



Bad Roads and Frequent Breakdown of Metro Mass Transit Limited Buses at the Tamale Depot

Jacob Kwaku Nkrumah^{a*}; Andrews N. Nyedeb^b; Samuel Assam Passim^c

^aDepartment of Automotive Engineering, Tamale Technical University (TaTU), Tamale, Ghana West Africa

^bDepartment of Automotive Engineering, Tamale Technical University (TaTU), Tamale, Ghana West Africa

^cDepartment of Automotive Engineering, Tamale Technical University (TaTU), Tamale, Ghana West Africa

Abstract Bad roads are very prevalent in the Northern Region of Ghana. The study sought to investigate whether the deplorable nature of the roads in the Northern Region contributes to the frequent breakdown of Metro Mass Transit (MMT) Limited buses at the Tamale depot. A survey research Design was used to collect data from twenty (20) Mechanics, thirty (30) drivers and 200 passengers using questionnaire. The findings of the study revealed that the roads linking the towns and villages in the Northern Region were in a deplorable state and was contributing to the frequent breakdown of the MMT buses at the Tamale depot. The study therefore recommended that, the central Government of Ghana and the District Assemblies within the enclaves of the Tamale depot should liaise with the Department of Feeder Roads to make it a deliberate policy to at least grade and gravel the roads linking their respective districts.

Keywords Bad roads; Frequent; Breakdown; Metro; Mass; Transit; Tamale; Depot

1. Introduction

Metro Mass Transit Limited (MMT) is a transportation company owned by the following shareholders; State Insurance Company (SIC Insurance company), National investment Bank, Ghana Oil Company limited, Agriculture Development Bank, Prudential Bank limited and Social Security and National Insurance Trust (SSNIT). These together have 55% shareholding. The Government of Ghana holds the remaining 45% shares. The company was formed in 2003 and, as at 2008, the company's national fleet stood at 955 buses. The core mandate of the company was to transport goods and services from across the length and breadth of Ghana. The company was also mandated to make transportation cheaper and accessible to every Ghanaian. The mission and vision of MMT is to set up a public transport system, an integrated network of scheduled buses. A public transport system interlinking residential areas, business districts, central bus terminals, suburbs and villages in a reliable, efficient, safe and affordable way. MMT aims to co-operate closely with the Government of Ghana to ensure that the pilot Bus Rapid Transit System succeeds.

According to [1], transportability refers to the ease of movement of passengers, freight or information. It is related to transport costs as well as attributes to what is being transported (fragility, perishable, price). Political factors can also influence transportability such as laws, regulations, borders and tariffs. A good transportation system in every country is a driving force of the economy which cannot be overlooked. Productivity of every country depends on the efficient transportation system of that country.

In the view of [2], transportation represents one of the most important human activities worldwide. It is an indispensable component of the economy and plays a major role in spatial relations between locations.



Transport creates valuable links between regions and economic activities, between people and the rest of the world.

Metro Mass Transit Limited has established two main departments to oversee to the day today activities of the company. These are Technical and Administrative departments of the company. The Technical department of the company is to see to it that, the company buses are well maintained and also advise management on every Technical issue concerning the company.

The administrative department is in charge of all administrative issues of the company including finance and human resource.

Metro Mass Transit Limited established depots in all the ten Regions of this country (Ghana) of which Tamale is one of the major depots which operates with less than forty (40) buses out of the total fleet of ninety (90) buses. Tamale depot has a lot of routes to ply on because of the large geographical area of the Region. Commercial vehicles do not ply on most of the routes in the Northern Region because of the bad nature of their roads. Bad roads increase vehicle maintenance cost, this factor is inhibiting private transport operators to ply on these roads in the northern region.

According to [3], it is not just common motorists who are facing a lot of inconvenience due to bad roads; the transporters too are facing a lot of hardships. The poor road conditions have increased the vehicle maintenance costs of city transporters. He further indicated that bad roads result in damaging the suspension, steering box and shock absorbers of many buses which have increased maintenance cost of buses by about 30%.

