Tempo/Nosimon	0.75	44	53	97	73	24.08
	Motorcycle	0.75	60	57	117	88	29.04
NMV	Rickshaw/Van	0.5	40	54	94	47	23.30
	Bicycle	0.5	28	54	82	41	20.40
	Animal Cart/Push Cart	3	0	0	0	0	0.00
Total MV					227	191	56.30
Total NMV					176	88	43.70
Grand Total					404	279	100.00

Table A-5: Hourly Traffic Volume according to the Vehicle Types for Gangni-Kushtia link during On Day, 29th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Gangni to Kushtia	Kushtia to Gangni			
MV	Bus/Minibus	3	6	2	7	22	4.20
	Heavy Truck/Light Truck	3	9	6	15	46	8.99
	Car/ Micro Bus/Jeep	1	10	4	13	13	2.54
	Auto Rickshaw/Tempo/Nosimon	0.75	70	41	111	83	16.20

APPENDIX-A

	Motorcycle	0.75	134	95	229	172	33.56
NMV	Rickshaw/Van	0.5	112	84	195	98	19.09
	Bicycle	0.5	81	77	158	79	15.42
	Animal Cart/Push Cart	3	0	0	0	0	0.00
Total MV					375	335	65.49
Total NMV					353	177	34.51
Grand Total					728	512	100.00

B) Bamundi

Table B-1: Hourly Traffic Volume according to the Vehicle Types for Bamundi-Gangni link during On Day, 29th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Bamundi to Gangni	Gangni to Bamundi			
MV	Bus/Minibus	3	7	7	14	41	1.49
	Heavy Truck/Light Truck	3	12	11	24	71	2.59
	Car/ Micro Bus/Jeep	1	7	13	20	20	2.15
	Auto Rickshaw/Tempo/Nosimon	0.75	94	149	243	182	26.78
	Motorcycle	0.75	128	160	288	216	31.79
NMV	Rickshaw/Van	0.5	79	142	221	110	24.34
	Bicycle	0.5	52	46	98	49	10.85
	Animal Cart/Push Cart	3	0	0	0	0	0.00
Total MV					587	529	64.81
Total NMV					319	159	35.19
Grand Total					906	688	100.00

Table B-2: Hourly Traffic Volume according to the Vehicle Types for Bamundi-Khalisha Kandi link during On Day, 29th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Bamundi to Khalisha Kandi	Khalisha Kandi to Bamundi			
MV	Bus/Minibus	3	8	8	16	49	4.21
	Heavy Truck/Light Truck	3	17	16	33	98	8.42
	Car/ Micro Bus/Jeep	1	7	9	16	16	4.08
	Auto Rickshaw/Tempo/Nosimon	0.75	37	87	123	93	31.80
	Motorcycle	0.75	33	65	99	74	25.40
NMV	Rickshaw/Van	0.5	17	48	65	32	16.67
	Bicycle	0.5	14	23	37	18	9.41
	Animal Cart/Push Cart	3	0	0	0	0	0.00
Total MV					287	329	73.91
Total NMV					101	51	26.09
Grand Total					388	380	100.00

Table B-3: Hourly Traffic Volume according to the Vehicle Types for Bamundi-Betbaria link during On Day, 29th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Bamundi to Betbaria	Betbaria to Bamundi			
MV	Bus/Minibus	3	1	7	8	25	2.47
	Heavy Truck/Light Truck	3	1	11	12	35	3.52
	Car/ Micro Bus/Jeep	1	1	6	7	7	2.01
	Auto Rickshaw/Tempo/Nosimon	0.75	22	47	70	52	20.99

APPENDIX-A

	Motorcycle	0.75	30	77	107	80	32.21
NMV	Rickshaw/Van	0.5	24	45	69	35	20.89
	Bicycle	0.5	27	32	59	30	17.92
	Animal Cart/Push Cart	3	0	0	0	0	0.00
Total MV					203	198	61.20
Total NMV					129	64	38.80
Grand Total					331	263	100.00

