



The Nigerian Society of Engineers

**NATIONAL ENGINEERING CONFERENCE,
EXHIBITION AND ANNUAL GENERAL MEETING**

**“CANAAAN
2011”**

Theme:



**“EFFECTIVE
TRANSPORTATION SYSTEM
IN NIGERIA:
THE WAY FORWARD”**

**INVESTIGATING THE EFFECT OF ROAD CONDITION ON
MAINTENANCE PROFILE OF TRICYCLE IN SOME
LOCATIONS IN LAGOS METROPOLIS**

by

Olagoke, S. A, Awolola, O. O. and Omoregbee, H. O
lekanoba@yahoo.com and omoregbeeho@yahoo.com
Mechanical Engineering Department, The Federal Polytechnic, Ilaro, Ogun State



IN

VESTIGATING THE EFFECT OF ROAD CONDITION ON MAINTENANCE PROFILE OF TRICYCLE IN SOME LOCATIONS IN LAGOS METROPOLIS

By

Olagoke, S. A, Awolola, O. O. and Omoregbee, H. O

lekanoba@yahoo.com and omoregbeeho@yahoo.com

Mechanical Engineering Department, The Federal Polytechnic, Ilaro, Ogun State

ABSTRACT

This paper looks at the effect of road surface conditions on the maintenance profile of TRICYCLE mode of transportation in the suburb of Lagos Metropolis. Primary data such as purchase, maintenance and route/road histories were analysed for five selected locations covering three (3) local governments. Results obtained revealed that road surface conditions constitute a downtime and maintenance costs of the TRICYCLES as follows 9.6%, 69%, 13%, and 12% for U turn, *Meiran*, *Agege*, *Abule-Egba* respectively.

Since transportation system worldwide thrive on efficiency, reliability, availability and functionality, it was concluded that road condition have great effect on these attributes. It therefore stands to good reason that good road conditions minimize frequent breakdowns and conversely maintenance cost.

It was finally recommended that based on this research, extensive road rehabilitation works be carried out to increase the efficiency of mass transportation system in the suburb of the Lagos Metropolis.

INTRODUCTION

Transportation is conveyance of people and goods from one location to another. There are different means of transportation medium. There are land transportation which includes road and railway, air transportation and water transportation systems.

In Nigeria the major mode of road transportation system is the land with only road system taking the largest share of operation. The reasons for this is the high level of infrastructural decay, corruption, under development of these sectors, discontinuity in Government and the people's attitude in wanting to show off their own vehicles. There are two types of road namely; Flexible pavement which is made with stone base and topped with asphalt and rigid

pavement which is made with concrete (Odunlami, 2011). The majority of roads in Nigeria is Flexible and built on lateritic soil. The major problem of Nigeria roads is lack of drainage on majority of the roads which make them to develop pot-holes. There are several kilometer lengths of roads (rural and urban) in Nigeria with their ownership ranging from Local, State and Federal Governments.

One of the vehicles used as means of road transportation system in the world is the TRICYCLE (see Table 1 for some of Technical properties of a type of TRICYCLE used in Nigeria). For example, TRICYCLE serves as the major transportation system in INDIA (Bajaj, 2008) where it's mass transit appeal and cheap operational cost suit the large population and subsistence economy.

With the introduction of this system of transportation in Nigeria, it has recorded tremendous success as a means of transporting people cheaply in rural communities.

The usage of the TRICYCLE in Lagos started in 1990 when the then Military administrator Colonel Buba Marwa introduced the Tricycle as a cheap means of transportation. Since then, the TRICYCLES which were aptly named *Keke Marwa* (*Marwa's Bike*) are still in operation. Huge success was recorded especially in the remote areas of the State where there were no tarred roads and cheap means of moving round. Following this, at the coming of the democratic government on the eve of the new Millennium, Chief Olusegun Aremu Obasanjo introduced the National Poverty Eradication Programme (NAPEP) in 2001 with the mandate to vigorously fight and empower the poor (www.nigeriafirst.org). With this in mind, he introduced this type of transportation system in all the States of the Federation to reduce Poverty and at the same time solve transportation problems among the populace.

In the developed and developing nations of the world, public and private transportation of people, goods and services has evolved significantly over the years. The simple reason being that most commuters want to reach, or shift things to specific destinations as hassle-free as possible (Awe, 2008). To achieve this, there is the need for effective transportation system. Effective transportation system in Nigeria depends on many factors, one of which is maintenance of the transportation system and to reduce as much as possible the cause of breakdown and increase the functionality of the transportation equipment.

