Predicting the Impact of a Technology for Instantly Verifying the Licenses of Vehicles/Drivers in Ghana

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Abstract: Vehicle and driver license registration is one of the many commodities that contribute significantly to the revenue generation capabilities of Ghana. However according to the investigation carried out for this research, 86.3 percent of respondents attest to the existence of fake vehicle and driver licenses. Thus, the government of Ghana loses a lot when it comes to generating revenue from Driver and Vehicle Licensing Authority. This research found out a yearly revenue generation capacity from the Tamale office of the Driver and Vehicle Licensing Authority of about GHS1, 440,000 from only vehicle registration, amidst this massive evasion by drivers and vehicle owners.

This research unearthed the major factors motivating the menace of non-licensing of vehicles and drivers; it as well exposed the methods by which vehicles are being stolen from their owners, pointing out reasons for vehicle owners' reluctance to report for the recovery of these stolen vehicles. The technology employed for license verification by the security services was not left out.

Keywords: Vehicle Theft; DVLA Ghana; License Verification; Ghana Revenue; Driver; Technology;

1. INTRODUCTION

The massive evasion of licenses for drivers and vehicles results in a number of related crimes. This is seen to be on the ascendancy with an almost daily occurrence in the country and the world at large. According to the Ghana Statistical Service report of May 2010, titled *"Victimization survey in Ghana (2009)"* reported cases of vehicles and related crimes ranged from 5.9% for the crime of "theft from car" to 83.3% for "theft of car". With the other related crimes falling in between the two percentages.

Also, statistics show that road accidents kill an average of four people a day in Ghana. In the year 2005, there existed 16% increase in road accidents as compared to the preceding year, (Global Road Safety Partnership 2012). As appeared in www.ghanaweb.com, between 2007 and 2010 the Motto Traffic and Transport Department (MTTD), in its report noted at least 6,000 people had died due to road accidents with an additional 40,000 injured within the same interval. This takes away valuable human resources which could have contributed immensely to the development of the country. Also, funds which should have been channeled into developmental projects are diverted into medical expenses of victims, damage to vehicles and insurance cost among others. According to Ghana News Agency (2008) it is estimated that Ghana loses an amount of GHS165, 000 annually which represents 1.6 percent of Gross Domestic Product (GDP) through road accidents.

This evasion of licenses causes the nation a great loss of revenue. For example in the year 2012 alone, the Ashanti Regional Office of the Driver and Vehicle Licensing Authority (DVLA) generated GHS4,596,379.30 as revenue from vehicle registration, renewal of road worthy certificates, licenses and sale of highway codes to motorists (ghanabusinessnews.com 2012). Sums of this magnitude can easily be lost by the state if the currently high levels of evasions are allowed to prevail

2. OBJECTIVES OF THE RESEARCH

This research seeks to establish the impact of evasion of vehicle licensing to the development of the country.

The specific objectives;

- to forecast the cost implications with the introduction of a license verification technology

- to uncover the reasons behind evading vehicle/driver license registration and or fake licensing

- to reveal the modes of vehicle theft in the country to aid the intelligence of the security services

3. EXISTING SYSTEMS OVERVIEW

The importance of the study of relevant and related literature on research work cannot be overemphasized. This eliminates the trouble of having to go through the same or similar mistakes made by previous researchers. It will as well give much insight as to the relevance of the research to be conducted. According to Chaplin as cited in Cissse (2006), it is short-sightedness and a waste of time to plunge at once into research without first taking a look at what has been done.

In the area of vehicle security, a little talk about the better, it has been left solely to the vehicle owners' themselves to manage, with the DVLA not making extra efforts aside keeping a database of registered vehicles. In this regard Abeo et al (2015) saw the need to develop a technology to assist in the instant verification of driver and vehicle licenses by the security services. From their research they found out that vehicle theft occurs daily with an endorsement from 90 percent of respondents. Their research gave birth to a GSM/SMS technology that when integrated into the driver and vehicle licensing authority's database, could instantly give a reply with vital information relating to the vehicle and the owner when a security personnel sends a mobile text message to it.