Most of the roads in the Northern Region such as Tamale to Gushegu, Tamale to Saboba, Tamale to Bimbila, Bimbila to Kpandai and many others are in very deplorable state. According to a report by [4], "the rain has cause deep potholes on the roads causing frequent breakdown of our vehicles, thereby increasing their maintenance cost".

To date, however, there has not been any research conducted to determine the contribution of Bad roads on the frequent breakdown of Metro Mass Transit Limited Buses at the Tamale depot. It was therefore essential to conduct a study to investigate the Causes of Frequent Breakdown of Metro Mass Transit Limited Buses at the Tamale depot.

1.1. Research Question

- How do bad roads contribute to the frequent break-down of the MMT buses?

2. Literature review

2.1 The Effects of Bad Roads on Vehicle Breakdown

According to [5], Americans pay for bad roads twice. First, on car repairs Granite Starters spend an average of \$323 and as much as \$500 annually on car costs due to driving on deteriorated roads, according to TRIP, a transportation trade organization in America.

In the view of [6], many transport operators or customers in America end up paying \$1,000 on repairs in a given year as a result of bad roads. When you go over a really big pothole, you can damage suspension parts and steering parts.

In fact, [7], says focusing on corporate real estate strategy found in that transportation infrastructure is the most important factor in location decision-making for corporate real estate executives. That is followed by work force, taxes and utilities.

In view of [8], there are definitely safety elements in adequately preserving and maintaining a highway system. Roads that lack basic treatments, shoulders or rumble strips as well as swerving to avoid potholes can play a part in vehicle collisions and breakdowns.

2.2 Effects of bad roads on vehicles' maintenance cost

According to [3], it is not just common motorists who are facing a lot of inconvenience due to bad roads; the transporters too are facing a lot of hardships. The poor road conditions have increased the vehicle maintenance costs of city transporters. Bad roads have increased the maintenance cost of buses by 30%. Bad roads are damaging the suspension, steering box and shock absorbers of many buses.

[9], was of the view that, wear and tear of tires as a result of bad roads has increased. This increases the transportation costs, which are passed on to consumers.

In the view of [10], the potential effects of deteriorating roads extend far beyond increased vehicle maintenance and repair costs. Transporters in some part of India, where the roads were not good pay more to drive than the



rest of the country. The reason for this is bad roads. Driving on roads with deteriorated pavement and potholes leads to frequent maintenance. Trucks plying on bad roads experience more vibrations that could damage the cargo being transported. Increased consumption of fuel and increased cost of maintenance of vehicles and also hike the prices of transportation.

2.3 Relationship between deplorable roads and vehicular accidents

According to [11], road as a type of transport means, is a path on land established for the movement of vehicles, humans and animals. Roads offer a dependable route for the movement of goods and services from one place to the other. For roads to effectively provide the functions described above, it should be in good shape or in other words motorable. All over the world road in the form of highways, motorways, trunk roads, arterial roads, feeder roads among others is the most widely used means of transport. It would therefore not be over the bar to describe road transport as the leading means of transportation.

In Ghana, the importance of road transport even assumes a higher tendency and indeed not quite different from the general world spectacle. This higher importance of road transport in Ghana is overly due to poor harnessing of the other means of transport such as rail, water and air. However, bad roads have become the bane of the country, subsequently impeding the effective functions of roads as a means of transportation. Statistics from the International Road Federation indicates that as at the year 2009, a percentage of only 12.59 of the total network of 109,515km had been paved, where paved roads are those roads surfaced with crushed stone, hydrocarbon binder or bituminized agents etc. A deplorable road in itself is a recipe for vehicular accidents. It is not surprising that road accidents keep increasing day in day out with its adverse effect on the lives of road users and the country at large.

According to [12], 1.3 million persons are killed and additional 30-50 million are injured annually in road traffic accidents. The worst part of these statistics from WHO is that majority of the road crashes, that is over 85% occur in low and middle income countries where over 81% of the world's poor population live and own about 20% of the world's vehicles. Unfortunately most African countries and for that matter Ghana is placed in this category. In Ghana, it does not get any better as statistics from the National Road Safety Commission indicates that between 1990 and 2010, a total of 200,678 crashes involving 311,075 vehicles were recorded with 272,689 casualties.

