

On Reported Cases of Road Traffic Offences in Anambra State, Nigeria

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ABSTRACT

This study examined the reported cases of road traffic offences in Anambra State, Nigeria. This study employed secondary source of data collection. The statistical tools used for analyzing the data were the time series analysis, Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test and measures of accuracy. The findings of this study revealed that the number of traffic offence was stationary and can be used for making future forecast of the series. It was found that road traffic offences has an increasing trend over the period with sharp decline in the month of January and June. Findings on comparison of the trend models showed that the quadratic model gives the least mean square deviation values. Hence the quadratic model was selected as the adequate trend model for estimating reported cases of traffic offences. Also, the result of comparison of decomposition model found the multivariate model to give the least accuracy measure. Hence the multivariate model was selected as the adequate decomposition model for assessing reported cases of traffic offences. Further findings showed that February recorded highest seasonal index while December recorded the least index. The sharp decrease recorded in the month of December is as a result of the federal road safety corps deploying its personnel on the local and high ways during the festive season. The presence of these personnel help in maintaining free flow of traffic and drivers upon seeing them tend to reduce the speed.

Keywords: Decomposition model, Trend analysis, Offences, Season, Stationarity

1. INTRODUCTION

Transportation has truly liberated man and has virtually makes him more mobile, his increasing reliance on vehicular movement has conferred great facilities on him and his activities. The greatest culprit of all the modes of transport is road of which traffic accident is the most disturbing repercussion of its use. Road safety management officials have often attributed the reckless traffic accidents to violation of traffic by most of the drivers. Road transportation and traffic law enforcement in every part of the world is being established in order to reduce the increasing road crashes and fatalities as well as making road users comply with traffic laws and regulations as a counter measure, which remain as a great challenge in Nigeria (Gana

and Emmanuel, 2014). However, most researcher have often focused on factors contributing to road traffic accident and a few on aftermath of road traffic accident while a little or no study has been done on evaluating the trend of road traffic offences which might probably have a serious effect on the worrying trend of road traffic accident in Nigeria.

The alarming increase of the number of road traffic accident presently in Nigeria reveals a serious and growing problem with absolute fatality rate and causality figure rising rapidly. In majority of developing countries accident occurrence and related deaths are relative to either population or number of vehicles. Ironically, in Nigeria, studies have indicated that better facilities in terms of good quality and standardized

roads have been accompanied by increasing number of accidents (Atubi and Onokala, 2009). This is totally contrary to the trends in countries where even the level of sophisticated road network and volume of vehicular traffic are which higher (Atubi, 2015). Road traffic accidents have physical, social, emotional and economic implications. The global economic cost of road traffic accident was estimated at \$518 billion per year in 2003 and \$100 billion of that occurring in poor developing countries (Atubi and Gbadamosi, 2015). Nigeria loses about 80 billion naira annually to road accidents of all subjects that are involved in road traffic accidents in Nigeria, 29.1 percent suffer disability and 13.5 percent are unable to return to work (Atubi, 2012a).

In almost all countries in Africa, Asia and Latin America road traffic crashes have become one of the leading causes of death in older children and economically active adults between the ages 30 and 49 years (Atubi, 2012b). Despite this burgeoning problem, little attention has been paid to road traffic injury prevention and treatment in most developing countries. Studies such as Oyeyemi (2003) have argued that human factors constitute about 80% of the cause of road traffic accidents recorded in the country. This includes dangerous overtaking at bends, crest of a hill, over speeding, driving under the influence of alcohol/drugs and the use of mobile phone while driving among others. Also, cases of drivers operating mechanically deficient vehicles on the roads carrying passengers and property without safety consideration. Such vehicles are not road worthy and they do not meet minimum safety standards. Bad weather condition leading to mist, haze, and sometimes heavy rainfall resulting in poor visibility and accidents.

It is interesting to note that a lot of interventions programme on accident prevention policies has been implemented over the years in Nigeria. These interventions comprises of adherence to putting on seat belts while driving,

motorcycle helmets, installation of speed limit device in commercial vehicles, public education targeting motorists, and traffic control by signs. Also, most importantly arrest of traffic offenders and consistent provision of required sensitization programme for the populace. Hence, this study seeks to assess the trend of reported cases traffic offences in Anambra State.

2. LITERATURE REVIEW

The Federal Road Safety Corps (FRSC) is the lead and coordinating agency for road safety management in Nigeria. This status has conferred on the FRSC the responsibility of playing its role as the key driver of all road safety efforts in Nigeria. While this is essential for achieving the goal of the safe system approach, unfortunately it has become unattainable due to its current involvement in managing road safety at operational level, a position it shares with several other agencies also duly empowered to perform similar functions. Road safety responsibility is to provide the benefits of coverage where cross-functional gaps exit, it portends the dangers of role- submergence and conflict which may arise out of competing interests. It is disturbing to note that such conflicts currently characterize road safety activities in Nigeria.

