A COMPARATIVE STUDY BETWEEN WEEKDAYS AND WEEKEND TRAFFIC VOLUME AT BANGLA MOTOR INTERSECTION

By

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A thesis submitted to the Department of Civil Engineering in partial fulfillment for the degree of Bachelor of Science in Civil Engineering

Department of Civil Engineering

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147/I, Green Road, Dhaka-1215, Bangladesh

Section: 19C+19E

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It is hereby declared that this thesis/project or any part of it has not been submitted elsewhere for the award of any degree or diploma.

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Dedicated

to

“Our Parents”

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ABSTRACT

The increment of vehicles due to the proportional increment of populations and a rapid development of modern society is a major concern in metropolitan cities in developing countries like Bangladesh. So it is imperative to monitor traffic volume as well as the quality transport supply termed as the Level of Service (LOS). The present study is an investigation of the behaveir of mixed traffic flow in Dhaka city of Bangladesh Field Traffic volume survey was carried out to determine the level of service at a signalized Bangla Motor intersection in Dhaka North City Corporation(DNCC). Level of Service (LOS) was determined by peak hour factor (PHF) method. Nature of traffic flow in dhaka city is heterogeneous.so this heterogeneous or mixed traffic are simplifed by passenger car unit (PCU). Then estimated PCU was used to determine LOS. LOS was calculated for both directions of roads. personal car, Motor bike CNG and buses are the dominat vehiles in this intersection . According to PHF method. LOS of this intersection is very unstable and worst. Considering and evaluating all the findings it can be recommended that increasing and improving public transport faciliyies, demotivating private transport should be applied and road eidth need to be incrased to make the traffic flow suitable. Also incorporatin of an effective intlligent traffic signal. Implementing traffic rules and regulation should be applied and maintained propely in the condition intersection to accelerate the traffic flow in this area.

TABLE OF CONTENT

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1
INTRODUCTION

1.1 Introduction

For the economic development, good transportation system is very important [1-3]. In transportation engineering traffic volume study is a baseline. Engineering operations and management are successfully completed by using it [4]. Traffic volume survey plays a significant role to determine the existing condition and to forecast the future condition of traffic volume [5]. The road traffic in developing countries like Bangladesh is highly heterogeneous comprising of the traffic of different static and dynamic characteristics [6,7]. Again Traffic volume data is very important as it is used to estimate capacity of a road and level of service of that given road under the combination of traffic at any hour of a day [8,9]. Los of a traffic facility defines as a concept used to determine the performance and quality of traffic service to a given flow rate [10]. Levels of service are defined as six categories from A to F category. A represents best operating condition on the other hand F is use to estimate capacity of a road and level of service of that given road under the combination of traffic at any hour of a day [8, 9]. Los of represents the worst [11]. In Dhaka city, the increment of traffic volume and congestions are two quickly developing problems. Nowadays, it is a common to see traffic congestions at intersections at pack hours in the morning and evening. According to a report, traffic volume is increasing in last few decades and was 19375 to 2015 with annual growth rate 6.1% in this city [12]. This may be due to poor road planning and sub-standard geometric conditions of selected intersections [13]. Intersections become very congested if traffic volumes are high, make inefficiency as a result peoples suffer delay and frustration [14]. A rapid escalation in the number of motor vehicles, greater availability of used vehicles, the relative reduction in prices traffic congestions Due to traffic congestion, air pollution, full usage, and travel time [16,17].

Therefore, it is a significant issue to investigate traffic volume and to monitor the quality of transport supply in teams of level of service for major intersections of Dhaka City. Traffic volume count of this study will be helpful for planning, accident analysis [18], design and operation, for roadway of Dhaka city [19] as well as future traffic demand forecasting. To estimate traffic volume at selected intersections, a case study was made at 1 major intersection during morning [9am-10am], Afternoon [5pm-6pm], and evening [8pm-9pm]. To analyze mixed or heterogeneous traffic, a simplification is developed to convert the different types of vehicles into equivalent number of passenger cars unit or PCU [6]. Finally estimated PCU values are used determine LOS on three or four legs divided intersections. Level of Service (LOS) was determined by peak hour factor method.

1.2 Objectives

1. The main objectives of this research work was to assess the estimating traffic volume conditions at Bangla Motor Intersection.

2. Traffic volume conditions were measured in terms of familiar Level of Service (LOS).

1.3 Organization of the thesis

In addition to this introductory chapter, this thesis consists of five different chapters. Chapter 2 summarizes the literatures reviewed in connection of this study. Chapter 3 describes the detailed methodology used to achieve the study objectives. Chapter 4 presents the results and discussion of the analysis of traffic volume condition. The conclusions recommendations drawn from this study for future effort are summarized in Chapter 5.

CHAPTER 2

Literature Review

2.1 Introduction

LOS is very effective approach to identify the existing traffic condition of any intersection. Numbers studies have been conducted by different researchers in which they describe the procedure about how to calculate the LOS using various methods.

2.2 Related works in Foreign Countries

A concept was first developed in 1965 for highway named capacity manual (HCM) to define level of service and classify it by a range A to F for highway [20]. It is very important to analyze the traffic performance for design, maintenance, rehabilitation, and planning of roads. Performance evaluation of traffic in a highway is expressed by a term Level of service. It is a method which can explain traffic conditions for an existing or proposed transportation facility operating based upon current or projected traffic demand [21]. Capacity and level of service are analyzed to get the delay of the analyzed facilities. This Analysis is two types. One is empirical, another is analytical. The empirical model is established on the basis of regression analysis on the other hand the analytical model is based on the gap-acceptance theory [22]. An attempt is made by Ankit N Mahidadiya and Prof. Jayesh Juremalani to estimate passenger Car unit (PCU) in an urban intersection [23]. A study was made in malaysia by jamil et al. using SIDRA (full abbreviate of SIDRA) intersection version 5.1 software to analyze factors affecting level of service at unsignalized intersection. Main purpose was to analyze affecting level of service at a junction [24]. Rao et al. followed HCM (highway capacity manual) 2000 to evaluate the capacity, control delay and vehicular streams and traffic parameters were abstracted by the videography for 3 uncontrolled intersection in India [25]. Mithun Mohon and Satish Chandra proposed three methods for the estimation of PCU at UI under highway heterogeneous traffic conditions. First one is PCU based on occupancy time, second one is PCU based on potential capacity, and last one is PCU based on queue clearance rate [26].

2.3 Related works in Bangladesh

Several research programs have been developed in foreign countries, but very limited studies have been made in this selected topic in Bangladesh. A case study like physical feature s survey, delay time survey, parking survey, traffic volume survey was done to find out the condition of traffic and transportation at central Business AREA of Rangpur city [27]. A study was developed by chisty , islam and mishuk to calculate LOS, a traffic survey was carried out to determine traffic volume, capacity and speed of that existing road [28].

CHAPTER 3
Methodology

3.1 Introduction

The main objective of this research is to identify the los of Banglamotors intersections. Los is related with model composition of various transport, road capacity and road geometry model composition. Describes the key operation, Commercial advantages and properties of any transport interms of cost, speed, accessibility, frequency, sefety, comfort, etc. In this research to achieve the los, traffic volume survey was carried out to court mixed vchicles, geometric feature survey. All traffic data were collected in to three phads like morning peak (9:00am-10:00am), afternoon peak (5:00pm-6:00pm) and evening peak (8:00pm-9:00pm) and each peak was continued for 1 hours duration (transport, 2004). Geometric feature survey is needed to identify the existing road capacity. To identify the existing supply and capacity conditions of various intersections road length, width of carriageway, footpath, median, shoulder, number of legs and control system wtc. Data has been collected by conducting field survey. The calculation of passenger car unit or PCU is very important to analyze the mixed or heterogeneous traffic and PCU is a simplification which converts the different types of vehicles in to equivalent number of passenger cars.

3.2 Data Collection Mechanism

We collect our data after group member's discussion. Traffic volume data were collected at each point on weekend for 1 hour with the help of a video camera. Four digital video cameras were used to collect traffic data. Then vehicle types and a number of the vehicles was counted by slowly playing all recorded videos at the laboratory.

3.3 Description of Study Area

Dhaka is a metropolitan city in Bangladesh and a major urban, commercial and educational centre of North City Corporation [29]. The study is carried out in Dhaka north City Corporation, Located in North East part of Bangladesh.

There are 12 city corporation in Bangladesh and Dhaka is one of the oldest city corporations, which is established in 1610 [29]. In the previous decade Dhaka is called a city of rickshaw but now it is called a city of Busses and cars, Motorcycle, and CNG [2]. In Dhaka city, 62% commercial vehicles transport passenger and carry freight [12]. The nature of all intersections is signalized. Among them, Bangla Motor is considered as one of the most busy intersections.

3.4 Road Geometry of Intersections

Bangla motor is one of the most busy road intersections in Dhaka city. From Kawran Bazar, in the middle of the shahbag square, from the Bangabandhu Sheikh Mujib Medical University, Kazi Nazrul Islam Soroni is connected horizontally. There is a busy road, with a mural at one end and a fighter jet at the other. The Bangla motor to Kazi nazrul Islam avenue has two lanes with two sided footpath and Median. The Bangla motor to Kazi nazrul Islam Soroni has two lanes with two sided footpath and Median. The Bangla motor to New Eskaton Road has two lanes with two sided footpath and Median. The Bangla motor to Hatirpool has two lanes with two sided footpath and Median.

3.5 Field observation and Reconnaissance

Reconnaissance was a process to observe the study area at a glance for preliminary data collection. Several on-spot visit and in formal data were collected for clear conceptualization and develop a strategy to conduct the study.

