



AN EVALUATION OF THE IMPACT OF PUBLIC-PRIVATE PARTNERSHIP ON VEHICLE INSPECTION IN THE GREATER ACCRA REGION OF GHANA

¹Larbie, A.T., ²Andoh, P.Y., and ³Ampofo, J.

^{1,2&3}Department of Mechanical Engineering, College of Engineering, Kwame Nkrumah University of Science and Technology (KNUST), Kumasi, Ghana.

adamlarbie@yahoo.co.uk

andoh_2@yahoo.com

josh.ampofo@gmail.com

ABSTRACT

Failure to increase vehicle inspection facilities in Ghana over the years, coupled with rapid increase in number of vehicles, has resulted in a situation where demand for mandatory vehicle inspection has surpassed the capacity of the Driver and Vehicle Licensing Authority (DVLA) of Ghana. Congestion and long delays are experienced at the vehicle inspection centres. Partnership with Private Vehicle Testing Stations PVTs was started in 2011 to mitigate the shortfall in inspection capacity and increase access. This study examined the impact of the introduction of PVTs on vehicle inspection in the Greater Accra Region, GAR. Data for the study was collected through questionnaires at the PVTs and DVLA, and inspection of a test vehicle at five (5) PVTs in GAR. Results of study show that, though, out-of-pocket fee for actual vehicle inspection increased by 80% after the introduction of the PVTs, a Generalised Vehicle Inspection Cost (GVIC), recorded a 45% reduction in cost for motorists from three communities in GAR. It is concluded that PVTs have increased access to vehicle testing and led to a reduction in the cost of vehicle testing.

Keywords: *Roadworthy, inspection, examination, and generalised cost.*

1.0 INTRODUCTION

1.1 Increasing Demand for Vehicle Inspection in GAR

Greater Accra Region (GAR) comprises of Accra Metropolitan Assembly and fifteen districts. Accra is the national capital and the largest city in Ghana with an estimated urban



population of 2.3 million (Odoi, 2013). GAR, with a population of about 3.9 million people, is the largest settlement in Ghana, by population.

The increase in the number of vehicles in GAR has been influenced by rapid urbanisation and an absence of reliable public transportation systems and increase in per capita income. Fig. 1 shows the number of vehicles, registered in Ghana from 2000 to 2010. General trends show an increasing numbers for vehicles of all categories (Data Portal Ghana, 2015). Between 2001 and 2010, the number of vehicles registered increased by more than 200%,

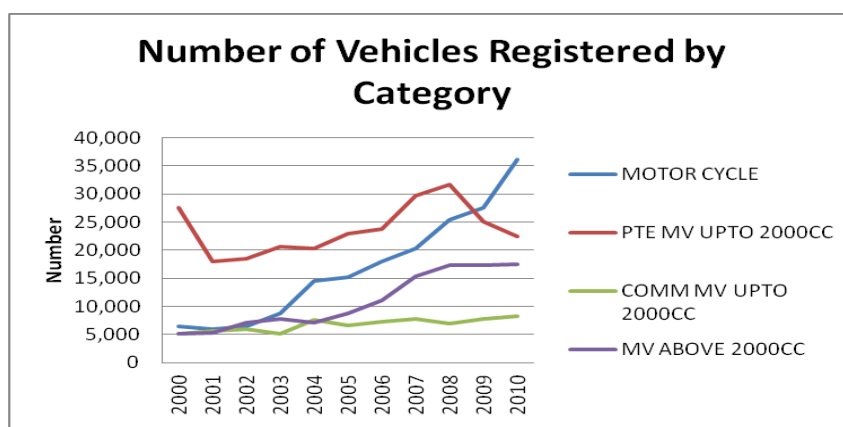


Figure 1 Graph of various classes of vehicles registered in Ghana (2000-2010)

with a total of five (5) inspection bays at the two (2) inspection centres in Accra and Tema for more than 860,000 vehicles registered in Ghana as of March 2012 (Tetteh-Addison, 2012).

Consequently, the inspection centres are characterised by long queues and congestion, which are worsened by other activities of the DVLA, as the centres are shared with other DVLA departments for new registration, change of vehicle ownership, national and international driving licenses.

Unable to fund the needed expansion to adequately cater for the demands of vehicle inspection, a public private partnership by the DVLA has licensed five (5) Private Vehicle Inspection Stations (PVTS), (Driver and Vehicle Licensing Authority, 2014) in the GAR to augment the services offered in the two centres of the DVLA.



