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Study the Effects of Traffic Situation on Driver's Mood and Root Choice Decision in Commercial Areas

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ABSTRACT

A traffic management system is essential for better mobility in terms of cost, safety, comfort, and time savings, among other factors. A traffic management system assures the safety of not only car occupants but also pedestrians crossing the road. The work primarily focuses on analysing traffic volume using software and manual counts on two types of roads, namely broad lane and service lane. This study comprises using the Picomixer STA (Smart Traffic Analyzer) programme to count the number of different types of vehicles, which are classified as light vehicles (Cars, SUVs, etc.), medium loading vehicles (trucks, minibuses), and heavy vehicles (Trucks, Minibuses, etc). (Trailers, Big trucks etc.).On the broad lane, traffic peaks during the day and at night, while it remains light and medium during the middle of the day. This trend also affects the rush in the service lane, which follows a similar pattern. Increased traffic and longer signal halt times encourage drivers to use the alternate service lane, which increases congestion in the narrow service lane and raises the danger of accidents. Longer signal halts were discovered to be the most important factor to consider when choosing a service lane. Reduced signal timing can have an impact on typical service lane and broad lane utilisation, as well as traffic management.

KEYWORDS: *Traffic management, pedestrians, Picomixer STA (Smart Traffic Analyzer), broad lane, service lane*

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1. INTRODUCTION

The Ministry of Road Transport systematically plans traffic management and places it throughout the country to suit the location. They carefully consider the type of road to be used in a given location to ensure that people have the safest driving experience possible. We in India are well aware that road restrictions are frequently disregarded by the bulk of the population. So let us educate ourselves to ensure that we are adhering to the regulations of the road in order to have a safe and enjoyable driving experience.

1.1. Lane System in India

Another essential factor that practically all road users in India ignore is the lane system. Each lane between the road lines serves a specific purpose, allowing only certain types of vehicles to pass through. Unfortunately, in our country, lane rules are rarely observed. On our roadways, people openly disobey all of these regulations and drive anywhere they please. This is a major factor in the rising frequency of road accidents in this area, particularly on highways. People must be trained on how to correctly use the ever-improving road structure in order to strengthen the country's transportation infrastructure as a whole. So, let's have a look at how India's lane system works. Broken White Line

This is the most common style of road in use across the country, as seen in Figure 1.2. A divided white line allows you to change directions, overtake, and do U-turns. Nonetheless, make sure the path is clear and the manoeuvre is safe before proceeding.

1.1.1. Continuous White Line

A continuous white line. It's a lot clearer now. This lane does not allow overtaking or changing directions. It's not going to happen. If you're in this type of lane, you must keep going straight. By crossing the line, accidents or turns can be avoided. These roads are usually built in hilly places where accidents are more likely.

1.1.2. Continuous Yellow Line
Overtaking is permitted on such routes as indicated in, but only when you are on your side. Neither team is allowed to cross the yellow line. These roadways are typically

This is possibly the most difficult road on the list. A double continuous yellow line denotes that crossing it is absolutely prohibited on both sides. So no overtaking, U-turns, or lane changes are allowed. This pattern is most common on risky two-lane highways with a high risk of accidents. Broken Yellow Line

It is possibly the most lenient one on the list. You are allowed to overtake, take U-turns and you could do both while going over the line (provided it is safe to do so).

1.2. Traffic data
Information generated from road vehicles moving over the transport network. This data include:

1.2.1. Accidents
Accidents are unintended and unplanned events that occur in the transportation network. It's usually measured in terms of the number of collisions per road segment or per conflict location (intersection).

1.2.2. Delay
It's a period of time during which the overall trip time is influenced and delayed. Deceleration and acceleration of the car, waiting in line or on the red phase of traffic lights, or crossing an intersection are all factors that contribute to this. Delay is often calculated as the difference between a vehicle's travel time and the time that would have occurred if traffic flowed freely.

1.2.3. Driving behaviour
It's a subjective traffic feature that indicates how drivers operate on the road. This characteristic includes the following traffic data:

- Intersection turning manoeuvres (turning rates).
- Following traffic laws and speed limitations (acceleration and deceleration).
- Changing lanes, merging, and diverging.
- Driving expertise, including cautious driving in inclement weather (e.g. wet roads).
- There is a lot of competition for available parking spots.
- Choosing a route.

"There is no approved method for calculating parameters that cannot be calculated, such as driving, pedestrian movements, and traffic circumstances."

1.2.4. Number of journeys
The amount of times a vehicle travels from one place to another place, usually a long distance and for a short time period. Trips are another term for traffic. The input information for this traffic data is the vehicles' origin and destination (O-D).

