TRAFFIC PERFORMANCE AND DRIVING PATTERNS ON HIGHWAYS

(*A Case Study of Minna, Niger State*)

BY

LAWAL OSIOAZORBEMHE SYLVESTER
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DECLARATION

I declare that this project has no bearing to any person or group of individual work.

I have written this project and is a record of research work. All quotations and references are duly acknowledged.

18/02/'11

LAWAL, O. SYLVESTER
(PG/CE/08/050)

DATE

CERTIFICATION

I certify that this project report titled "**TRAFFIC PERFORMANCE AND DRIVING PATTERNS IN MINNA"** is the bonafide work of Mr. Lawal O. Sylvester, who carried out the research under my supervision. I certify further, that to the best of my knowledge the work reported herein does not form part of any other project report or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this.

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DR. ENGR. P. N. NDOKE **DATE**
(PROJECT SUPERVISOR)

---------- ----------

PROF. S. SADIKU **DATE**
(HEAD OF DEPARTMENT)

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EXTERNAL EXAMINER **DATE**

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DEAN OF SEET **DATE**

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DEAN OF POSTGRADUATE SCHOOL **DATE**

DEDICATION

This project work is wholly dedicated to God Almighty and my lovely son; "Delight Lawal Anetekhai" I marvel at the good work of God in how you have grown so big, smart and active in a short time. You are a true source of inspiration to me.

ABSTRACT

This project involves a detailed study of traffic performance and driving patterns on highways, Minna as a case study. During this study, various methods were taken. This includes moving with motorcycles and cars on main route of Minna to enable me to get the existing details. It also enables me to study the behavior of drivers and their pattern of driving on this route. The congestion of traffic and accident on highways has increased considerably due to the driving pattern of drivers.

Influence of driving pattern on highways is a tool to identify potential risk on our highways and manage it accordingly with proper rules and regulations on driver's behaviours and speed limit. Possible solutions were mentioned and recommended which can be used to improve road user's behaviours as to know the appropriate driving pattern on the highways.

CHAPTER ONE

1.0 Introduction

1.1 BACK GROUND TO STUDY

In transportation engineering, we are constantly being challenged with dilemma in that congestion, particularly on city streets and urban freeways will continue to become more acute, while it is increasing more difficult to acquire the right of way need to build new ones.

A project that evaluated relationships between driving patterns emission and traffic management measures in streets with heavy traffic. The project shared a serving relationship between driving speed and emission. The driving speeds in the four (4) streets were between 10- 60 km/hr:

Driving patterns were selected to represent the widest range of average speeds and variability of driving patterns in the driving patterns database.

Driving behaviour has an effect on the power output of the engine and consequently its emission- But there are also operating units imposed by the actual driving behaviour for on the road driving conditions encountered in reality on highways that are of significance in determine emissions of a speed and acceleration for a given vehicle, therefore, it is of interest to determine how vehicles are actually used on the highways.

1.2 STATEMENT OF THE PROBLEM

Most of the activities centered on Bosso campus gate Mobil market junction and Niger State Secretariat. The journey by a mixture of motor vehicles and pedestrians. The movements of these centers interrupt the smooth flow of traffic and lead to the conflicts that account for the commonly driving patterns and higher accidents'. Characteristics of drivers and vehicles always be kept in mind.

For prosper turning, it has been found that adequate lighting must be provided and controlled. Access is required at the point of intersection.

1.3 AIMS AND OBJECTIVES

The aim of this project is to the influence of driving patterns and traffic performance in a city street.

i. To obtained the proportion of the different driving patterns with a driving cycle.
ii. To determine the contribution of these patterns to traffic congestion and accidents
iii. To determine factors favoring particular driving patterns.
iv. To suggest ways of improving driving patterns in the city street.

1.4 SCOPE OF WORK

This project report is restricted to the improvement of free flow of traffic on city streets. For instance, Minna as a case study and also to know how the driving patterns affect traffic performance and then recommend possible solutions to such occurrence. Two major routes in Minna Boss and Paiko mainly were considered.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 TRAFFIC

Traffic can be defined as the movement of pedestrians and goods along a route, and in the 21st century, the biggest problem and challenges for the traffic engineer is often the balance between the volume of traffic and the capacity of the route leading to congestion. Traffic congestion is not a new phenomenon. Roman, in his tarry records that the streets of Rome were to clogged with traffic that at least one emperor was forced to issue a proclamation threatening the death pending to those whose chariots and carts blocked the way. More recently pictures of our modern cities taken at the turn of the century shows streets clogged with traffic.

Traffic in the context of this book, the dictionary describes "traffic" as the transportation of goods coming and going of persons or goods by road, rail and air. With the wider definition of traffic, and this book deals with the design of facilities of most forms of road traffic. Thus, we deal with pedestrians, cyclists, and motorized traffic including vehicles.

We do not deal with animals, although horses and herd animal have the same right of way as pedestrians on a motor vehicle. This sort of traffic is excluded for practical reasons.

2.2 TRAFFIC ENGINEERING

This book, Gordon Wells quoted the institution of civil engineer for his definition or traffic engineering as:-

That part of engineering which deals with traffic planning and design of roads, of frontage development and parking facilities, and with the control of traffic to provide safe, convenient and economic movement of vehicles and pedestrians.
This definition remain valid today, there has clearly been a change in the emphasis in the role of the traffic engineering in the time since this book was produced.

In the 1970's the car was seen as the future and the focus was very much predict and provide traffic engineers the task of increasing the capacity of the high way system to accommodate the growth in motor traffic often at the expenses of other road users.

