Quest Journals
Journal of Architecture and Civil Engineering
Volume 6 ~ Issue 11 (2021) pp: 26-32
www.questjournals.org

Research Paper

Assessment of Flow Rate of Motorcycle in Ibrahim Taiwo Road, Ilorin Metropolitan City-Northern, Nigeria

[1]Biliyamin A. Ibitoye, [2]Mariam Funmilayo Daudu,[3]Nurudeen A. Ibrahim, [4]Nurudeen A. Adeyemoh, and [5]Mukaila B. Kazeem
[1,2] *Department of Civil Engineering, Kwara State University, Malete, Nigeria.*
[3] *Works and Services Department, The Federal Polytechnic Offa, Offa, Nigeria.*
[4,5] *Department of Civil Engineering, The Federal Polytechnic Offa, Offa, Nigeria.*

ABSTRACT
Sharing of lanes by motorcyclists can cause injuries to their body because of the exposure of the part of the body due to the design of motorcycle. Due to lane sharing by motorcyclists' fatal accident may occurred which can lead to death of the motorcyclists and lane splitting leads to confusion at intersections. Road accident in Nigeria is attributed to many reckless motorcyclists and absence on motorcycle lane forming part of the road. Motorcycle lane design and construction are important to reduce road accident claiming lives and causing causalities. This justifies the study on motorcycle lane design considering geometric features, traffic data and road users as elements of the design. Raw data were collected at Ibrahim Taiwo road Ilorin from four different sections, A,B,C and D using video recording from Monday to Sunday at the peak hours of 7am-9am in the morning and 2pm-4pm in the afternoon.
KEY WORDS: Floe rate, Motorcycle, Accident and Safety

Received 17 November, 2021; Revised: 29 November, 2021; Accepted 01 December, 2021 © The author(s) 2021. Published with open access at www.questjournals.org

I. INTRODUCTION

In Ilorin Metropolis today, the amount of disturbance to traffic flow from motorcyclist is often considered as death trap for other road user. Behaviour of motorcyclists on shared lane can endanger lives. Sharing of lanes by motorcyclists can cause injuries to their body because of the exposure of the part of the body due to the design of motorcycle. Due to lane sharing by motorcyclists' fatal accident may occur which can lead to death of the motorcyclists and lane splitting leads to confusion at intersections. Intersections are one of the leading spots where accidents happen.

Over the years, there has been a wide gap in the safety of motorcyclist and the rules guiding riding of motorcycle on Nigeria roads (Ogunmodede *et al.* 2012). A lot of underlying rules of road safety are either not put into use by various people using motorcycle.

In view of the high population of motorcycle in Ilorin metropolis and also their high injury risk, it justifies the need to pay serious attention to this vulnerable road user. In addition, addressing the problem of motorcyclist would also means solving the key problem of road accident. As such, it is essential that proper research on motorcycle safety be conducted to produce appropriate countermeasures in reducing the present high causality and mortality rates among motorcyclists. One of the effective engineering approaches to improve motorcycle safety is to segregate motorcycle from other motorised traffic by the provision of an exclusive motorcycle lane.

Motorcycle is one of the major modes of transportation and is expected to remain so at least for decades because they provide easy mobility solutions in the range of up to several dozen kilometers and are expensive to board compared to cars. However, due to their growing numbers in cities worldwide, motorcycles are increasingly offset by significant problems including, rough riding, safety and regulation issues. Many local stakeholders of roads have asked for guidance in optimising their policies and design standards to maximize the benefits and minimise the problems of this growth. So far, motorcycles have firmly occupied a significant place in transportation systems because they offer very convenient and comfortable high-speed travel at a very low cost.

The objective of this study is to investigate the possibility of introducing motorcycle lane on typical arterial roads in Nigeria.

Motorcycles and Road Safety

Aside from its benefits, motorcycle has particular issues within road safety framework. Motorcycle accidents, which lead to fatalities, often occurred. One of the main reasons for this scenery is due to the mixed traffic and road design. Among allmotor vehicles, motorcycles are the most vulnerable on the road. As motorcycles do not have seat belts, you can be thrown off your seat in a crash, which can result in serious injury or even death. The following precautions have to be taking into consideration for motorcyclist safety during riding.

Inspect your motorcycle before each ride

Conduct a safety inspection of your motorcycle before each ride, and wear protective clothing including gloves, boots and a jacket. Proper maintenance and protective clothing will help reduce your chance of a crash or the severity of injury if you are involved in a crash, especially with a large truck or bus.