1.2.5. Queue length.
The length covered by a line or sequence of vehicles awaiting their turn to proceed on their route.

1.2.6. Road condition
This document discusses the state of the road surface (built, unpaved, old/new, concrete, asphalt, faults, wet/dry). Other road characteristics include the number of lanes, intersections, and interchanges, traffic lights, tunnels, signals, speed limits, route type (highway, road, or urban), and geometry (grades and curves, turning ratios, involved curvature, slope, etc.). "There is no accepted method for computing parameters that cannot be estimated, such as driving, pedestrian movements, or traffic conditions."

1.2.7. Traffic density (k)
The number of vehicles per unit length of the roadway can be seen in (see equation 2.1). In traffic flow, the two most important densities are the jam density and critical density. Two indicators of vehicle density are space and time headway.

$$K = \frac{\text{volume}}{\text{road length}}$$

The important density is the maximum density of free flow that can be achieved.

The jam density is measured by the average congestion rate.

The position and gap between one car's front and the other car front is known as space headway (in meters).

Time headway is the difference in time between when a vehicle in front of you arrives at a certain place on the car and when another vehicle in front of you arrives at the same position (in seconds).

1.2.8. Traffic flow (Q)
It is defined as the rate at which vehicles passes a fixed point normally given in vehicles/hour (see equation). It is generally constrained along a one dimensional pathway (e.g. a travel lane).

$$Q = \frac{\text{volume}}{\text{Hr}}$$

When, vehicles moves without any impedance during the condition of free flow traffic.

1.2.9. Traffic volume
The number of cars in the network is referred to as traffic volume. This information comes from traffic

counts. A road segment's or the entire network's traffic volume can be configured. Traffic volumes are usually expressed in terms of time periods of a day, week, month, or year. The most common statistic used in traffic studies is annual traffic volume.

1.2.10. Travel direction
The course along which the vehicle moves in road traffic is given by the road lane way. It can be identified with the cardinal directions.

1.2.11. Travel time (t)
It is the amount of time it takes to go between two locations of interest or the length of each journey. The trip time of a vehicle is calculated by comparing its signature at two separate sensors. The average speed of travel and the distance travelled can also be used to determine journey time (see equation).

$$t = \frac{\text{Distance}}{\text{Speed}}$$

1.2.12. Travelled distance
The length of a journey, usually expressed in vehicle kilometers (VKT). VKT was considered a traffic volume indicator by Leduc (2008). When the number of vehicles on a specific route or traffic network is multiplied by the average length of their trips, VKT can be used as another metric of flow.

1.2.13. Vehicle classification
Vehicles are classified based on features such as the number of wheels, axles, length, and weight. Vehicle categorization is usually done in accordance with the laws of each country. There are numerous classification schemes to choose from. The classifications for vehicle categories in Europe are based on the guidelines of the United Nations Economic Commission for Europe (UNECE). Vehicle categories in the United States of America (USA) are based on Federal Highway Administration (FHWA) criteria. Both classification schemes are shown in Appendix 1.

1.2.14. Vehicle identification
Vehicle identification is often done using a vehicle identification number (VIN), a unique code incorporating a serial number used by the automotive industry to identify automobiles, to detect distinctive attributes of a vehicle as an individual part of the transportation network. Some vehicle recognition techniques, on the other hand, may distinguish vehicles that match their unique signature in two different checkpoints (e.g. the magnetic signature).

1.2.15. Vehicle location
The location or position in which the car is parked. Global Positioning System (GPS) technology can be used to identify checkpoints on the route, or the average speed and direction can be computed.

1.2.16. Vehicle noise
Is the sum of the vehicle's sound energy (tire/road surface, engine/transmitter, aerodynamics, and safety features). The total noise emissions in society are made up of a decent and equitable amount of road surface noise. The decibel is the International System unit of sound volume (dB).

1.2.17. Vehicle speed (v)
The rate at which vehicles move (km/hr) can be calculated as the change of distance with time (see equation 1).

$$v = \frac{\text{Distance}}{\text{Time}} \quad \text{eq. 1}$$

Instant speed refers to the rate at which a vehicle moves suddenly at a specific time or location. It is the raw data collected by the sensors, as well as a time and spatial reference.

The weighted average arithmetical speed of all vehicles over a certain time period is the mean speed.

The average speed of vehicles travelling a certain length of road for a set period of time is known as spatial mean speed.

1.2.18. Vehicle weight
The weight of a vehicle varies based on its classification, such as chassis, body, engine, engine fluids, fuel, accessories, and so on, as well as the dynamic components (driver, passengers and cargo).

2. LITERATURE REVIEW
(Ringhand and Vollrath, 2019)(Ringhand and Vollrath, 2019) In certain cases, drivers could save travelling time and eliminate waiting on traffic lights on major roads if more accurate traffic information is provided. However, drivers on side roads face complicated traffic regulations such as 'right before left' or limited speed zones with participants such as bikers on slow roads. The resulting increase in travel time and unrestricted driving was therefore balanced by more complicated traffic and slower drive conditions. This chapter investigates the balance between these various gains and losses in road preference when measuring driver pressure and road satisfaction. Towards this end, route selection scenarios have been introduced in a driving simulator with a set of the main street and a side path with various difficult situations. A total of 60 drivers (29 women) took part and went through 16 scenarios. The priorities for the secondary road were primarily determined by the shift in driving time and less by the growing complexity of the traffic situation. However, when driving extremely complicated side streets, driver pressure was higher. Behaviour explanations and move to real traffic are mentioned since road

planning in the residential streets provides special protection.