Road capacity improvements were often achieved at the expense of pedestrians freedom of movement, pushing pedestrians to bridges and under passes so that the carriage way could be given over to the cars.

However, it is now generally but by no means universally recognized that we will never be able to accommodate unconstrained travel demanded by cars and so increasingly traffic engineering has become focused on sharing space and ensuring that more sustainable forms of transport such as walking and cycling are adequately centered, for this change has been in response to change in both society and concerns about traffic and the impact of traffic on the wider environment. There has also been a pragmatic change forced on traffic engineers as traffic growth has continued unabated and so, the engineers has been forced to fit more traffic into a finite highways system.

In other country like UK, road transport has increased by about 75%, although, many new roads have been built, these have tended to be inter-urban areas. Thus, particularly

in urban areas, traffic engineers' role is increasingly to improve the efficiency of an existing system rather than to build new higher capacity roads.

2.3 VOLUME OF TRAFFIC

At the end of the First World War, there were about one third or a million motor vehicles in the UK within 6 years, this number had increased by a factor of nearly 5 to 1.5 million vehicles. The rapid increase in vehicle ownership (+45%) in the last 25years is clear; however, the change in the number of vehicles does not tell the whole story.

Also, more people own cars each, vehicles are used more. In addition, the pattern of freight movement has changed dramatically with a shift from rail to road and radical change in distribution procedures, which means that goods now tends to be distributed from fewer, larger depots, with a consequent increase in good vehicles.

Driving the same period, the highway network was increased by the construction of new roads, such as by-pass and latterly by motor ways.

In the UK, the department of transport uses a mile-wheel of predicting future traffic which links growth in car owners to among other things predicted changes in economic performance, the methodology provides high and low predictive based on expectations about economic performance.

The productions, which have proved historically conservative, suggest that, within the next 25years traffic level will be more than double.

2.4 CHARACTERISTICS OF TRAFFIC

The operation state of any given traffic system is defined by three primary measures:-

(1) Speed

(2) Volume or rate of flow

(3) Density

These measures will be described and their relationship with the concept of capacity and level of services

(1) SPEED

Speed is defined as the rate of motion expressed as distance per unit time, commonly expressed in kilometers per hour (Km/hr). Speed is an important measure of the quality of services provides to motorist. It is used as one of the many types of highways facilities, used as a measure of effectiveness. Speed criteria must recognize the expectations of drivers and road way functions.

Thus, individuals expect a higher speed on an expressway than on urban arterials. There are three basic speed parameters that can be applied to traffic stream:

(i) **Average Running Speed:-**

This is also known as "space mean speed". It is a traffic stream measurement based on the observation of vehicles travel times traversing section of a highway known as length.

(ii) **Average Travel Speed:-**

This is a traffic stream measured based on travel time's observation over a known length of highway. It is defined as the length of the segment divided by the average travel times of vehicles traversing the segment, including all stopped delay times.

2.7 FACTORS INFLUENCING DEMAND FOR DECONGESTION

The following are factors influencing demand decongestion.

2.7.1 POPULATION

Growth in population, increases demands for traffic capacity to move its members and to facilitate communication between them.

There is need for food transport system to connect low density to high density area of population.

2.7.2 INDUSTRIAL DEVELOPMENT

The development of industries which could be regarded as industrial resolution lead to the growth of modern business and economic activities. There are many manufacturing industries today in our urban centers that needs enormous amount of raw materials for use. These raw materials have to be moved from various site or location to the appropriate industries where they are required by means of transportation. There are a lot of markets, shopping centers, business centers and super markets within the central areas of urban centers and there is need for good and efficient traffic flow.

The development of industries has lead to mass production of motor vehicles and other allied automobile machines competing for better roads, hence there is need for better roads to meet up these changes in development. (Hay, 1972).

2.7.3 WORKABILITY

(iii) **Time Mean Speed:-**

This is the arithmetic average of vehicle speed observed passing a point on the highways, and it is also referred to as the "average spot speed" individuals speed are recorded passing a point, and arithmetically average.

(2) VOLUME

Traffic volumes are used in almost every facet of highways planning and design. The average daily traffic is used in highways planning; but because traffic volume is not evenly distributed throughout the day, highways facilities are often designed based on peak demands occurring for periods as shot as an hour.

(3) DENSITY

Traffic density is defined as the average number of vehicles occupying a unit length of road way at a given instant usually expressed a vehicle per kilometers. It is a measure of congestion of a traffic stream.

2.5 TRAFFIC PERFORMANCE

This helps to evaluate the traffic performance on the highway, how it operates and its level of services. Road is built with specifications, the type of speed expected *on* it, its traffic flow and also its density. The kind of flow of traffic determines how much these commercial vehicles affect the roadway. The manner in which the commercial vehicles park on the side of the road unlawfully, affects the capacity because of the re*duction* in the number of lanes used by the given volume of traffic. At the end of this project, we will be able to determine the performance of traffic on the roadway and how serviceable it is to its users.

2.5.1 TRAFFIC SPEED

Traffic volume provides a method of qualifying capacity values. Speed (or its reciprocal travel time) is an important measure of the quality of traffic services provided to the motorist. It is used as one of the most important measures of effectiveness defining levels of services for many types of facilities, such as rural two-lane highways arterials, freeways, wearing sections and others.

A driver expects a highway speed on a freeway than on an urban arterial like the given road under study. On these roadways, lower speed will be tolerated because of how busy the road is, drivers will not feel comfortable driving at extremely high speed. On a roadway like this driving free flow speed, 30-35mph is expected and its minimum speed expected is nothing less than 18mph. Because of the activities of these commercial vehicles and the activities of other vehicles, speed will greatly be affected and be reduced due to the abrupt manners in which they park on the road side, low speed of vehicle on fast lane, uniform speed of vehicles on the same sport of the road causing delay to other vehicles behind to overtake.