There is no doubting the extensiveness of this research. On the other hand, they could not delve into the revenue generation ability which the implementation of this technology would have supported.

Bracha (2008) saw the need to invent a system for verifying Driver's insurance coverage. In his system, a database of Driver's License ("DL") number identifying a motorist is maintained. A request containing a DL is used to fetch an indexing DL in the database and retrieving the DL-indexed motorist record, which they discovered as the only proof of insurance.

As could be noted, *Bracha's (2008)* concentration is narrowed to only insurance coverage monitoring. They could not move further to ascertain the reasons for possible low insurance coverage.

Taking vehicle monitoring into a different angle, *Zlojutro (2010)* designed a vehicle monitoring and traffic enforcement system in which a wireless communication device is linked to motor vehicles. Data about the identification of the vehicle could be sent to a database which contained up to date information concerning insurance law compliance, vehicle registration and the like. When a violation is detected on any, the system sends real time information to the law enforcement agency and also to a nearby law enforcement vehicle using GPS (Geographical Positioning System) and GIS (Geographic Information System) technologies. The information provided by the system does not only show the vehicle being tracked but in addition an area map showing roads, traffic situations as well as the location of other emergency vehicles for law enforcers to be able to act promptly.

A problem foreseen in this system is that, there will be a failure in the final execution. Ideally, the system is expected to work automatically without a lot of human intervention; this might not apply very well in our society where the law enforcement agencies like the police service most at times expects the victims to keep making follow-ups on them after reporting their cases. Also, this research could not establish reasons for people not reporting to the security services when their vehicles are stolen.

Adding more functionality to check post or Toll base, *Mahesh (2012)* developed a smart logic system which helps to detect stolen vehicles at the check post or Toll base. This technology

seems to be the first of its kind in its target area. In this technology, a Unique Identification (UID) code is associated with every vehicle. Each and every vehicle is embedded with a silicon chip which contains that unique number pre-installed. This UID chip is strategically placed in the engine of the vehicle to avoid easy manipulation by criminals. A database containing vehicle codes is also stored and maintained at the check post or Toll base. It is then made possible for any vehicles' passing through the check post/Toll, Radio Frequency (RF) tag (which has been pre-installed in the vehicle) to be decoded by a 125kHz frequency generated by an RF passive vehicle reader. The code is then checked with that of the database, if the stolen UID code is not found then the security gate gets open and the vehicle is able to proceed. On the contrary where the stolen UID code finds a match in the database then the security gate remains closed and an alarm is then triggered ON automatically. This draws the attention of the nearby authorities and finally, the vehicle is apprehended by the security apparatus.

Having gone through this research, there is no doubt that if this system is ideally implemented in an ideal society it would have been a perfect system for tracking fake vehicle license. However, it comes with a lot of limitations as follows; the gates at the check post or Toll base have to function automatically without human intervention, which will be difficult to achieve in our part of the world, there is non-existent of even manual gates. The cost of implementing such a system will be quiet huge, since you will need to deploy experts to various check post culminating with installation of databases in all such areas. These systems are all electronic and thus there must be constant supply of electricity or else gates at check post or Toll base could seize to open or vice versa. The study failed to do a cost-benefit-analysis for the implementation of this system.

Shihab et al (2012) asserted that, a lot of efforts are being made by local and international companies towards producing car security systems, but the number of car theft cases kept on increasing beyond expectation. It added, "The thieves are developing and inventing smarter and stronger capabilities and stealing techniques which require very powerful security systems. *Shihab et al (2012)* realized most of the security systems made use of traditional alerts which do not support multimedia and mobile facilities. Also the few existing advance car security systems are very expensive and are commonly used in expensive cars. Thus they proposed an "effective Car Monitoring and Tracking Model" (CMTM) which tried addressing the above problems. In their research, they introduced a powerful security model that sends SMS and MMS to the owner or security organization for a quick response. In their system, a database containing information about cars and their owners is maintained. The system made provisions for the police or security authorities to track the car using GPS systems which is linked to Google Earth as well as other mapping software.