Obey traffic rules, use your signals and drive the speed limit

Motorcycles are the smallest vehicles on the road. Unfortunately, they provide virtually no protection in a crash. Other drivers may not see you on your motorcycle, so you must be aware of everything on the road. Be extra cautious, paying attention to the signals and brake lights of other vehicles, especially trucks. However, you still need to be prepared in the event their signals or lights don't work. Ride with caution and drive defensively. Even though your motorcycle may be small, you must adhere to the laws of the road. Never ride in between lanes in traffic or share a lane with another vehicle. Don't instigate aggressive driving with other motorists; you will only increase your chance of a crash.

Weather

The most important thing to consider before taking to your bike, even prior to checking the weather, is your mental state.If you are in the wrong frame of mind, you could be prone to do the wrong things. From riding too fast to making basic errors in judgement, the wrong frame of mind is one of the most crucial factors to consider before setting off.If you're tired, irritable, annoyed or distracted; getting on your bike can be very dangerous.

II. METHODOLOGY

The following methods were used in carrying out this study

2.1 Description of the study area

The study was carried out at Ibrahim Taiwo Road in Ilorin, Kwara State, Nigeria. Ilorin is a medium-sized city which is situated in the traditional zone between the forest and savannah regions of Nigeria and serves as a gateway city between the northern and the south western part of Nigeria (Tolu, 2013). Ibrahim Taiwo Road is a central business district in Ilorin metropolises, due to the fact that it is one of the major centers of business activities in the city, it draws the attention of most people to the area and movement of motorcycle and vehicle are high(Figure 1).

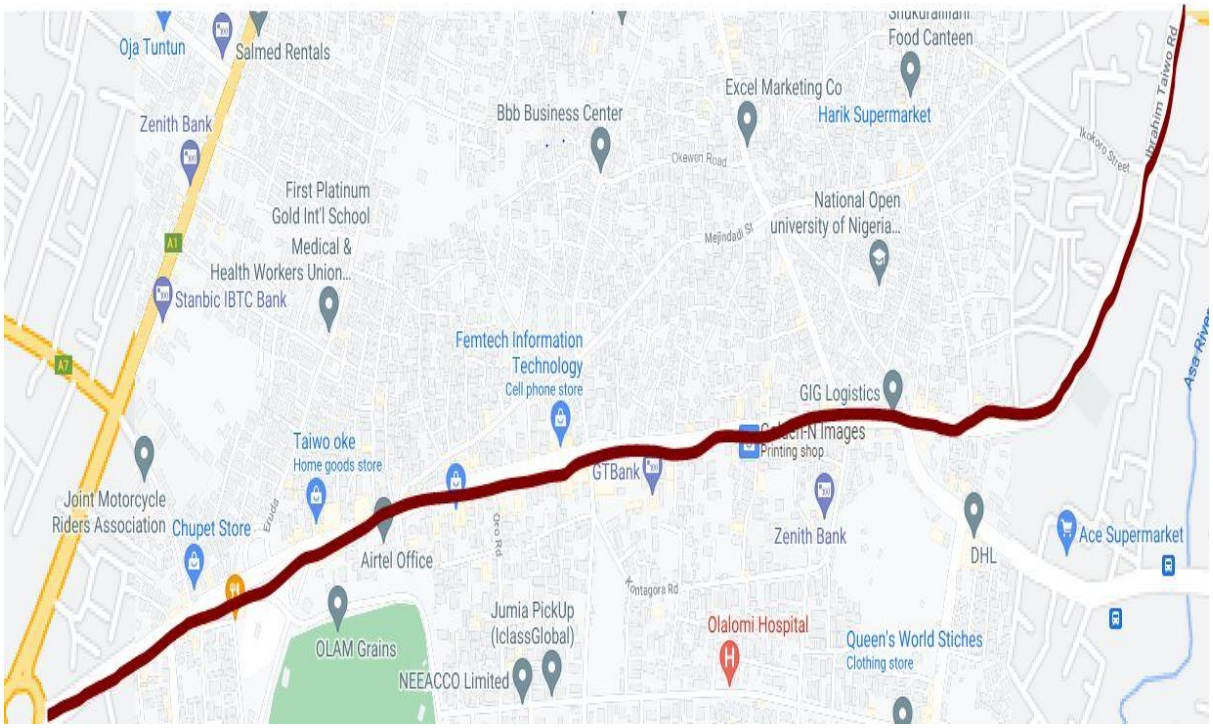


Figure 1

2.2 Data Collection

Geometric and traffic data are the two major type of data collected during the study. Geometric data include; Carriage way width, Median width, Drainage width, Shoulder width, The length of the road Clearance width were collected with the use of measuring tape. Traffic data was gathered with use of video recording method.