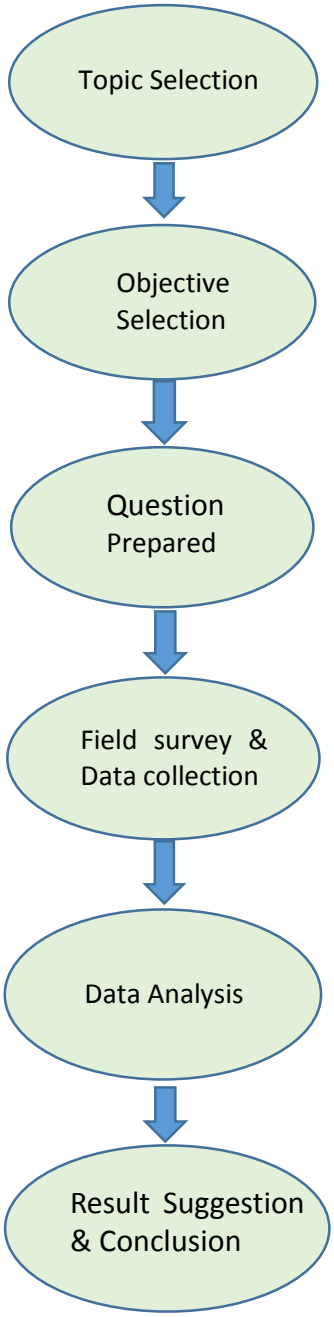
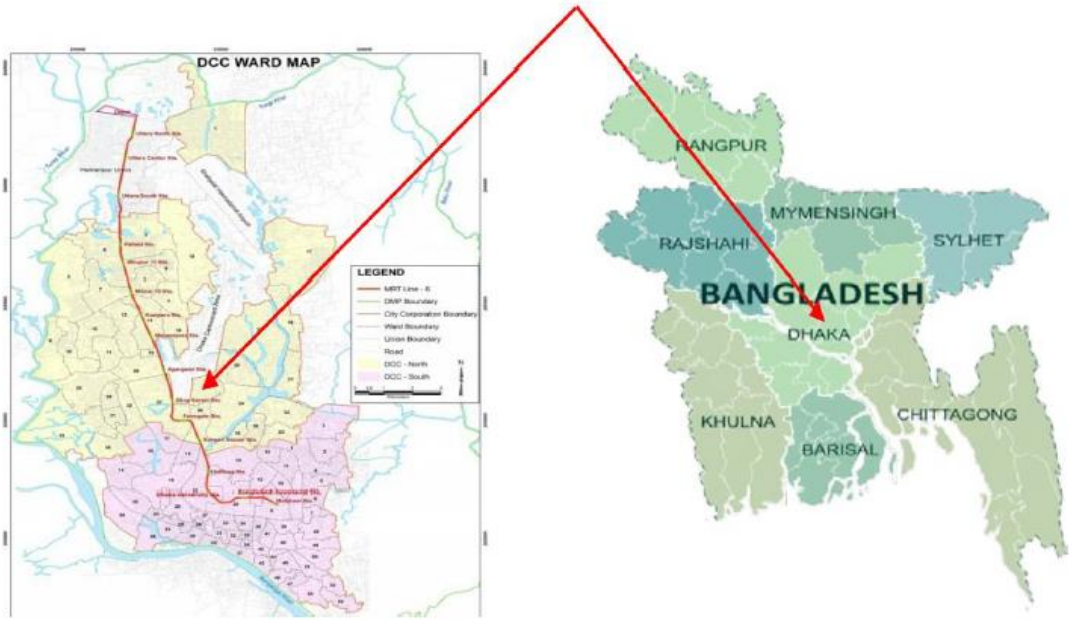
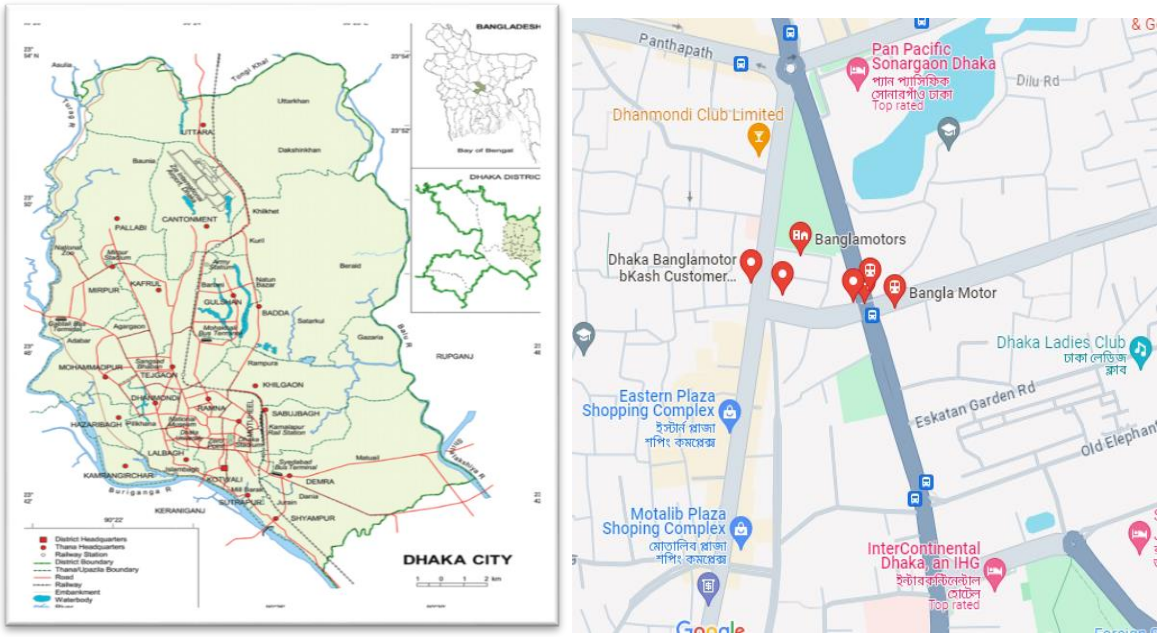


Figure 3.1: The Methodology

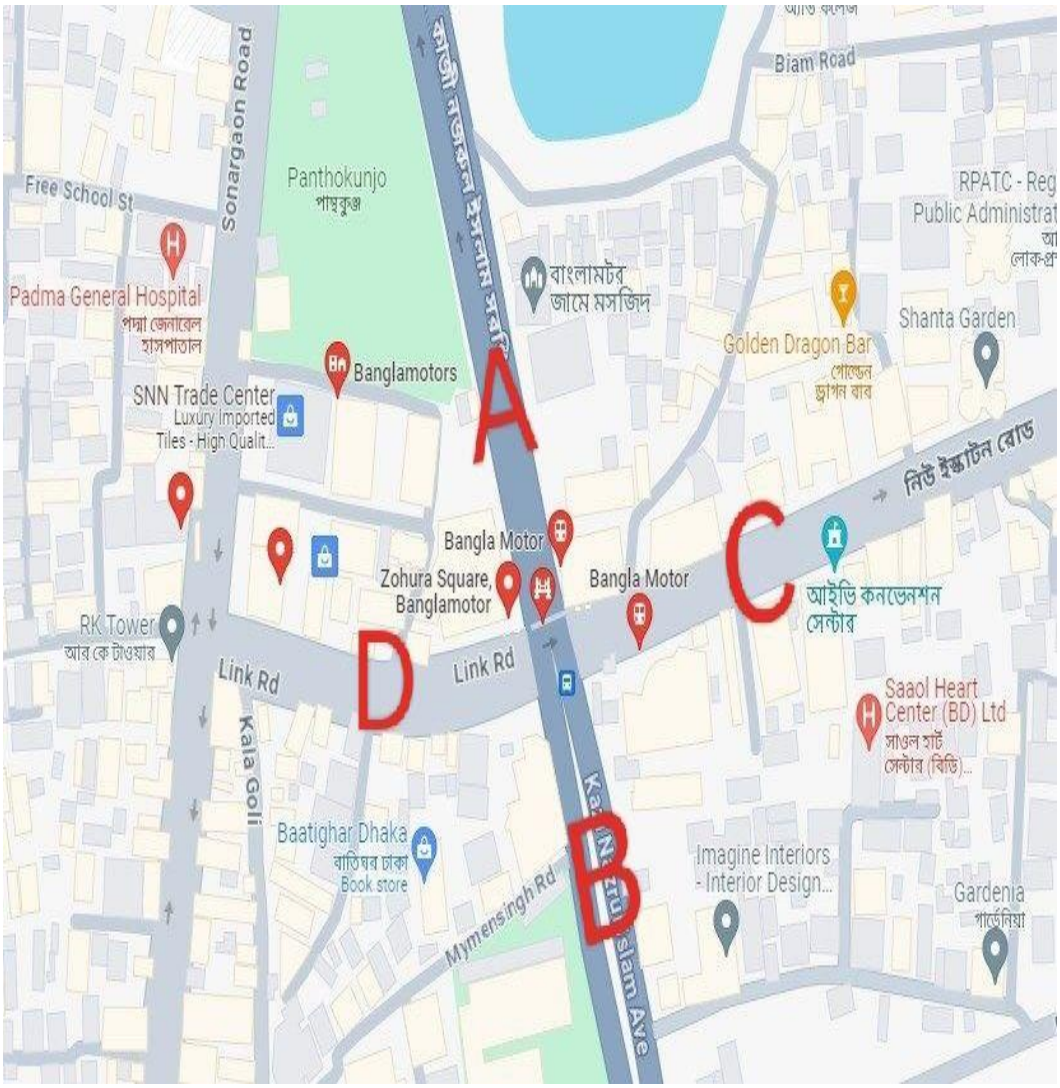
Dhaka North City



Figuer.3.2: Location of Study Area



Figuer.3.3:Location of Banglamotor Intersection



Figuer.3.4: Location of Banglamotor Intersection

Table 3.1: Road Geometry of one major intersection in DCC area

Point Name	Road Name	Lane Width (ft.)		Median(ft.)	Footpath Width(ft.)	
		Right	Left		Right	Left
A	Banglamotor to Kazi Nazrul Islam Sarani	45’-0”	45’-0”	4’-0”	8’-0”	8’-0”
B	Banglamotor to Kazi Nazrul Islam Avenue	45’-0”	45’-0”	4’-0”	8’-0”	8’-0”
C	Banglamotor to New Eskaton Road	35’-0”	35’-0”	3’-0”	6’-0”	6’-0”
D	Banglamotor to Hatirpool	35’-0”	35’-0”	3’-0”	6’-0”	6’-0”

Table 3.2: Los with respect to its Peak Hour Factor

Peak Hour Factor Value	LOS
0.7 or less	A
0.8 or less	B
0.85 or less	C
0.90 or less	D
0.95 or less	E
>1 or less	F

To calculate the LOS, peak Hour factor (PHF) method is used. Traffic engineers focus on the peak-hour traffic volume in evaluating capacity and other parameters because it represents the most critical time. the analysis of service is based on peak rates of flow occurring within the peak hour because substantial short-term fluctuations typically occur during an hour. Common practice is to use a peak 15-minute rate of flow. Flow rates are usually expressed min vehicles per hour, not vehicles per 15 minutes. the relationship between the peak 15- minute flow rate and the full hourly volume is given by the peak-hour factor (PHF) as shown in the following equation [Authority,2003]. peak -hour factors in urban areas generally range between 0.80 to 0.98. peak-hour factors over 0.95 are often indicative of High traffic volumes [31]. PHF was evaluated by the following formula [30].

PHF= (hourly volume/4*volume count at highest 15-min)

Table 3.3: Los with respect to its Peak Hour Factor

PCU factors for Urban road	
Vehicle Types	PCU factors
CNG	0.6
Pickup	1.5
Covered van	3
Truck	3
Car	1
Bus	2.5
Bicycle	0.3
Motorcycle	0.5

CHAPTER 4

Results and Discussion

4.1 Introduction

To fulfill the objective of the study, data analysis has been done on two stages. First analysis on existing conditions of intersection has been conducted. Secondly, survey data have been conducted to findout the recent traffic performance conditions of these intersections. In mixed traffic condition, model share is on important factor for assessment of intersection performance.

4.2 Intersection Approch

4.2.1 Banglamotor to Kazi Nazrul Islam Sarani

Car is the most dominated vehicle about 167 found in the morning. Rest of the peaks also contain highest amount of car and the number 255 & 172 at afternoon and evening hour respectively. Motorcycle and buses are maximum in afternoon peak period. The maximum volume of motorcycle is found in the evening period where as maximum CNG volume is found in the afternoon peak. Moderate numbers of vehicles are covered van, picup. There is no truck influence in this lane in the morning peak. Less dominant vehicles are truck, also their effect are less at three peaks.