Maintenance is an activity; applicable to all systems to cause such systems to remain unaltered or unimpaired (Okah-Avae, 1996). Efficiency is the key to profitability in any industry. To maximize this, it is imperative that the productive and operational life of a system is as long as possible; this is to say high availability of the system at minimum cost (Okah-Avae, 1996, Adigun, 2004).

Various reasons are adduced for a system to be altered either in its physical state of existence or in performance which includes:

Deterioration as a result of their functioning which could result from frictional wear, and tear, environmental erosion etc,

Design stage decision such as on material selection, Operation of the system at variance with the design condition.

Maintenance is a cause-and-effect condition and it must be decided whether to treat the effect or eliminate the cause. There are types of maintenance strategies employed to see to the functionality of the systems such as breakdown maintenance which is corrective, time-based maintenance which is preventive.

The objective of this work is to investigate the effect of the road surface on the cost of the maintenance of TRICYCLES.

METHODOLOGY

The research is garnered with the utmost desire to create a template for the roads. The method used in gathering the information involves a field survey of four locations in Lagos. Four roads types were considered as in Table 2. Ten respondents were taken from each of the route and two mechanic workshops were visited. The data were gathered using questionnaires and personal interactions with the respondents.

The questions asked ranges from educational background, year of experience, types of maintenance, how they carry out the repair, what constitute frequent breakdown, frequency during dry and rainy season and the cost involved in regular maintenance i.e. breakdown maintenance.

The following locations were chosen as the road type:

Type A is Agege-AbuleEgba in Agege Local Government Area;

Type B is U-Turn - Jibowu Estate in Ifako Ijaiye Local Government Area

Types C and D are *AbuleEgba-ile Iwe* and *Meiran* junction- *Meiran* respectively in *Alimosho* Local Government Area.

RESULTS

The results obtained from the study were collated for each of the road type. The maintenance works were classified as routine and breakdown maintenance. The average value of the cost of routine maintenance was calculated and the average of the breakdown maintenance was equally calculated.

The identities of the respondents or operators are in Table 3.

The route and routine maintenance history per route is shown in Table 4.

Table 5 shows the component of routine maintenance per period of two weeks

Table 6 shows the road with bad surface condition (*Meiran*) and maintenance profile and attendant cost.

The Maintenance cost analysis for the routes is shown in Table 7.

DISCUSSIONS

The results shows that the respondents are literate with the minimum of primary education as shown in Table 3, and this shows that the respondent have relatively good understanding of the questions asked and they are experienced in the operations of TRICYCLES.

From Tables 4 and 5, the average maintenance cost of TRICYCLE taken from the sampled route indicated that the routine maintenance cost is virtually the same for all the routes. The number of trip per day by the operator is 18 times on the average (see Table 5), and the routine maintenance was carried out every two weeks which means the routine maintenance was carried out as indicated by the manufacturer. The average breakdown maintenance cost is on the high side due to the road surface condition for *Meiran* route and this is due to the undulating effect caused by the road surface on the vehicles (see Tables 6 and 7). The shock absorbers are made to stretch to their breaking points and often they break. The breakdown maintenance is mostly related to route with bad road surface condition as the case of *Meiran* Road. The rear wheel developed problem due to the failure of the hubs. This is also caused by the

galloping effect on the vehicle that creates excessive stress on the hubs. Another major spare part that is often replaced is the steering bearings. During rainy season, the grease inside the ball bearings is usually washed away leading to excessive friction and eventual breaking.

CONCLUSION AND RECOMMENDATIONS

The eventual aim of the research is to establish a maintenance data base for the whole country. This may for now be taken as a pilot scheme on which the whole research will be based. This, to our mind will go a long way in assisting in the implementation of the National Poverty Eradication Programme (NAPEP) through:

REFERENCES

Adigun, Y. J and Ishola, T. A, (2004), "Assessment of Maintenance of Agricultural Machinery in Kwara State of Nigeria", Nigerian Journal of Engineering Management Vol. 5, No. 4 pg 15-20
Awe, L, (2008), "Nigeria's public transportation problems", downloaded on Saturday, 3rd September 2011 from www.motorcycles-for-urban-transport.htm
Bajaj User's guide, (2008), Akurdi Pune, 411035, India.
NAPEP: Eradicating Poverty downloaded from www.nigeriafirst.org on 14th September, 2011