(Bitkina *et al.*, 2019)(Bitkina *et al.*, 2019)Several previous researches have shown that the physiological responses of a driver are substantially correlated with driving stress. The study, however, is limited to identifying the impact on driving pressure of road conditions (low vs. highway) and roadway forms (highway vs. city). The aim of this analysis is to determine the relationship between driving pressure and conditions along with moving pain and road types. In this study, EDA channels were accumulated for a men driver in real road conditions for a period of 60 minutes a day during a period of 21 days. Two different models have been proposed with the incorporation of the statistical properties of EDA signals, one for road traffic and one for road types to categorize the rates of driving stress (low vs. high). The EDA showcases with a logistic regression analysis were used for both modelling techniques. Driving in the city was more difficult than driving on the highways. Whenever the vehicle speed criteria are around 40 km / h and standard speed deviation of 20 km / h are used, the speed limits will define it as traffic jams have also influenced the driver's level of stress significantly. Importance to the business sector: the outcomes of the evaluation of the two approaches demonstrate that transport conditions and road conditions are the key aspect for pressure driving and associated applications.

(Marfani *et al.*, 2018)(Marfani *et al.*, 2018)In the Simada Naka Junction, Surat, one of India's fastest-growing cities, is proposing improvement of intersection. Surat is a rapidly developing town with a traffic jam. This paper is intended to analyze the problem and to find the solutions needed. Data were collected from the highest times at the selected intersection based on a video graphics process. The conversion of the volume is performed by adopting IRC recommended PCU values. Many other traffic flow parameters are estimated from the Transportation Road Research Lab (TRL) empirical model. Many alternative solutions were listed and the rotary design from different alternatives is taken into consideration and is useful in managing intersection traffic flows. This paper also included a number of several other suggestions.

(Studer *et al.*, 2018)(Studer *et al.*, 2018)Driver conduct and psychophysical condition seem to be the most common reasons for incidents at the roads. The study discussed in the paper suggests a method to classify particularly hazardous stretches/intersections of routes in advance, focused on the location of drivers' stressful/relaxing situations. Those have been assessed using wearable tools by obtaining physiological parameters. The correlation has been explored, based on a historic analytical framework (black spot), regarding stressful/relaxing circumstances and locations with high accident rates. There have been a series of driving tests in Milan. The very first set had been mainly focused on the investigation and verification of the psychophysical condition parameters of the driver. Following experiments, a link between black spots and stress/relaxation areas could be found. The findings revealed that drivers had primarily encountered high accident rates in the most dangerous regions. In addition, the validity of the approach has been confirmed as a tool to support the previous prevention and control road safety analyses using this method, 80 percent of the most dangerous areas of the traffic. The wearable devices have enabled essential characteristics related to human behaviour, usually, technical-engineering, to be studied and incorporated in the field of land security.

(SHIVATARE *et al.*, 2017)(SHIVATARE *et al.*, 2017)The current problem is linked to the social issues of road accident and traffic jam preventions; it is managed by the state government and the municipal corporation. In this context, the distribution of traffic signals to the administrations is very necessary and important. The State Government and Municipal Corporation are completely responsible for enforcing these laws. Information and content facts were shown in this literature review in order to study traffic signal regulations and avoidance accident rates. It is a social investigation to direct the public on traffic signs towards their respective destinations for a "happy journey".

(Batrakova and Gredasova, 2016)(Batrakova and Gredasova, 2016) We recognize the effect assessment of the driving conditions on road safety on the basis of a theory of the driver's engaging with the traffic environment. The number of injuries has been shown to be affected by weather, economic, economic and vehicle factors. The discrepancy between the two also needs testing methodology, an analysis of driver behaviour, to determine the effect of road conditions on the risk of an accident, while coping with the problem of improving traffic safety. The relationship between road conditions and driver functional status indicators was developed on the basis of the studies. Optimum speed is established for different road conditions. The criterion of optimality is trust in the operator. The findings obtained are the basis for the development of initiatives to improve environmental movement components and realistic methods for evaluating accident damage under changing operating conditions.

3. METHODOLOGY

3.1. Introduction

This chapter outlines the work process flow and procedures that were used in this project. To begin, streets are divided into two types of lanes: broad lane and service lane. After selecting a road on which these two lanes run parallel to a target point, the traffic volume count of these two lanes was investigated. The traffic generated by a video is then evaluated using Picomixer STA (Smart Traffic Analyzer). The software has limits in counting rickshaws and motorcycles, so manual counting is done as well.