Table 4.1: Field survey at Banglamotor to Kazi Nazrul Islam Sarani (Point A)

POINT	A= Banglamotor to Kazi Nazrul Islam Sarani								Date:14.09.2023(Thursday)	
Mode	CNG	Pickup	Covered van	Truck	Car	Bus	Non-motors	Motor cycle	15min Total Value	60min Total Value
MORNING PEAK										
9:00-9:15	12	5	3	1	42	8	0	37	108	
9:15-9:30	16	2	0	0	50	10	0	45	139	
9:30-9:45	20	0	1	1	40	8	0	40	110	
9:45-10:00	18	0	0	2	35	9	0	38	102	459
AFTERNOON PEAK										
5:00-5:15	32	4	2	0	60	20	15	70	203	
5:15-5:30	38	2	0	1	72	25	10	79	227	
5:30-5:45	35	0	1	0	65	18	5	60	184	
5:45-6:00	40	1	1	0	58	15	6	57	178	792
EVENING PEAK										
8:00-8:15	32	0	3	2	50	25	15	55	182	
8:15-8:30	40	5	1	0	45	20	10	60	181	
8:30-8:45	37	0	1	0	42	22	16	75	193	
8:45-9:00	30	2	0	1	35	17	20	65	170	726

Table4.2: Banglamotor to Kazi Najrul Islam Sarani (Point A PCU factor)

POINT	A= Banglamotor to Kazi Najrul Islam Sarani (Point A PCU factor)								Date: 14.09.2023(Thursday)	
Mode	CNG	Pickup	Covered van	Truck	Car	Bus	Non-motors	Motor cycle	15min Total Value	60min Total Value
MORNING PEAK										
9:00-9:15	7.2	7.5	9	3	42	20	0	18.5	107.2	
9:15-9:30	9.6	3	0	0	50	25	0	22.5	110.1	
9:30-9:45	12	0	3	3	40	20	0	20	98	
9:45-10:00	10.8	0	0	6	35	22.5	0	19	93.3	408.6
AFTERNOON PEAK										
5:00-5:15	19.2	6	6	0	60	50	4.5	35	180.7	
5:15-5:30	22.8	3	0	3	72	62.5	3	39.5	205.8	
5:30-5:45	21	0	3	0	65	45	1.5	30	165.5	
5:45-6:00	24	1.5	3	0	58	37.5	1.8	28.5	154.3	706.3
EVENING PEAK										
8:00-8:15	19.2	0	9	6	50	62.5	4.5	27.5	178.7	
8:15-8:30	24	7.5	3	0	45	50	3	18	150.5	
8:30-8:45	22.2	0	3	0	42	55	4.8	22.5	149.5	
8:45-9:00	18	3	0	3	35	42.5	6	32.5	140	618.7

Table4.3: Field survey at Banglamotor to Kazi Najrul Islam Sarani (Point A)

POINT	A= Banglamotor to Kazi Najrul Islam Sarani								Date: 14.09.2023(Friday)	
Mode	CNG	Pickup	Covered van	Truck	Car	Bus	Non-motors	Motor cycle	15min Total Value	60min Total Value
MORNING PEAK										
9:00-9:15	35	12	5	8	40	20	9	37	166	
9:15-9:30	30	8	3	2	33	25	5	46	152	
9:30-9:45	38	4	0	0	39	14	0	29	124	
9:45-10:00	25	0	1	1	30	10	0	33	100	542
AFTERNOON PEAK										
5:00-5:15	30	5	6	0	38	11	0	38	128	
5:15-5:30	33	3	0	0	45	18	0	44	143	
5:30-5:45	46	0	1	1	52	22	4	50	176	
5:45-6:00	40	1	3	3	50	20	10	57	184	631
EVENING PEAK										
8:00-8:15	48	12	9	6	45	25	10	65	220	
8:15-8:30	40	1	0	0	55	22	20	75	213	
8:30-8:45	56	3	2	2	39	17	29	55	203	
8:45-9:00	50	5	6	7	42	20	26	59	215	851

Table4.4: Banglamotor to Kazi Najrul Islam Sarani (Point A PCU factor)

POINT	A= Banglamotor to Kazi Najrul I slam Sarani (Point A PCU factor)								Date: 14.09.2023(Friday)	
Mode	CNG	Pickup	Covered van	Truck	Car	Bus	Non-motors	Motor cycle	15min Total Value	60min Total Value
MORNING PEAK										
9:00-9:15	21	18	15	24	40	50	2.7	18.5	189.2	
9:15-9:30	18	12	9	6	33	62.5	1.5	23	165	
9:30-9:45	22.8	6	0	0	39	35	0	14.5	117.3	
9:45-10:00	15	0	3	3	30	25	0	16.5	92.5	564
AFTERNOON PEAK										
5:00-5:15	18	7.5	18	0	38	27.5	0	19	128	
5:15-5:30	19.8	4.5	0	0	45	45	0	22	136.3	
5:30-5:45	27.6	0	3	3	52	55	1.2	25	166.8	
5:45-6:00	24	1.5	9	9	50	50	3	28.5	175	606.1
EVENING PEAK										
8:00-8:15	28.8	18	27	18	45	62.5	3	32.5	234.8	
8:15-8:30	24	1.5	0	0	55	55	6	37.5	179	
8:30-8:45	33.6	4.5	6	6	39	42.5	8.7	27.5	167.8	
8:45-9:00	30	7.5	18	21	42	50	7.8	29.5	205.8	787.4

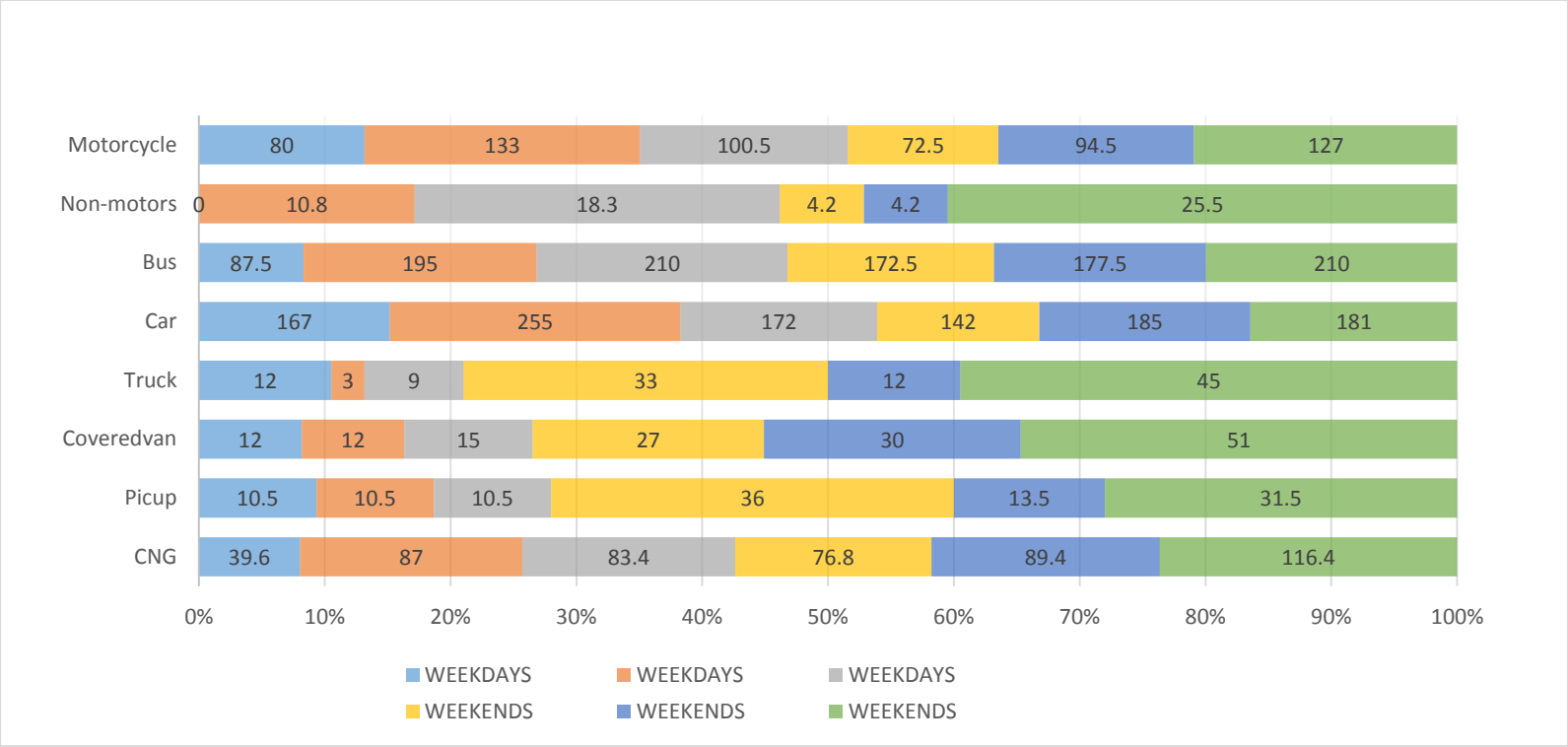


Figure 4-1: Modal variation of Bangla Motor to Kazi Narzul Islam Sarani (Weekend and Weekdays Traffic Volume)

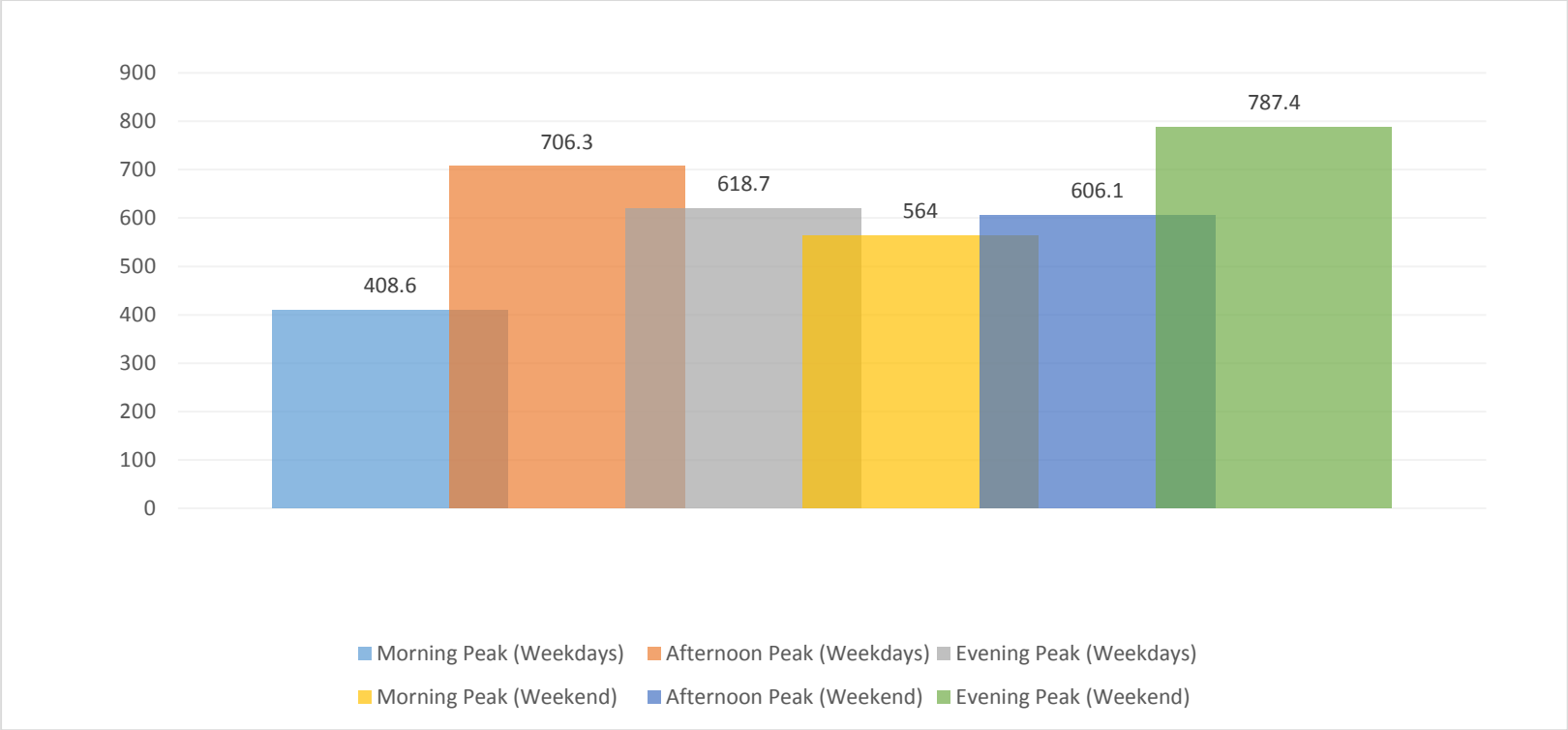


Figure 4-2: Differernce Between Bangla Motor to Kazi Narzul Islam Sarani (Weekend and Weekdays Traffic Volume)

