

**ASSESSING THE EFFECTS OF BAD ROADS ON TRAVEL PATTERN: CASE STUDY
OF ATAN –LUSADA ROAD, ADO-ODO OTA LOCAL GOVERNMENT AREA,
OGUN STATE.**

By

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Abstract

This paper assessed the effects of bad road on the travel pattern in the study area, and the components of travel pattern examined are; traffic flow by vehicle type, travel time and transportation energy consumption. A structured questionnaire of fifty (50) was used to collect data from commercial motor drivers, and twenty (20) questionnaires from motor cycle operators operating on the road. A traffic survey was conducted on the corridor for three (3) days (Monday, Friday and Saturday). The research revealed that commercial motor cycle has the highest percentage of the rate of flow of vehicle plying the road with 58.8% (951 out of an average of 1618 rate of flow of vehicle plying the road daily), with an average of 37mins spent on the road during the drying period of the day, instead of an average of 18mins if the road is in the good condition, while the motor cycle spent an average of 28mins during the dry period of the day, instead of an average of 22mins if the road is in good condition. A synergy between the federal government and the management of the industries within the area, with respect to road management/maintenance is recommended.

Keyword

Road Management, Road Facilities, Traffic Flow, Travel Time, Transportation Energy Consumption.

1.0 INTRODUCTION

The importance of mobility cannot be overemphasized within the context of socio-economic development. Olagunju (2015) identified mobility as crucial to the functioning of cities and region, as it affects their socio-economic activities, and that it is a fact that the economic development of a nation is closely linked to its transportation system. Afolayan and Abidoeye (2017) identified Road as an important infrastructure in a nation or community of people, and that it greatly affects the economy of any nation, while Onwubiko (2010) cited by Afolayan and Abidoeye (2017) affirmed that roads are built to provide safe passage of vehicles and must therefore be properly designed and constructed , after which there arises the need for appropriate maintenance for the road to attain its design life and ensure that the objective of safety, strength and durability are met. Stead and Marshall (2001) observed that the form or structure of an area may be characterized to some extent by the road network, and the road network may be described using qualitative labels for their overall pattern or by description based on some component properties, and that the qualitative labels can give a reasonable initiative impression of network shape (for example, a grid, radial, and so on), while component properties are more easily qualified, and hence, used as the basis for systematic comparison (for example, the composition of the network interms of the route type or junction type). However, Messenger and Ewing (1996) cited by Stead and Marshall (2001) reported that road network design has no apparent effect on bus use.

Atan- Lusada Road is a sub set of Atan-Agbara road, and this road is a major road. The existence of Agbara Industrial District at Agbara has contributed to the types of vehicle plying the road, and it is on this premise that the road is classified as an industrial corridor. However, this road creates access to some settlements within the Ado-Odo Ota Local Government Area and these include

Lusada and Igbesa. This corridor is in bad condition, and has effect on the travel pattern of road users.

However, Stead and Marshall (2001) identified five measures of travel pattern which are distinguishable in different studies that have examined different travel pattern, namely; the travel distance; journey frequency; modal split; travel time; and transportation energy consumption. For the purpose of this research, the components of travel pattern examined are; traffic flow by vehicle type; travel time; and the transportation energy consumption.

It should be noted that Atan junction to Lusada-Igbesa junction is selected for this study. This research, therefore, assessed the effects of the selected road on the traffic flow by vehicle type, travel time, and the transportation energy consumption.

2.0 STATEMENT OF PROBLEM

According to Ndefo (2012), cited by Afolayan and Abidoye (2017), road failure include; Potholes and Cracks, Depression on road surface, Development of Gully due to erosion, Failed road shoulders, Faulty Drainage, Faulty road Signals and Street light and wiping off of lane markings, while Olaseni (2011) observed that several factors are responsible for the poor state of road infrastructure in Nigeria, and that these include; poor funding; poor maintenance; neglect of Urban and Regional Planning and so on.

Osuolale, Oseni and Sanni (2012) cited by Afolayan and Abidoye (2017) identified the effects of failure along Nigerian roads on both the road users and vehicles to include; increased accident rate; increase in faulty vehicles; high vehicle maintenance cost and increase in travel time either due to traffic congestion or due to bad nature of road section. Other effects of road failure identified

include insecurity posed by criminals at failed sections of the roads, risk of flooding, and erosion, and adverse effect on economic development.