There is a department of the Nigeria Police Force constitutionally empowered to act as the primary enforcement agency of all traffic laws and regulations of the Federal, State and Local governments in the country. The Nigeria Police Forces performs this duty through its Motor Traffic Division. Thus like the FRSC, the Police carries out road patrols, vehicle checks, and prosecute traffic offenders. The Vehicle Inspection Officers (VIO) is constitutionally mandated to issue and renew Licenses for all private and commercial vehicle drivers, and issue such permits as Hackney Carriages, Stage Carriages, and Goods Carriages. They also regulate fares and register new vehicles and keep a register of such in all states of the Federation. It is with this body that FRSC faces the greatest conflict especially in

carrying out some of its important road safety activities. There are other Federal Ministries (e.g. Transport, Works), State Ministries e.g. Works and Transport; Transport Regulatory Authorities; Local Government Councils; and Trade Unions e.g. National Union of Road Transport Workers (NURTW) who are empowered to play either persuasive, preventive or punitive safety roles in the country. Conventionally, the FRSC is expected to coordinate the activities of these bodies in order to improve road safety, but their linkages are either non-existent or at best weak and in a few cases they even operate at cross-purposes.

Sumaila (2013) studied traffic accidents and safety management in Nigeria. The study focused on trends in road crashes and involves critical review of current road safety approaches with a view to identifying their defects and deficiencies in tackling the traffic accident problem in the country. Accident records and details of current safety measures obtained from such relevant agencies as the Federal Road Safety Corps, The Nigeria Police and Department of Road Transport Services in addition to maps and photographs provided the basic data for the study. The results of the study revealed there exist in general high rate of accidents in Nigeria with the driver as the main culprit, the functional limitations of FRSC as the lead agency for road safety matters, the practical difficulties of implementing the driver license and vehicle registration schemes, and poor driving culture of Nigerians arising from weak traffic education, public awareness and enforcement programmes.

Gana and Emmanuel (2014) in their study discussed the roles of the Federal Road Safety Corps (FRSC) in the enforcement of Road Traffic Laws. The finding from the study revealed that there is dearth of operational equipments in FRSC thus hampering its performance. It further observed that Road traffic laws are strong and adequate, but lack effective enforcement, which is responsible for non-

compliance. The study also revealed that FRSC has done very well in its performance especially in Educating motorists through various public enlightenment campaigns. The study shows that there are bad roads with narrow lanes and potholes resulting to traffic congestions and crashes. Having identified these challenges, the study recommended among others, adequate funding of the corps, effective enforcement of existing road traffic laws by all the relevant law enforcement agencies, training of the law enforcement personnel and construction of befitting roads.

Atubi and Gbadamosi (2015) examined the global positioning and socio-economic impact of road traffic accidents in Nigeria. They noted that Nigeria has a serious road accident problem and more road safety measures need to be introduced. In order to identify priorities for actions it is important that there is a clear understanding of the road accident problem and the likely effectiveness of road safety improvements. It is therefore, a priority for Nigeria to have an appropriate accident information system and that they carry out research and evaluation studies of remedial measures. Another basic requirement is a well trained road safety teams which is capable of coordinating and integrating a wide ranging programme of road safety improvements which are preferably low cost.

3. MATERIALS AND METHODS

This section deals with the research methodology adopted in the study, source of data collection and data presentation.

3.1 Source of Data

Secondary source of data collection obtained from the Anambra State Statistical year book. The data comprises of monthly reported cases of road traffic offences for 2014 - 2015.

3.2 Methodology

3.2.1 Time Series

Time series analysis involves the collection of random variables indexed according to the order they are obtained in time. Time in

this case can be generic and can represent seconds, hour, day, month, quarter or Year. The parameters of a linear time series process can be estimated using the least square estimator.

3.2.2 The Least Square Regression

The least square method of estimating regression parameters aims at generating estimators in such a way that the sum of squares of the error is minimized.

Suppose,

$$Y_t = \beta_0 + \beta_1 \times t \quad (1)$$

where t is the time parameter

β is a (k+1) x 1 vector of unknown parameters,

and ε_t is an n x 1 random vector with mean 0 and variance $\sigma^2 I$.

3.2.3 Stationarity test

Stationarity test will be performed on the number of reported cases of road traffic offence. This will help in revealing whether the series is time independent over the observed period. A unit root test was performed on each of the variable since the variables are time series in nature and prone to fluctuations.