3.2. Classification of Streets

The classification of road types in this study is based on six major criteria. The first five floors are static, describing how the road network functions and originates in various forms of road functions, type of surroundings, speed limits, traffic density, and various types of traffic signals, as well as road calming, while the sixth floor is dynamic and versatile, describing high and low-pitch traffic flows (Ericsson et al.).

The six features are established by the application, which has been proved to be particularly important for emissions and fuel usage factors and metrics, as well as how the ISA dataset can enable the use of adequate data in the combined application of road types across the field. Many of the street shapes, however, were quite unusual, and there was insufficient data in a few combinations, thus some were combined. The total price of static street forms was 22, or 61, depending on traffic flow conditions.

3.2.1. Street function

Street lines, whether as part of a main route or as part of the national transportation network, formed the practical division. The fact that these sections are subordinated to the major road network system, i.e. at level crossings controlled by traffic lights, some of which have stopping symbols, giveaway indications, or a lesser preference, are factors for the Local road network. The regional road network accounts for 47 percent of the road system surveyed in Land.

3.2.2. Type of environment

The population of the local neighbourhood in which the road exists is described as the community, which includes the town centre (Central Business District, CBD), residential neighbourhoods, and other types of locations (e.g. industrial and communications areas).

3.2.3. Speed limit

The research area featured speed limits of 30, 50, 70, 90, or 110 kilometres per hour. Due to a lack of driving practises or the number of physical divisions in particular classes, the speed limits of 30 and 50 km/h had to be mixed in eight circumstances.

3.2.4. Density of junctions controlled by traffic lights

The density of intersections controlled by traffic lights significantly impacts the style of traveling, consumption of energy and emissions.

3.2.5. Traffic-calming measures

Earlier research on the impact of traffic-calming measures on fuel consumption and waste shown that with transits of traffic-relaxation regulations and actions, fuel consumption falls for the rest of the voyage (SmidfeltRosqvist, 2003). Two classes were divided into channels in this experiment, one with traffic-calming measures and the other without.

The above information is used to categorise lanes and roads as Broad Lane or Service Lane. Following the classification, it's time to talk about the many types of driver perceptions that influence their route selection. (a) The driver's perceptions may differ significantly from their actual experiences, and the driver's choice is better explained by their perceptions than by their experiences. (b) Drivers are better at understanding travel speeds than travel times; (c) observed travel speeds, rather than perceived travel times, appear to impact route choice. (d) the action of the drivers' option differs depending on the driver class they belong to (Tawfik and Rakha, 2012).

3.3. Selection of Streets for experimental data collection

Various parameters were examined in the selection of streets in order to get some deep data so that the results acquired may be well descriptive. Various elements that are taken into account and influence the decision of which route to study are listed below –

3.3.1. Distance to the destination

This factor describes the distance taken to conduct the study to show the best results. The distance should neither too short, nor too long is preferred for the study.

Diversions on the road

The number of vehicles will be affected if there are too many diversions and road convergences. The optimum route for the study should have the fewest diversions and road crossings possible, so that the total number of vehicles on the route can be maintained on average.

3.3.2. Traffic Signal Halts

When discussing traffic signals, it's important to remember that inter-road crossings are included, which is why they can't be overlooked. As a result, an increase in the number of traffic signals along the route will influence the driver's route choices.

3.3.3. Service lane

A service lane parallel to the main road, providing an alternate option for cars to pick for traffic to be spread, is an ideal route decision. This element also influences driver stress when picking a smaller lane with potential pedestrians.

3.3.4. Traffic

Another factor that can improve traffic data and understanding is when a varying amount of vehicles pass through the route at different times.

A suitable route and mileage are chosen based on the aforementioned variables. The distance between Rani Kamlapati Square and Aashima Mall is taken into account. This distance is appropriate because it includes three traffic signal stops as well as a parallel running service lane that ends immediately before the destination. This route is also taken into account because it connects important locations and is a common feature of a heavy traffic commute a service lane with parked and moving vehicles.

shows the google map image of the route considered for the study. A service lane is also visible in white parallel to it.

3.4. Experimental Outreach

This task is separated into two parts: one is to gather data while physically present on the site, and the other is to process the data acquired using traffic management and analytic software and receive the work's findings. The initial section focuses on gathering data from the designated location. A video is captured from an angled perspective using a camera. This experiment is carried out according to a set of guidelines, each of which must be met. To capture the varied traffic on the streets, these criteria are split and organised into two-hour time periods. The first recording is scheduled for 9-11 a.m., followed by 1-3 p.m., 4-6 p.m., and 7-9 p.m. As similar requirements of crowd travel in similar time slots, different time slots provide different types of traffic density, rising or decreasing traffic according to time. The traffic shift is categorised and given in table 3.1 based on visual observation alone.