Table B-4: Hourly Traffic Volume according to the Vehicle Types for Bamundi-Kazipur link during On Day, 29th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Bamundi to Kazipur	Kazipur to Bamundi			
MV	Bus/Minibus	3	0	1	1	2	0.10
	Heavy Truck/Light Truck	3	1	4	5	15	0.99
	Car/ Micro Bus/Jeep	1	1	3	3	3	0.61
	Auto Rickshaw/Tempo/Nosimon	0.75	58	37	94	71	19.25
	Motorcycle	0.75	82	78	160	120	32.61
NMV	Rickshaw/Van	0.5	62	49	111	55	22.54
	Bicycle	0.5	54	64	117	59	23.90
	Animal Cart/Push Cart	3	0	0	0	0	0.00
Total MV					263	210	53.55
Total NMV					228	114	46.45
Grand Total					490	323	100.00

Table B-5: Hourly Traffic Volume according to the Vehicle Types for Bamundi-Karamdi link during On Day, 29th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Bamundi to Karamdi	Karamdi to Bamundi			
MV	Bus/Minibus	3	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	5	5	11	32	5.11
	Car/ Micro Bus/Jeep	1	10	3	13	13	2.06
	Auto Rickshaw/Tempo/Nosimon	0.75	71	70	141	106	17.20
	Motorcycle	0.75	111	171	282	211	34.25
NMV	Rickshaw/Van	0.5	124	150	273	137	22.17
	Bicycle	0.5	112	125	237	118	19.21
	Animal Cart/Push Cart	3	0	0	0	0	0.00
Total MV					446	361	58.62
Total NMV					510	255	41.38
Grand Total					956	616	100.00

C) Dhankhola

Table C-1: Hourly Traffic Volume according to the Vehicle Types for Dhankhola-Chitla link during On Day, 29th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Dhankhola to Chitla	Chitla to Dhankhola			
MV	Bus/Minibus	3	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	1	1	2	6	2.41
	Car/ Micro Bus/Jeep	1	0	1	1	1	1.20
	Auto Rickshaw/Tempo/Nosimon	0.75	6	5	11	8	13.25
	Motorcycle	0.75	14	10	24	18	28.92
NMV	Rickshaw/Van	0.5	6	11	17	9	20.48
	Bicycle	0.5	13	15	28	14	33.73
	Animal Cart/Push Cart	3	0	0	0	0	0.00
Total MV					38	33	45.78
Total NMV					45	23	54.22
Grand Total					83	56	100

Table C-2: Hourly Traffic Volume according to the Vehicle Types for Dhankhola-Koshba link during On Day, 29th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Dhankhola to Koshba	Koshba to Dhankhola			
	Bus/Minibus	3	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	2	3	4	12	5.37

APPENDIX-A

MV	Car/ Micro Bus/Jeep	1	2	1	3	3	4.03
	Auto Rickshaw/Tempo/Nosimon	0.75	11	9	20	15	26.17
	Motorcycle	0.75	6	9	14	11	18.79
NMV	Rickshaw/Van	0.5	8	7	15	7	19.46
	Bicycle	0.5	10	10	20	10	26.17
	Animal Cart/Push Cart	3	0	0	0	0	0.00
Total MV					41	40	54.36
Total NMV					34	17	45.64
Grand Total					75	57	100.00

Table C-3: Hourly Traffic Volume according to the Vehicle Types for Dhankhola-Shaldah Hat link during On Day, 29th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Dhankhola to Shaldah Hat	Shaldah Hat to Dhankhola			
MV	Bus/Minibus	3	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	3	1	4	11	3.33
	Car/ Micro Bus/Jeep	1	1	2	3	3	2.38
	Auto Rickshaw/Tempo/Nosimon	0.75	20	9	29	22	27.62
	Motorcycle	0.75	15	16	31	23	29.05
NMV	Rickshaw/Van	0.5	12	10	22	11	20.48
	Bicycle	0.5	4	14	18	9	17.14
	Animal Cart/Push Cart	3	0	0	0	0	0.00
Total MV					66	58	62.38
Total NMV					40	20	37.62
Grand Total					105	77	100.00