2. 3 Traffic Data

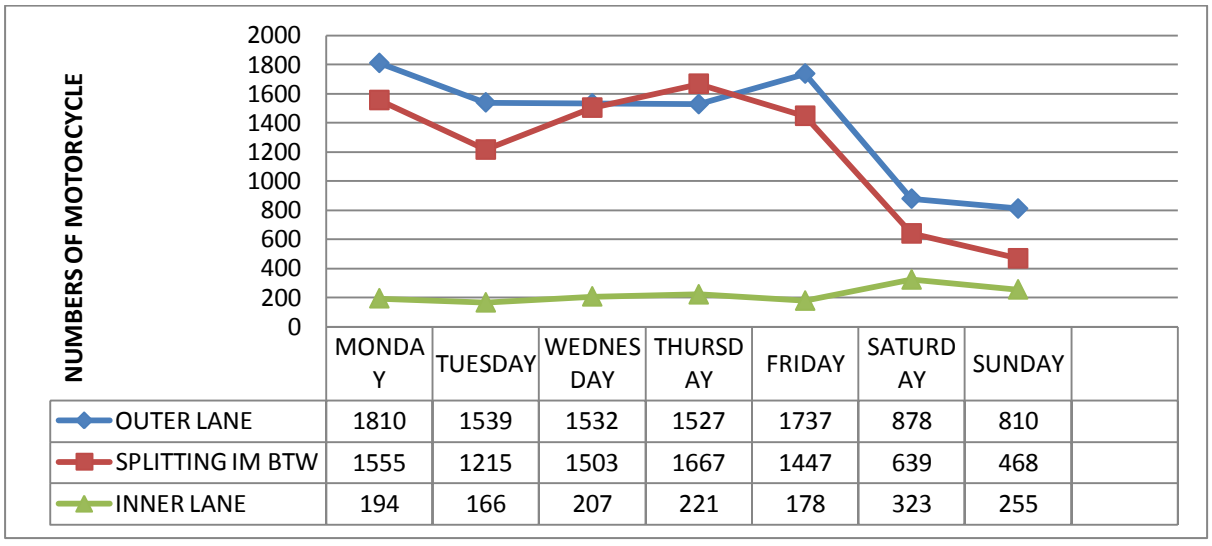
The traffic data collected on the study area was carried out using video recording method. Four digital video recorders were set up at the median of the road in the study site, which captured all the traffic movements at specified time period. This process required four corresponding person designated at each section of the road using a tripod stand with a portable camera mounted on the stand and a stopwatch to check the time. The video recording was done for a week in the morning peak hour of 7am-9am and in the afternoon peak hour of 2-4pm. The video was played back to determine the number of motorcycle moving on the outer lane, numbers of motorcyclist splitting in between moving traffic stream and the number of motorcyclist moving in the inner lane, this was done both at the North and South bound. The process was to check the distribution of traffic along the carriageway. Again the video was played back and the following data were collected. The numbers of motorcycle and numbers of other vehicles, the data was used to calculate the average hourly traffic for both motorcycle and vehicles both in the morning and afternoon for each section of the road and it helped to calculate the percentage of motorcycle. This helped to determine the flow of motorcycle in the study area.

III. RESULTS AND DISCUSSION

The results and discussion on the motorcycle distribution within the carriage way in Section A, B, C and D considering morning and afternoon peak hour