Still delving more into the research of car security, *Abdullah (2011)* noted that; the existing vehicle alarm systems are of no match to the well-equipped thieves. There may be so many car alarms that are too sensitive, while the rest can withstand a major

earthquake without a single beep. Also, it has limited capability to interact with its owner.

In addition, the conventional alarm systems did not help in any way in assisting the recovery of a stolen vehicle. While the GPS systems do, there are situation where the GPS system encounters a deficiency such as at underpasses and indoor parking. In view of these challenges they came out with a "Mobile Controlled Car Security System" (MCCS). This mobile controlled system is capable of providing a two way effective communications between the alarm system and the owner of the car. In this system when an intrusion is detected, by the help of the mobile transceiver a call is quickly made to the owner of the car immediately. In addition, there is a feature that makes it possible for the owner to remotely control the car through a phone call. The mobile phone transceiver is detected by the Mobile Switch Center (MSC) of the GSM network as long as the phone is turned on. The user can then request for the location of the car from the MSC.

In the heat of finding solutions to the problem of vehicle security, one is likely to gross over the cost of implementation of such a system. Khondker et al (2009) noted the expensive nature of most of the existing live tracking systems which employ SMS for communication to the server. Thus, they proposed a "Cost Effective GPS-GPRS Based Object Tracking System" which solves the underlining problem was carried out. In this system a MYSQL database is maintained which is interfaced with a web server, with embedded Google Maps. The target vehicle location is read by the system using GPS; this data is then sent using the services of GPRS from the GSM network to the web server. The information is finally stored into the database for both past and live tracking. The past and present recorded positions are then available through the internet on Google Maps for the user to access. It was concluded that this system was very useful for situations of car theft, for parents to watch and monitor their adolescent drivers as well as tracking both pets and humans alike.

4. RESEARCH APPROACH

Taking into consideration the nature of the research, both qualitative and quantitative approaches were adopted; so as to be able to have answers to questions interviewee may feel reluctant to give responses to, thus the qualitative approach.

4.1 Sample Population and Techniques

The study considered a 152 population size; distributed as 7 staff from the Driver and Vehicle Licensing Authority, 45 officials from MTTD coming from the Ghana Police service, and both private and commercial vehicle owners/drivers being 100, all from the Tamale metropolis. The choice was carefully made since they were the core actors who were directly linked to the objectives of the study, and these were the group of people who were interviewed for the data collection.

The study generally made use of purposive, quota and convenience sampling techniques. When it came to getting the technical people from DVLA and MTTD, the Manager and Commander from DVLA and MTTD respectively and the leaders

from the various unions of the commercial vehicle stations, it was the purposive sampling technique which was implored.

In dealing with the commercial and private vehicle owners, drivers and other official of the MTTD, there was a combined quota and convenience sampling techniques which were used. This was based on the availability of the respondent at that particular time while being mindful of the sample allocation to the various groups. This was how sampling was applied to technically extract balanced respondents.

4.2 Methodology

This study made use of techniques in the form of Interviews and questionnaires in the collection of the required data and information necessary for answering the objectives of the research. In reality the qualitative data which was gathered from the verbal interviews and observations helped greatly to re-structuring the questionnaire.

In this study, the research findings and analysis were presented in accordance to the research objectives. The general objective of this study seeks to establish the impact of evasion of vehicle licensing to the development of the country. The data for this study was gathered and analyzed using the Statistical Package for Social Scientist (SPSS) and that of Microsoft Excel in a quantitative perspective.

5. RESULTS AND DISCUSSIONS

The structured questionnaires were divided into three categories. One for the workers of the DVLA, the Ghana Police Service, whilst drivers and vehicle owners taking the last category. The findings sought among other things; evasion of vehicle and driver license registration and related cost, the category of vehicles which are mostly stolen, reasons for reporting when your vehicle is stolen.

The research sought to know the most stolen category of vehicles or vehicles which are mostly reported as being stolen. This was sought for from the workers of DVLA and the MTTD officials of the Ghana Police Service. Private vehicles mysteriously dominated the first top three with a percentage of 56.8 representing a frequency of 25 of the total of 44 respondents. While motor bike which is noted to be used by many, came second with a frequency of 17 representing 38.6 percent, while passenger vehicle falling third with a percentage of 4.6 as shown in Table 1.