2.5.2 TRAFFIC FLOW

Traffic flow or the rate of flow is formed by taking the number of vehicles observed in a sub-hourly period and dividing it by the time (in hours) over which they are observed.

According to the volume gotten on the road, (volume which is the total number of vehicles that pass over a given section of a lane or roadway during a given time intervals) between the peak hour of 8-9am, we have a total number of 988vehicles per hour and

out of which precisely 545 vehicles are commercial vehicles. If this amount operates on these roadways, then it is certain that flow will be distorted.

Peak flow rate is of utmost importance in capacity analysis, given that the flow rate is more than the peak and this led to a breakdown of the roadway and serious congestion.

2.5.5 LEVEL OF SERVICES

Level of service is a term used to specify the different operating condition that occurs on a highway capacity where it accommodates various traffic volumes. It is a quantitative measure of the effect of number of factor which includes:-

(1) Speed and travel time

(2) Safety

(3) Traffic interruption

(4) Diverse comfort and convenience

(5) Freedom to maneuver

(6) Vehicle operating cost

2.5.4 TRAFFIC CONDITION

This refers to the characteristic of traffic using the roadway, which may change hourly.

2.5.5 SERVICE VOLUME

This is the maximum numbers of vehicle that can pass a given section of a lane on a highway in one direction on multi-lane highways during a specific period, while operating conditions are maintained corresponding to the selected or specified level of service.

2.5.6 OVERALL SPEED AND RUNNING SPEED

These are speed over a relatively long section of highways between origin and destination. These measures are used in journey period to determine or compared the quality of services between alternative routes.

Overall speed: - is defined as the total distance travelled divided by the total time required including traffic delay.

Running speed:- this is defined as the total distance travelled divided by the running time.

Overall and Running speed are normally measured by means of test vehicle that is, drivers over the test section of roadway.

2.6 TRAFFIC REGULATION AND LAW ENFORCEMENT

1. TRAFFIC REGULATION:-

In recent years, many African countries have updated their traffic regulations, although a country like Ethiopia still has national traffic regulations dating back to the 1960's. The southern African transport and communications commission (SATCC) produced a model code a traffic regulations in an attempt to prompt regional harmonization of traffic regulations among African countries which has been an ongoing objectives (SATCC, 1992).

2. TRAFFIC LAW ENFORCEMENT

Traffic police officers are notoriously under resourced in Zambia, traffic police has speed detection equipment, very few motor vehicles and reflective vast for only one out of every II traffic police officer.(Capps 1998, Aaron Thomas 1998).

2.7 FACTORS INFLUENCING DEMAND FOR DECONGESTION

The following are factors influencing demand decongestion.

2.7.1 POPULATION

Growth in population, increases demands for traffic capacity to move its members and to facilitate communication between them.

There is need for food transport system to connect low density to high density area of population.

2.7.2 INDUSTRIAL DEVELOPMENT

The development of industries which could be regarded as industrial resolution lead to the growth of modern business and economic activities. There are many manufacturing industries today in our urban centers that needs enormous amount of raw materials for use. These raw materials have to be moved from various site or location to the appropriate industries where they are required by means of transportation. There are a lot of markets, shopping centers, business centers and super markets within the central areas of urban centers and there is need for good and efficient traffic flow.

The development of industries has lead to mass production of motor vehicles and other allied automobile machines competing for better roads, hence there is need for better roads to meet up these changes in development. (Hay, 1972).

2.7.3 WORKABILITY

Urban centers especially need effective transportation system to ease their daily work trips. The majority of people that resides in urban cities are civil servants and business people. These people move daily from their houses to their places of work and these demands for a good transport system to reduce their length of travel time to work. (Hay, 1972).

2.7.4 CHANGE IN STATUS OF TOWN AND CITIES

The expansion of cities outwardly, engulfing intermediate communities, the cities become complex in pattern with numerous activities modern change takes place within the cities due to technological development, the state of roads to meet these new changes have to be re-designed and planned. (Hay, 1972).

2.8 TRAFFIC CONGESTION

Traffic congestion is a condition on road networks that occurs as the road users increases, and is characterized by slower speed, longer trip time. The most common example is the physical use of roads by vehicles when the traffic demand is high enough that the interaction between vehicles slows the speed of the traffic stream. Congestion is increased as demand approaches the capacity of road (or of the intersection along the road extreme) traffic congestion sets in when vehicles are fully stopped for a period of time this is known as traffic Jam.

Traffic congestion occur when a volume of traffic generate demand for space greater than the available road capacity, this point in community team situation.

Below are some factors or circumstances which causes or increase traffic congestion, most of them reduces the capacity of a road at a given required volume of people or goods.

2.8.1 CAUSES OF TRAFFIC CONGESTION

- High volume of pedestrians
- Inadequate parking facilities
- Activities of traders
- Movement of motor cycles
- Unauthorized parking officers
- Operation of road officers
- Driving pattern of learners
- Break down vehicles
- Road accidents
- Construction or maintenance work on existing road.

2.8.2 EFFECTS OF CONGESTION ON PUBLIC TRANSPORT

Traffic congestion is undoubtedly contributing to the death of road-based public transport in cities. It has been shown that when the traffic using a stretch of road is at 25% of its maximum capacity, the effect on journey times per mile is to increase by approximately 12%. When traffic is 50% of maximum, the journey is 40% longer than in light traffic conditions. Small change in the level will lead to large increase in journey times.