3. Methodology

This section provides detailed description of the methodology that was used in the study. This included the population and setting of the study, sample and sampling procedures, research design, research instrument, data collection procedure and the method of data analysis.

3.1 Research Design

The study used survey research design with quantitative approach. Survey research design is procedures in quantitative research in which investigators administer a survey to a sample or to the entire population of people to describe the attitudes, opinions, behaviours, or characteristics of the population [18]. Survey uses a standard set of questions to get a broad overview of a group's opinions, attitudes, self-reported behaviours, demographic and background information [19]. According to [20], there are four (4) main types of research designs out of which cross-sectional research design was used. A cross-sectional design entails the collection of data on more than one case and at a single point in time, in order to collect a body of quantifiable or quantitative data in connection with two or more variables, which are then examined to detect patterns of association.

3.2 Population and Setting

The population of the study comprised twenty (20) Mechanics, thirty (30) Drivers and two hundred (200) Passengers of Metro Mass Transit Limited at the Tamale Depot. Tamale depot was chosen for this study because the researcher did his attachment with the company at the Tamale depot for one and half years and has familiarizes himself with the working environment of the company at the Tamale depot. Mechanics, Drivers and Passengers of Metro Mass Transit Limited were used in this study because they are the people who are always with the buses.

3.3 Sampling Technique

To ensure a fair representation of the sample, a stratified sampling technique was used. According to [18] a stratified random sampling is when the population is first divided into subgroups, called strata. In this regard, the sample cases were categorized into Mechanics, Drivers and Passengers was disaggregated. Accidental



sampling technique was further used to select twenty (20) Mechanics, thirty (30) Drivers and two hundred (200) Passengers; from the Tamale depot of Metro Mass Transit Limited.

3.4 Research Instruments

After a careful review of appropriate literature, questionnaire was chosen as the instrument to elicit information for this study. Questionnaire was chosen because it took less time to administer them and also ensured the anonymity of respondents. Questionnaire enabled the researchers to collect potential information about the frequent breakdown of Metro Mass Transit Limited Buses at the Tamale Depot in the Northern Region. The questionnaires consisted of both close and open ended items. The open-ended questions enabled the researcher to probe a little deeper and explore the contribution of bad roads on the frequent breakdown of Metro Mass Transit Limited Buses at the Tamale Depot from the participants.

3.5 Data Collection Procedures

To achieve the main objectives of this study, the researcher contacted the Depot Manager of Metro Mass Transit Limited in Tamale depot and told him about the intended study. With the consent of the Depot Manager, questionnaire was administered to the respondents by the researcher. This was done to ensure that, there is improvement in the collection and response rate. The questionnaire was collected as soon as the respondents completed them. This enabled the researcher to obtain 98% response rate. There is the need to use systematic methods and instruments to collect data, since the appropriateness of this will go a long way to determine the validity and credibility of the findings.

3.6 Method of Data Analysis

The responses from the questionnaire items were coded and analyzed through the use of Statistical Package for Social Science (SPSS) software version 16.0. The SPSS software was used for the data analysis because it was user friendly and did most of the analysis of the quantitative data for the researchers. The data entries were done by the researchers in order to check the accuracy of the data. Data were cleaned before running any analysis. Cleaning the data helped the researcher to get rid of errors that could result from coding, recording, missing information, influential cases or outliers. Descriptive statistics such as percentage scores were calculated for participants' responses to the contribution of bad roads on frequent breakdown of Metro Mass Transit Limited Buses at the Tamale Depot.

4. Presentation of Results

This chapter focuses on the presentation of results and the analyses of the data on the frequent breakdown of metro mass transit limited buses at the Tamale depot. The data was organized and presented using descriptive statistics including frequency tables and figures.

4.1 Contributions of bad roads on Frequent Breakdowns of MMT Buses at the Tamale depot.

Bad roads are inimical to nation's development, Tamale and its adjoining towns and villages are saddle with bad roads. This is making this part of the country less developed. MMT buses ply on almost all the routes in the Tamale depot. These buses have of late been breaking down frequently. The study collected data to ascertain the veracity of the contribution of bad roads on the frequent break down of MMT buses at the Tamale depot. The responses of the Drivers, Passengers and Mechanics of MMT buses concerning the nature of roads in the Tamale depot and the parts that frequently breaks down are presented below.