Traditional, econometric methods require that the data be stationary. Most of the macroeconomics time series, instead, display a trend and heteroscedasticity, failing to fulfill stationarity conditions. As a consequence, time series must be modelled taking into account non-stationary features detected in the data. Also, statistical and econometric methods assume that the data arise from a stationary process. A stochastic process is stationary if all of its random variables are identically distributed. This condition implies that all of the statistical moments of the variable are identically distributed.

A stationary time series is one whose statistical properties such as mean, variance or autocorrelation are all constant over time. Most times, statistical forecasting methods are based on the assumption that the time

series can be rendered approximately stationary through the use of mathematical transformations. Stationarity of a process implies that predictions of the statistical properties will be the same in the future as they have been in the past. In addition, the stationary assumption allows the straight forward calculation of the long run equilibrium distribution of the process.

3.2.4 The Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test

The Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test is used for testing the null hypothesis that the observed time series is stationary around a deterministic trend. Kwiatkowski *et al.* (1992) proposed a test of the null hypothesis that an observed series is trend stationary (stationary around a deterministic trend). The series is expected as the sum of deterministic trend, random walk, and stationary error, and the test is the Lagrange multiplier test of the hypothesis that the random walk has zero variance.

The KPSS test statistic assess whether the null hypothesis is a stationary process, whereas the alternative is an integrated process. Thus, the researcher can transform the variables by taking logarithm (LOG) the variables to achieve normality. The decision rule is to reject the null hypothesis when the test value is greater than critical value at 95% confidence level.

3. 3 Data Presentation

Table 1: Summary of number of traffic offence in Anambra State

Month	Number of Traffic Offence 2014	Number of Traffic Offence 2015
Jan	1133	1133
Feb	1639	1639
Mar	1970	1970
Apr	1751	1751
May	1563	1563
Jun	1392	1392
Jul	1811	1811
Aug	2062	2062
Sept	2012	2012
Oct	1942	1942
Nov	1875	1875
Dec	1144	1144

Source: Anambra State Statistical Year Book for several years

4. Data Analysis and Result

4.1 Test of Stationarity of the reported cases of traffic offences in Anambra State

Table 2: Summary of Test for Stationarity of the reported cases of traffic offences in Anambra State

S/N	Variables	Kwiatkowski-Phillips-Schmidt-Shin test statistic	5% Critical Value	Decision
1	Traffic Offence	0.4119	0.4630	Stationary

The result of the test for stationarity presented in table 2 showed that the number of traffic offence was stationary and can be used for making future forecast of the series since their test value of 0.411 and a corresponding critical value of 0.4630 which falls on the acceptance region of the hypothesis at 95% confidence level.

Graph shows the presence of increasing trend over the period with sharp decline in the month of January and June.

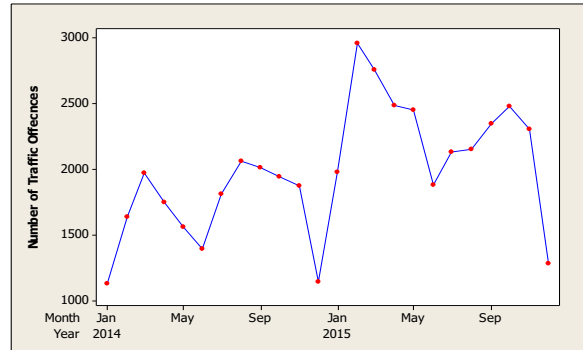


Figure 1: Graph showing the distribution of reported cases of traffic offences in Anambra State

4.2 Tend Analysis for reported case of traffic offences in Anambra State

Table 3: Comparison of Trend Equation for reported case of traffic offences in Anambra State

Name of Model	Model	MAPE	MAD	MSD	Decision
Linear	$Y_t = 1591 + 31.2*t$	17	284	172767	Not Adequate
Quadratic	$Y_t = 1177 + 126.8*t - 3.82*t^2$	17	293	146058	Adequate
Exponential Growth	$Y_t = 1572.35 * (1.01618^{**t})$	17	294	178630	Not Adequate
S-Curve	$Y_t = (10^{**4}) / (4.87400 + 3.69376*(0.766394^{**t}))$	17	310	168234	Not Adequate

The result of comparison of four trend models (linear, quadratic, exponential growth and S-curve model) presented in table 3 showed that the quadratic model gives the least MSD values. Hence the quadratic model was selected as the adequate trend model for estimating reported cases of traffic offences.