The road understudied is characterized by unpaved surface with different dimensions of potholes which resulted into increase in travel time. The problem is aggravated during the raining season due to the occurrence of flooding and erosion. The high volume of rain water during the raining season resulted into either slow movement of vehicles or non-passage of vehicles, while the eroded debris forms barriers to the easy flow of vehicles. Traffic problems of this corridor is unique due to the nature of the road and its land use composition. Due to the bad condition of road, competition for spaces for the movement of various categories of vehicles occurred. Often time, the small available spaces for movement are competed for between commercial motor cycle and the heavy duty vehicles, while observation revealed that the frequency of private cars plying the corridor is significantly low. It is noteworthy to point out that , broken down vehicles along the road occupied available spaces for the movement of vehicles, and also served as collision points for moving vehicles, particularly at night, and during poor visibility, which may be caused by weather or any other factor. However, the ongoing construction work is at a slow pace, and this further make the surface of the road to remains unstable.

3.0 LITERATURE REVIEW

Olaseni (2011) noted that infrastructure can be broadly classified into two, namely; physical (road, electricity, telecommunication, and so on), and social (education, health, recreation, and so on), while Aigbokhan (1999) cited by Olaseni (2011) gave examples of physical infrastructure as Public Utilities such as power, telecommunication, pipe-water supply, sanitation and sewage, solid waste collection and disposal, and pipe gas, as well as public works which include road, major

dams, and canal work for irrigation and drainage, and other project like urban and inter urban railway, urban transport, seaports and waterways, and airport.

Roads are built to provide safe passage of vehicle for the movement of people, goods and services while its design and construction must meet the goals of good and functional road. Afolayan and Abidoeye (2017) identified four (4) steps involved in achieving good and functioning roads to include; Thorough Preliminary Geological Investigation, Proper Design of the Road Quality Control and Supervision and timely maintenance. Ndefo (2012) cited by Afolayan and Abidoeye (2017) pointed out that a functional road possess the following characteristics:

- I. The road should be able to give an all-weather support to vehicles, that is, it should bear and distribute wheels loads to within the bearing capacity of the sub-grade soil.
- II. It should boost of adequate drainage facilities. This means that there should be free flow of water and floods along its drainage system so that water will not follow back on to the pavement to cause one problem or the other.
- III. It should provide adequate skid resistance .This implies that it should provide enough frictional adhesion to vehicle tyres, especially during acceleration, deceleration and cornering.
- IV. There should be adequate highway geometric facilities like good geometric design of road width, intersections, slopes, and sight distance that make easy movement and passing with safety at established level of service.
- V. Term paper presentation

Road Maintenance is a major pre-requisite to proper function of road. According to Onalaja and Abatan (2009), Maintenance is defined as the continuous protective core of the contents and settings of a place, and /or work undertaken in order to keep or restore every facility, that is,

every part of site, building and content to an acceptable standard. Maintenance can broadly classified into two, namely, the preventive and the corrective maintenance. Preventive maintenance is often referred to in some literature as planned or scheduled maintenance, while the corrective maintenance is referred to as crisis intervention approach maintenance.

4.0 RESEARCH METHODOLOGY

The actual location and distance of the road understudy was established through the Google map, while physical assessment was carried out on the characteristics of the road and this include; the width of the road, the serviceability of the road, the road facilities and the condition of the road.

A traffic survey was conducted on the corridor for three (3) days (Monday, Friday, and Saturday), while a structured questionnaire of fifty (50) was used to collect data from commercial motorcycle operators operating on the corridor.

5.0 RESULTS AND DISCUSSION OF FINDINGS

5.1 RESULTS

5.1.1 The Road Characteristics

The road characteristics considered are; the dimension of the road both in terms of the width and distance; the classification taken into cognizance the hierarchy and it adjoining land use composition; its serviceability; and its conditions. However, the characteristics of the road is germane to this study, as this influences the travel pattern of road users, particularly with respect to traffic flow by vehicle type, travel time and energy consumption.