Table C-4: Hourly Traffic Volume according to the Vehicle Types for Dhankhola-Gangni Bazar link during On Day, 29th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Dhankhola to Gangni Bazar	Gangni Bazar to Dhankhola			
MV	Bus/Minibus	3	1	1	2	5	1.13
	Heavy Truck/Light Truck	3	3	2	4	12	3.02
	Car/ Micro Bus/Jeep	1	2	1	3	3	1.89
	Auto Rickshaw/Tempo/Nosimon	0.75	15	12	26	20	19.62
	Motorcycle	0.75	19	23	42	31	31.32
NMV	Rickshaw/Van	0.5	13	14	26	13	19.62
	Bicycle	0.5	8	23	31	16	23.40
	Animal Cart/Push Cart	3	0	0	0	0	0.00
Total MV					76	70	56.98
Total NMV					57	29	43.02
Grand Total					133	98	100.00

D) Saharbati

Table D-1: Hourly Traffic Volume according to the Vehicle Types for Saharbati-Gangni link during On Day, 31th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Saharbati to Gangni	Gangni to Saharbati			
MV	Bus/Minibus	3	3	3	6	18	3.97
	Heavy Truck/Light Truck	3	2	4	6	18	3.97
	Car/ Micro Bus/Jeep	1	1	0	1	1	0.66
	Auto Rickshaw/Tempo/Nosimon	0.75	16	9	25	19	16.56
	Motorcycle	0.75	30	23	53	40	35.10
NMV	Rickshaw/Van	0.5	5	16	21	11	13.91
	Bicycle	0.5	16	23	39	20	25.83
	Animal Cart/Push Cart	3	0	0	0	0	0.00
Total MV					91	96	60.26
Total NMV					60	30	39.74
Grand Total					151	126	100

Table D-2: Hourly Traffic Volume according to the Vehicle Types for Saharbati-Kathuli link during On Day, 31th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Saharbati to Kathuli	Kathuli to Saharbati			
	Bus/Minibus	3	12	12	24	72	7.84
	Heavy Truck/Light Truck	3	12	18	30	90	9.80
	Car/ Micro Bus/Jeep	1	0	0	0	0	0.00

APPENDIX-A

MV	Auto Rickshaw/Tempo/Nosimon	0.75	24	30	54	41	17.65
	Motorcycle	0.75	30	42	72	54	23.53
NMV	Rickshaw/Van	0.5	36	42	78	39	25.49
	Bicycle	0.5	18	30	48	24	15.69
	Animal Cart/Push Cart	3	0	0	0	0	0.00
Total MV					180	257	58.82
Total NMV					126	63	41.18
Grand Total					306	320	100.00

Table D-3: Hourly Traffic Volume according to the Vehicle Types for Saharbari-Hinda link during On Day, 31th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Saharbari to Hinda	Hinda to Saharbari			
MV	Bus/Minibus	3	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	6	12	18	54	9.09
	Car/ Micro Bus/Jeep	1	0	0	0	0	0.00
	Auto Rickshaw/Tempo/Nosimon	0.75	6	0	6	5	3.03
	Motorcycle	0.75	24	12	36	27	18.18
NMV	Rickshaw/Van	0.5	12	6	18	9	9.09
	Bicycle	0.5	54	66	120	60	60.61
	Animal Cart/Push Cart	3	0	0	0	0	0.00
Total MV					60	86	30.30
Total NMV					138	69	69.70
Grand Total					198	155	100.00

Table D-4: Hourly Traffic Volume according to the Vehicle Types for Saharbati-Garadob link during On Day, 31th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Saharbati to Garadob	Garadob to Saharbati			
MV	Bus/Minibus	3	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	6	6	12	36	3.33
	Car/ Micro Bus/Jeep	1	0	0	0	0	0.00
	Auto Rickshaw/Tempo/Nosimon	0.75	18	30	48	36	13.33
	Motorcycle	0.75	54	30	84	63	23.33
NMV	Rickshaw/Van	0.5	30	30	60	30	16.67
	Bicycle	0.5	84	72	156	78	43.33
	Animal Cart/Push Cart	3	0	0	0	0	0.00
Total MV					144	135	40.00
Total NMV					216	108	60.00
Grand Total					360	243	100.00