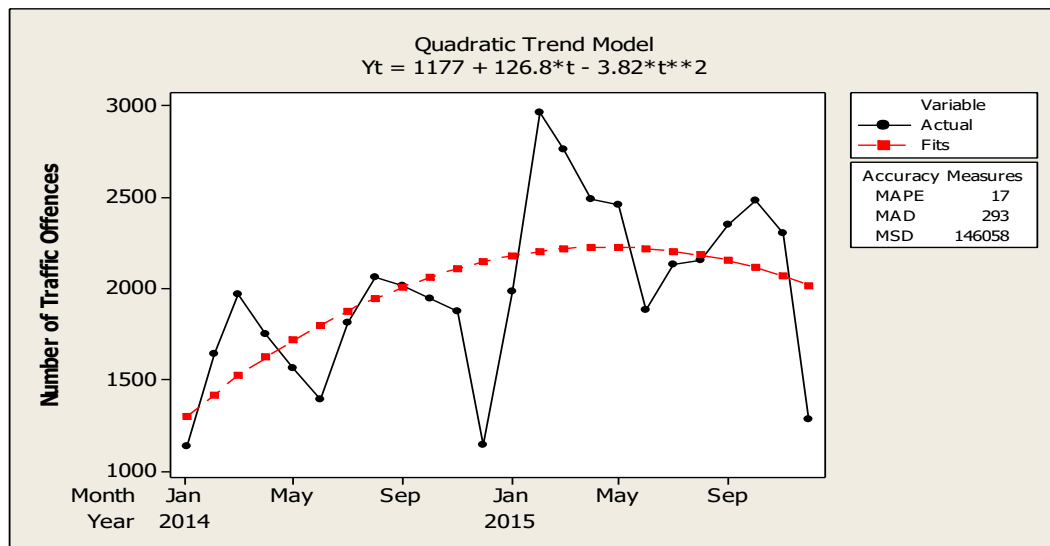


Figure 2: Graph showing the quadratic trend model of reported cases of traffic offences in Anambra State

4.2 Time Series Decomposition Analysis for reported case of traffic offences in Anambra State

Table 4: Comparison of Time Series Decomposition model for reported case of traffic offences in Anambra State

Name of Model	MAPE	MAD	MSD	Decision
Additive	18	318	161934	Not Adequate
Multiplicative	17	309	152826	Adequate

The result of comparison of two decomposition model presented in table 4 showed that the multivariate model gives the least accuracy measure. Hence the multivariate model was selected as the

adequate decomposition model for assessing reported cases of traffic offences.

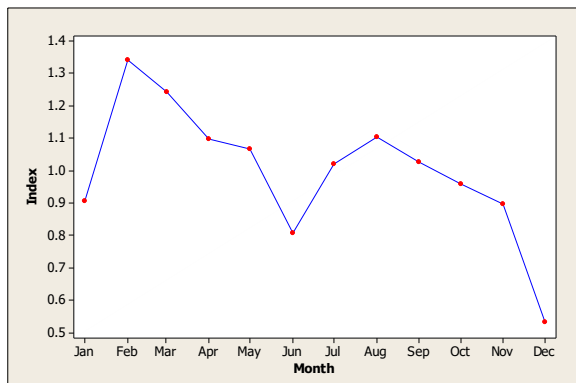


Figure 3: Graph showing the quadratic trend model of reported cases of traffic offences in Anambra State

The result of the seasonal index presented in figure 3 revealed February to record the highest index with a value of 1.3433 while December recorded the least index with a value of 0.5313.

5. CONCLUSION

This study examined the reported cases of road traffic offences in Anambra State, Nigeria. Road traffic offences have been identified as the major factor that contributes to the increased and reckless road crashes and accident experienced in Nigeria. The findings of this study revealed that the number of traffic offence was stationary and can be used for making future forecast of the series. It was found that road traffic offences has an increasing trend over the period with sharp decline in the month of January and June.

Findings on comparison of trend models showed that the quadratic model gives the least MSD values. Hence the quadratic model was selected as the adequate trend model for estimating reported cases of traffic offences. Also, the result of comparison of decomposition model found the multivariate model to give the least accuracy measure. Hence the multivariate model was selected as the adequate decomposition model for assessing reported cases of traffic offences. Further findings showed that February recorded the highest seasonal index while December

recorded the least seasonal index. The sharp decrease recorded in the month of December was as a result of the Federal road safety corps deploying its personnel on the local and high ways during the festive season. The presence of these personnel help in maintaining free flow of traffic and drivers upon seeing them tend to reduce the speed. Based on the findings of this study, it is recommended that the since federal road safety corps increase its personnel on surveillance to help in reducing recklessness of some motorist during the festive and non festive seasons. Also, it is recommended that restructuring and re-tooling of the lead agency, declaration of traffic accidents as a national health problem and institution of driver identity management system among others are proposed to improve safe motoring in Nigeria.

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Appendix

Null Hypothesis: NUMBER_OF_TRAFFIC_OFFECN is stationary			
Exogenous: Constant			
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel			
			LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic			0.411950
Asymptotic critical values*:	1% level		0.739000
	5% level		0.463000
	10% level		0.347000
*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)			
Residual variance (no correction)			219325.5
HAC corrected variance (Bartlett kernel)			357556.0

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