Table 1: category of vehicles normally stolen

Type of vehicle	Frequency	Percent
motor bike	17	38.6
private vehicle	25	56.8
passenger vehicle	2	4.6
Total	**44**	**100.0**

It became prudent to find out from the owners and drivers of vehicles to know their reasons for making reports when their vehicles are stolen. It was not strange to realize that about 88.9 percent of respondents representing a frequency of 80, report for the reason of recovering their vehicles. A frequency of 8, do report to meet insurance demands. Another frequency of 2, claim they report just for the purpose of assisting in the statistics gathering for the country. This could be seen in figure 1.
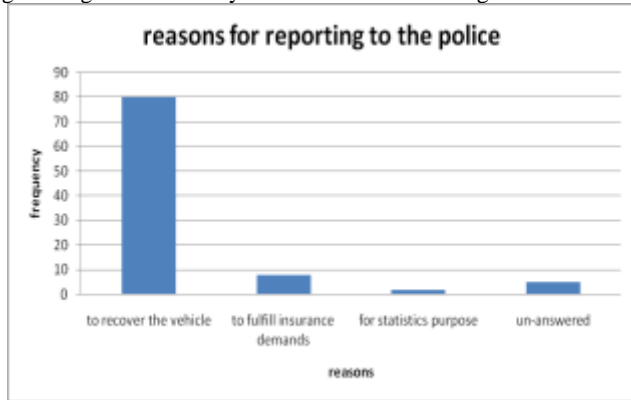
Figure 1: reasons for reporting a stolen vehicle

5.1 Evasion of Vehicle and Insurance Registration and Related Cost

Registration of all kinds relating to a vehicle is one of the ways government raises income to support the running of the state. But it is rather unfortunate that a number of people take to the business of evasion of licenses. From the survey conducted on the issue of the existence of fake license, out of 139 respondents, 120 attested to the fact that they have come across licenses which were fake as shown in Table 2. They gave several reasons for people embarking on such an activity. But here, strategically the views of DVLA staff were not sought for. Some of the reasons as seen in Figure 2 indicated 99 respondents out of a total of 133 were of the view that the fake license is cheaper to obtain, this represents 74.4 percent.

Table 2: Knowledge of fake license

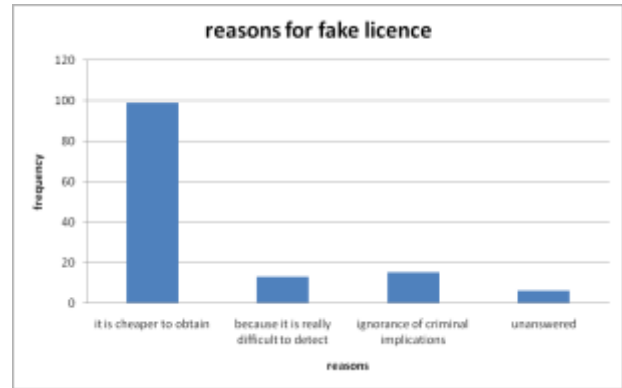| Response	Frequency	Percent
Yes	120	86.3
No	19	13.7
Total	**139**	**100.0**

Figure 2: reasons for embarking on fake license registration

Inferring from the response from the Ghana Police Service, the most faked license in the country is the vehicle license, obtaining 52.6 percent of the 38 respondents, followed by the driver license with 31.6 percent and that of custom duty coming third with 15.8 percent as appeared in Table 3. There was no mention of insurance license, which presupposes that the insurance companies are getting it right.