E) Tentulbaria

Table E-1: Hourly Traffic Volume according to the Vehicle Types for Tentulbaria-Kathuli link during On Day, 31th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Tentulbaria to Kathuli	Kathuli to Tentulbaria			
MV	Bus/Minibus	3	0	1	1	3	0.71
	Heavy Truck/Light Truck	3	0	1	1	3	0.71
	Car/ Micro Bus/Jeep	1	0	1	1	1	0.35
	Auto Rickshaw/Tempo/Nosimon	0.75	17	10	27	20	18.79
	Motorcycle	0.75	15	12	27	20	19.15
NMV	Rickshaw/Van	0.5	15	16	31	16	21.99
	Bicycle	0.5	30	25	54	27	38.30
	Animal Cart/Push Cart	3	0	0	0	0	0.00
Total MV					56	47	39.72
Total NMV					85	43	60.28
Grand Total					141	89	100

Table E-2: Hourly Traffic Volume according to the Vehicle Types for Tentulbaria-Saharbati link during On Day, 31th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Tentulbaria to Saharbati	Saharbati to Tentulbaria			
	Bus/Minibus	3	1	1	2	5	2.54
	Heavy Truck/Light Truck	3	2	1	2	6	3.39
	Car/ Micro Bus/Jeep	1	0	1	1	1	1.69

APPENDIX-A

MV	Auto Rickshaw/Tempo/Nosimon	0.75	5	7	12	9	19.49
	Motorcycle	0.75	9	8	17	12	27.97
NMV	Rickshaw/Van	0.5	3	3	6	3	9.32
	Bicycle	0.5	13	9	21	11	35.59
	Animal Cart/Push Cart	3	0	0	0	0	0.00
Total MV					33	33	55.08
Total NMV					27	13	44.92
Grand Total					59	46	100.00

Table E-3: Hourly Traffic Volume according to the Vehicle Types for Tentulbaria-Bamundi link during On Day, 31th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Tentulbaria to Bamundi	Bamundi to Tentulbaria			
MV	Bus/Minibus	3	0	1	1	2	0.37
	Heavy Truck/Light Truck	3	1	4	5	14	3.36
	Car/ Micro Bus/Jeep	1	0	2	2	2	1.12
	Auto Rickshaw/Tempo/Nosimon	0.75	23	17	40	30	29.85
	Motorcycle	0.75	16	15	31	23	22.76
NMV	Rickshaw/Van	0.5	22	8	30	15	22.39
	Bicycle	0.5	13	12	25	13	18.66
	Animal Cart/Push Cart	3	0	2	2	6	1.49
Total MV					77	69	57.46
Total NMV					57	34	42.54
Grand Total					134	103	100.00

Table E-4: Hourly Traffic Volume according to the Vehicle Types for Tentulbaria-Kazipur link during On Day, 31th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Tentulbaria to Kazipur	Kazipur to Tentulbaria			
MV	Bus/Minibus	3	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	1	1	2	5	1.92
	Car/ Micro Bus/Jeep	1	0	2	2	2	1.92
	Auto Rickshaw/Tempo/Nosimon	0.75	7	3	10	7	12.18
	Motorcycle	0.75	5	9	13	10	16.67
NMV	Rickshaw/Van	0.5	10	12	22	11	27.56
	Bicycle	0.5	16	16	31	16	39.74
	Animal Cart/Push Cart	3	0	0	0	0	0.00
Total MV					26	23	32.69
Total NMV					53	26	67.31
Grand Total					78	49	100.00