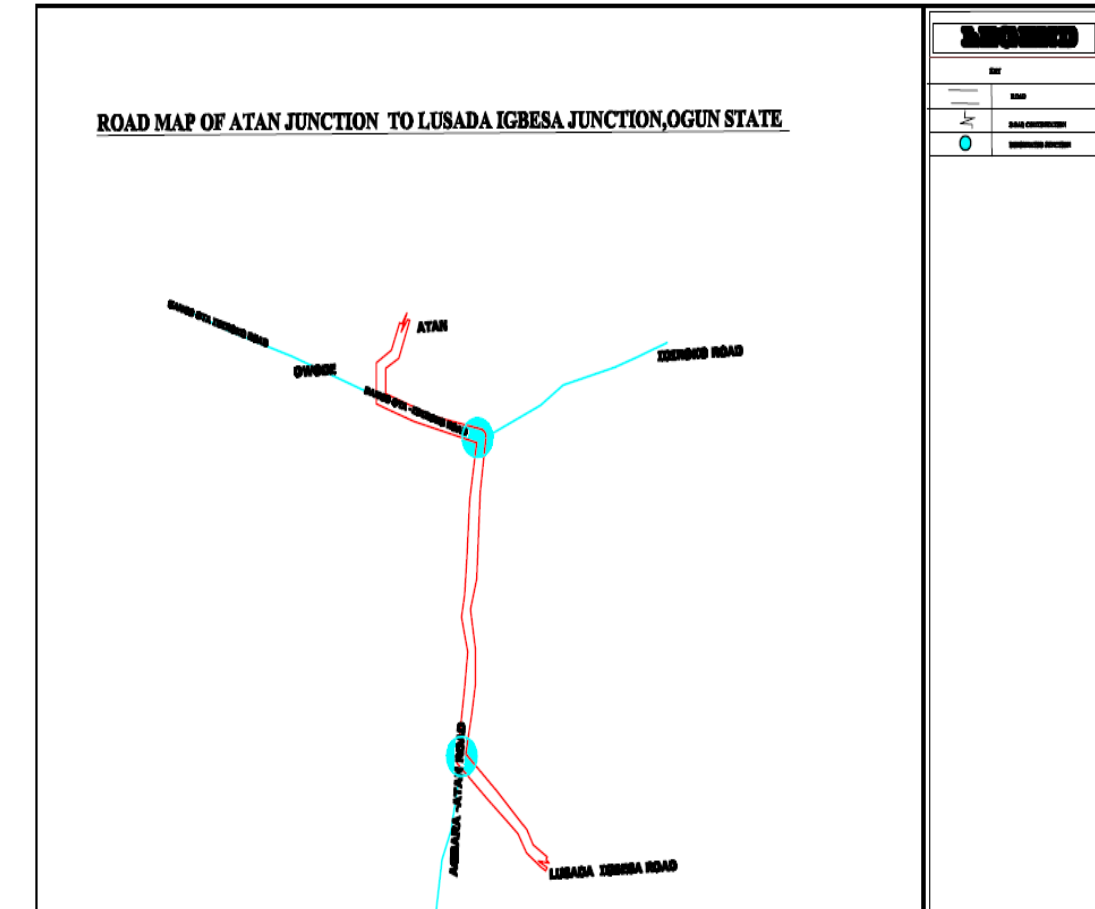


Plate 1: The Road Map

The width of the road is 24meters while the distance from Atan junction to Lusada - Igbesa Junction is 8.6km. The road is a major road which gives access to Agbara Industrial District in Agbara, hence it is classified as an Industrial Corridor. It should be noted that the road serves as an access to settlements in Ado Odo Ota Local Government Area and these include, Lusada, Igbesa, Alapoti, Olorunsogo, Idesan, Olorunishola, Inawole to mention few. The Local Government Area is the second largest Local Government Area in Ogun State, with a land area of 878km² and population of 526,565 at the 2006 census ,while the population projection 2006 – 03 – 21 is put at 733,400 with density of 855/km² (<http://en.m.wikipedia.org/wiki/ota>).

The road is under construction due to its bad condition. The bad condition of the road is manifested in an unpaved surface, unstable surface due to flooding and erosion, and lack of drainage which makes runoff difficult.



Plate 2: The Condition of the Road

5.1.2 The travel Pattern on the Road

5.1.2.1 Traffic Flow by Vehicle Type.

The categories of vehicle plying the road are: Motorcycle, Car, Bus, Heavy vehicle. The motorcycle are purely used for commercial purpose (in terms of its operation) while the cars and buses are used both for commercial and personal used. The heavy vehicle are purely for industrial purpose.

Table 1: Summary of Traffic Survey Outcome

	Cars	Buses	Heavy Duty	Motor Cycle	Total	Total (P.C.U)
Passenger Car Unit	1.00	1.5	2.5	0.7		

Location A – From Atan junction to Lusada- Igbesa Junction

Monday	438	89	121	1010	1658	
Friday	401	93	139	989	1622	
Saturday	460	90	98	823	1471	
Total	1299	272	358	2822	4751	
Daily Average	433	90.7	119.3	940.7		
PCU Converted	1299	408	895	1975.4		

Location B – From Lusada- Igbesa Junction to Atan junction

Monday	459	99	202	1027		
Friday	398	80	217	1019		
Saturday	421	101	90	838		
Total	1278	280	509	2884		
Daily Average	426	93.3	169.7	961.3		
PCU Converted	1278	420	1272.5	2018.8		

Source: Researcher Field Survey, July2018.