Table 3: mostly faked license

Type	Frequency	Percent
vehicle license	20	52.6
driver license	12	31.6
custom duty	6	15.8
Total	**38**	**100.0**

There is always a cause for every action, thus we sought further from the drivers and vehicle owners their opinion for having to evade or fake license instead of getting the genuine one from the DVLA. It was revealing to note that cost was not the bone of contention but rather, the process to obtaining the license. 65.2 percent of 95 Respondents alluded to the fact that it is tedious to obtain a license. Whilst 31.6 percent were of the view that the registration is costly, this is illustrated in Figure 3.
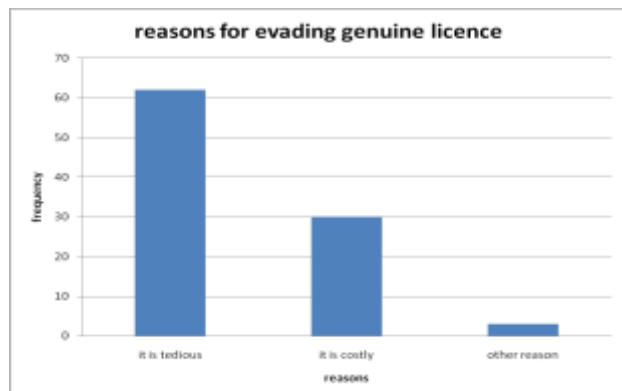

Figure 3: reasons for evading DVLA licence

It is thus necessary for putting in place a system of registration which will be fast and convenient for potential client's patronage.

It could be noticed that the government earns a lot of income from the registration of vehicles. As can be seen from Table 4, a 58.9 percent representing 56 respondents indicated it cost them an amount more than GHS100 but less than GHS200 to register their vehicles. 25.3 percent of respondents indicated it cost them between GHS300 and GHS400 and a 5.3 percent said they spend more than GHS400.

Table 4: Cost of Registering a Vehicle

Cost	Frequency	Percent
100-200 GHS	56	58.9
200-300 GHS	24	25.3
300-400 GHS	10	10.5
400 and above	5	5.3
Total	**95**	**100.0**

It was necessary to know how much revenue is generated, thus we enquired from officials of the Driver and Vehicle Licensing Authority, how many vehicles they can register in a day. 6 respondents representing 85.7 percent said they register about 30 to 50 vehicle a day. While a respondent representing 14.3 percent indicated they register less than 30 vehicles a day as seen in Figure 4.

Inferring from Table 4 and Figure 4, it can be estimated that the daily revenue that could be generated will be an amount of GHS6,000(that is GHS150 by 40 vehicles), which is at least approximately GHS120,000 a month (considering averagely 20 working days in a month) and GHS1,440,000 for the year, only from the Tamale office of the Driver and Vehicle Licensing Authority.
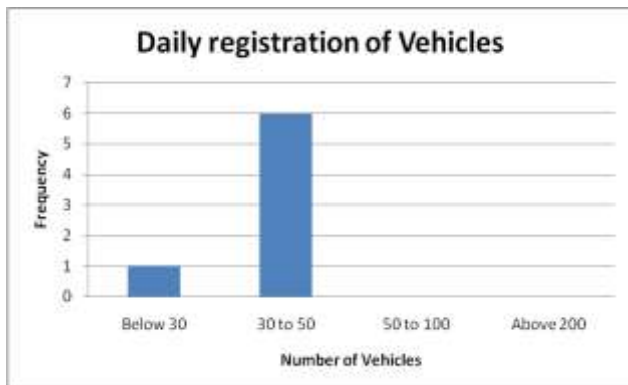

Figure 4: Number of vehicles registered daily

5.2 License Verification and Associated Technology

It was evident that verification is normally done in one way or the other by the Ghana Police Service on driver and vehicle license registration. The onus now lies on how it is being done. In responding to this as appeared in Table 5, 42 percent of a total of 38 respondents said they use the picture in the driver's license card as a form of verification. All in all 63.1 percent of the respondents agreed they do normally verify, while a 31.6 percent are of the view that normally they do not verify, this I think they are not denouncing verification but that if there is no reported case, they will not undertake any verification.