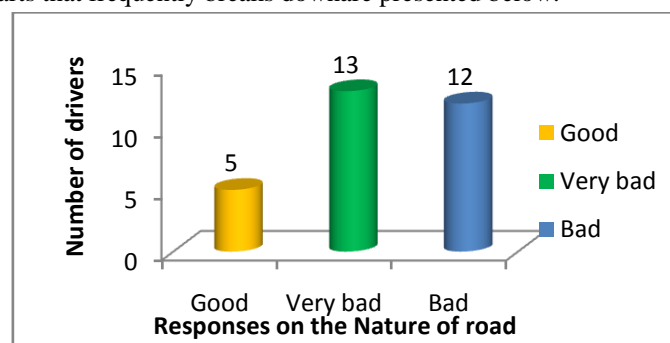


Figure 1: Drivers' responses on Nature of Roads at the Tamale Depot.

Source: Field data, 2014



From Figure 1, majority (43.3%) of the Drivers reported that the roads on which they plied on almost every day was very bad. Twelve (12) Drivers representing 40% also affirmed that, the roads were bad. This gives an indication of the likelihood of the buses breaking-down due to the poor nature of the roads. This finding is consistent with the views of [11], who indicated that, "bad roads have become the bane of the country, subsequently impeding the effective functions of roads as a means of transportation in Ghana.

Table 1: Responses of Passengers on their experience of Breakdown on rough road

Responses	Frequency	Percentage
Have experience of breakdown on rough roads	175	87.5 %
Have no experience of breakdown on rough roads	25	12.5 %
Total	200	100 %

Source: Field Data, 2014

From the results in Table 1, the majority of the passengers 175 representing 87.5% agreed that, they had ever experience breakdown of the MMT buses on a rough road. The rest (12.5%) however reported that, they had never experience breakdown of the MMT buses on a rough road. The views of the majority of the passengers is in consonance with the finding of [3], who found that, it is not just common motorists who are facing a lot of inconvenience due to bad roads; the transporters too are facing a lot of hardships. The poor road conditions have increased the vehicle maintenance costs of city transporters.

Table 2: Responses of Mechanics on Parts which frequently breaks down

Responses	Frequency	Percentage
Suspension system	16	80 %
Steering system	1	5 %
Braking system	3	15 %
Total	20	100%

From Table 2, majority (80%) of the mechanics were of the view that, parts of the MMT buses which frequently break down is the suspension system. The suspension system mostly comprise of leaf springs, hubs and tires. Three (3) mechanics representing 15% believes that, the braking system is the part of the buses which frequently breaks down.

5. Summary of Findings, Conclusions and Recommendations

5.1 Findings

The key findings of the study are as follows:

- The study revealed that almost all the roads linking the surrounding districts of Tamale were in deplorable state and the frequent break down of the buses are mostly experienced on these roads.
- It was found that due to the nature of the roads in the Region, private transport operators do not want to put their buses on such roads. As a result only MMT buses plied on almost all the routes in the Region and for that matter there is high pressure on MMT buses at the Tamale depot.
- It was established that, the bad roads in the Northern region of Ghana contribute significantly to the frequent break-down of MMT buses at the Tamale depot. It became evident since the components that break down can only be attributed to severe vibration as a result of road surface irregularities.
- The study found that the suspension system of the MMT buses is the part of the buses which frequently breaks down. These parts were identified to be hubs, leave springs and the tires. The suspension system was identified to be breaking down more frequently because of the irregular nature of the road surfaces in most of the routes in the Tamale depot.

5.2 Conclusion

Based on the findings made, it can therefore be concluded that the contribution of bad roads on the frequent break down of MMT buses at the Tamale depot is significant and therefore needed urgent attention. This is evident as most of the towns and villages in the Northern Region are not connected with good roads and for that matter contributing significantly to the frequent breakdowns of the MMT buses at the Tamale depot. The nature of the roads affects very essential components such as leaf springs, brake pads, tyres and many other parts of the buses, it also reduces the life span of the buses.