1.2 Aim and Objectives of the Study

The aim of this work is to investigate the impact of the PVTS on vehicle inspection in the GAR of Ghana. The specific objectives are to:

- i. Determine the congestion at the vehicle inspections after the introduction of the PVTS,
- ii. Find the Cost implication of the PVTS to the motoring public, and
- iii. Identify problems, if any, which need to be addressed to improve the performance of the PVTS.

2.0 Literature Review on Vehicle Inspection

Ghana operates a Periodic Motor Vehicle Inspection (PMVI) as pertains in Sweden, United Kingdom and Australia. Random roadside inspections (Zaney, 2011) by police and DVLA complement the PMVI. The schedule for PMVI in Ghana as given by (Adoko, 2015) indicate that all vehicles are inspected once every year except commercial passenger vehicles which are inspected at six (6)-month intervals.

In their comparison of crash rates in United States (NHTSA, 1989 cited in Rechnitzer, et al., 2000) found that the overall ‘crash rate was higher in states without PMVI’. Irrespective of the vehicle age category analysed, results showed that states with PMVI recorded lower crash rates than those without. Further, the study showed that existing vehicle defect contribution to crashes was higher for states without PMVI but it did not find any ‘difference in fatality rates between states with and without PMVI’. However, (Libertas Institut, 2016) believes the cost of vehicle inspection far exceeds the benefits especially in communities where the accident rates are low.

Keall, et al., (2012) have demonstrated ‘the safety benefits and the reductions in safety-related vehicle faults associated with the increase from annual to bi-annual inspections’ of vehicles. Their results showed 8% - 9% crash rate reduction and decrease by 13.5% in rate of vehicle faults.

Privatisation of vehicle inspection is becoming more popular, especially in developing countries, due to inability of governments to fund vehicle inspections. It has been acknowledged that privatisation of vehicle inspection may lead to reduced waiting times for motorists (Magyar, 2013) as private businesses may want to invest in increased capacity especially, if there is demand to make the investment feasible.



The greatest challenge in privatisation of vehicle inspection is in the ability of the regulator to ensure that inspection centres apply the guidelines uniformly. Results coming from Thailand (Taneerananon, et al., 2005) indicate that motorists may opt to have their vehicle inspected at stations that have less stringent testing routines, where the standards are not so well maintained. Consequently, the objective of this work is to examine the impact of the PVTS on vehicle inspection in the GAR of Ghana.

3.0 RESEARCH METHODOLOGY

3.1 Research Design and Study Area

This is a study of the impact of PVTS on vehicle inspection in the GAR. Types of equipment used for the inspection of the vehicles as well as other related issues on maintenance and calibration of the test equipment, inspection data storage formats were also studied. Structured interviews were adopted for the collection data.

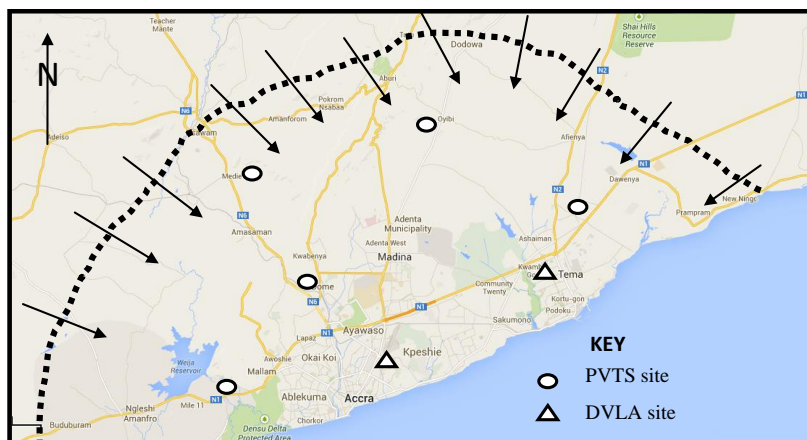


Figure 2 Map shows the location of PVTS and DVLA vehicle inspection centres (source: (Larbie, et al., 2016))

Figure 2 shows the map of the study area. Accra, the capital of Accra Metropolitan District is seen at the bottom centre of the Fig. 2, with Tema to the left. Broken lines show the current settlement limits for GAR while the arrows show the direction of the daily commute by motorists. PVTS and DVLA vehicle inspection centres in the GAR area are also shown. They are found north of the N1 highway in new settlements with growing residential and commercial developments.