Table 5: verification of license for ownership by the Police

Ways of verification	Frequency	Percent
We use the picture in the driver's license card	16	42
We do cross check the vehicle license against DVLA register	6	15.8
We don't normally verify	12	31.6
We verify if there is a reported case of a missing vehicle	2	5.3
Unanswered	2	5.3
Total	**38**	**100**

Observing critically how the police carried out their day to day verification for ownership of a vehicle, it was realized there still exist a big chance for thieves to do away with stolen vehicles especially getting their way to neighboring countries. This is because responses from the Ghana Police Service on what they require from people, who are driving across the border, indicated that driver's license topped with a percentage of 73.7 out of a total of 38 respondents as seen in Figure 5.
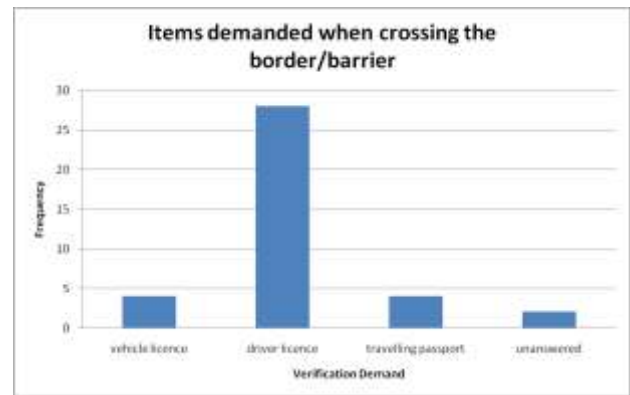
Figure 5: what police demand when crossing the border/barrier

5.3 Summary of Findings
After the interpretation and analysis of the results, there were interesting and very revealing findings which are summarized here.

The Ghana Police noted they undertake license verification for ownership but this is normally carried out by the use of the driver's license.

There is the occurrence of Vehicle theft on a daily basis, snatching being the prominent means of perpetrating it. Private vehicles are the most stolen, and stolen vehicles are normally reported to the Police for the purpose of recovering such vehicles.

Also, respondents attest to the fact that there exist fake licenses in the country, with vehicle license being the most faked, blaming the tedious nature of getting a license on DVLA as the reason for the evasion.

6. RECOMMENDATIONS

The study makes the following recommendations as a result of the research findings gathered.

The government should empower the security services with a technology which can assist them to instantly track the licensing status of vehicles to boost the revenue generation capacity of the Driver and Vehicle Licensing Authority.

There should be a committed and zealous policy by the government to vigorously implement a technology to instantly verify the status of all kinds of licensing in the country.

There should be a national policy to educate the public on the economic and social implications of evading genuine licensing at the driver and vehicle licensing authority.

The government in collaboration with the Driver and Vehicle Licensing Authority (DVLA) should consider as a matter of urgency the automation of all the licensing processes at the DVLA to increase the patronage of clients.

7. REFERENCES

[1] ABEO TIMOTHY APASIBA, J.B. HAYFRON-ACQUAH, J.K. PANFORD, MICHAEL ASANTE (2015). Enhancing the security of vehicles and the work of the DVLA using GSM/SMS technologies, International Journal of Science and Engineering Applications, Volume 4 Issue 5, 2015, ISSN 2319-7560 (Online)

[2] AVRAHAM BRACHA (2008). *System and method for verifying Driver's insurance coverage*, U.S. Pat. US 2008/0027761 A1

[3] AWUNI, MANASSEH AZURE (2011) *Can ACP Awuni change the face of MTTU?* Available from: http://www.ghanaweb.com/GhanaHomePage/NewsArchive/artikel.php?ID=202276 [Accessed 07/02/13]

[4] BUSINESSGUIDEGHANA.COM (2012) *first capital plus pampers workers* Available from:
http://news.moneygh.com/pages/bankingandfinance/201206/50.php [accessed 24/0613]

[5] CISSSE, L. (2006) *ECOWAS and the Daily Events: The Present Realities of the Integration Process within the Sub-Region* (GJA and FES: Accra), p.47.