F) Raipur

Table F-1: Hourly Traffic Volume according to the Vehicle Types for Raipur-Hatgoali link during On Day, 31th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Raipur to Hatgoali	Hatgoali to Raipur			
MV	Bus/Minibus	3	2	2	4	11	1.20
	Heavy Truck/Light Truck	3	3	2	5	15	1.72
	Car/ Micro Bus/Jeep	1	0	1	1	1	0.17
	Auto Rickshaw/Tempo/Nosimon	0.75	39	24	62	47	21.31
	Motorcycle	0.75	47	45	92	69	31.62
NMV	Rickshaw/Van	0.5	41	20	61	31	20.96
	Bicycle	0.5	52	15	67	34	23.02
	Animal Cart/Push Cart	3	0	0	0	0	0.00
Total MV					163	142	56.01
Total NMV					128	64	43.99
Grand Total					291	206	100

Table F-2: Hourly Traffic Volume according to the Vehicle Types for Raipur-Alangi link during On Day, 31th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Raipur to Alangi	Alangi to Raipur			
MV	Bus/Minibus	3	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	0	0	0	0	0.00
	Car/ Micro Bus/Jeep	1	0	0	0	0	0.00
	Auto Rickshaw/Tempo/Nosimon	0.75	17	7	24	18	15.26
	Motorcycle	0.75	32	17	49	36	31.49
NMV	Rickshaw/Van	0.5	26	9	35	17	22.40
	Bicycle	0.5	35	13	48	24	30.84
	Animal Cart/Push Cart	3	0	0	0	0	0.00
Total MV					72	54	46.75
Total NMV					82	41	53.25
Grand Total					154	95	100.00

G) Kazipur

Table G-1: Hourly Traffic Volume according to the Vehicle Types for Kazipur-Bamundi link during On Day, 31th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Kazipur to Bamundi	Bamundi to Kazipur			
MV	Bus/Minibus	3	0	1	1	3	0.33
	Heavy Truck/Light Truck	3	6	1	7	20	2.12
	Car/ Micro Bus/Jeep	1	1	0	1	1	0.16
	Auto Rickshaw/Tempo/Nosimon	0.75	55	30	85	64	27.73
	Motorcycle	0.75	33	40	73	55	23.82
NMV	Rickshaw/Van	0.5	29	41	70	35	22.84
	Bicycle	0.5	29	42	71	35	23.00
	Animal Cart/Push Cart	3	0	0	0	0	0.00
Total MV					166	142	54.16
Total NMV					141	70	45.84
Grand Total					307	212	100

Table G-2: Hourly Traffic Volume according to the Vehicle Types for Kazipur-Shabenagar link during On Day, 31th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Kazipur to Shabenagar	Shabenagar to Kazipur			
	Bus/Minibus	3	1	1	2	5	0.59
	Heavy Truck/Light Truck	3	0	1	1	2	0.20
	Car/ Micro Bus/Jeep	1	1	0	1	1	0.20

APPENDIX-A

MV	Auto Rickshaw/Tempo/Nosimon	0.75	21	39	60	45	23.29
	Motorcycle	0.75	45	39	83	62	32.49
NMV	Rickshaw/Van	0.5	20	33	53	27	20.74
	Bicycle	0.5	22	36	58	29	22.50
	Animal Cart/Push Cart	3	0	0	0	0	0.00
Total MV					145	113	56.75
Total NMV					111	55	43.25
Grand Total					256	169	100.00

Table G-3: Hourly Traffic Volume according to the Vehicle Types for Kazipur-Nodapara link during On Day, 31th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Kazipur to Nodapara	Nodapara to Kazipur			
MV	Bus/Minibus	3	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	2	0	2	5	0.78
	Car/ Micro Bus/Jeep	1	0	0	0	0	0.00
	Auto Rickshaw/Tempo/Nosimon	0.75	23	8	31	23	15.89
	Motorcycle	0.75	19	26	45	33	23.18
NMV	Rickshaw/Van	0.5	34	12	46	23	23.96
	Bicycle	0.5	45	24	69	34	35.68
	Animal Cart/Push Cart	3	1	1	1	3	0.52
Total MV					77	61	39.84
Total NMV					116	60	60.16
Grand Total					192	121	100.00

Table G-4: Hourly Traffic Volume according to the Vehicle Types for Kazipur-Pragpur link during On Day, 31th March, 2016.