Table 3.1 Time slots and assumed Traffic density

S. No.	Time Slots	Traffic Density
1.	9 am to 11 am	Heavy
2.	1 pm to 3 pm	Light
3.	4 pm to 6 pm	Medium
4.	7 pm to 9 pm	Heavy

Three locations at three traffic signals are selected to record the video and capture shots of the traffic. These locations are at Rani KamlaPati Square, another one at Bagmugaliya Junction and final one at Aashima Mall. These different locations and service lanes..

3.5. Traffic Signal Halts

Traffic signal plays a very important role in this study. It affects the driver's choice of choosing an alternate route having more stress for safety of pedestrians than to choose a path on which there are enough number of traffic signals to stop him again and again after few seconds. These traffic signals have also been captured considering the long time stops that they enforce. In the practical experiment of staying at the three traffic signal costs around 3.5 minutes extra for a distance of total 4 minutes. That says, it takes double time to reach the destination while stopping at three frequent signals. A psychological aspect gets added here for the drivers, concerning their frustration because of this and that too when the destination is a Railway station which depicts the time saving interests.

3.6. Software based study

The experimentally gathered data is brought up and examined with the help of the software in the second phase of the study. Picomixer STA was the software utilised in this study (Smart Traffic Analyzer). This programme is commonly used for traffic management and detecting vehicles going by on the road. Furthermore, this is real-time software that can be used both offline and online. It is primarily utilised as a vehicle traffic management and analysis software operating system. Artificial intelligence-based vision (machine intelligence and multimedia computing) transforms every traffic observing image sensor into an advanced AI structure Robot in the traffic management (& Highway Administrative) framework for information gathering, incident detection, and traffic safety management. As shown in figure 3.1. Picomixer smart traffic analyser.

Figure 3.1:Picomixer Smart Traffic Analyzer

Basic Features of STA (Smart Traffic Analyzer)

- A traffic analysis using machine intelligence and autonomous video calculation on a highway, road, or street (no intersection).
- Vehicle counting and categorization in several classes (in two directions (along with numerous lanes)), such as:
- Overall classification technique for two groupings, i.e. light cars and trucks, and the same for buses and trains, trucks, heavy buses, and loaders, as well as all heavy vehicles
- Car, minibus, truck, bus, and trailer are all classified into five categories.

STA can identify up to 235 automobiles simultaneously (adapted to multi-lane roadways) in two different directions. The following are some key considerations of this operating system:

- Real- time and average measurement of traffic levels.
- Speed measurement and average vehicle frequency.
- identification and tracking of incidents included:
- Detection of accidents and unusually disrupted vehicles (including large vehicle object classes)
- Cars moving in the other direction are detected (which include unethical Overtaking and moving in the opposite direction)
- Tracking road accidents and power outages by detecting unexpected changes in traffic flow;
- Keep an eye on rapid changes in traffic conditions, such as road-freezing and slipping situations.
- Capability to capture pictures of occurrences from a different perspective by using an additional camera.
- The opportunity to use an extra camera to take images of events from a different perspective.
- On an easily accessible live map, you can see traffic congestion and accidents.
- Efficient installation and configuration in a variety of organisational settings.
- Two modes of operation: internet-based (real-time camera connection) and off-line (video files).
- The ability to use a variety of video channels, as well as all common IP and analogue camera systems.
- Integration into common video communications systems, such as certain Milestone XProtect and Axis media control systems.
- Ability to combine traffic and congestion into advanced analytics structures, such as dynamic maps.

4. Result and Discussion

4.1. Introduction

The findings of the analysis using the software Picomixer Smart Traffic Analyzer are evaluated and explained in depth in this chapter. Various features of the results gained are discussed, as well as how they influence the driver's decision to take a specific route to reach the target. The results of the software are provided first.

4.2. Results

This software is used to examine four time periods and produce traffic results. Due to the software's constraint of not counting motorcycles and auto rickshaws separately, manual counting was chosen for these two vehicles. Software and manual counting results are being obtained. Table 4.1 shows the total number of cars passing through the broad lane, as well as readings recorded every half hour.

Table 4.1: Number of Vehicles from 9 – 11 am on Broad lane

Time Slots	Time (Minutes)	Cars	Motorcycles	Heavy Vehicles	Auto Rickshaws	TOTAL
9 am to 11 am	30	142	236	84	165	627
	60	181	265	65	136	647
	90	198	256	77	166	697
	120	162	216	63	144	585
Total	2 Hours	683	973	289	611	2556

Table 4.2illustrates the total number of vehicles travelling through service lane and readings taken after every half an hour.