[6] EN.WIKIPEDIA.ORG (2012) *Interview*. Available from: http://en.wikipedia.org/ wiki/Interview [Accessed 08/02/14]

[7] ESERVICES.GOV.GH (2012) *online services*. Available from: http://www.eser vices.gov.gh/dvla/SitePages/DVLA-Home.aspx [Accessed 30/05/13]

[8] ESERVICES.GOV.GH (2013) *eservices portal of government of Ghana.* Available from: http://www.eservices.gov.gh [Accessed 26/05/13]

[9] ESOKO.COM (n.d.) Available from: http://www.esoko.com/about/index.php [Accessed 21/06/13]

[10] FIRSTCAPITALPLUS.NET (2011) Available from: http://blog.firstcapitalplus.net/ events/ [Accessed 24/06/13]

[11] FLEETNEWS (2008) *DVLA launches e-licence checking service*. Available from: http://www.fleetnews.co.uk/news/2008/12/11/dvla-launches-e-licence-checking-service/29530/ [Accessed 30/07/12]

[12] Ghana News Agency (2007) *MTTU gives statistics of fatal accidents*. Available from: http://www.ghanaweb.com/GhanaHomePage/NewsArchive/artikel.php? ID=128741 [Accessed 07/02/13]

[13] Ghana News Agency (2008) *DVLA registrations go online*. Available from: http://www.modernghana.com/news/163669/1/dvla-registrations-go-online.html [Accesed 21/06/13]

[14] Ghana News Agency (2008) *road accidents cost Ghana Ghs 165,000 annually*. Available from: http://www.modernghana.com/news/160253/1/road-accidents-cost-ghana-gh165000-annually.html [Accessed 07/02/13]

[15] Ghana Statistical Service (2009) *Victimization survey in Ghana.* Available from: http://www.unodc.org/documents/data-and-analysis/dfa/Executive_Summary _GHANA_ final.pdf [Accessed 21/08/2010]

[16] GHANABUSINESSNEWS.COM (2012) Available from:http://www.ghanabusiness news.com/2013/02/05/ashanti-dvla-raises-gh%C2%A24-5m-revenue-in-2012/ [Accessed 07/02/13]

[17] GHANAPOLICE.INFO (n.d.) Available from: http://www.ghanapolice.info/broad_ formation.htm [Accessed 07/02/13]

[18] Global Road Safety Partnership (2012) Available from: www.grsproadsafety.org [Accessed 06/01/13]

[19] GNA (2012) *EC to Launch "BVR SMS Checking" on 3ʳᵈ September*, Available from:http://www.africanelections.org/ghana/news_detail.php ?nws=6560&t=EC%20to%20launch%20%E2%80%9CBVR %20SMS%20Checking%E2%80%9D%20on%203rd%20Sep tember [Accessed 21/06/13]

[20] JIWA ABDULLAH (2011) the design of mobile control car security system, *International Journal of Engineering and Technology* IACSIT, Vol.3, No.3, p.5

[21] JOSHUA PEPRAH (2008). Cell Phone Penetration to Hit 50%, Available from: http://www.ghanaweb.com/GhanaHomePage/economy/artike l.php?ID=144001

[22] KHONDKER SHAJADUL HASAN, MASHIUR RAHMAN, ABUL L. HAQUE, M ABDUR RAHMAN, TANZIL RAHMAN, M MAHBUBUR RASHEED (2009) Cost Effective GPS-GPRS Based Object Tracking System, *Proceedings of the International MultiConference of Engineers and Computer Scientists* Vol I, p.6 IMECS 2009, March 18 - 20, 2009, Hong Kong

[23] MAHESH KUMAR SHAKYA (2012) Catching Of Stolen Vehicles With Unique Identification Code Using Embedded Systems, *International Journal of Electronics Communication and Computer Technology* (IJECCT) Volume 2 Issue 6, p.5

[24] MILAN ZLOJUTRO (2010) *Vehicle Tracking and Monitoring System* U.S. pat. US 7,701,363 B1, p.2

[25] OSAC (2013) *Ghana 2013 Crime and Safety Report.* Available from: https://www.osac.gov/pages/ContentReportDetails.aspx?cid= 13768 [Accessed 15/3/2013]

[26] SHIHAB A. HAMEED, SHAIMA ABDULLA, AISHA HASSAN, OTHMAN KHALIFA, JAMAL I. DAOUD (2012) Effective Car Monitoring And Tracking Model**,** *Australian Journal of Basic and Applied Sciences*, 6(1): pp. 1-8, 2012