3.1 Motorcycle Distribution within the Carriage Way

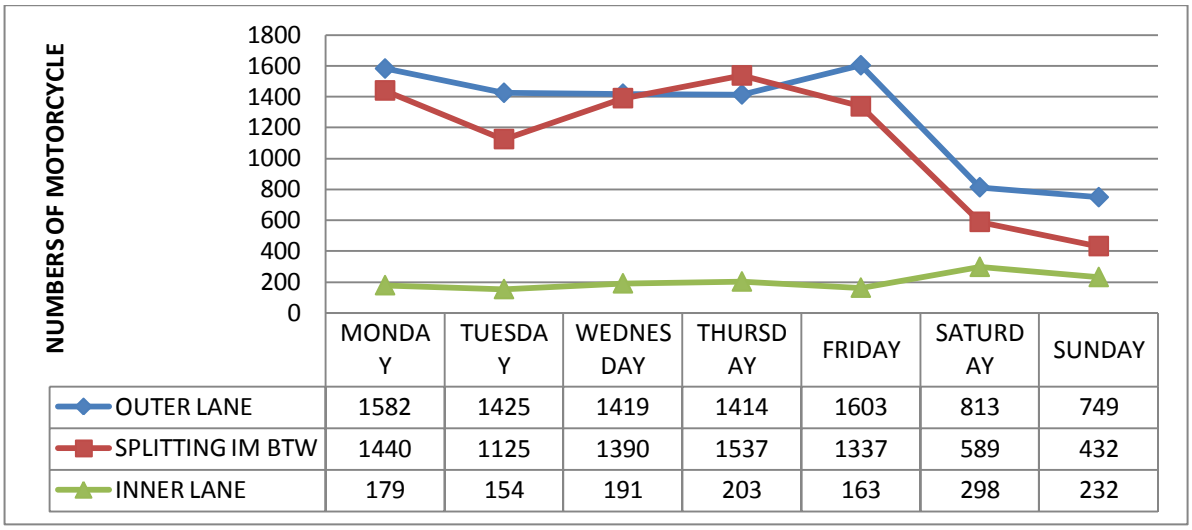
Figure 2 shows the behaviour of motorcyclist at section A in the morning peak hour. It shows that the outer lane movement has more of the motorcyclist maneuverings with the highest outer lane maneuvering being on Monday (1810) and the least on Sunday (810) which is a weekend, the movement of motorcyclist in between other vehicle has the highest value on Thursday (1667) and the least value on Sunday (468), and the motorcyclist moving at the inner lane has the highest being on Saturday (323) and the lowest on Friday (178). The result shows that most motorcyclists prefer to move either at the outer lane or the inner lane for easy overtaking of other vehicles.



	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
OUTER LANE	1810	1539	1532	1527	1737	878	810
SPLITTING IM BTW	1555	1215	1503	1667	1447	639	468
INNER LANE	194	166	207	221	178	323	255

Figure 2 Movement of Motorcycle within the Carriageway of Section A in the Morning

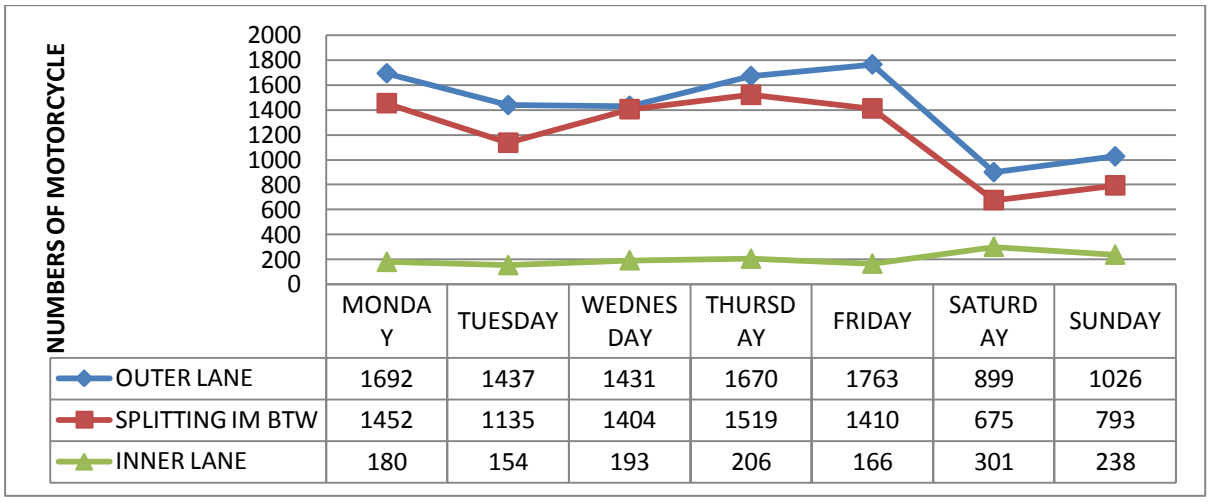
Figure 3 shows the behavior of motorcyclist at section B in the morning peak hour. It shows that the outer lane movement has more of the motorcyclist maneuverings with the highest outer lane maneuvering being on Friday (1603) and the least on Sunday (749) which is a weekend, the movement of motorcyclist in between other vehicles has the highest value on Thursday (1537) and the least value on Sunday (432), and those at the inner lane has the highest being on Saturday (298) and the lowest on Friday (163). The result shows that most motorcyclist prefer to move either at the outer lane or the inner lane for easy overtaking of other vehicles.