Unfortunately, such conditions are most likely to occur in central business districts (CBD) during the three (3) peak period (morning, afternoon and evening) associated with the

journey to work, when public transport is usually at its highest level, buses and taxi usually stop on the route to pick up and drop off passengers, it is then necessary for them to set back into traffic streams and this combined with the less direct route used by buses and create a considerable difference between the trip times of taxis, buses and cars. This happens despite the facts that the taxis occupy about three times the road space of one car. Hence, car commutters, who are major contributors to traffic congestion, pass on time and create the cost to other road user's in particular public transport, passengers. Public transport trips therefore appear to offer I furious services, irrespective of any costs differences real or perceived. (Hay, 1972).

2.9 PLANNING TO IMPROVE TRAFFIC

The planning and research to improve or develop traffic in any particular area has to be projected for several bases, such planning is conducted at many levels by a variety of agencies. Private companies including those that provide and use transportation make decisions for their cooperate transportation needs using data and alternative proposals.

Traffic planning is undertaken for a variety reasons. One of the most important reasons is that a very long period of time is required to implement most changes in the transportation system, particularly the construction of new facilities. Hence, the arrival of rational decision regarding weather or not to improve or construct a particular road facility requires looking ahead into the future, at the period when it will be used and the benefits from its usage. (Hay, 1872).

Besides, when planning for traffic improvement, it is essential to identify potential problems sufficiently associated with traffic situation in the area, so that new changes

could be implemented to alleviate those problems before they become intolerable. Although, there are many different types of traffic or transportation planning, but the common ones adopted are short and long range planning for urban centers and towns.

2.10 TRAFFIC MANAGEMENT SCHEME

There are very few towns in today's highly developed nations and in many newly developing ones as well which do not experience traffic congestion, accidents, traffic noise and pollution problems.(Morlok 1978). This calls for the urgent need of a traffic management strategies to control those problems. As such, many alternative strategies for the improvement of traffic flow in these countries have been adopted to solve these problems and yet the problems still need to be given enough attention.

2.11 TRAFFIC FLOW IMPROVEMENT

Many of the strategies implemented in order to improve traffic flow, enhance rapid safety, reduce the length of travel time, fuel consumption and to better the environment depends on the area being evaluated. Most of the common traffic management measures adopted by most countries include:- restricting turning movement, the closing of side streets, the use of traffic signal. However, these are the most common system adopted in solving traffic flow problems in urban centers such as Minna, Kaduna and Abuja etc.

2.12 TRAFFIC COMPOSITION

In planning for a new or improved traffic flow on a road system, it is necessary to known the traffic composition using the traffic composition using the existing road, passengers

cars, buses, lorries, trucks, motorcycles, bicycles and pedestrians all have different effects on traffic stream movement.

Therefore, in estimating the design volume for an area, it is necessary to know the percentage of different classes of vehicles present during the design period.

Research and observation at the Mobil round about area in Minna shown that it is mostly cars taxis, buses and cyclists that flux the area then occasionally by lorries or trucks, motorcyclist now popularly known as "GOING" has effects on the traffic flow at Mobil round about area, the cyclists have their parks close to the roundabout and always interfering with the traffic flow into and out of the area.

2.13 DRIVING PATTERN

Driving behavior has effect on the power output of the engine and consequently its emission. But there are also operating limits imposed by the actual driving behavior on the road. The conditions encountered in reality on highways are of significance in determining emissions, and are not necessary on every possible combination of speed and acceleration for a given vehicle.

Therefore, it is of interest to determine how vehicles are usually used in traffic.

To determine the average trip speed of the driving pattern for a given road type. This could be mean that even though speed fluctuation is very important in determining vehicle emissions, on a road with a speed limit of 90km/h, for example, one would normally only drive at an average speed of 50km/h because of traffic restrictions. This means stop and go driving, and therefore a driving pattern of a constant speed of 50km/h on that road is very unlikely.

An attempt was made to find a general relation between speed variation and trip sped for all type of roads. The basic idea is that, for a given street or road, there is a speed at which traffic flow freely, when there are no steps due to traffic signs, lights or congestion. This speed is expected to be close to the posted speed limit for a given street or road. Consequently, the average driving speed for each driving pattern and its corresponding deviation were normalized by dividing by the rated speed for each street or road.

As the flow of traffic becomes limited by either traffic regulation or congestion, it is expected that the variability of the traffic flow will increase as the number of accelerations and deceleration increases.

For a trip speed less than one half of the rated speed, there is no driving with zero deviation. In agreement with the proposition that low speeds and associated speed fluctuations are related to traffic restrictions, though it is well known that emissions are lower when driving at a constant speed than for fluctuating speed at a given average trip speed, constant speed driving is of little important in the situation where the average speed is well below the rated speed (J. Q. Hansenetal 1995).

Driving pattern was selected from the available cycles for the testing purposes. Due to car availability, it was not possible to test all the cars, over the same number of driving pattern was selected with higher priority, driving patterns assuring coverage of the entire range of speed and deviation.

The combination of trips speed and deviation include in the determination of average vehicle emissions. For cars with and without catalysts, it was required that at least for

2.14.1 ACCELERATION

This is the rate of change of velocity with time.

A= v/t

The word acceleration is often the rate of change of speed with time. Though, acceleration and velocity are both vector quantity. If the velocity of any given car is increasing with time, it is said to be accelerating. But if the velocity of any given car is decreasing with time the vehicle is said to be experiencing retardation or deceleration. In this case, the acceleration is negative (P. N. Okeke).