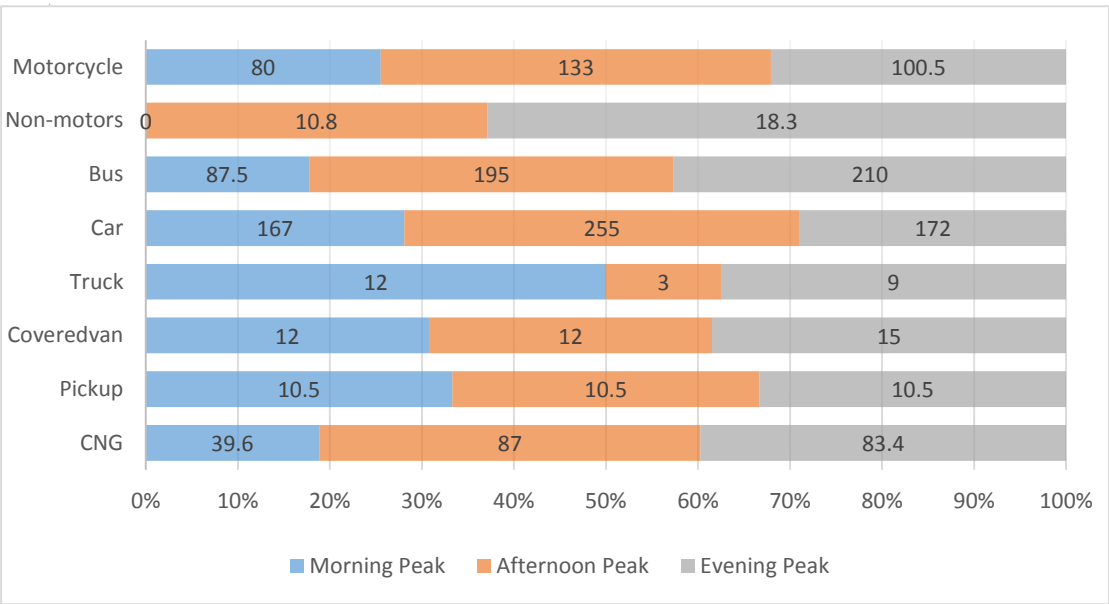


Figure 4-3: Modal variation of Bangla Motor to Kazi Nazrul Islam Sarani

4.2.2 Banglamotor to Kazi Nazrul Islam Avenue:

In this lane, highest concentration of car was found and its amount is 1833 and so it is considered as the dominat vechicle morning peak hour. Secend dominant vechicles are motorcycle ,CNG, covered van and their percentage are about 19%, 30%, 35%, at morning 40%, 25%, 22% of vechicles found at evening respectively. Low volume of traffic like Bicycle, busses, pikup,was found in this lane less deminanat vehicles were truc

Table4.5: Field survey at Banglamotor to Kazi Nazrul Islam Avenue

POINT	B= Banglamotor to Kazi Nazrul Islam Avenue								Date: 14.09.2023(Thursday)	
Mode	CNG	Pickup	Covered van	Truck	Car	Bus	Non-motors	Motor cycle	15min Total Value	60min Total Value
MORNING PEAK										
9:00-9:15	48	4	0	0	72	13	3	60	200	
9:15-9:30	55	0	1	0	66	10	0	50	182	
9:30-9:45	40	0	0	1	53	9	0	55	158	
9:45-10:00	52	1	0	0	48	14	2	62	179	719
AFTERNOON PEAK										
5:00-5:15	65	1	2	0	85	25	38	80	296	
5:15-5:30	50	0	0	1	60	18	40	68	237	
5:30-5:45	55	1	1	0	67	22	42	75	263	
5:45-6:00	60	0	0	0	52	18	30	70	230	1026
EVENING PEAK										
8:00-8:15	65	1	0	2	80	22	38	78	286	
8:15-8:30	68	0	0	0	70	18	30	80	266	
8:30-8:45	72	0	3	1	65	25	45	67	278	
8:45-9:00	80	6	1	2	75	20	50	85	319	1149

Table4.6: Banglamotor to Kazi Nazrul Islam Avenue (Point B PCU factor)

POINT	B= Banglamotor to Kazi Nazrul Islam Avenue (Point B PCU factor)								Date: 14.09.2023(Thursday)	
Mode	CNG	Pickup	Covered van	Truck	Car	Bus	Non-motors	Motor cycle	15min Total Value	60min Total Value
MORNING PEAK										
9:00-9:15	28.8	6	0	0	72	32.5	0.9	30	170.2	
9:15-9:30	33	0	3	0	66	25	0	25	152	
9:30-9:45	24	0	0	3	53	22.5	0	27.5	130	
9:45-10:00	31.2	1.5	0	0	48	35	0.6	31	147.3	599.5
AFTERNOON PEAK										
5:00-5:15	39	1.5	6	0	85	62.5	11.4	40	245.4	
5:15-5:30	30	0	0	3	60	45	12	34	184	
5:30-5:45	33	1.5	3	0	67	55	12.6	37.5	209.6	
5:45-6:00	36	0	0	0	52	45	9	35	177	816
EVENING PEAK										
8:00-8:15	39	1.5	0	6	80	62.5	11.4	39	239.4	
8:15-8:30	40.8	0	0	0	70	45	9	40	204.8	
8:30-8:45	43.2	0	9	3	65	62.5	13.5	33.5	229.7	
8:45-9:00	48	9	3	6	75	50	15	42.5	248.5	922.4

Table4.7: Field survey at Banglamotor to Kazi Nazrul Islam Avenue

POINT	B= Banglamotor to Kazi Nazrul Islam Avenue								Date:15.09.23 (Friday)	
Mode	CNG	Pickup	Covered van	Truck	Car	Bus	Non-Motors	Motor cycle	15min Total Value	60min Total Value
MORNING PEAK										
9:00-9:15	31	8	5	6	36	15	10	33	144	
9:15-9:30	38	2	2	2	39	18	8	40	149	
9:30-9:45	45	3	1	1	45	22	5	56	178	
9:45-10:00	50	1	0	1	55	27	15	49	198	669
AFTERNOON PEAK										
5:00-5:15	38	6	3	2	34	12	3	40	138	
5:15-5:30	42	2	2	0	45	18	2	60	171	
5:30-5:45	49	4	5	1	55	24	8	63	209	
5:45-6:00	51	5	4	3	60	29	15	55	222	740
EVENING PEAK										
8:00-8:15	55	10	7	3	50	30	8	60	223	
8:15-8:30	62	5	8	0	60	36	15	75	261	
8:30-8:45	68	9	5	1	70	30	22	84	289	
8:45-9:00	52	11	10	2	64	25	29	58	251	1024

Table4.8: Banglamotor to Kazi Nazrul Islam Avenue (Point B PCU factor)

POINT	B= Banglamotor to Kazi Nazrul Islam Avenue (Point B PCU factor)								Date: 15.09.23 (Friday)	
Mode	CNG	Pickup	Covered van	Truck	Car	Bus	Non-Motors	Motor cycle	15min Total Value	60min Total Value
MORNING PEAK										
9:00-9:15	18.6	12	15	18	36	37.5	3	16.5	156.6	
9:15-9:30	22.8	3	6	6	39	45	2.4	20	144.2	
9:30-9:45	27	4.5	3	3	45	55	1.5	28	167	
9:45-10:00	30	1.5	0	3	55	67.5	4.5	24.5	186	653.8
AFTERNOON PEAK										
5:00-5:15	22.8	9	9	6	34	30	0.9	20	131.7	
5:15-5:30	25.2	3	6	0	45	45	0.6	30	154.8	
5:30-5:45	29.4	6	15	3	55	60	2.4	31.5	202.3	
5:45-6:00	30.6	7.5	12	9	60	72.5	4.5	27.5	223.6	712.4
EVENING PEAK										
8:00-8:15	33	15	21	9	50	75	2.4	30	235.4	
8:15-8:30	37.2	7.5	24	0	60	90	4.5	37.5	260.7	
8:30-8:45	40.8	13.5	15	3	70	75	6.6	42	265.9	
8:45-9:00	31.2	16.5	30	6	64	62.5	8.7	29	247.9	1009.9

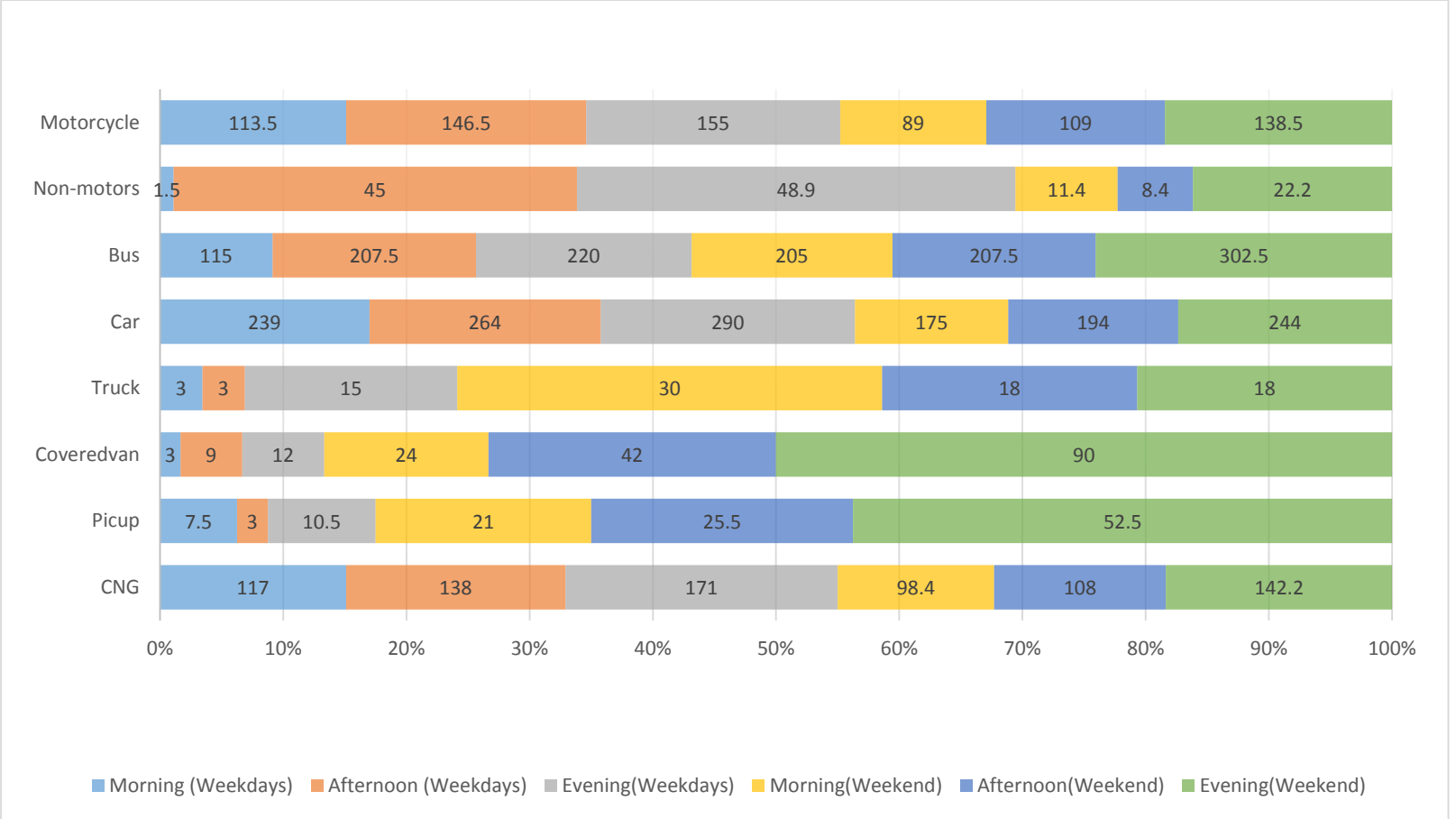


Figure 4-4: Modal variation of Bangla Motor to Kazi Nazrul Islam Avenue (Weekend and Weekdays Traffic Volume)