Table 4.2: Number of Vehicles from 9 – 11am on Service lane

Time Slots	Time (Minutes)	Cars	Motorcycles	Heavy Vehicles	Auto Rickshaws	TOTAL
9 am to 11 am	30	19	44	0	22	85
	60	24	56	0	35	115
	90	15	63	0	28	106
	120	28	41	0	18	87
Total	2 Hours	86	204	0	103	393

Table 4.3and table 4.4 illustrate the total number of vehicles travelling through broad lane and service lane, respectively and readings taken after every half an hour.

Table 4.3: Number of Vehicles from 1 – 3pm on Broad lane

Time Slots	Time (Minutes)	Cars	Motorcycles	Heavy Vehicles	Auto Rickshaws	TOTAL
1 pm to 3 pm	30	94	185	66	89	434
	60	121	174	74	115	484
	90	88	159	45	84	376
	120	75	146	58	65	344
Total	2 Hours	378	664	243	353	1638

4.3. Comparison and Discussion

The graph above depicts the various sorts of vehicles on the broad lane and service lane at various times of the day. By looking at the traffic fluctuation over time and as the day progressed, these statistics clearly demonstrate the premise presented in table 3.1. The results show the traffic volume count and how it affects a driver's decision to choose a different route to work. Figure 4.1 depicts a comparison graph of traffic volume counts on a broad lane at various times of the day. These disparities in bars indicate that there is a considerable flow of traffic on the broad lane from 9 a.m. to 11 a.m. This strong traffic can be explained by office hours, school bus hours, coaching hours, and other factors. These variables have a significant impact on the quantity of vehicles on the road. Following that, the time window of 1 p.m. to 3 p.m. displays a decreasing bar of traffic, as most workplace or other places' regular hours do not overlap with this time slot. As a result, this time period receives low traffic. As time passes, the bar raises slightly, although traffic remains low between the hours of 4 and 6 p.m. This is the medium traffic count time slot, and it also indicates that as the sun sets, traffic begins to climb slightly. Moving on to the final time slot, from 7 to 9 p.m., the traffic bar rises to its highest level of all the time slots.

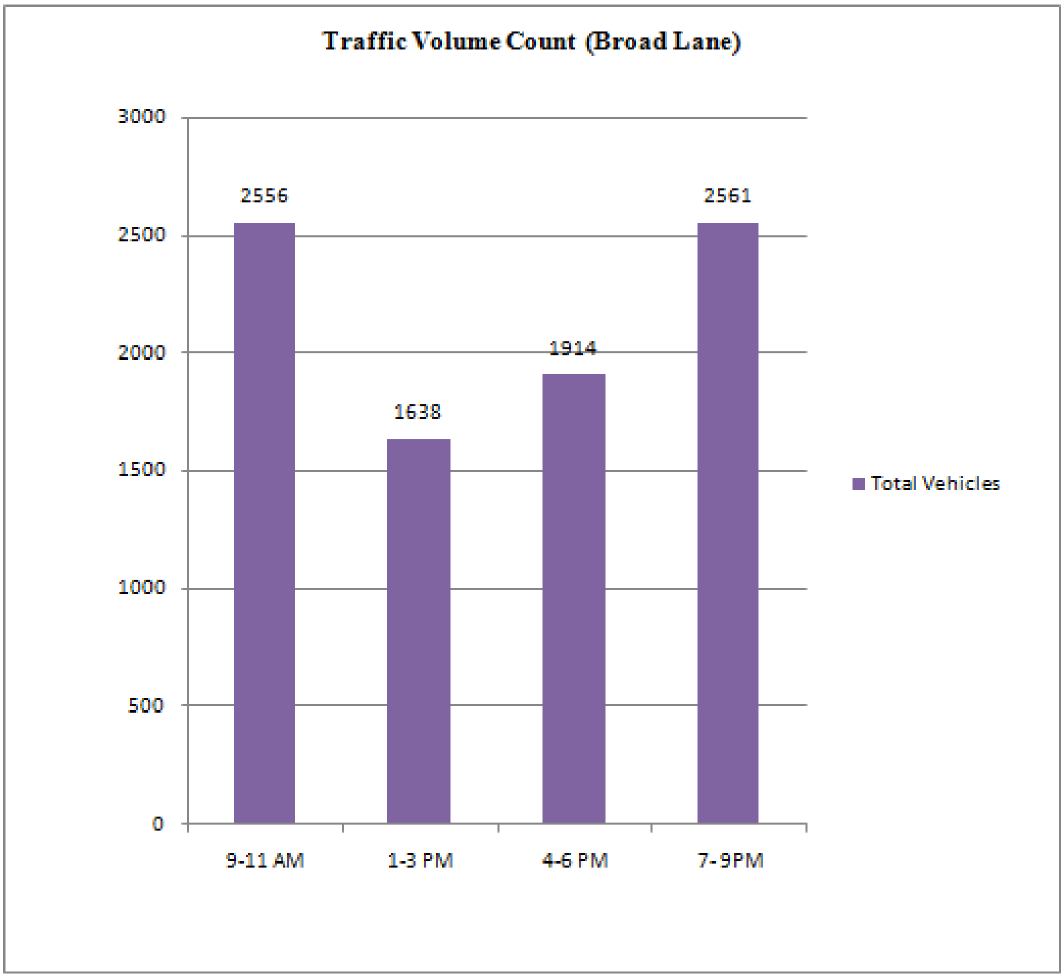

Figure 4.1: Comparison of Traffic Volume Count on Broad Lane

After comparison of broad lane traffic, according to the data gathered, the service lane traffic seems to fluctuate and influenced greatly from broad lane traffic. The comparison graph of the traffic volume count at different day timings on service lane. Among the four time slots, similar kind of trend is visible as the traffic on broad lane.