2.14.2 CONSTANT SPEED

This is the rate of change of distance with time. If the ratio s/t is constant throughout the journey, the speed 'v' is said to be uniform average speed,(Cruising) =

Total distance travelled

Total time taken

(P. N. Okeke)

2.15. IMPROTANCE OF DRIVING PATTERN

For instance, if you are in Minna and you are needed to drive to a nearby town e.g Bosso, (Mobil junction) to FUT Gate at Bosso, you would like to get to FUT gate safely and as quickly as possible. If you have the opportunity to ask local drivers on how to drive there, he will like to give you a nice and quick route although it may necessary the quickest. The suggested route will not send you through a high area, or if there is a snow, storm, it will avoid the roads that are more likely become dangerous. Local expert will

vehicle of a given type be tested over a given driving pattern in order for the pattern to be included in the average for that fleet.(J. Q. Hansenetal 1995) pages 129-139.

2.14.1 DRIVING PATTERN ANALYSIS

The summary of the streets and roads included in the investigation:-

Type	Length (km)	Posted limit (Rate)	speed
Motorway	6.3	100	100
motorway	5.7	100	100
Main rural highway	5.8	90	90
Main rural highway	7.1	90	90
Rural highway through towns	8.7	80	80
Rural highway	8.4	80/50	80
Rural highway	5.9	80	80
Main road into town	1.5	60/50	60

(J. Q. Hansenetal 1995) pages 129-139.

The driving pattern is divided into driving conditions which can be characterized as either

(i) Idling

(ii) Acceleration

(iii) Deceleration

(iv) Constant speed or Crusing.

consider a multitude of important factors that are difficult to explicitly incorporate into a path finding algorithm.

We proposed that instead of trying to model all such factors explicitly, historic traffic data from the past driving behavior, in our algorithm, we give preference to fast route that have high support, that is, that are frequently travelled, over those through fast rarely taken by drivers.

2.16 IMPORTANCE OF SPEED PATTERN

In a new corner, you would like to go down town to work your experience, local drivers will suggest to you routes by taking you into the consideration many factors that influence your driving sped e.g. the time of departure, weather conditions, whether you are qualified to drive on a car poor lane etc, the importance factors are also neglected by the current route planning software. It is clearly essential to have new system that can learn from historic traffic data, construct a multi-condition based road speed model; and plan the fastest route adaptively and dynamically.

2.17 ACCIDENTS

An accident is a specific, identifiable, unexpected, unusual and unintended external action which occurs in a particular time and place, without apparently or deliberate cause but with unforeseen circumstances / effects. It implies a generally negative probabilities outcome which may had been avoided or prevented the circumstances leading up to accident, been recognized and acted upon, prior to its occurrences. Experts in the fields of injury prevention avoid use of the term “accidents” to describe an event that causes

injury in an attempt to highlight the predictable and preventable nature of most injuries. Such incidents are viewed from the perspective nature.

2.17.1 CLASSIFICATION OF ACCIDENTS

In order to determine road accident, it is important that a country has a complete classification method. Accidents either involved injury to person ie personal injury accidents (together with vehicle or property damage) or merely involved damage to vehicle or possibly property in which case they are termed damaged only accident. In UK, and in many other countries, personal injury accidents are usually reported to the local police who then make a return to a central organization (e.g. police head quarters or to a ministry). It is standard practice for these accidents to be then classified as being fatal, serious or slight (overseas Road note 10).

2.17.2 CAUSES OF ROAD ACCIDENTS

Road accidents, as the word "accident" itself suggest, are randomly occurring events cause by the interaction of a diverse set of factors. The causes can be broadly group under the following heads:-

(1) The road

(2) The vehicle

(3) The driver

(4) The road user other than the driver

(5) Environmental factors

Road accidents cause heavy losses to the economy in the shape of loss of output. Charges incurred in the hospital station, treatment, damage to vehicles and properties.

In the year 1999, economic was due to various categories of road accidents as shown in the table below:-

S/No	ACCIDENT CATEGORIES	RATE PER ACCIDENT (RS)
1	Fatal	535,489
2	Serious	242,736
3	Minor injury	106,959
4	Major injury	18,855
5	Damage to buses	47,100
6	Damage to trucks	48,700
7	Damage to cars	16,200
8	Damage to two-wheeler	4,100
9	Damage to three-wheeler	10,900

2.17.3 ACCIDENT COST TO NATION

Motor vehicles have made changes in transportation that have placed command of individual improved facility as well as increase in distance and speed of travel. Since the time of century, these have been enormous increase in the number of speed and length of trips of road vehicles.

The social and economic benefits rendered to the public at large through this improved means of highway transportation are prodigious while the pains to the nation are immeasurable losses and waste as well as community resources have been in cursed. Many benefits of motor vehicle which thwart the many ages of travel and are pretence especially in urban area.

The mechanized development in highway traffic has brought about with it a shocking toll of human causalities congestion and accidents which arise as a consequences of motor transport result in loss to public at large.

The net gains establish the utility and place of highway traffic transportation have brought serious amount of loss through congestion and causality. The loss due to congestion are not readily established but is clear that direct waste of congestion, itself coupled with direct effect of city growth and development are enormous.(Jibril 1995).

2.17.4 ROAD ACCIDENT ANALYISIS SYSTEM

As part of it research programme, the overseas unit of the transport and road research laboratory (TRRL) in the united kingdom has developed a micro-computer bases Road accident analysis package, (MAAI), designed for use at the level of local highway authorities where up to data information on local road accident pattern is required on a day to day basis. In developing the package, particular emphasis has been placed in, making it easy to use; with the operation merely having to select a number of options and thus requiring minimal knowledge of computers. The TRRL accident analysis package is available free to governments and research organizations. However, there are expenses involved in setting up the system. The only condition for use of the TRRI experts to obtain copied of any accident data collection by the users for their world wide road safety research purposes.