Mode of Transport		PCU	Direction Name		Total Vehicle /Hour	Total PCU/ Hour	Percentage
			Kazipur to Pragpur	Pragpur to Kazipur			
MV	Bus/Minibus	3	0	0	0	0	0.00
	Heavy Truck/Light Truck	3	2	1	3	8	1.03
	Car/ Micro Bus/Jeep	1	0	1	1	1	0.21
	Auto Rickshaw/Tempo/Nosimon	0.75	28	24	52	39	21.19
	Motorcycle	0.75	40	34	73	55	30.04
NMV	Rickshaw/Van	0.5	36	19	55	28	22.63
	Bicycle	0.5	37	23	60	30	24.69
	Animal Cart/Push Cart	3	1	0	1	2	0.21
Total MV					128	101	52.47
Total NMV					116	59	47.53
Grand Total					243	160	100.00

ORIGIN AND DESTINATION SURVEY

Table B-1: Types of Mode

Vehicle Type	Frequency	Percent
Bus	13	14.4
Motor cycle	5	5.6
Nosimon	28	31.1
Van	35	38.9
Easybike	5	5.6
Leguna/TATA ACE	3	3.3
On foot	1	1.1
Total	90	100

Table B-2: Trip Purpose

Trip Purpose	Frequency	Percent
Work/Commute	15	16.7
Business Related	16	17.8
Shopping	39	43.3
Education	10	11.1
Social	3	3.3
Recreation	7	7.8
Total	90	100

Table B-3: Frequency of Passengers Occupancy

No. of people in a vehicle	Frequency	Percent
Below 5 persons	55	61.8
6 to 10 persons	23	25.8
11 to 20 persons	4	4.5
21 to 30 persons	1	1.1
31 to 40 persons	1	1.1
Above 41 persons	5	5.6
Total	89	100

Table B-4: Nature of Origin

Origin type	Frequency	Percent
Residence	67	74.4
Workplace	11	12.2
School/College/University	1	1.1
Social	2	2.2
Recreational	9	10
Total	90	100

Table B-5: Nature of Destination

Destination Type	Frequency	Percent
Residence	22	24.4
Workplace	27	30
Shopping	24	26.7
School/College/University	7	7.8
Social	7	7.8
Recreational	3	3.3
Total	90	100

Table B-6: Origin and Destination Pattern

Origin \ Destination		Residence	Workplace	Shopping	School/College/University	Social	Recreational	Total
Residence	Frequency	10	23	22	6	4	2	67
	Percentage	14.90%	34.30%	32.80%	9.00%	6.00%	3.00%	100.00%
Workplace	Frequency	4	4	2	0	1	0	11
	Percentage	36.40%	36.40%	18.20%	0.00%	9.10%	0.00%	100.00%
School/College/University	Frequency	0	0	0	1	0	0	1
	Percentage	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	100.00%
Social	Frequency	0	0	0	0	2	0	2
	Percentage	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	100.00%
Recreational	Frequency	8	0	0	0	0	1	9
	Percentage	88.90%	0.00%	0.00%	0.00%	0.00%	11.10%	100.00%
Total	Frequency	22	27	24	7	7	3	90
	Percentage	24.40%	30.00%	26.70%	7.80%	7.80%	3.30%	100.00%

PASSENGERS INTERVIEW SURVEY

Table B-7: Trip Purpose of Passengers

Trip Purpose	Frequency	Percent
Work/Commute	22	24.4
Business Related	27	30
Shopping	24	26.7
Education	7	7.8
Social	7	7.8
Recreation	3	3.3
Total	90	100

Table B-8: Age of the Respondent

Age	Frequency	Percent
Below 15 years	2	2.5
16-20 years	8	10.1
21-30 years	30	38
31-40 years	27	34.2
41-50 years	9	11.4
Above 51 years	3	3.8
Total	79	100

Table B-9: Travel Cost for Passengers

Travel Cost	Frequency	Percent
Within 50 Taka	86	95.6
51-100 Taka	3	3.3
401-600 Taka	1	1.1
Total	90	100