	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
OUTER LANE	1582	1425	1419	1414	1603	813	749
SPLITTING IM BTW	1440	1125	1390	1537	1337	589	432
INNER LANE	179	154	191	203	163	298	232

Figure 3Movement of Motorcycle within the Carriageway of Section B Morning

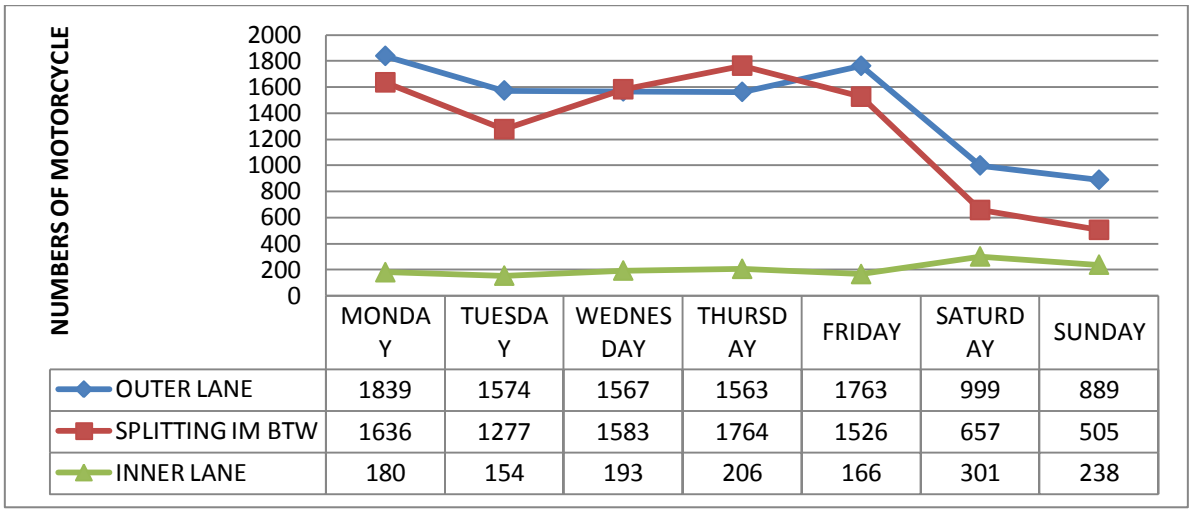
Figure 4 shows the behavior of motorcyclist at section C in the morning peak hour. It shows that the outer lane movement has more of the motorcyclist maneuverings with the highest outer lane maneuvering being on Friday (1763) and the least on Saturday (899) most rider take time to rest since it is a weekend, the movement in between other vehicles has the highest value on Thursday (1519) and the least value on Saturday (675), and movement along the inner lane has the highest being on Saturday (301) and the lowest on Friday (166). The result shows that most motorcyclist prefer to move either at the outer lane or the inner lane for easy overtaking of other vehicles and to avoid leg injury.



	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
OUTER LANE	1692	1437	1431	1670	1763	899	1026
SPLITTING IM BTW	1452	1135	1404	1519	1410	675	793
INNER LANE	180	154	193	206	166	301	238

Figure 4 Movement of Motorcycle within the Carriageway of Section C Morning

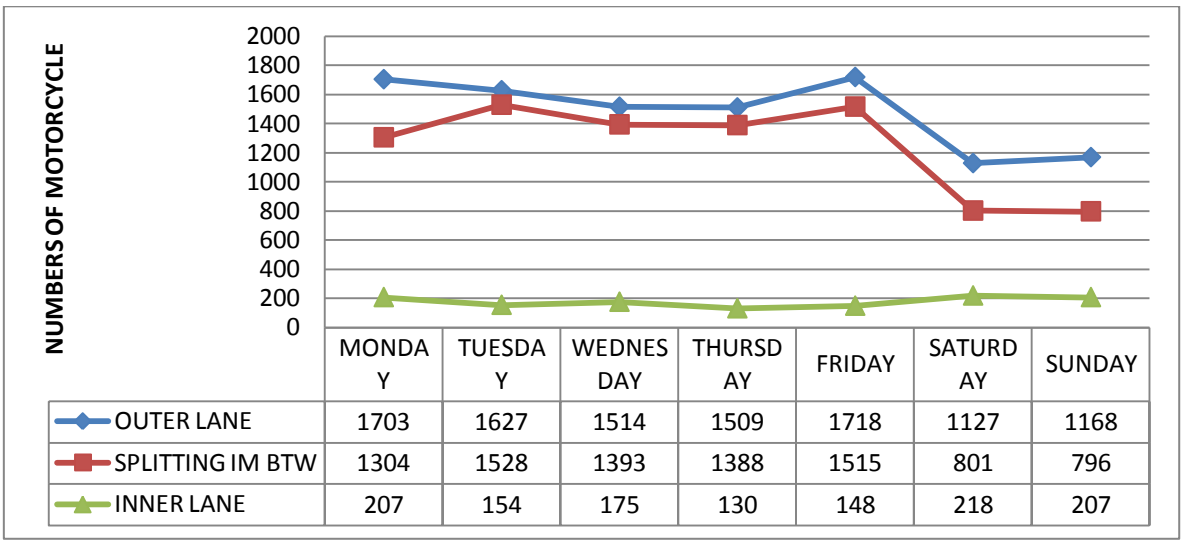
Figure 5 shows the behavior of motorcyclist at section D in the morning peak hour. It shows that the outer lane movement has more of the motorcyclist maneuverings with the highest outer lane maneuvering being on Monday (1839) and the least on Sunday (889) which is a weekend, the movement in between moving vehicles has the highest value on Thursday (1764) and the least value on Sunday (505), and those moving at the inner lane closer to the median has highest being on Saturday (301) and the lowest on Friday (166). The result shows that most motorcyclist prefer to move either at the outer lane or moving in between vehicle for maneuvering and for easy overtaking of other vehicles. In conclusion , it is observed that motorcyclist maneuvering through the outer lane has the highest values on Monday for section (A and D) and on Friday for section (B and C), while that of the motorcyclist splitting in between the traffic stream has the highest values on Thursday at all sections in the morning for both North and South bound.