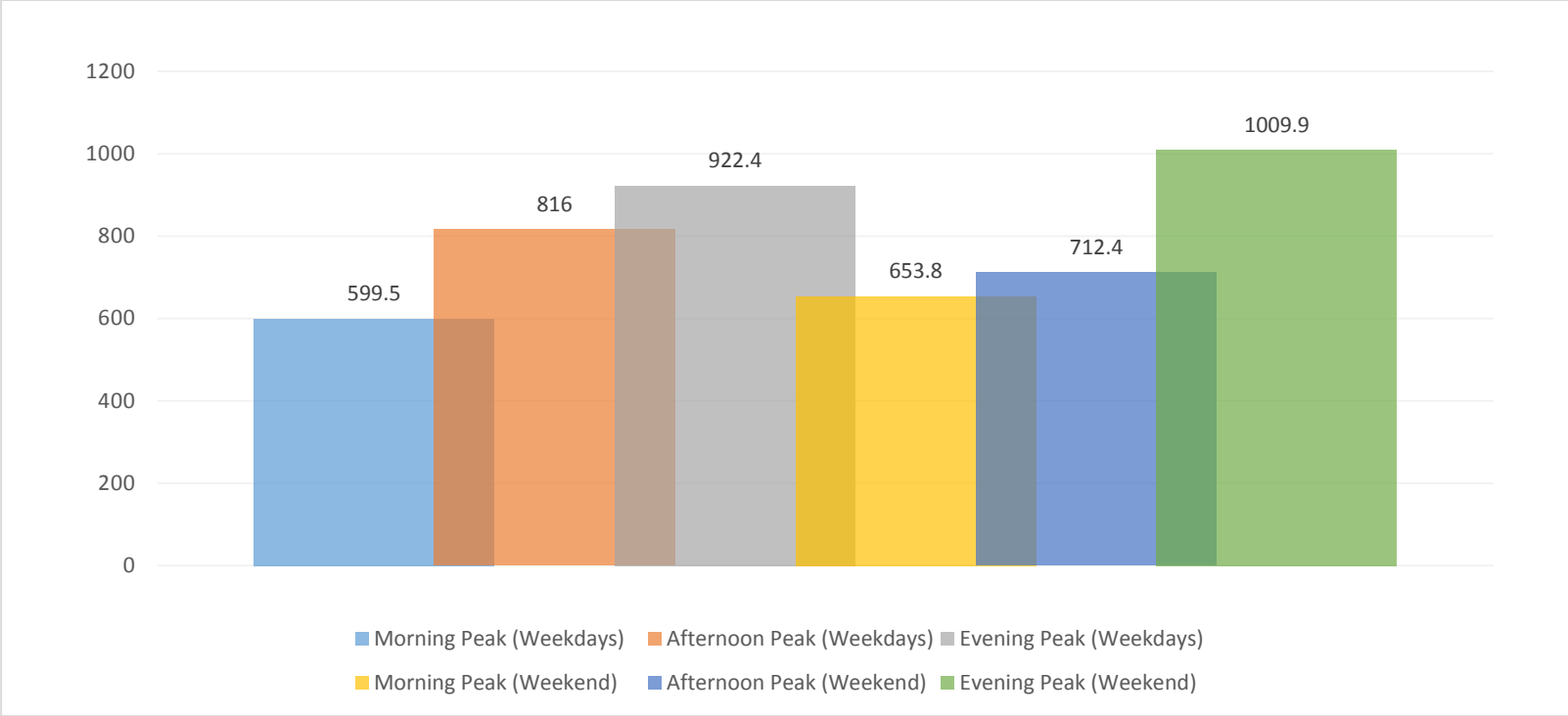


Figure 4-5: Differernce Between Bangla Motor to Kazi Narzul Islam Avenue (Weekend and Weekdays Traffic Volume)

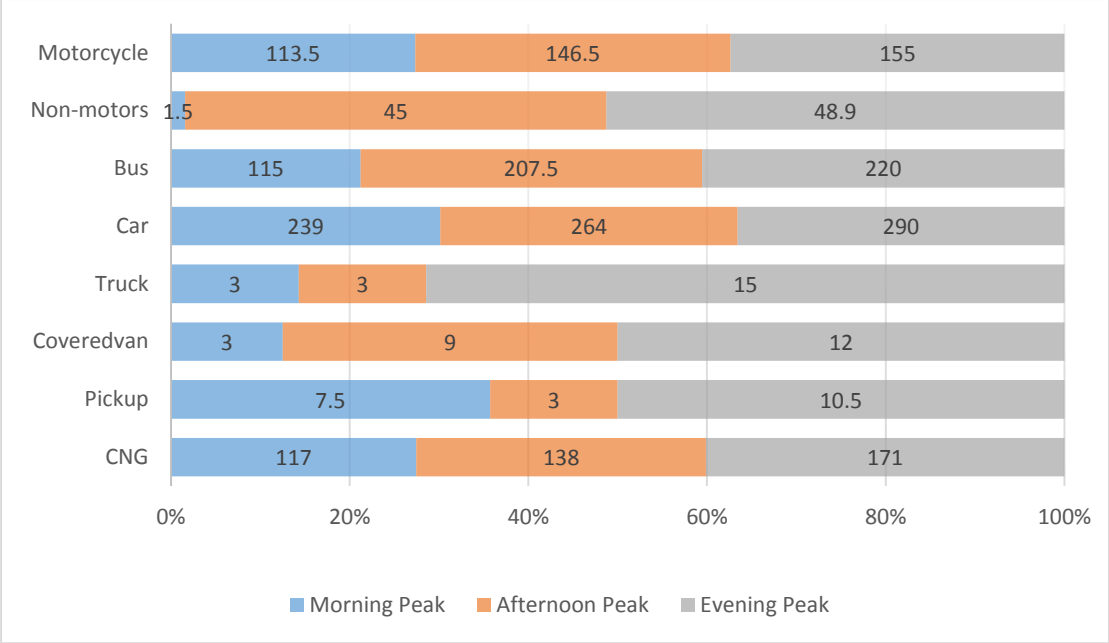


Figure 4-6: Modal variation of Bangla Motor to Kazi Narzul Islam Avenue

4.2.3 Banglamotor to New Eskaton Road:

This lane dominant vehicle is bus (1947). Less influenced vechicle is were bicycle, truck and pickup. Concentration of motorcycle, Busses, covered van, CNG about 37%, 43%, 29%, 40%, at morning 27%, 32%, 37%, 21%, 21%, at afternoon and rest of the parcentage vechicles were found at evening off peak respectively

Table4.9: Field survey at Banglamotor to New Eskaton Road

POINT	C= Banglamotor to New Eskaton Road								Date: 14.09.2023 (Thursday)	
Mode	CNG	Pickup	Covered van	Truck	Car	Bus	Non-motors	Motor cycle	15min Total Value	60min Total Value
MORNING PEAK										
9:00-9:15	15	3	2	0	23	4	40	18	105	
9:15-9:30	25	0	0	0	37	6	48	28	144	
9:30-9:45	36	0	1	0	18	10	55	42	162	
9:45-10:00	18	2	0	0	22	5	51	38	136	547
AFTERNOON PEAK										
5:00-5:15	25	0	0	0	40	6	74	48	193	
5:15-5:30	34	0	1	0	38	9	80	57	219	
5:30-5:45	27	0	0	1	47	15	77	71	238	
5:45-6:00	40	3	2	1	34	13	85	65	243	893
EVENING PEAK										
8:00-8:15	20	3	3	0	35	8	68	30	167	
8:15-8:30	34	2	1	0	30	6	78	50	201	
8:30-8:45	40	0	2	0	26	10	84	62	224	
8:45-9:00	53	5	6	1	40	18	70	71	264	856

Table4.10: Banglamotor to New Eskaton Road (Point C PCU factor)

POINT	C= Banglamotor to New Eskaton Road (Point C PCU factor)								Date:14.09.2023 (Thursday)	
Mode	CNG	Pickup	Covered van	Truck	Car	Bus	Non-motors	Motor cycle	15min Total Value	60min Total Value
MORNING PEAK										
9:00-9:15	9	4.5	6	0	23	10	12	9	73.5	
9:15-9:30	15	0	0	0	37	15	14.4	14	95.4	
9:30-9:45	21.6	0	3	0	18	25	16.5	21	105.1	
9:45-10:00	10.8	3	0	0	22	12.5	15.3	19	82.6	356.6
AFTERNOON PEAK										
5:00-5:15	15	0	0	0	40	15	22.2	24	116.2	
5:15-5:30	20.4	0	3	0	38	22.5	24	28.5	136.4	
5:30-5:45	16.2	0	0	3	47	37.5	23.1	35.5	162.3	
5:45-6:00	24	4.5	6	3	34	32.5	25.5	32.5	162	576.9
EVENINGPEAK										
8:00-8:15	12	4.5	9	0	35	20	20.4	15	115.9	
8:15-8:30	20.4	3	3	0	30	15	23.4	25	119.8	
8:30-8:45	24	0	6	0	26	25	25.2	31	137.2	
8:45-9:00	31.8	7.5	18	3	40	45	21	35.5	201.8	574.7

Table4.11: Field survey at Banglamotor to New Eskaton Road

POINT	C= Banglamotor to New Eskaton Road								Date: 15 .09.23 (Friday)	
Mode	CNG	Pickup	Covered van	Truck	Car	Bus	Non-Motors	Motor cycle	15min Total Value	60min Total Value
MORNING PEAK										
9:00-9:15	20	3	0	0	28	12	25	30	118	
9:15-9:30	18	2	1	0	25	10	28	35	119	
9:30-9:45	24	4	0	2	30	15	36	45	156	
9:45-10:00	29	6	1	1	26	8	40	55	166	559
AFTERNOON PEAK										
5:00-5:15	37	2	0	0	20	5	52	20	136	
5:15-5:30	42	0	2	0	30	8	45	30	157	
5:30-5:45	50	2	3	2	33	16	55	42	203	
5:45-6:00	55	3	1	3	28	20	40	50	200	696
EVENING PEAK										
8:00-8:15	40	4	3	0	30	15	60	50	202	
8:15-8:30	30	6	2	2	25	10	70	58	203	
8:30-8:45	37	4	4	1	28	19	75	48	216	
8:45-9:00	45	2	3	1	34	23	55	60	223	844