This speaks about the influence of traffic of broad lane on service lane. These differences in bars show that from 9 am to 11 am, there is rush of traffic on the service lane. The reason comes quite clear as passing more time, the traffic shows similar trend as the traffic on broader lane. After this, timings 1 pm to 3 pm shows the falling bar of traffic as the regular timings of any office or any other places usually don't get collided with this time slot. Next time slot is of 4 pm to 6 pm and this is the time slot of medium traffic count and also shows that as the sun goes down, traffic starts to increase a bit. Moving onto the last time slot from 7 pm to 9 pm, traffic bar of service lane raises at the top of all the time slots and thus shows that, the heavy traffic on the broad lane is one of the major factors of the rush in service lane too. As the day ends, number of vehicles increases hugely than the previous cases. This graph shows that due to high traffic on the broad lane, more number of drivers tends to take an alternate path to reduce the time and increase the speed of commute.

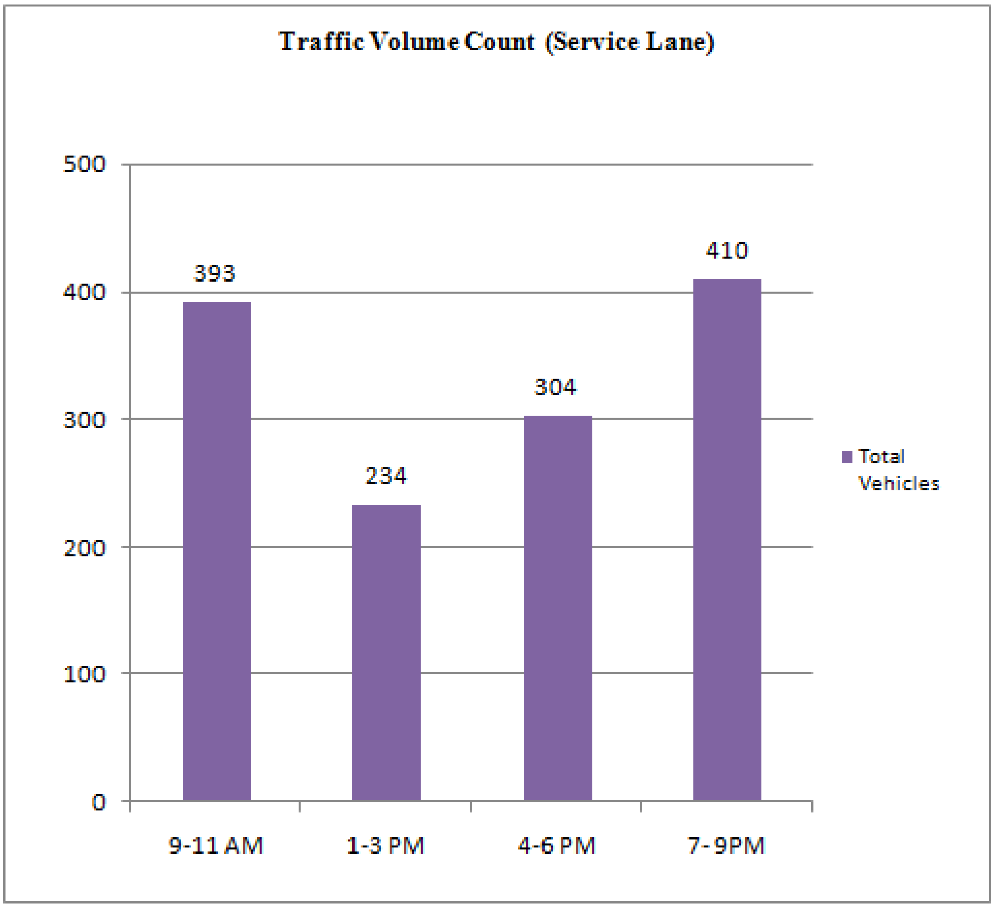

Figure 4.2: Comparison of Traffic Volume Count on Service Lane

4.4. Traffic Congestion

The traffic speed in the larger city that is considered regular or light will be almost undoubtedly regarded as congestion in a small village and, further, interestingly enough, that can be seen by the same driver on various legs of the same trip. It appears that, with conditions, the concept varies, with small duration fluctuations in city traffic in a neighbourhood being known as grid-lock, however, the same traffic frequency has been reduced to only continue moving as it is expected to repeat.