Table B-10: No. of trips in a week

No. of Mode	Frequency	Percent
1 Mode	39	43.3
2 Modes	47	52.2
3 Modes	4	4.4
Total	90	100

Table B-11: No. of trips in a week

No. of Trips	Frequency	Percent
1 Trip	44	48.4
2 Trips	15	16.5
3 Trips	6	6.6
4 Trips	2	2.2
5 Trips	8	8.8
6 Trips	15	16.5
7 Trips	1	1.1
Total	91	100

Table B-12: Travel Distance for Passengers

Travel Distance	Frequency	Percent
1.1-2.0 km	68	75.6
2.1-3 km	3	3.3
3.1-5.0 km	3	3.3
5.1- 10.0 km	4	4.4
10.1- 20.00 km	5	5.6
20.1-30.00 km	2	2.2
Above 30.00 km	5	5.6
Total	90	100

Table B-13: Age Distribution according to the Gender

Age		Below 15 years	16-20 years	21-30 years	31-40 years	41-50 years	Above 51 years	Total
Gender	Frequency	2	6	19	24	4	3	58
	Percent	3.40%	10.30%	32.80%	41.40%	6.90%	5.20%	100.00%
Male	Frequency	0	2	11	3	5	0	21
	Percent	0.00%	9.50%	52.40%	14.30%	23.80%	0.00%	100.00%
Female	Frequency	2	8	30	27	9	3	79
	Percent	2.50%	10.10%	38.00%	34.20%	11.40%	3.80%	100.00%
Total	Frequency	2	8	30	27	9	3	79
	Percent	2.50%	10.10%	38.00%	34.20%	11.40%	3.80%	100.00%

Table B-14: Trip Purpose according to the Age Distribution

Age Trip Purpose		Below 15 years	16-20 years	21-30 years	31-40 years	41-50 years	Above 51 years	Total
Work/ Commute	Frequency	2	2	5	4	4	2	19
	Percent	10.50%	10.50%	26.30%	21.10%	21.10%	10.50%	100.00%
Business Related	Frequency	0	2	8	11	2	0	23
	Percent	0.00%	8.70%	34.80%	47.80%	8.70%	0.00%	100.00%
Shopping	Frequency	0	1	10	8	1	1	21
	Percent	0.00%	4.80%	47.60%	38.10%	4.80%	4.80%	100.00%
Education	Frequency	0	0	2	3	1	0	6
	Percent	0.00%	0.00%	33.30%	50.00%	16.70%	0.00%	100.00%
Social	Frequency	0	3	4	0	0	0	7
	Percent	0.00%	42.90%	57.10%	0.00%	0.00%	0.00%	100.00%
Recreation	Frequency	0	0	1	1	1	0	3
	Percent	0.00%	0.00%	33.30%	33.30%	33.30%	0.00%	100.00%
Total	Frequency	2	8	30	27	9	3	79
	Percent	2.50%	10.10%	38.00%	34.20%	11.40%	3.80%	100.00%

Table B-15: Trip Cost according to the Distance

Distance Travel Cost		1.1-2.0 km	2.1-3 km	3.1-5.0 km	5.1- 10.0 km	10.1- 20.00 km	20.1-30.00 km	Above 30.00 km	Total
Within 50 Taka	Frequency	68	3	3	4	5	2	1	86
	Percent	79.10%	3.50%	3.50%	4.70%	5.80%	2.30%	1.20%	100.00%
51-100 Taka	Frequency	0	0	0	0	0	0	3	3
	Percent	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	100.00%
401-600 Taka	Frequency	0	0	0	0	0	0	1	1
	Percent	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	100.00%
Total	Frequency	68	3	3	4	5	2	5	90
	Percent	75.60%	3.30%	3.30%	4.40%	5.60%	2.20%	5.60%	100.00%

Urban Development Directorate
PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS
(PACKAGE: 02): UDD

Bus/ Boat or Launch/ Train Passenger Interview Survey Questionnaire

Name of Upazila :

Date :

Time of Interview :

Location of Interview point :