Table4.12: Banglamotor to New Eskaton Road (Point C PCU factor)

POINT	C= Banglamotor to New Eskaton Road								Date: 15.09.23 (Friday)	
Mode	CNG	Pickup	Covered van	Truck	Car	Bus	Non-Motors	Motor cycle	15min Total Value	60min Total Value
MORNING PEAK										
9:00-9:15	12	4.5	0	0	28	30	7.5	15	97	
9:15-9:30	10.8	3	3	0	25	25	8.4	17.5	92.7	
9:30-9:45	14.4	6	0	6	30	37.5	10.8	22.5	127.2	
9:45-10:00	17.4	9	3	3	26	20	12	27.5	117.9	434.8
AFTERNOON PEAK										
5:00-5:15	22.2	3	0	0	20	12.5	15.6	10	93.3	
5:15-5:30	25.2	0	6	0	30	20	13.5	15	109.7	
5:30-5:45	30	3	9	6	33	40	16.5	21	158.5	
5:45-6:00	33	4.5	3	9	28	50	12	25	164.5	526
EVENING PEAK										
8:00-8:15	24	6	9	0	30	37.5	18	25	149.5	
8:15-8:30	18	9	6	6	25	25	21	29	139	
8:30-8:45	22.2	6	12	3	28	47.5	22.5	24	165.2	
8:45-9:00	27	3	9	3	34	57.5	16.5	30	180	633.7

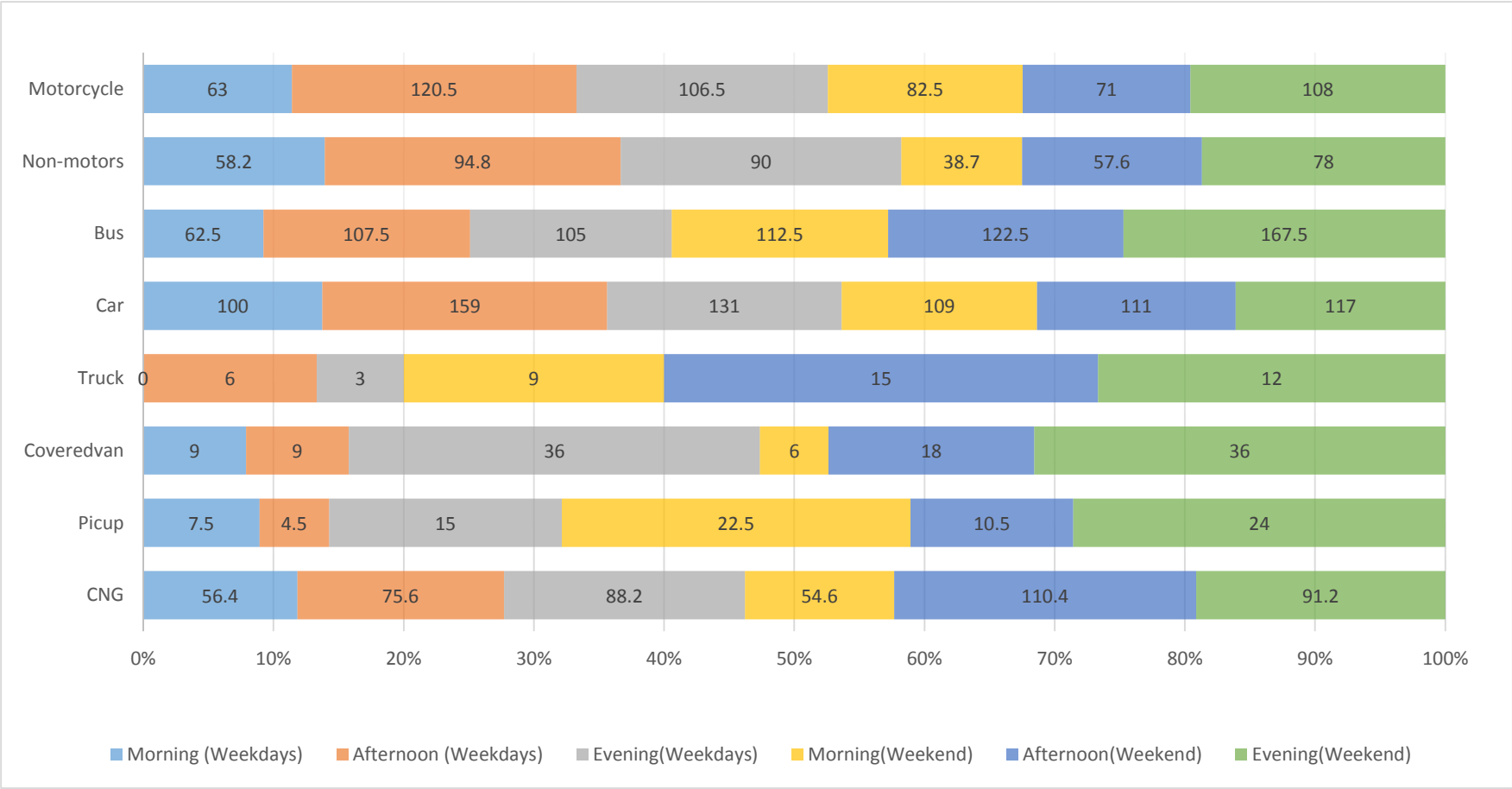


Figure 4-7: Modal variation of Bangla Motor to New Eskaton Road (Weekend and Weekdays Traffic Volume)

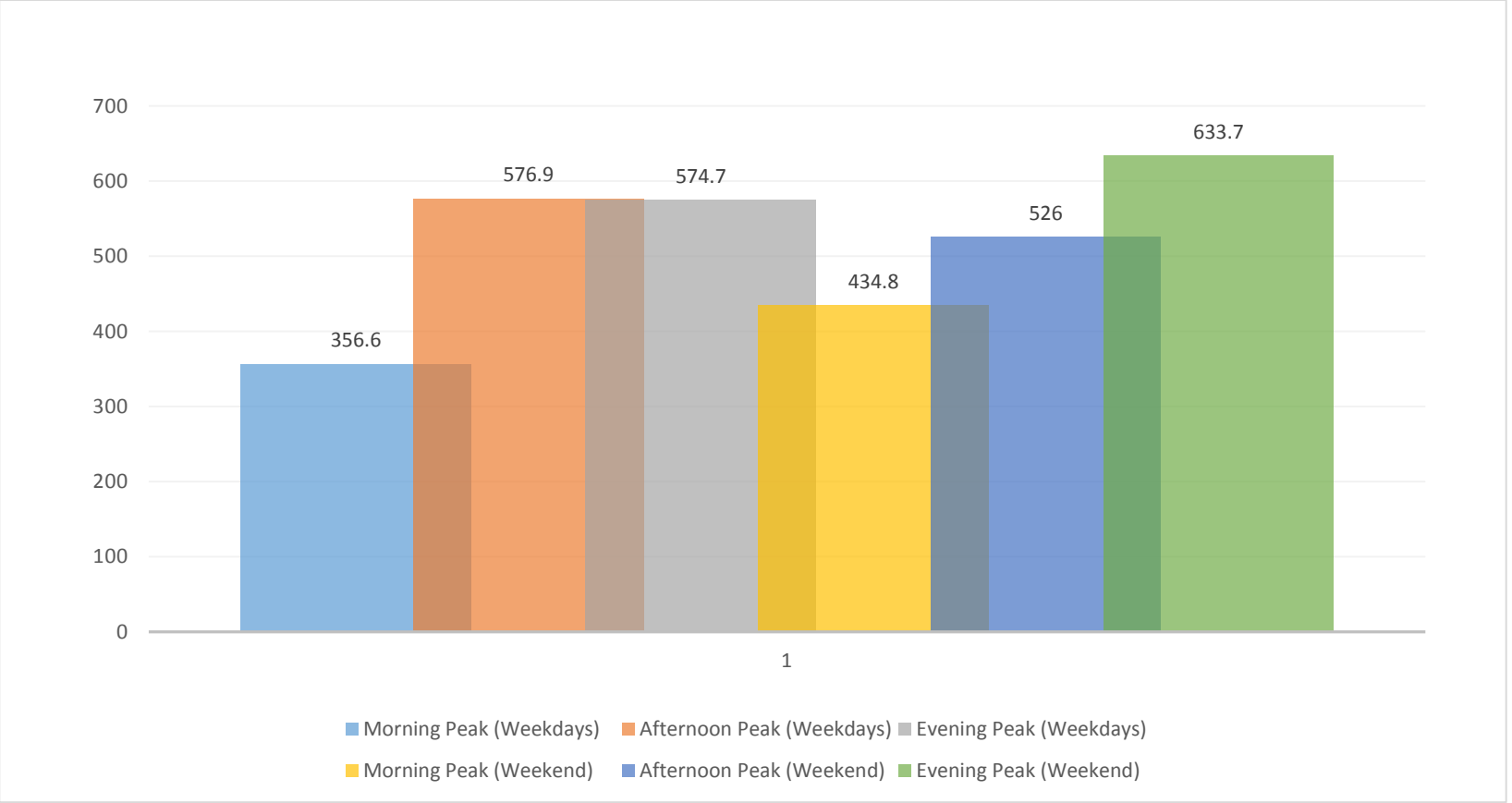


Figure 4-8: Differernce Between Bangla Motor to New Eskaton Road (Weekend and Weekdays Traffic Volume)

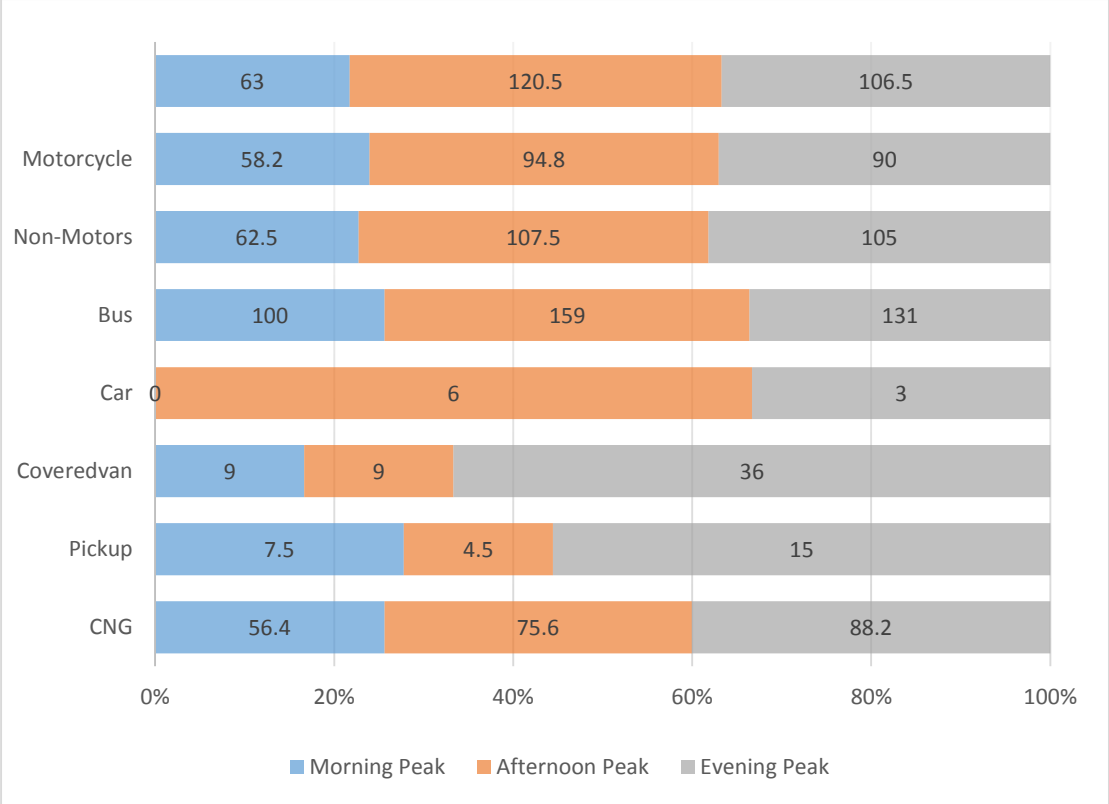


Figure 4-9: Modal variation of Bangla Motor to New Eskaton Road

4.2.4 Banglamotor to Hatirpool:

Large amount of vehicles is car found at morning. Concentration, motorcycle, busses, covered van, pickup,CNG, are 25%, 37%, 38%, 40%, at aftyernoon off peak respectively.