3.2 Study Population

GAR constitutes only 14% of the geographical area of Ghana yet it registered more than 60% of the entire number of eligible vehicles in 2012. Table 1 shows vehicle density pertaining to the GAR and the rest of Ghana. With 265.85 vehicles/ km² compared to the 2.39 vehicle/km² for the rest of Ghana, GAR is more than 10,000% vehicle denser than the rest of the country. This high vehicle density comes with unique challenges including congestion and long queues since vehicle inspection are alien to other parts of the country.

Table 1: Vehicle Densities in the GAR of Ghana

Registered Vehicle Density	
Area	Vehicles/km sq
GAR	265.85
Ghana Excluding GAR	2.39

Using purposive sampling technique, where data was collected from the five (5) of seven (7) PVTs vehicle inspection centres in the GAR. The five (5) PVTs selected because they have operated for more that twelve months at the time of data collection. Questionnaire data was collected from the two (2) DVLA vehicle inspection stations in Accra and Tema, the DVLA head office in Accra, and five (5) PVTs stations at Weija, Kuntunse, Dome, Oyibi and Tema.

3.3 Instrument and Data Collection

Data was collected through visits to each inspection centre and observing the operations. Face-to-face interviews of centre managers or technical heads in charge of the physical inspection were conducted. Measured data, printouts by the inspecting equipment, from the test vehicle sheets after were collected and analyzed.

Site visits to the two (2) DVLA centres were made to collect data on equipment and capacities. A supplementary data from DVLA was collected through face-to-face interview of the Deputy Director in charge of vehicle inspections at the DVLA head office. Data collected on staff members at the PVTs are also checked during this interview.



Travel time to access the inspection facilities were measured and recorded for accessibility and cost of generalised vehicle inspection calculated.

4.0 RESULTS AND DISCUSSION

4.1 Training and Specialisation

Table 2 shows that the PVTs have increased the inspection bay numbers in the GAR from five (5) to 28 functional bays, which translates to an increase of 460%. The number of vehicles tested has increased per day by 67% while the number of technical and non-technical staff engaged in vehicle examination and inspection has recorded 391% and 306% increment, respectively.

Table 2: Vehicle Inspection Facility and Capacity

	Inspection Bays	Vehicles Tested/Day	Technical staff	Support staff	DVLA staff	
	1	3	200	6	10	16
DVLA	2	2	180	5	8	13
	Total	5	380	11	18	29
	1	3	300	6	18	3
	2	3	140	18	3	4
PVTS	3	10	55	11	20	5
	4	3	80	10	14	3
	5	9	60	9	18	4
	Total	28	635	54	73	19
Grand Total	33	1015	65	91	38	
Increase (%)	460%	67%	391%	306%	-34%	

It can be deduced that the increase in the number of inspection bays has made it possible to have well-resourced testing of vehicles to meet DVLA standards. Also, the increase in the number of PVTs staff has led to division of tasks, specialisation and efficiency in different aspects of inspection. Since the actual inspection is done by the staff of the PVTs, owners of the PVTs have the responsibility to ensure that their staff is properly trained by the equipment manufacturers to reduce the duration of inspection and long queuing which deters motorists from using the facility. They also owe it to the owners to make sure that results are



precise and accurate. However, the DVLA should allow the PVTS to do the inspection and their staff deployed to supervise the inspection and have the final decision whether to pass or fail a vehicle. This will act as a check and balance for the inspection processes.

4.2 Enhanced Brake and Headlamps Testing

Equipment usage makes the inspection process more transparent and motorists are bound to accept the results generated from the inspection equipment than from manual testing. Moreover, inspection duration has been reduced and more consistent results obtained through the deployment of more equipment, and inspection equipment have been calibrated to the DVLA standard. In the past, a number of fatal accidents have been attributed to brake failure while data from Building and Road Research Institute (BRRI) shows that most accidents in Ghana occur in the night when visibility is low. Increase in the number of headlamp and brake testers will go a long way to ensure that these two critical components are properly tested. Keeping brakes effective and head lamps in good working order is sure to have an impact on the number and severity of accidents.

Table 3: Vehicle Inspection Equipment

	Brake Tester	Headlamp Tester	Vehicle Lift	Computer	Emission Analysers	Lux Meter
	1	1	0	2	0	0
DVLA	2	1	0	3	0	0
	Total	2	0	5	0	0
	1	3	3	3	3	0
	2	3	3	2	3	0
PVTS	3	6	6	3	6	0
	4	3	3	3	3	0
	5	9	9	4	9	0
	Total	24	24	15	24	0
	Before	2	3	0	5	0
	After	24	24	24	15	0
Change	22	21	24	10	24	0



4.3 Increased Opening and Closing Times for Vehicle Inspection

One area where the impact of the PVTS has made a significant impact is the opening period for inspection. As shown by Table 4, below, while the DVLA is a government office that is closed during the weekends, the PVTS as private business opens for longer periods during the weekday and works for part of Saturday as well.