	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
OUTER LANE	1839	1574	1567	1563	1763	999	889
SPLITTING IM BTW	1636	1277	1583	1764	1526	657	505
INNER LANE	180	154	193	206	166	301	238

Figure 5 Movement of Motorcycle within the Carriageway of Section D in the Morning

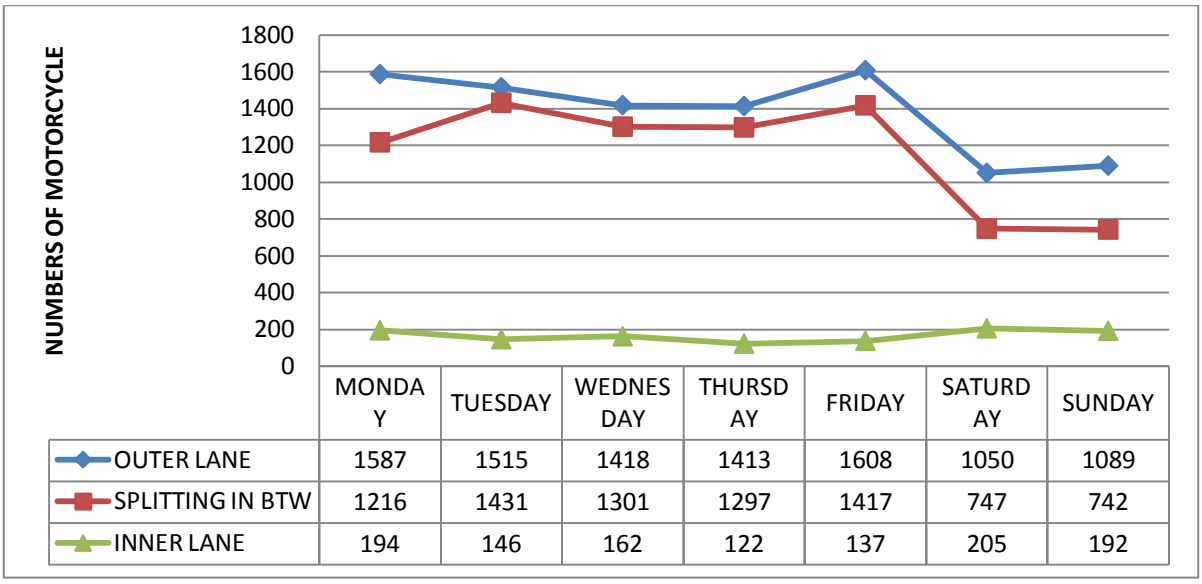
Figure 6 also shows the behavior of motorcyclist at section A in the afternoon peak hour. It shows that the outer lane movement has more of the motorcyclist manoeuvrings with the highest outer lane manoeuvring being on Friday (1718) and the least on Saturday (1127) which is a weekend, the movement in between moving vehicles has the highest value on Thursday (1515) and the least value on Sunday (796), and those moving at the inner lane closer to the shoulder has highest been on Saturday (218) and the lowest on Friday (130). The result shows that most motorcyclist prefer to move either at the outer lane or moving in between vehicle for manoeuvring and for easy overtaking of other vehicles.