Table4.13: Field survey at Banglamotor to Hatirpool

POINT	D= Banglamotor to Hatirpool								Date: 14.09.2023 (Thursday)	
Mode	CNG	Pickup	Covered van	Truck	Car	Bus	Non-motors	Motor cycle	15min Total Value	60min Total Value
MORNING PEAK										
9:00-9:15	13	6	1	0	15	0	32	43	110	
9:15-9:30	18	0	0	0	8	0	40	33	99	
9:30-9:45	24	1	0	0	20	0	56	45	146	
9:45-10:00	30	2	0	0	14	0	50	48	144	499
AFTERNOON PEAK										
5:00-5:15	26	2	0	0	25	0	58	60	171	
5:15-5:30	30	0	0	0	22	0	52	55	159	
5:30-5:45	22	1	0	0	18	0	45	48	134	
5:45-6:00	35	2	3	0	30	0	62	40	172	636
EVENING PEAK										
8:00-8:15	28	8	2	0	20	0	60	52	170	
8:15-8:30	36	0	0	0	17	0	53	44	150	
8:30-8:45	40	3	2	1	25	0	65	50	186	
8:45-9:00	51	4	3	2	15	0	70	59	204	710

Table4.14: Banglamotor to Hatirpool (Point D PCU factor)

POINT	D= Banglamotor to Hatirpool								Date: 14.09.2023 (Thursday)	
Mode	CNG	Pickup	Covered van	Truck	Car	Bus	Non-motors	Motor cycle	15min Total Value	60min Total Value
MORNING PEAK										
9:00-9:15	7.8	9	3	0	15	0	9.6	21.5	65.9	
9:15-9:30	10.8	0	0	0	8	0	12	16.5	47.3	
9:30-9:45	14.4	1.5	0	0	20	0	16.8	22.5	75.2	
9:45-10:00	18	3	0	0	14	0	15	24	74	262.4
AFTERNOON PEAK										
5:00-5:15	15.6	3	0	0	25	0	17.4	30	98.8	
5:15-5:30	18	0	0	0	22	0	15.6	27.5	76.5	
5:30-5:45	13.2	1.5	0	0	18	0	13.5	24	104	
5:45-6:00	21	3	9	0	30	0	18.6	20	126.1	405.4
EVENING PEAK										
8:00-8:15	16.8	12	6	0	20	0	18	26	91	
8:15-8:30	21.6	0	0	0	17	0	15.9	22	83.1	
8:30-8:45	24	4.5	6	3	25	0	19.5	25	70.2	
8:45-9:00	30.6	6	9	6	15	0	21	29.5	101.6	345.9

Table4.15: Field survey at Banglamotor to Hatirpool

POINT	D= Banglamotor to Hatirpool								Date: 15.09.2023 (Friday)	
Mode	CNG	Pickup	Covered van	Truck	Car	Bus	Non-motors	Motor cycle	15min Total Value	60min Total Value
MORNING PEAK										
9:00-9:15	22	8	5	2	15	0	30	33	115	
9:15-9:30	18	4	2	0	8	0	45	40	117	
9:30-9:45	20	1	1	0	20	0	54	44	140	
9:45-10:00	16	3	0	0	14	0	51	48	132	504
AFTERNOON PEAK										
5:00-5:15	40	0	0	0	25	0	62	20	147	
5:15-5:30	30	1	0	0	22	0	51	25	129	
5:30-5:45	20	2	0	0	18	0	48	30	118	
5:45-6:00	22	3	3	1	30	0	50	40	149	543
EVENING PEAK										
8:00-8:15	45	4	1	0	20	0	70	50	190	
8:15-8:30	40	2	0	0	17	0	63	44	166	
8:30-8:45	48	2	1	0	25	0	69	48	193	
8:45-9:00	51	1	3	1	20	0	80	39	195	744

Table4.16: Field survey at Banglamotor to Hatirpool (Point D PCU factor)

POINT	D= Banglamotor to Hatirpool								Date: 15.09.2023 (Friday)	
Mode	CNG	Pickup	Covered van	Truck	Car	Bus	Non-motors	Motor cycle	15min Total Value	60min Total Value
MORNING PEAK										
9:00-9:15	13.2	12	15	6	15	0	9	16.5	86.7	
9:15-9:30	10.8	6	6	0	8	0	13.5	20	64.3	
9:30-9:45	12	1.5	3	0	20	0	16.2	22	74.7	
9:45-10:00	9.6	4.5	0	0	14	0	15.3	24	67.4	293.1
AFTERNOON PEAK										
5:00-5:15	24	0	0	0	25	0	18.6	10	77.6	
5:15-5:30	18	1.5	0	0	22	0	15.3	12.5	69.3	
5:30-5:45	12	3	0	0	18	0	14.4	15	62.4	
5:45-6:00	13.2	4.5	9	3	30	0	15	20	94.7	304
EVENING PEAK										
8:00-8:15	27	6	3	0	20	0	21	25	102	
8:15-8:30	24	3	0	0	17	0	18.9	22	84.9	
8:30-8:45	28.8	3	3	0	25	0	20.7	24	104.5	
8:45-9:00	30.6	1.5	9	3	20	0	24	19.5	107.6	399

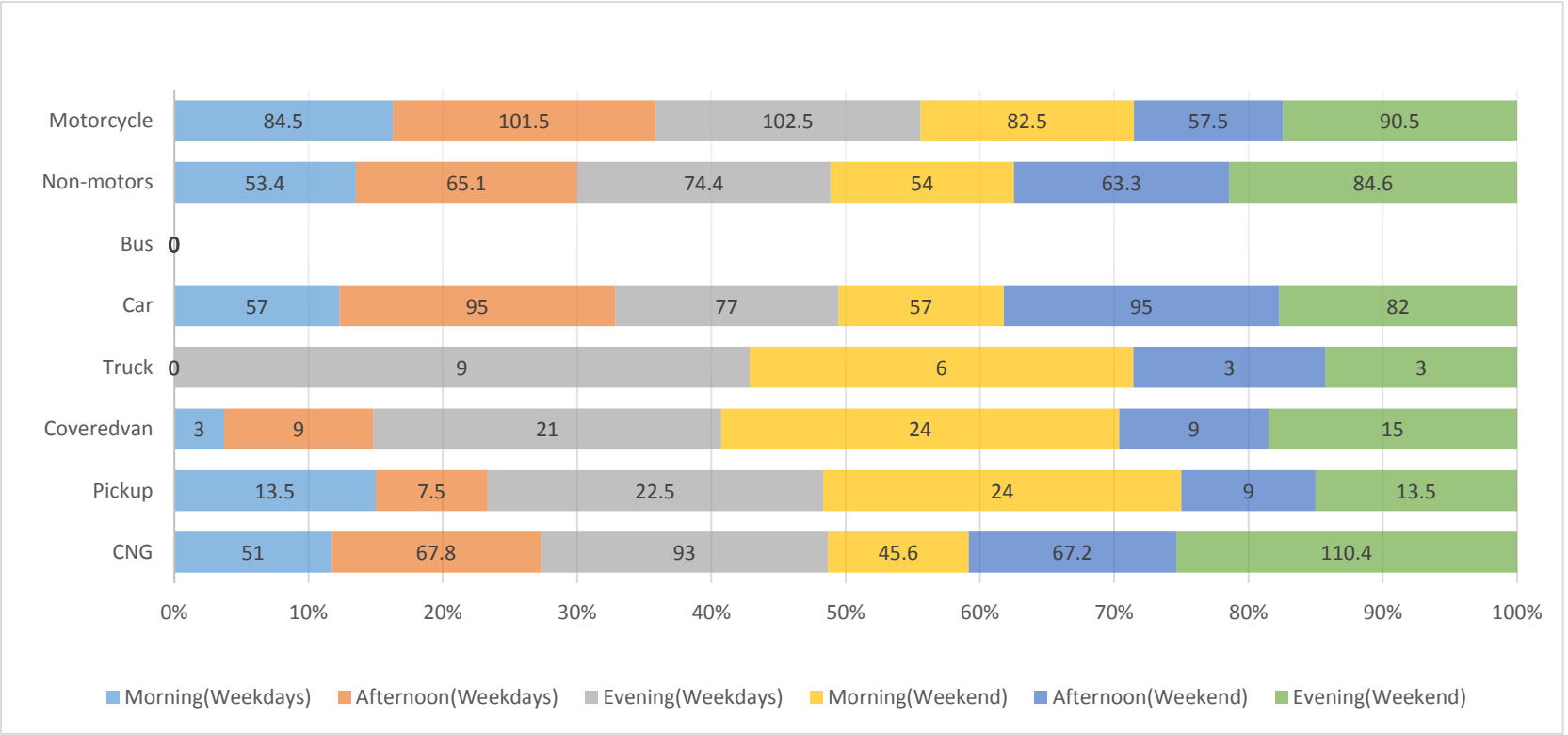


Figure 4-10: Modal variation of Bangla Motor to Hatirpool (Weekend and Weekdays Traffic Volume)

Figure 4-11: Differernce Between Bangla Motor to Hatirpool (Weekend and Weekdays Traffic Volume)

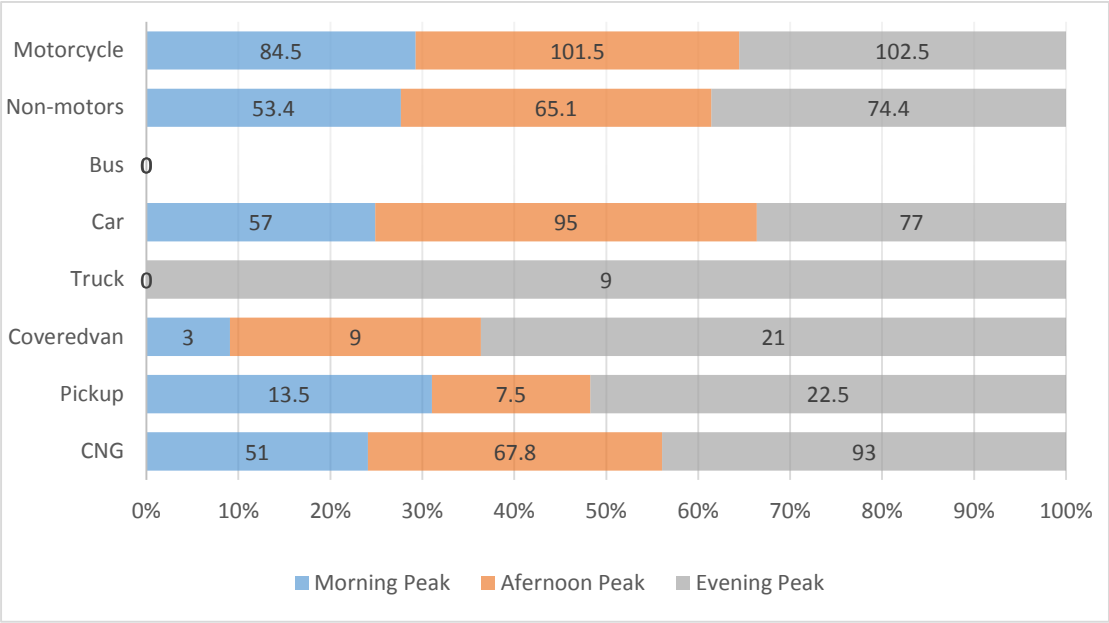


Figure 4-9: Modal variation of Bangla Motor to Hatirpool

4.2.5 Temporal Veriation for four legs of Banglamotor Intersection

Banglamotor to Kazi Nazrul Islam Sarani Road leg has 4723.50 PCU/hour which contains the highest among the four legs at morning-off-peak. Second one is intersection to Kazi Nazrul Islam Sarani and Kazi Nazrul Islam Avenue leg has 4559.90 PCU/hour which contains the highest among at Evening-off-peak. and last one is Banglamotor to Hatirpol leg contain 4512.80 PCU/hour at Evening off peak 3565.80 PCU/hour at afternoon off peak and 2432.30 PCU/hour at morning off peak respectively. Temporal Variation of four legs in shown in Figure 9.