4.4.1. Result

By the combined useof the software Picomixer STA (Smart Traffic Analyzer) and manual counting, following data of vehicle count is taken from the three traffic signal halts. This data is the average vehicle count of Rani Kamlapati Square, Bagmugaliya Junction, and Aashima Mallpresented in table 4.9,table 4.10 and table 4.11 respectively.

Table 4.4: Average Vehicle Count at different time slots at Rani Kamlapati Square

Time Slots	Cars	Motorcycles	Heavy Vehicles	Auto Rickshaws	TOTAL
9 – 11 am	18	21	7	15	61
1 – 3 pm	9	13	4	8	34
4 – 6 pm	14	18	8	21	61
7 – 9 pm	22	25	6	20	73
Total	63	77	25	64	229

4.4.2. Discussion

Above data represents the average vehicle count at three different traffic signal halts during different timings of the day. The final count of average vehicle at different signal shows that Rani Kamlapati Square has the maximum average count of the vehicle for the overall day, followed by traffic on Bagmugaliya Signal and then least on Aashima Mall Signal. Also from the above data, it can be seen that time slots 9-11 am and 7-9 pm are the busiest signal halt timings. These timings hold the maximum count of vehicle in traffic. And throughout the day, these halt timings remain the same which results in the inefficiency of the system. Rather, variable halt timings according to the obtained data would be more efficient and smooth than the conventional similar timings. As the number of vehicles increases, then the halt timing should be decreased, so that congestion could be reduced and there will not be any big accumulation of vehicle at one stop.

There are other possible solutions to reduce the congestion and improve traffic management of an area. As per the data obtained, these halt timings also depends upon the crowd of pedestrians. The pedestrian raises the safety concerns while having a traffic management system. The number of pedestrian increases the halt timings for them to cross roads. The total elimination of the crowd crossing roads can be achieved by making foot over bridges or pedestrian subway. These two methods are widely used depending upon various factors such as the location, space, suitability for the traffic managers. These two methods are briefly discussed further.

4.4.2.1. Foot Over Bridges

Foot over bridges are the path way made for the pedestrians in order to raise their safety and so that travel time for the vehicles can be reduced. The use of foot over bridge can effectively reduce the pedestrian traffic from the road and gives them a safety path to cross the roads. The setup of foot over bridge at these signal halts, will decrease the time of stoppage signal by a significant amount which will largely reduce the travel time of this route. A foot over bridge.

5. Conclusion

This chapter concentrates over the results obtained from the software and manual counting and the final wrap-up of the whole work. In this, two types of roads are selected for the study of traffic and its influence on the driver's choice of alternate path to reach the same destination. With the help of the software, Picomixer STA (Smart Traffic Analyzer), data was gathered of the traffic count on the broad lane and service lane. For this, videos and photographs are taken of the site and then uploaded in the software, and obtained the traffic volume count. The following conclusion can be obtained from this work:

- In the time slot of 9 am to 11 am, there is a heavy traffic on broad lane and traffic volume count reaches to the figure of 2556. The factors, due to which such high traffic is seen, are morning office timings, school and college timings, coaching timings etc.
- This kind of traffic on broad lane, makes drivers choose a quick and traffic less path, i.e. they go for service lane. And from the results obtained, it can be seen that, at this time slot, there is a huge rush of vehicles on the service lane.
- The maximum and minimum traffic count was seen in the slot of 9 am to 11 am and 7 pm to 9 pm which was 2561 and 1638 respectively.
- Highest traffic count of service lane is in the slot of 7 pm to 9 pm which is 410. And the least count is in the time slot of 1 pm to 3 pm which is 234.
- The trend shown by traffic on broad lane is that from 9 am to 11 am, there is heavy traffic, from 1 pm to 3 pm, there is low traffic, followed by time slot 4 pm to 6 pm, the traffic increases a little and makes it a medium traffic. The final time slot of 7 pm to 9 pm shows the highest traffic count of 2561 and tops the chart.
- Similar trend is shown by the traffic on service lane too. From heavy traffic to low, then from low to medium and then medium to heavy traffic and topping the chart in the final time slots. This shows the connectivity of the traffic on the broad lane to the traffic on the service lane.
- Heavy traffic and the three traffic signals affect the short route to consume more than the double time, and thus this leads to a similar trend of the traffic on service lane. The drivers choose the alternate path to avoid such a heavy traffic and thus driver stress increases because of commuting on a route where count of pedestrians dominates.
- Traffic Signal halts are way too much on this route which makes the time almost double to travel. It works as a hindrance in commuting and not as a management. A reduction in the halt timings may decrease the usage of service lane for commuting and further safety can be increased on both the lanes by reducing and managing rush.

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