	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
OUTER LANE	1703	1627	1514	1509	1718	1127	1168
SPLITTING IM BTW	1304	1528	1393	1388	1515	801	796
INNER LANE	207	154	175	130	148	218	207

Figure 6 Movement of Motorcycle within the Carriageway of Section A in the Afternoon

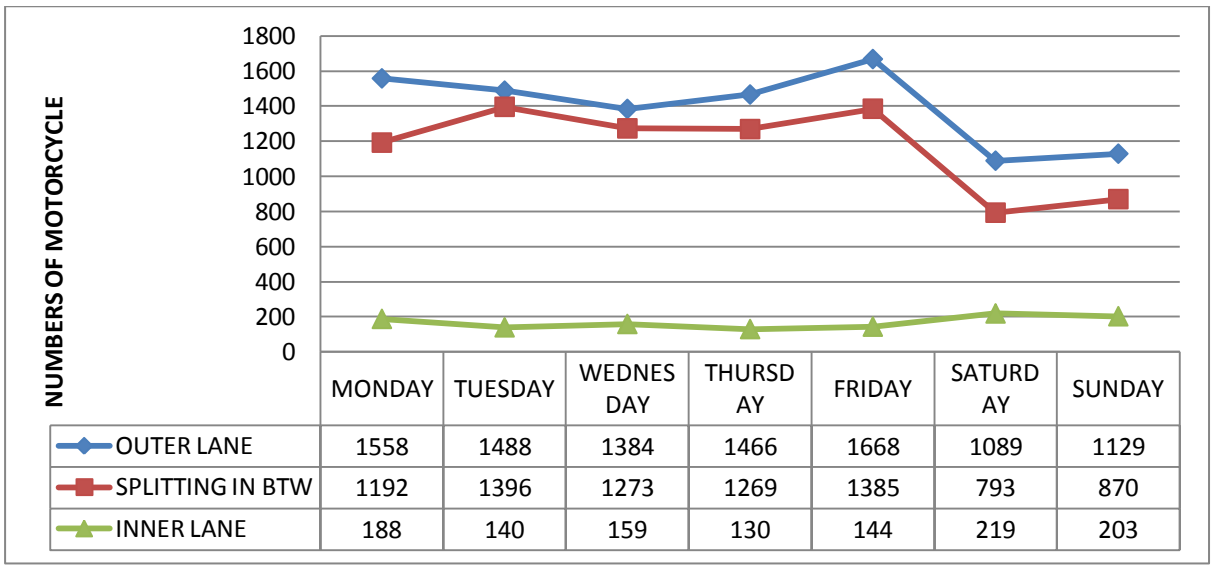
Figure 7 shows the behavior of motorcyclist at section B in the afternoon peak hour. It shows that the outer lane movement has more of the motorcyclist manoeuvrings with the highest outer lane manoeuvring been on Friday (1608) and the least on Saturday (1050) which is a weekend, the movement of motorcycle splitting in between moving vehicles has the highest value on Tuesday (1431) and the least value on Sunday (742), and those moving at the inner lane closer to the shoulder has highest being on Saturday (205) and the lowest on Thursday (122). The result shows that most motorcyclist prefer to move either at the outer lane or moving in between vehicle for maneuvering and for easy overtaking of other vehicles



	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
OUTER LANE	1587	1515	1418	1413	1608	1050	1089
SPLITTING IN BTW	1216	1431	1301	1297	1417	747	742
INNER LANE	194	146	162	122	137	205	192

Figure 7 Movement of Motorcycle within the Carriageway of Section B Afternoon

Figure 8 shows the behavior of motorcyclist at section C in the afternoon peak hour. It shows that the outer lane movement has more of the motorcyclist maneuverings with the highest outer lane maneuvering being on Friday (1668) and the least on Sunday (1089) which is a weekend and a rest day for most people, the movement of motorcycle splitting in between moving vehicles has the highest value on Tuesday (1396) and the least value on Saturday (793), and those moving at the inner lane closer to the shoulder has highest being on Saturday (219) and the lowest on Tuesday (140). The result shows that most motorcyclist prefer to move either at the outer lane or moving in between vehicle for maneuvering and for easy overtaking of other vehicles.