Table 4: Vehicle Inspection Equipment

		Monday-Friday	Saturday	Total Hours/Week
DVLA	1	8:30-15:00	Closed	32.5
	2	8:30-15:00	Closed	32.5
	Total			65.0
PVTS	1	8:30-15:00	8:30-12:00	36.0
	2	8:00-17:00	8:00-12:00	49.0
	3	8:30-16:30	8:30-12:00	43.5
	4	8:00-16:00	8:00-12:00	44.0
	5	8:00-16:00	8:00-12:00	48.0
	Total			220.5
	Before (2)	2 Open	2 Closed	65
	After (7)	7 Open	5 Open	285.5
	Increase (%)			239%

From Table 4, both the PVTS and DVLA test stations in GAR operate from Monday to Friday. While the DVLA operates 6.5 hours from Monday to Friday by opening at 8:30am and closing 3:00 pm, the PVTS put in extra hours per day ranging from 0 to 2.5 during the week. On Saturdays, when the DVLA stations are closed the PVTS operate for 3.5 hour to 4 hours. Operation of the PVTS has added a total testing 220.5 hours per week. This represents a 239% increase in opening period for vehicle testing in GAR. It is envisaged that as PVTS compete for motorists to use their facilities and maximise their revenue, opening periods may become longer. However, as a substantial part of the vehicle testing involves visual inspection, it is an imperative standard for lighting under which inspection could be carried out. DVLA and PVTS are closed on Sundays and public holidays.



Each circle in Figs. 3 and 4 gives visual representation of areas within the study area (GAR) from which a motorist can complete a vehicle inspection and return to the origin within a four-hour period. It is evident from Fig 4 that a motorists fall within many circles. This means a motorist can obtain a vehicle inspection in a number of the inspections, unlike the pre-PVTS situation where motorists are limited to at most two (2) choices.

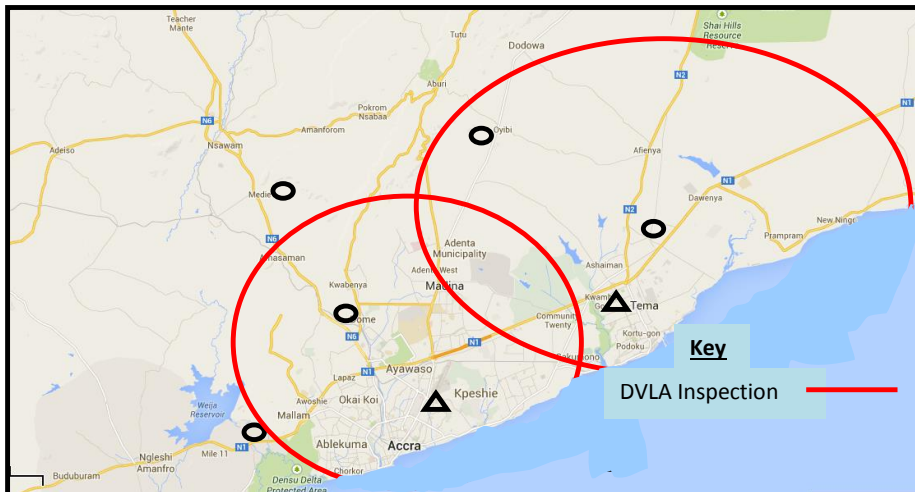


Figure 3 Visual depiction of access to vehicle inspection centres in GAR when only two DVLA centres were in operation (source: Author et al, 2017)