The main objective of the TRRL road accident system is to supply road safety information which will assist the traffic police and other local government department to become more effective in preventing road accidents. The road accident data can be used in a number of ways to help target the limited resources available for reducing the road

accident toll. The traffic police can determine where and what type of enforcement campaign will be most effective, what areas of driver training and testing should be emphasized and what legislation needs to be enacted or amended.

Road accident data can be used by the city transport agencies to determine trends in road accidents and where and what type of physical remedial measures would be required to deal with these. The city public work department can use the analyzed data to identify the worst road accident locations in depth analysis of the data can then be carried out for these location and appropriate traffic management.

Engineering measures can be proposed in order to reduce accidents at hazardous sites. It was mentioned that about 60-70 percent of road accidents occurred in urban areas and most of these accidents take place on a limited number of roads. The road used to plan publicity campaigns can also be effective manner by rejecting the "at risk" groups indentified from the collected data. For instance, young or old pedestrians, drivers and passengers of private and/or public transport vehicles, motor cyclist & bicyclist.
Department of health and education, insurance agencies and other organizations could also benefit from a reliable and accessible micro-computer and road accident analysis system.

2.17.5 IMPLEMENTATION

A standard traffic accident report from (TARE) has been developed by the TRRL for use by the police attending the scene of an accident. The accident analysis package can also be configured to other reports directly in the micro-computer without the need to transcribe data into separate coding street.

2.17.6 DRIVERS TESTING AND TRAINING

An assessment of driving instruction in Nigeria based on surveys of drivers. Driving schools and a review of recent driving test results. The survey of drivers and driving schools in Nigeria was conducted to assess the effectiveness and quality of professional driving instructions as driving schools are uncontrolled in Nigeria.

Commercial drivers were the focus of research study in Nigeria. Commercial vehicles account for 46% of all registered vehicles in Nigeria have higher occupancies and greater kilometers travelled. A community based survey was undertaken in Nigeria which both estimated the involvement of commercial vehicles in road injuries and assessment of the current knowledge and attitude, commercial drivers of about 1,232 motor vehicle related injuries identified in a survey of 21,105 people, commercial are found to be equally involved in pedestrians crashes and motor vehicle crashes. Commercial vehicles had a higher involvement rate in children injuries (95%) and adults (75%).

Irrespective of the positive attitude towards safety and basic knowledge of the effect of alcohol, driver vision, vehicle maintenance is contributing to crashes; drivers did not appear to put into practice what they know. For instance, few drivers had their sight distance checked and only few used seat belts on long journeys. Traffic signs passed a problem with 70% of commercial drivers incorrectly identifying the sign for "sharp bend ahead" other contributing factors on roads crashes are, the drivers grumbling for economic pressure with high rate of rent of properties pushing them to drive long hours even when they are exhausted. Limited availability and the high cost of spare parts also contributed to crash.

The output from the computer package is present in several different formats. The most common being cross tabulations on accidents casualties for investigating the nature and causes of road accidents.

One of the most important outputs from the analysis package is the road accident maps. Accidents frequencies plotted on a simple grid co-ordinate map of the local road system to determine usually where road accident lack spot exist together with accident maps. The computer will produce various different lists of accidents black spot ie, at intersections and/or along road links.

The cross tabulations data can be exported to various other software packages to that graphical output of the table that can be achieved easily and without the need for any prior knowledge of this computer package. Graphical analysis enable the traffic police to identify quickly the most hazardous locations and where physical counter measures eg traffic management scheme should be planned and implemented.
For road accidents at one particular location, accident stick diagrams are frequently used by traffic engineers to display the key features in the form of column of data.

Experience has been shown that road accident spots investigations and subsequent treatment can result in significant reductions and high economics returns by implementation of low cost. Engineering counter measures have demonstrated that existing road networks can be made saver by small scale engineering improvement without the need for large scale infrastructure investment projects.

Interior spare parts also caused road crash for instance, brake fluid that is water diluted with soap.

Though, road crash could be reduced if the cost of quantity and quality of spare parts could be improved, towing services should be reduced to allow prompt removal of broken down vehicles; free or low cost, vision testing for drivers, stickers licensing and testing of drivers.

2.17.7 EFFECT OF ROAD TRAFFIC ACCIDENTS

The effect of road traffic accident cannot be over emphasized. It has left no one untouched by its devastating effects.

Road traffic accident are known to claim lives able-bodied Nigerian deleted of manpower since most of them died as a result of such road traffic accidents.

Property worth of billion of naira and even lives are also guttered by road traffic fire incident. Other victims that might not have died but may carry or sustain serious handicap injury such as lost of hand, leg, blindness or even bound to wheel chair for life. The European Federation of road traffic victim reveals that a large proportion of the relatives of the dead and the disabled themselves suffer psychological disorders.

2.17.8 PREVENTION STRATEGIES

From the foregoing, it is pertinent that a meaningful resolution for road safety must be addressed with all vigour to eliminate inhibitors of safety on our roads. This is imperative as the strategies to be adopted for such prevention must take cognizance of details of road traffic accident causative factors.

Prevention of road traffic accidents therefore could be realized with concerned efforts by all roads users through proper education of the highway codes and road signs.

The Federal Government established the Federal Roads Safety Commission of Nigeria (FRCN) in 1988 charged to:-

(1) Preventing or minimizing road accidents on highways

(2) Cleaning or removing obstructions on the highways.

(3) Educating road users/motorists on the proper use of highway.

(4) Giving prompt care/attention to accident victims.

(5) Making regulations on any action assigned.