Sensitization of Government on the creation of a two (2) meter wide lane for TRICYCLES operators in the rural and suburb areas. This will reduce total cost spent by government on road rehabilitation.
Assisting TRICYCLES operators in knowing the correct maintenance cost for their vehicles thereby boosting government's poverty eradication policy.
Focusing government's attention on production of the essential spare parts mentioned above here in Nigeria, hence generating jobs and further reducing poverty.
It is also being suggested that Nigerian Engineers been empowered to completely manufacture this TRICYCLE in Nigeria instead of importing it from India.

Odunlami, B. A. T, (2011), "Road types and maintenance" unpublished work
Okah-Avae, B. E (1996), "The Science of Industrial Machinery and Systems Maintenance", Spectrum Books Limited Ibadan, Nigeria. Pg 1,19-24
Tricycle maintenance (2009) at <http://tricyclemaintenance04.blogspot.com/> downloaded on 14th September, 2011
<http://www.adb.org/Documents/Studies/air-noise-pollution/chap5.pdf>
<http://www.gmdn.net/corp-98720.html> downloaded on 14th September, 2011

TABLE 1: TECHNICAL SPECIFICATIONS

S/No	Parts	Descriptions
1.	Engine	2 Stroke, single cylinder, forced air cooled
2.	Bore X Stroke	57.00 X 57.00
3.	Engine displacement	145.45 cc
4.	Max. Net Power	12.17Nm @ 5000r/min of engine
5.	Max. Net Torque	12.17Nm @ 3500rpm

Source: Bajaj User's guide

TABLE 2: ROAD TYPES AND SURFACE CONDITIONS

Road Type	Surface Condition	Remarks
A	Well tarred road	Found in Urban area
B	Surface dressed road	Found in Suburb
C	Road filled with 20% potholes on its surface	Found in Suburb
D	Road filled with 75% potholes on its surface	Found in Suburb

TABLE 3: IDENTITY OF THE RESPONDENT (OPERATOR)

	U Turn- Jibowu	Meiran-Ile Iwe	Abule Egba- Ile Iwe	Agege-Abule Egba
Education				
Primary	26%	5%	60%	35%
Secondary	53%	75%	40%	50%
Tertiary	21%	20%	0%	15%
Years of Experience				
1-2	75%	15%	40%	40%
3-4	5%	60%	50%	30%
Above 5	20%	25%	10%	30%

TABLE 4: THE ROUTES AND ROUTINE MAINTENANCE HISTORY

Road Type	Route	Approx. Length (km)	Average No of Trips per day	Average kilometers covered per day	Time of Routine Maintenance
A	U-Turn	5	18	90	Bi-weekly
B	Meiran	4	18	72	Bi- weekly
C	Abule-Egba	4.5	20	90	Bi- weekly
D	Agege	4	18	72	Bi- weekly

TABLE 5: COMPONENTS OF ROUTINE MAINTENANCE AND ATTENDED COST

S/No.	Parts Worked on	Average Cost
1.	Engine oil	700.00
2.	Petrol	300.00
3.	Workmanship	1000.00

TABLE 6: MEIRAN ROUTE AND BREAKDOWN MAINTENANCE PROFILE AND ATTENDED COST

Parts	Parts Worked on	Cost plus Workmanship	Period of Maintenance
Steering Column	Bearings	3,500.00	Every 3 months
Wheel	Shock absorber	2,500.00	At least one in 12 months
Wheel	Tyres	5,500.00	At least one in 12 months
Wheel	Hubs	7,000.00	Every month
Steering Column	Slider Crank	400.00	Bi-weekly

TABLE 7: ANALYSIS OF COST OF MAINTENANCE

Route	Average Cost of Routine Maintenance Per Annum	Average Cost of Break down Maintenance Per Annum	Average Total Cost of Maintenance Per Annum	% of breakdown cost on Total Cost
U-Turn	52,000.00	5,500.00	57,500.00	9.6%
Meiran	52,000.00	116,400.00	168,400.00	69%
Abule-Egba	52,000.00	8,000.00	60,000.00	13%
Agege	52,000.00	7,000.00	59,000.00	12%