From the summary of the traffic survey outcome, the commercial motor cycle has the highest percentage of the total categories of vehicles plying the road with 58.8%, that is, an average of one thousand, nine hundred and two (1902) out of an average of three thousand, two hundred and thirty four (3234) vehicles plying the road daily. An average of eight hundred and fifty nine (859)

cars was recorded as category of vehicle in the traffic flow on the road daily. It should be noted that this comprised of both private owned and those used for commercial operation while the heavy vehicles are vehicles either loaded or off loaded, heading to either Agbara or Igbesa. In order to establish the total number of vehicles in operation for commercial use, data on the total number of categories of vehicle, which comprise of cars and Buses was collected and presented in the table 2.

Table 2; Analysis of Commercial Vehicle at the Motor Parks Daily

No of vehicle in operation by type	Atan Junction Motor Park	Lusada/ Igbesa Junction. Motor Park	Total	%
CAR	16	10	26	65
BUS	8	6	14	35
TOTAL	24	16	40	100

Source: Researcher Field Survey, July, 2018.

Table 2 revealed that cars has the highest number of frequency of vehicle used for commercial operation on the corridor with twenty six (26) vehicle representing 65% of the total number of vehicle at the motor park daily

5.1.2.2 Travel Time

Travel time variation exist among the categories of vehicle plying the road, and this travel time also varies from period to period of the day depending on the atmospheric condition (or seasonal variation). It is important to note that the variation in the travel time on the corridor under study is

majorly a function of the bad condition of the road, and this has consequence on the rate of floor of different type of vehicles on the road.

From the data collected on travel time of road users, an average of 37 mins was spent by both cars and buses plying the road while an average of 28 mins was spent by the motor cycle from Atan Junction to Lusada/ Igbesa Junction.

5.1.2.3. Travel Energy Consumption

Travel energy consumption of a vehicle is a function of time spent (travel time) while the travel time is also a function of the condition of road to some extent and other factor such as the type and condition of the vehicle, level of traffic intensity and so on. Travel Energy Consumption varies from vehicle, hence, the analysis for travel energy consumption takes into cognizance the travel time in order to statistically establish the Energy Consumption of vehicle on the road.

However, the travel energy consumption can be measured by the volume of liters consumed by vehicle on a trip or trips on the corridor, or by the actual cost spent on fueling the vehicles for the trip on the corridor. Data collected on the rate of fuel consumption from the commercial car operators revealed that an average of three (3) liters is used for a trip when the surface of the road is dry while six (6) liters or more is used when the surface is wet

5.2 Discussion of Findings

The corridor understudied (Atan junction to Lusada-Igbesa junction) is a major road which is in bad condition, and this condition has influenced the traffic pattern of the road users. The significant increase in the traffic flow of motorcycle (58.8%) when compared to the flow of other vehicle along the corridor has shown that the preference for the choice of motorcycle by road users is due to the condition of the road. Though, the cost of the use of commercial motorcycle is higher (^ 250)

when compared to other means of road transport (by vehicle), but the travel time is less (an average of 28mins) when a dry day period occurs. Hence, travel pattern of the road users is highly influenced by the condition of the road.

It should be noted that the corridor is an industrial corridor due to the landuse composition of the area on a broader scale (that is, the existence of Agbara Industrial Estate at the Agbara axis and the Industrial Estate at the Igbesa axis), and therefore leading to competition by various categories of vehicle for available spaces for the flow of traffic, with high potential of accident occurrence.

6.0 CONCLUSION AND RECOMMENDATIONS

The bad condition of the road has significant effect on the travel pattern, with respect to traffic flow by vehicle type, travel time, and transportation energy cost. The corridor understudied is an industrial corridor where heavy vehicle and buses/cars are expected to ply more frequently than the motorcycle, but the bad condition of the road has resulted into higher frequency of motorcycle plying the road than any other type of vehicle, with potential accident occurrence.

The need for construction of the road to meet the required standard is imperative, while a synergy between the government and the industries, with respect to management/maintenance is recommended. Road is a capital intensive project, and it is one of the infrastructure that can pay for itself interms of management/maintenance through the introduction of toll gate where toll fee is collected and properly managed for maintenance works on the road.

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