A. Present Address of the respondent

B. Sex: (a) Male (b) Female

C. Age: 1. Below 15 years 2. 16-20 Years 3. 21-30 Years 4. 31-40 Years 5. 41-50 Years 6. Above 51 Years

D. Where did your trip begin?

E. Where did your trip end point?

F. What was the purpose of your trip?

1. Work/Commute 2. Business related 3. Shopping 4. Education 5. Social 6. Recreation

G. No. of trips in a week?

H. How many times you changed modes to complete this trip?

1	2	3
---	---	---

I. What are types of modes you used to complete the trip?

1. Bus 2. Motor cycle 3. Rickshaw 4. Van 5. Rail 6. Boat/Launch 5. On foot 6. Others (specify)

J. Total travel time of the trip?(In min/hour)

K. Total costs of the trip? (In Taka)

L. Total distances of the trip? (In k.m.)

M. Any comments on transportation?

Name of Enumerator:

Name of Supervisor:

Signature of Enumerator:

Signature of Supervisor:

Urban Development Directorate
PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS
(PACKAGE-02):UDD

Traffic and Transportation Survey
Traffic Volume Count Tally Sheet

(24 Hours long) Weather condition

Name of Upazila:

Date:

Route Name:

Hours counted: **Start**am/pm, **Finish**am/pm

Traffic Direction: Fromto.....

Intersection Name:

Type of traffic	Number of Traffic	Total
Bus/Minibus		
Heavy Truck/ Light Truck		
Car/Micro-bus/Jeep		
Auto Rickshaw/Tempo/Nosimon		
Motorcycle		
Rickshaw/Van		
Bicycle		
Animal cart/Push cart		
Pedestrian		
Others (specify)		

Name of Enumerator

Signature of Enumerator

Name of Supervisor

Signature of Supervisor

Urban Development Directorate
PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS
(Package: 02): UDD

Roadside Interview Survey (O-D Survey) Questionnaire

Time: Every half an Hour Interval (24 hours clock)

Name of Upazila:

Date:

Route Name:

Hours counted: **Start**am/pm, **Finish**am/pm

Traffic Direction: Fromto.....

A. Vehicle Type:

1. Truck 2. Bus 3. Car/Pickup/Jeep/Motorbus 4. Auto Rickshaw/Tempo 5. Motorcycle 6. Rickshaw/Van 7. Bicycle

B. Where did your trip begin?

City/Town.....

C. What type of place is your trip start point?

1. Residence 2. Workplace 3. Shopping 4. School/College/University 5. Social 6. Recreational

D. Where did your trip end?

City/Town.....

E. What type of place is your trip end point?

1. Residence 2. Workplace 3. Shopping 4. School/College/University 5. Social 6. Recreational

F. What was the purpose of your trip?

1. Work/Commute 2. Business related 3. Shopping 4. Education 5. Social 6. Recreation

G. How many people were in the vehicle including the driver?

No. of people.....

H. Any comments on Transportation?

Name of Enumerator:

Signature of Enumerator:

Name of Supervisor:

Signature of Supervisor:

Urban Development Directorate
PREPARATION OF DEVELOPMENT PLAN FOR FOURTEEN UPAZILAS
(PACKAGE: 02): UDD

Questionnaire on Regional Transportation Network System

Name of Upazila :

Date of survey :

A. Information of trip going out from study area to other region (upazila/district)

1) Type of Mode (Bus/Truck/Train/Water way):

(Response will be collected from every mode)

- 2) Name of trip destination point (Upazila/District):
- 3) No. of trips per day (hour basis)
- 4) Average no. of passengers carried by per mode (per trip):
- 5) Types of goods carried by per mode (per trip):

B. Information of trip coming into study area from other region (upazila/district)

1) Type of Mode (Bus/Truck/Train/Water way):

(Response will be collected from every mode)

- 2) Name of trip origin point (Upazila/District):
- 3) No. of trips per day (hour basis)
- 4) Average no. of passengers carried by per mode (per trip):
- 5) Types of goods carried by per mode (per trip):
- 6) Stoppage area inside the upazila area

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