(6) Determining and enforcing speeds limits for all vehicles categories.

(7) Working hand-in-hand with collaborative agent or groups on the serious task of road traffic accident reduction.

2.18 WAYS OF IMPROVING DRIVING IN THE CITY STREETS

The ways of improving driving in the city streets are given below:-

(1) By creating a driving school to educate drivers on how to drive in the city streets.

(2) By indicating the speed limit in the city streets to inform the drivers that the speed should not be more than 0km/hrs in the city streets.

(3) By indicating or putting of all road marking and signals in the city streets.

(4) By avoiding indiscriminate parking in the city streets.

(5) By putting on seat belts and avoiding dangerous overtaking.

CHAPTER THREE

3.0 MATERIALS AND METHODS

3.1 LOCATION OF PROJECT SITE

Minna lies within certitude 90 " 37 ' north and longitude 60 33' east on a geographical base. The town enjoys a climate typical of the middle belt zone. The rainy season which start on average between 11th to 20th April last between 190 – 200 days means annual rainfalls with September recording the highest rains.

Minna has almost means of transportation system except water transport, Minna has rail transportation, Air transportation, Road transportation, taxi and bus services within Minna are improving regularly, Minna and suleja, kontagora, Bida, Kaduna, FCT Abuja, motorcycles are also a very common means of transportation within the town.

FIELD WORK

Considering BOSSO Road, on carrying out driving pattern studies using motorcycle and car; you would like to get to FUT. gate safely and quickly as possible. So, observing, the driver when the car is in gear 1 (one), I look the vehicle speed it rises from 10 Km/hr to 20km.hr and then record the engine revolution. That is also the same method used on motorcycle to enable me get all the driving pattern's datas.

BOSSO ROAD: FIRST LANE

1. Idling	-	Speed	-	900rpm
	-	Acceleration	-	2800rpm
	-	Deceleration	-	2500rpm
	-	Constant Speed	-	1800rpm

Gear	Vehicle Speed KM/HR	Engine rpm	Comments
1	10	1 x 2000rpm	Accelerating
	20	2 x 1500rpm	Constant Speed
2	20	2 x 1000rpm	Accelerating
	30	2x1000 rpm	Decelerating
	40	1.5 x 1000 rpm	Decelerating
3	40	3 x 1000rpm	Accelerating
	50	2.5 x 1000rpm	Accelerating
	60	3 x 1000rpm	Accelerating
4	50	2 x 1000 rpm	.....
	60	2.8 x 1000 rpm	Accelerating
	70	2.5 x 1000 rpm	Decelerating
5.	60	2.5 x 1000rpm	Decelerating
	70	2.6 x. 1000 rpm	Accelerating
	80	2.6 x 1000 rpm	Accelerating

BOSSO ROAD: SECOND LANE

2. Idling
   - Speed - 900rpm
   - Acceleration - 2800rpm
   - Deceleration - 2500rpm
   - Constant Speed - 1800rpm

Gear	Vehicle Speed KM/HR	Engine rpm	Comments
1	10	2000rpm	Accelerating
	20	1600rpm	Constant Speed
2	20	2 x 1000rpm	Accelerating
	30	2.3 x1000 rpm	Decelerating
	40	2.0 x 1000 rpm	Decelerating
3	40	2.0 x 1000rpm	Accelerating
	50	2.6 x 1000rpm	Accelerating
	60	3 x 1000rpm	Accelerating
4	50	2 x 1000 rpm	.....
	60	2 x 1000 rpm	Accelerating
	70	2.5 x 1000 rpm	Decelerating
5.	60	2 x 1000rpm	Decelerating
	70	2.5 x. 1000 rpm	Accelerating
	80	3. 1 x 1000 rpm	Accelerating

FREE GEAR IDLE

Speed Vehicle - 5km/hr

Engine rpm - 100rpm

Gear	Vehicle Speed KM/HR	Engine rpm	Comments
1	10	2 x 1000rpm	Constant speed
	20	2.5 x 1000rpm	Decelerating

2	20 30 40	1.5 x 1000rpm 2 x 1000rpm 2.3 x 1000rpm	Constant speed Decelerating Accelerating
3	40 50 60	3 x 1000rpm 2.7 x 1000rpm 3.5 x 1000rpm	Accelerating Accelerating Accelerating
4	50 60 70	2 x 10000rpm 2 x 1000rpm 2.5 x 1000rpm	Accelerating Accelerating Decelerating
5.	60 70 80	2 x 1000rpm 2.5 x 1000rpm 3 x 1000rpm	Accelerating Decelerating Accelerating

PAIKO ROAD: FIRST LANE

Gear	Vehicle Speed KM/HR	Engine rpm	Comments
1	10 20	1 x 1000rpm 2 x 1000rpm	Constant speed Accelerating
2	20 30 40	2 x 1000rpm 2.5 x 1000rpm 3 x 1000rpm	Decelerating Accelerating Accelerating
3	40 50	2 x 1000rpm 2.5 x 1000rpm	Accelerating Accelerating

4	50	2 x 1000rpm	Decelerating
5.	60 70 80		

PAIKO ROAD: SECOND LANE

Gear	Vehicle Speed KM/HR	Engine rpm	Comments
1	10 20	1 x1000rpm 2 x 1000rpm	Constant speed Accelerating
2	20 30 40	2 x 1000rpm 2.5 x 1000rpm 3 x 1000rpm	Decelerating Decelerating Accelerating
3	40 50	2 x 1000rpm 2.5 x 1000rpm	Accelerating Decelerating
4	50	2 x 1000rpm	Accelerating
5.	60 70 80		