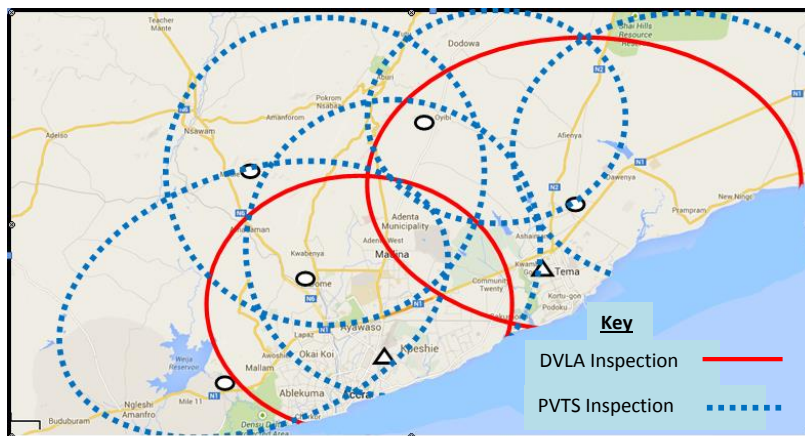


Figure 4 Visual depiction of access to vehicle inspection centres in GAR after the introduction of the PVTS (source: Author et al, 2017)

Presence of the PVTS on the vehicle-testing scene in Ghana has increased accessibility and provided more options for motorists to have their vehicles tested. As motorists are not restricted to which facility they may use to have their vehicle tested, there is some level of



competition among the PVTs to provide more services to satisfy them. Headlamp polishing, number plate embossment, photocopying and secretarial services in close proximity to the PVTs have added to value of services rendered.

However, the PVTs have moved from the already congested streets of AMA and spread throughout the periphery of GAR to reduce traffic congestion resulting from vehicle testing.

4.4 Generalised Vehicle Inspection Cost

Since the introduction of the PVTs, out-of-pocket testing fee for a saloon car increased from 8.3 USD to 15 USD. The difference of 6.7 USD, representing an 80% increase in the out of pocket cost for the actual inspection of the vehicle. A Generalised Vehicle Inspection Cost (GVIC) which accounts for changes in travel time to and fro, waiting time at the inspection centres, out-of-pocket cost of inspection and payment of tolls, is developed to compare the total monetary cost of vehicle testing before and after the introduction of the PVTs in GAR. To simplify the GVIC computation, wear and tear, vehicle maintenance, vehicle operation costs and depreciation were ignored as their contribution to the cost is also negligible for the short journeys involved.

GVIC is mathematically expressed as,

$$C_{GV} = dv + tv + t_p + I + v_c + rv$$

$$GVIC = (TDRV \times VOT) + (TINSP \times VOT) + TOLL + INSP + VOC + (RDRV \times VOT)$$

Equation 1

- C_{GV} Generalised Vehicle Inspection Cost
- d Driving time to Inspection Centre
- r Driving time when returning from to Inspection Centre
- v Value of Time
- t Time Spent at Inspection Centre
- t_p Cost of Road Toll Paid
- I Fee paid for Inspection



Motorists from the three communities use the nearest DVLA inspection station, plying the shortest routes. Vehicles travel long distances to access inspection usually resulting in long queues at the two inspection stations. A minimum out of pocket fee of 8.3 USD is paid for inspection at the scene.

Five (5) PVTs, together with two DVLA inspection stations are all operational. The scenes here are characterised by shorter queues at the PVTs inspection stations but patrons have to pay 15 USD, 80% higher than the fee at the DVLA. Unlike Scenario 1, motorists travel a shorter distance and spend lesser time at the test inspection centre but pay more for the inspection.

Results shows that the out-of-pocket cost is a small percentage of the total cost of having a vehicle tested. The main influencing factor of the GVIC is the cost of time, which is also dominated by the duration of TINSP. After the introduction of the PVTs, 73.5% reduction in the TINSP was recorded. All the three locations examined showed some reduction in the GVIC as shown on Table 5.

Table 5: Results of GVIC for CBD of Accra, Kasoa and Dodowa

	Kasoa		Dodowa		CBD	
	Without PVTs	With PVTs	Without PVTs	With PVTs	Without PVTs	With PVTs
GVIC/USD	166	95	167	55	107	94
% reduction	43%		67%		12%	

The highest reduction of 67% was recorded for Dodowa, where motorists could use an uncongested road to a PVTs a short distance away, which saves a lot of time. The least reduction was recorded for the CBDs of Accra, where saving time was minimal due to proximity to the DVLA but driving in a direction opposite to the flow of traffic in the CBD.

For the three communities studied, a reduction by a total of 2,059 (USD) representing 45% was recorded. This result shows that while motorist may be paying more money to have the



vehicle tested with the advent of the PVTs, they are actually saving money since the service is rendered faster and they have extra time to use for other income earning activities.