In view of this, the researcher has made the following recommendations.



5.3 Recommendations

From the summary of the major findings of this study, it is recommended that:

- The central Government and the District Assemblies within the enclaves of the Tamale depot should make it a deliberate policy to at least grade and gravel the roads linking their respective districts to make them motor able.
- The shareholders of MMT buses, should see it necessary to increase the fleet of the buses at the Tamale depot to cover the entire routes in the Northern Region to reduce the over burdening of the few buses at the Tamale depot.
- To keep the buses running all the time, the company should provide enough spare parts to the Tamale depot to aid the depot fulfil its mandate of rendering accessible and affordable transportation.
- In-service training should be carried out for drivers of MMT to acquire good driving skills on how to maneuver on bad roads.

References

- [1]. Rodrigue, P. (2013). *Purpose of Transportation*. New York: Oxford press.
- [2]. Merlin, G. (1992). *“Transportation and Space”*. New York: Oxford press.
- [3]. Proshun, C. (2011, August 9). *“Types of Bad Roads”*. Retrieved July 16, 2013, from Arnold Law Firm: <http://www.justice4you.com/bad-roads-types-and-information.html>
- [4]. GPRTU, (2014). *“The rain has caused deep potholes on our roads”*. Retrieved July 19, 2014, from Ghana web.
- [5]. *Roadway Delineation Practices Handbook*, (1994). Federal Highway Administration, U.S. Department of Transportation, Washington D.C.
- [6]. *Transportation and Traffic Engineering Handbook*, (1982). Institute of Transportation Engineers, Prentice-Hall, Inc. Eaglewood Cliff, New Jersey
- [7]. Gorden, D. (2009). *“Types of Bad Roads”*. Retrieved September 15, 2013, from FL Bad Roads: <http://www.forthereinjured.com/fl-bad-roads/html>
- [8]. The Times of India. (2011, August 9). *Bad roads increases vehicles maintenance*. Retrieved July 14, 2013, from Times of India: <http://www.articles.timesofindiatimes.com/2011-08-09/nagpur/29868488-1-bad-roads/tyre-burst.transport>.
- [9]. Chhajed, (2013). *“Wear and Tear of Tyres”*. Report on Bad Roads in India
- [10]. Jaiswal, (2011). *“Potential Effects of Deteriorating Roads on Vehicular breakdown”*
- [11]. Yeboah, K. (2012, May 7). *“Effects of Bad Roads on Transport in Ghana”*. Retrieved December 14, 2013, from gGhana web: <http://www.users/admin/Documents/effects-of-bad-roads-on-transport-in-ghana.html>
- [12]. World Health Organisation WHO, (2011). *“Increase Rate of Vehicular Accident in Ghana”*. Report on Bad Roads in Ghana.
- [13]. Montana Owners Club. (2005). *“Effects of Overloading on Tyres”*. Retrieved December 8, 2013, from Big Sky: <http://www.montanaowners.com/tyrefaq.html>
- [14]. Ghana Highway Code, (1974). Ministry of Transport and Communications, Accra, Ghana.
- [15]. American Automobile Association, (1997). *Responsible Driving*. Glencoe, MCGraw Hill, Westerville, Ohio.
- [16]. espano., L. e. (2013, March 15). *Driving Through Tyre Blowouts*. Retrieved November 19, 2013, from TyreRack.com: <http://www.tyrerack.com/tyres/tyretech/techpage.jsp/techid.html>
- [17]. Glennon, G. (2013). *“Wheel and Hub Failures-Crash Reconstruction Expert”*. Retrieved October 20, 2013, from Crash forensics: <http://www.crashforensics.com/wheelandhubfailures.cfm>
- [18]. Creswell, J. W. (2012). *“Educational Research; Planning, Conducting and Evaluating Quantitative and Qualitative Research,”*. Boston: Pearson Education, inc.
- [19]. Onley, A. C.&Barnes (2008). *“Collecting and analyzing evaluated data”*. In Planning and Evaluating Health Information Outreach Projects. New York: National Network of Labraries of Medicine.
- [20]. Bryman, A. (2004). *“Research Methods”*. New York: Oxford University Press, Oxford.