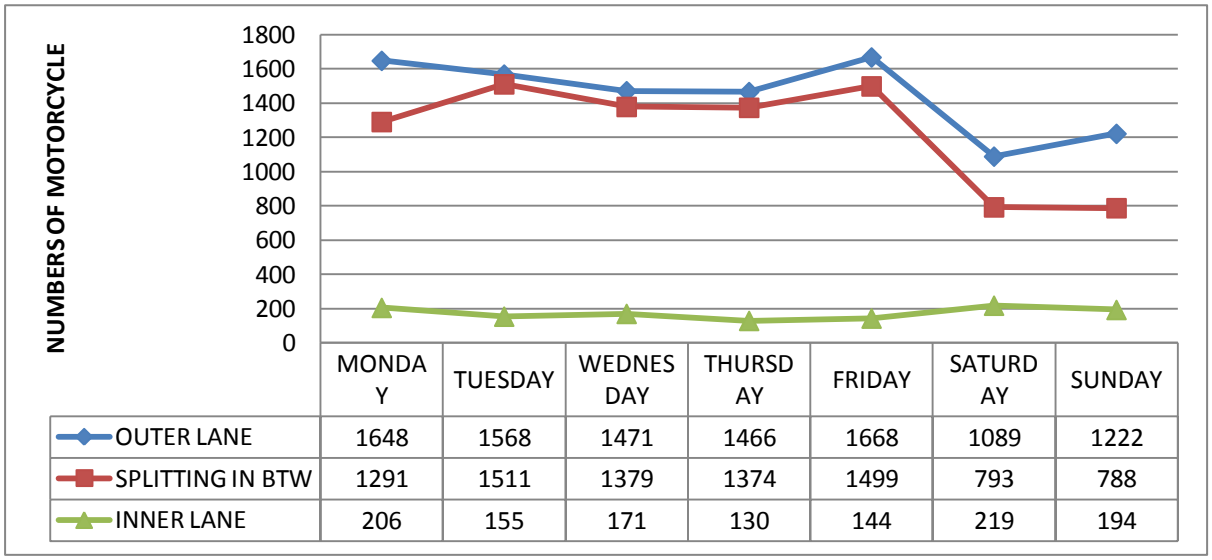


	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
OUTER LANE	1558	1488	1384	1466	1668	1089	1129
SPLITTING IN BTW	1192	1396	1273	1269	1385	793	870
INNER LANE	188	140	159	130	144	219	203

Figure 8 Movement of Motorcycle within the Carriageway of Section C Afternoon

Figure 9 shows the behavior of motorcyclist at section D in the afternoon peak hour. It shows that the outer lane movement has more of the motorcyclist manoeuvrings with the highest outer lane manoeuvring been on Friday (1668) and the least on Sunday (1089) which is a weekend and a rest day for most people, the movement of motorcycle splitting in between moving vehicles has the highest value on Friday (1499) and the least value on Saturday (793), and those moving at the inner lane closer to the shoulder has highest being on Saturday (219) and the lowest on Friday (144). The result shows that most motorcyclist prefer to move either at the outer lane or moving in between vehicle for manoeuvring and for easy overtaking of other vehicles. In conclusion, it was observed that motorcyclist maneuvering through the outer lane has highest values on Friday for all sections while those splitting between the traffic streams has highest values for section (B and C) to be on

Tuesdays, while for section A is on Thursday and for section D on Fridays in the afternoon for North and South bound.



	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
OUTER LANE	1648	1568	1471	1466	1668	1089	1222
SPLITTING IN BTW	1291	1511	1379	1374	1499	793	788
INNER LANE	206	155	171	130	144	219	194

Figure 9 Movement of Motorcycle within the Carriageway of Section D Afternoon

IV. CONCLUSION

The study was based on the possibility of introducing motorcycle lane on Nigeria roads. The study shows that Ibrahim Taiwo road is a very busy road in Ilorin metropolis with different types of traffics e.g motorcycle, bus, car, lorry and tricycle using the road and behavior of motorcyclist is of high risk to other road users. From the study, the following conclusion were drawn

i. The introduction of motorcycle lane will be a very good advantage to all road users along the study area

ii. Enforcement agencies should mandate the compulsory possession of motorcycle riding license.

iii. Government should provide better facilities for the traffic police to guarantee the implementation of traffic rules.

iv. Road Safety Organisations should periodically organise trainings, seminars and public enlightenment programmes to educate motorcyclists on the need for more care on the

REFERENCES

[1]. Emeka Ibemere (2013) commercial motorcycle caused 47% of accident in 2013 Daily signpost

[2]. Ibitoye B. A, Odeyemi S.O, Salman A, Daudu M. (2018) Assessment of Lane-Sharing Maneuverability and Risk Exposure Effect on Motorcycling in Nigeria EJERS, European Journal of Engineering Research and Science Vol. 3, No. 8, August 2018

[3]. Ogunmodede. T. A, Adio G, Ebijuwa A. S, Oyetola S. O, Akinola J. O, (2012) Factors Influencing High Rate of Commercial Motorcycle Accidents in Nigeria

[4]. Tolu I. A. Assessment of Traffic Delay Problems and Characteristics at Urban Road Intersections: A Case Study of Ilorin, Nigeria. IOSR Journal Of Humanities And Social Science (IOSR-JHSS) Volume 12, Issue 4 (Jul. - Aug. 2013), PP 06-16 e-ISSN: 2279-0837, p-ISSN: 2279-0845.