BOSSO ROAD: MOTORCYCLE

Gear	Vehicle Speed KM/HR	Engine rpm	Comment
1	10	1 x 1000rpm	Constant speed
	20	3 x 1000rpm	Decelerating
2	20	2.5 x 1000rpm	Accelerating
	30	4 x 10000rpm	Accelerating
	40	4.5 x 1000rpm	Accelerating
3	40	4 x 1000rpm	Accelerating
	50	4.5 x 1000rpm	Accelerating
	60		
4	50	4.5 x 1000rpm	Accelerating
	60	5 x 1000rpm	Accelerating
	70		
5	50	4 x 1000rpm	Accelerating
	70	4.5 x 1000rpm	Accelerating
	80	5 x 1000rpm	Accelerating

PAIKO ROAD:MOTORCYCLE

Gear	Vehicle Speed KM/HR	Engine rpm	Comment
1	10	3 x 1000rpm	Accelerating
	20	4 x 1000rpm	Accelerating
2	20	2 x 1000rpm	Accelerating
	30	4 x 1000rpm	=
	40	4.5 x 1000rpm	=
3	40	3 x 1000rpm	Accelerating
	50	4 x 1000rpm	=
	60	5 x 1000rpm	=
4	50		
	60	4 x 1000rpm	Accelerating
	70	4.5 x 1000rpm	Accelerating
		5 x 1000rpm	Accelerating

Free Gear Speed km/hr Engine 1 x 100rpm

CHANCHAGA ROAD

IDENTIFIED FOUR DRIVING PATTERN

1. Speed

- Acceleration
- Deceleration
- Constant Speed

Gear	Vehicle Speed KM/HR	Engine rpm	Comment
1	10 20	2 x 1000rpm 3 x 1000rpm	Accelerating =
2	20 30 40	2.5 x 1000rpm 3 x 1000rpm 4 x 1000rpm	Accelerating = Accelerating
3	40 50 60	3 x 1000rpm 4.3 x 1000rpm 5 x 1000rpm	Accelerating Accelerating Accelerating
4	50 60 70	3 x 1000rpm 4 x 1000rpm 5 x 1000rpm	Accelerating Accelerating Accelerating
5	60 70 80 90 100	3 x 1000rpm 4 x 1000rpm 5 x 1000rpm	Accelerating Accelerating Accelerating

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 RESULT ANALYSIS

The main driving patterns on road traffic performance are Acceleration, Idling, Crusing and deceleration. The proportion or those driving pattern are known by driving a car on the main roads that I used in determining the driving patterns are Bosso road and Paiko road by looking the engine revolution when the vehicle is in gear and (one) the vehicle speed is raising from 10km/hr, then the engine revolution will be determined.

The research intends to analyze the driving pattern on the main road of Minna, from Bosso road to Paiko road from the tables above, you will conclude that when it is crusing, the engine revolution is 2800rev/min, while acceleration is mat 3500rev/min Deceleration at 25000rev/min and idling at 900rev/min.

4.2 CAUSES OF DRIVING PATTERN

The occurrence of driving pattern is not usually attributed to single cause but combine effect of number of differences associated with the road users, his vehicles, the road layout and his environment condition.

i. **Road User**-: This comprises of the drivers as well as the pedestrians.

ii. **Drivers**-: Over Confident drivers: Drivers often feel that they are master of the vehicle; however, we all know that tyres brakes and engine controls the motion of the vehicle and the drivers merely operate.

iii. **Over speeding driver**- Drivers often think that the faster they driver, the more they impress themselves and others fails to understand that tyres, brake and the machine controlling the vehicle can fail at any time.

iv. **Bad Condition of Vehicle**-: Drivers often don't check their vehicles to ensure that they are in Good Condition before setting out for a journey checking of engine oil, water in the radiator and tyres are very important.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATION

5.1 CONCLUSION

The ultimate aim and objectives of research and planning to know the proportion of driving pattern and what are those things to measure and how it affects by traffic performance. As such, these objectives, some of the problems affecting the driving pattern on traffic road way terminals and management need to be reviewed and constantly addressed. The movement of vehicle at one point to another over series of links and intersection is affected by the presence of other vehicles on these facilities.

In this work, research on characteristics of traffic flow such as travel time, traffic management is also important as the design of the road facilities itself. Unless the system is adequate, management will not serve its function well: Therefore, in this research and report, a traffic management scheme was discussed with emphasis to the bodies change with the responsibility of controlling traffic on Nigeria highways.

The proportions of driving patterns are: idling using car on Bosso road are 1.5 %, cousing 28%, Deceleration 27% and Acceleration 44%. While using Paiko road, idling 2.%, cousing 27% Deceleration 29% and Acceleration 43%. But using the motorcycle on Bosso road to know thee proportion, idling 1.4%, cousing 31%, Deceleration 27% and Acceleration 40%.

However, one thing is certain, the future will be different from the past social movement; decision by government and industries, technological developments and other many unknowns will all influence transport requirement and capacity of the future.

5.1 RECOMMENDATIONS

Based on the findings in this research, the following recommendation has been given: - The management should enter into financial agreement management with any interested corporate birches so that more facilities can be provided and regularly monitored to meet the standard.

In order to attract users to patronize this road, there ought to be an aggressive advents campaign to make people aware of the need to obey all traffic rules and regulations.

In order to attract people about the effects of population that cause by driving pattern, it need awareness on how to drive in the city roads and speed not more than 80 km/hr.

And in order to remedy this situation of accident, we must be focus on education for drivers and strict enforcement of roles and regulations that govern driving behavior. Special driving schools organized by the road transport inducting should be established with attendance mandatory; especially for those who drives commercial vehicles.

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