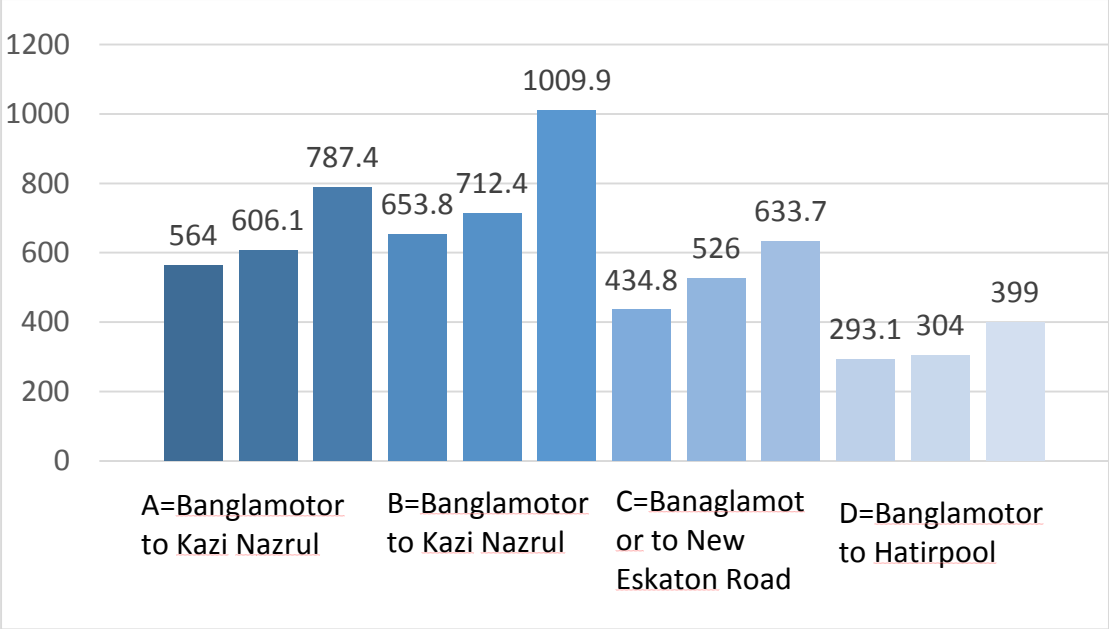


Figure 4-13: Temporal Variation Of Four Legs

4.3 Level of Service (LOS) in Banglamotor Intersection

Level of Service (LOS) of Banglamotor to Hatirpool lane in morning is D category. Banglamotor to Kazi Nazrul Islam sarani in morning is C category and other lane in morning is B category. Banglamotor to Hatirpool lane in Afternoon is D category and other lane in Afternoon B category. Banglamotor to New Eskaton Road lane in Evening is D category.

Table 4.13: Level of Service of different lenes of Banglamotor Intersection by peak hour factor

Time	Lean Name	Peak hour factor	los	Maximum los
Morning peak 9am-10am	Banglamotor to Kazi Nazrul islam sarani.	0.92	E	
	Banglamotor to Kazi Nazrul islam Avenue.	0.88	D	
	Banglamotor to New Eskaton road	0.89	C	
	Banglamotor to Hatirpool	0.87	D	
Afternoon peak 05pm-06pm	Banglamotor to Kazi Nazrul islam sarani.	0.85	C	
	Banglamotor to Kazi Nazrul islam Avenue.	0.83	C	
	Banglamotor to New Eskaton road	0.88	D	
	Banglamotor to Hatirpool	0.8	B	
Evening peak 08pm-09pm	Banglamotor to Kazi Nazrul islam sarani.	0.86	D	
	Banglamotor to Kazi Nazrul islam Avenue.	0.92	E	
	Banglamotor to New Eskaton road	0.71	B	
	Banglamotor to Hatirpool	0.85	C	

Table.4.14: Level of Service of different lans of Banglamotor Intersection by peak hour factor model

Time	Lean Name	Volume (PCU/h)	15 Minutes High PCU	PHU	Los	Maximum los
Morning peak 9am-10am	Banglamotor to Kazi Nazrul islam sarani.	408.6	110.1	0.92	E	E
	Banglamotor to Kazi Nazrul islam Avenue.	599.5	170.2	0.88	D	
	Banglamotor to New Eskaton road	356.6	105.2	0.89	C	
	Banglamotor to Hatirpool	262.4	75.2	0.87	D	
Afternoon peak 05pm-06pm	Banglamotor to Kazi Nazrul islam sarani.	706.3	205.8	0.85	C	
	Banglamotor to Kazi Nazrul islam Avenue.	816	245.4	0.83	C	
	Banglamotor to New Eskaton road	576.9	162.3	0.88	D	
	Banglamotor to Hatirpool	405.4	126.1	0.8	B	
Evening peak 08pm-09pm	Banglamotor to Kazi Nazrul islam sarani.	618.7	178.7	0.86	D	
	Banglamotor to Kazi Nazrul islam Avenue.	922.4	248.5	0.92	E	
	Banglamotor to New Eskaton road	574.7	201.8	0.71	B	
	Banglamotor to Hatirpool	345.9	101.6	0.85	C	

4.4 A Comparative Study between Average of Daily traffic volume on weekdays and weekend

In this section, we investigate the fractal behavior of traffic volume in urban expressway based on a newly developed adaptive fractal analysis (AFA), which has a number of advantages over traditional method of defended fluctuation analysis (DFA). Before fractal analysis, autocorrelation function was first adopted on traffic volume data and the long-range correlation behavior was found to be existed in both on-ramp and off-ramp situations. Then AFA as well as DFA was applied to further examine the fractal behavior. The results showed that the multi fractal city and the long-range anti-persistent behavior existed on both on-ramp and off-ramp. Additionally, multi fractal analysis on weekdays and weekends are performed respectively and results show that the degree of multi fractal city on weekdays is higher than that on weekends, implying that long-range correlation behaviors were more obvious on weekdays finally, the source of multi fractal city is examined with randomly shuffled and the surrogated series. Long-range correlation behaviors are identified in both on-ramp and off-ramp situations and fat-tail distributions were found to make little in the contributions of multi fractal city.

4.5 Discussion

4.5.1 Causes of Congestion in Intersection

BanglaMotor intersection plays as one of the main commercial hub of Dhaka city. This is the main reason of rising Car volume in Banglamotor Intersection. Traffic flow in morning peak is higher than other peak hours. This is may be due to Banglamotor Intersection is located near educational and commercial zone. The factors for Banglamotor to Kazi Narzul Islam Sarani is the lane use containing important establishments like Ekushey Television limited, Pan pacific Sonargaon Hotel Dhaka, Saudi Arabian Airlines Bangladesh, Bashundhara City Shopping Complex, farmgate etc. Most of the VIP movements are done through this intersection and during that movement all the vehicles passing this intersection are forced to stand still.

We investigate the fractal behavior of traffic volume in urban expressway based on a newly developed adaptive fractal analysis (AFA), which has a number of advantages

over traditional method of defended fluctuation analysis (DFA).Before fractal analysis, autocorrelation function was first adopted on traffic volume data and the long-range correlation behavior was found to be existed in both on-ramp and off-ramp situations. Then AFA as well as DFA was applied to further examine the fractal behavior. The results showed that the multi fractal city and the long-range anti-persistent behavior existed on both on-ramp and off-ramp. Additionally, multi fractal analysis on weekdays and weekends are performed respectively and the results show that the degree of multi fractal city on weekends is higher than that on weekends, implying that long-range correlation behaviors were more obvious on weekdays, Finally, the source of multi fractal city is examined with randomly shuffled and the surrogated series. Long-range correlation behaviors are identified in both on-ramp and off-ramp situations and fat-tail distributions were found to make little in the contributions of multi fractal city.

4.5.2 Effect of Congestion in intersection

One of the major disadvantages is outdated and obsolete hand-signalized intersections. This is also known as priority-controlled intersection. It provides no exact indication to the driver`s concern when vehicle approaches to enter the intersection [32] Low priority movement on roads cause delay that influence the performance of such type intersection very strongly. As a result, vehicular conflict creates which is responsible for accident and congestion [32]. Level of service E means in an intersection vehicle is forced to move and speed of vehicles are too low [34Commercial and educational activities around banglamotor intersection attract people so why LOS of banglamotor is very low. Again, all the vehicles pass this intersection very slowly. Few lanes contain higher flow rate than their required capacity. If traffic flow equals or becomes less than capacity, collision between vehicles, low mean speed, and frequent unexpected stoppage will occur [35] congestion occurs due to excess traffic demand and inefficient road operations [36].

CHAPTER 5

Conclusions and Future Works

5.1 Conclusions

The traffic flow behavior in heterogeneous traffic in Dhaka city observed that in absolutely complex. Highest concentration of dominant vehicle (Car & Motorcycle) is found in the morning peak period (9am-10am) at kazi nazrul islam sarani to kazi narzul islam avenue determined by using model variation. bangla motor intersection to kazi nazrul islam sarani leg contain highest amount of PCU/hour at morning hour by using temporal variation. at bangla motor intersection Car is the dominant vehicle in all lanes. Traffic flow in morning off-peak is higher than other hours in kazi nazrul islam sarani to kazi narzul islam avenue because traffic flow from different two direction mix here. The volume of kazi nazrul islam sarani to New Eskaton road lanes, bangla motor to hatirpool lane at afternoon off peak and kazi narzul islam sarani lane at Evening off peak are higher than their standard capacity. According to peak Hour Factor Method, LOS of bangla motor intersection is E category at its highest peak. So, final LOS is E.

5.2 Recommendations

This Based on the study findings, the following recommendations can be put forward to improve the mobility and service quality of signalized intersection as well as other road resembling similar condition

1. A dedicated lane for Car can be effective to increase this road serviceability.
2. The effective width of the carriageway should be increased. This should be free from all encroachment.

3.Vehicles of different destinations use this intersection to reach their destination. Grade separation can be a viable solution for external to external traffic movement without disturbing intersection performance.

4. Carriageway width should be increased. City Corporation Authority should take necessary steps to improve the condition of this selected intersection.
5. The study is done during weekdays. study during weekends may also be done to perform an comparative analysis.

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