4.5 Creation of Employment

PVTs have provided direct employment to 127 people, who would, otherwise, not be involved in vehicle inspection. Most of the technical personnel at the PVTs are highly qualified. Qualifications of technical personnel range from Higher National Diploma (HND) to Master's degree in areas ranging from automobile to computer engineering. Indirectly, they have provided other employment to bank personnel, headlamp polishers, vehicle number plate embossers, security staff cleaners, etc.

5.0 CONCLUSION AND RECOMMENDATIONS

This study concludes that the introduction of the PVTs has been very helpful in easing the demand for vehicle inspection from the two DVLA test stations, in Accra and Tema, and distributing it to, at least, seven PVTs stations spread throughout the GAR. Motorists have more options in terms of where and when a vehicle may be tested. Motorists, therefore, spend relatively shorter periods at the inspection centres.

Introduction of the PVTs has led to significant increase in the number of testing equipment, has created employment and given opportunity to entrepreneurs to invest in novelty areas of public regulation in Ghana. This study has established that with the introduction of the PVTs in GAR, there has been easier access to vehicle testing. Opening hours per week has increased by 339% while inspection equipment has also increased. Brake tester, headlamp tester, vehicle lift and emission analyser increased by 800%, 2,300%, 2,300% and 2300%, respectively after the introduction of the PVTs.

The study established that with the commencement of the PVTs operations motorists have to pay additional 6.7 US dollars, representing an 80% increase, at the PVTs for the actual inspection. However, this cost does not account for the journey made to the inspection centre and delays at the inspection centre. A generalised vehicle inspection cost, which accounts for the journey time, tolls, fuel used and delays at the inspection centre, showed a 45% reduction after the introduction of the PVTs. Thus, the results show that while motorists are paying



more money upfront to inspection centres following the introduction of the PVTs, they spent less money to have their vehicles inspected, if the monetary value of the time saved is included.

This study recommends that the DVLA needs to set up a system to regularly monitor and evaluate the operation of the PVTs. There is no use to have vehicles tested, if a lack of good testing equipment results in passing defective vehicles. Monitoring of PVTs operations must be expanded to include equipment maintenance and calibration, staff training and regulation of DVLA staff to ensure they are not compromised.

It is also recommended that since roadworthy information needs to be shared with National Road Safety Commission and Ghana Police Service, inspection results from all PVTs must be uploaded in real time into the DVLA database. This will enable immediate access to reliable information during police investigation to incidents involving vehicles.

6.0 REFERENCES

- Adoko, J. E., (2015). *Vehicle Inspection Schedule for Ghana* [Interview] (20th February` 2015).
- Data Portal Ghana, (2015). *Total number of vehicles registered in Ghana by category(2000-2010)*, Accra: s.n.
- Driver and Vehicle Licensing Authority, (2014). Results of Private Vehicle Testing Station in Ghana. *Daily Graphic*, SS XX.
- Keall, M., Stephen, L., Watson, K. and Newstead, S., (2012). Road Safety Benefits of Vehicle Roadworthiness Inspections in New Zealand and Victoria. *Monash University Accident Research Centre*, November, p. 37.
- Larbie, A. T., Andoh, P. Y. & Ampofo, J., (2016). *Qualitative Analysis of Vehicle Inspection and Vehicle Inspection Results by the Private Vehicle Testing Stations (PVTs) in the Greater Accra Region of Ghana*. Koforidua, 9th Annual International Applied Research Conference, Koforidua Technical University.
- Libertas Institut, (2016). *Vehicle Safety Inspections: Another Wasteful Government Program*, Lehi: Libertas Institute.
- Magyar, M. J., (2013). *Democrats Attack Potential Privatization of Motor Vehicle Inspection*, s.l.: NJSpotlight.



Odoi, I. O., (2013). Climate Change and its Impact on Flooding in Accra- Accra Metropolitan Assembly. September.

Rechnitzer, G., Haworth, N. and Kowadlo, N., (2000). *The Effect of Vehicle Roadworthines on Crash Severity*, Victoria: Monash University Accident Research Centre.

Taneerananon, P., Chanwannakul, T., Suanpaga, V., Khompratya, T., Kronprasert, N., and Tanaboriboon, Y. (2005). An evaluation of the effectiveness of private vehicle inspection process in Thailand. *Journal of the Eastern Asia Society for Transportation Studies*, 6, 3482-3496.

Tetteh-Addison, E., (2012). *Vehicle Population and International Trend*, Accra: Ministry of Transport.

Zaney, G. D., (2011). DVLA Outdoor Mobile Braking Testing Equipment. *Information Service Department*.