

**INFLUENCE OF NATIONAL TRANSPORT AND SAFETY AUTHORITY  
STRATEGIES ON PERFORMANCE OF ZUSHA ROAD SAFETY PROJECTS IN  
NAKURU COUNTY, KENYA**

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## DECLARATION

This research project report is my original work and has not been presented for a degree in any other University or any other award.

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This research project report has been submitted for examination with my approval as the University Supervisor.

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## **DEDICATION**

This work is dedicated to my son Joseph Horeri Mathenge who died in an accident in September, 2016 leaving behind a young family, his patients and medical students without a mentor.

## **ACKNOWLEDGEMENT**

My gratitude and thanks to those who have participated in one way or another to make this study possible, my wife Roseline and entire family. I cannot fail to mention Dr. Naomi Gikonyo, my very able supervisor and Mr. Mumo Mueke who have always been there to answer to my concerns.

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## ACRONYMS & ABBREVIATIONS

<b>BAC</b>	Blood Alcohol Consumption
<b>DMC</b>	Dangerous Mechanical Conditions
<b>FRSC</b>	Federal Road Safety Corps
<b>NRSC</b>	National Road Safety Council
<b>NTSA</b>	National Transport and Safety Authority
<b>PDO</b>	Property Damage Only
<b>PSV</b>	Public Service Motor vehicle
<b>SACCOs</b>	Savings and Credit Co-operative Organizations
<b>RSU</b>	Road Safety Unit
<b>RTA</b>	Roads and Transport Authority
<b>TNZ</b>	Transit New Zealand
<b>UAE</b>	United Arab Emirates
<b>US</b>	United States
<b>VIO</b>	Motor vehicle Inspection Office

## ABSTRACT

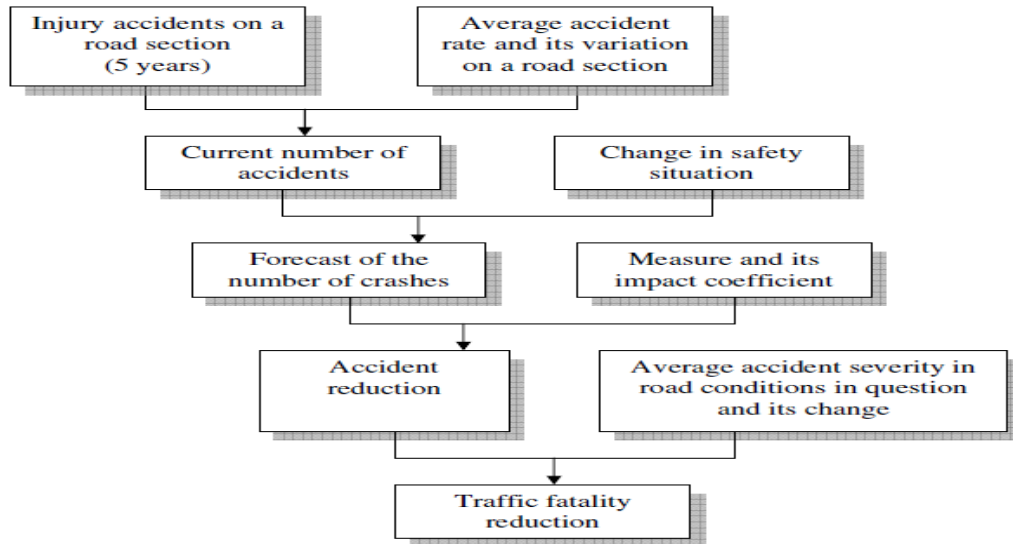
This study examined the influence of the National Transport and Safety Authority Strategies on the performance of Zusha road safety projects with a reference to Zusha project in Nakuru, Kenya. The road safety in Kenyan roads and especially in relations to the public road safety continues to be of concern to the government and other diverse stakeholders. The number of road fatalities were 1, 344 pedestrians, 339 drivers, 668 passengers, 637 motor cycle fatalities, and 69 pedal cyclists in 2015. These numbers illustrates the state of road safety in Kenya. The country continues to face relatively high cases of accidents and fatalities despite the formation of NTSA. The study's objectives were to determine the influence of motor vehicle inspections on road safety projects performance, to establish the influence of road regulations on performance of road safety projects, to examine the influence of road users' safety awareness on performance of road safety projects, and to determine the influence of road safety audits on performance of road safety projects. The study utilized the descriptive research design. The target population of this study was the people with information on the road safety projects performance in Nakuru. These people included the drivers, pedestrians, motor cyclists, motor vehicle passengers, NTSA officials and traffic police officers. The sample size utilized for this study was 353 respondents. This research utilized the structured questionnaire to address the specific objectives of the study. The pilot study was undertaken in Naivasha Sub County using 10% of the respondents, that is, 10 respondents. The validity of the questionnaire was examined using the pilot study aspects. The reliability of the study was examined using the cronbach alpha coefficient of above 0.7. Both the descriptive and inferential data analysis was utilized for the study. The descriptive statistics involved the frequency distributions and the means while the inferential statistics involved the multiple linear regressions. The multiple regression coefficient (R) that resulted from the multiple linear regression was 0.687 which implied that there was a moderate positive correlation between the independent variables and the dependent variable. The coefficient of determination ( $R^2$ ) was 0.472 which implied that 47.2% effect on performance of Zusha road safety projects can be accounted to the road users' safety audits, road regulations, motor vehicle inspection and road safety awareness. This therefore indicates that there are other factors which were not considered in this study which have a 52.8% influence on the performance of Zusha road safety projects. The analysis of variance (ANOVA) was undertaken to determine whether the regression model was reliable. The p value from the ANOVA was 0.000 which indicated that the regression model had no likelihood or probability (0.0%) of giving a wrong prediction. The threshold for reliability is 0.05 which was reached since the p value was 0.000 implying that the model was reliable. This regression model indicates that one-unit increase in road users' safety audits while other factors are kept constant would result in a 0.889 increase in performance of Zusha road safety projects. A one-unit increase in road regulations and road safety awareness would result in a 0.073 and 0.047 increase in performance of Zusha road safety projects respectively with the other variables kept constant. A one-unit increase in motor vehicle inspection would result in a 0.200 decrease in performance of Zusha road safety projects. This indicates that safety audits, road regulations and road safety awareness have a positive influence on the performance of Zusha road safety projects. On the other hand, it indicates that motor vehicle inspection has a negative influence on performance of Zusha road safety projects.

## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.1 Background of the Study**

Road safety remains a critical concern for governments and other stakeholders across the world since the first fatality caused by a motor vehicle in 1889 in New York, United States of America (Pooyan, 2012). Different authors have examined the conceptualization of the term road safety. King (2005) in a study on road safety in Thailand and Vietnam didn't explicitly examine the concept of road safety but looked at road safety projects. The study noted that road safety projects as interventions that seek significant improvement in factors driving road safety situation. These factors include driver behaviour, motor vehicle standards, enforcement levels, legislation, road infrastructure quality and traffic engineering standards. On the other hand, Pooyan (2012) in a study on the incorporation of road safety into road management systems conceptualized road safety in terms of road crashes, severity of road crashes, and frequency of road crashes per road segment. The study defined the road crashes as a set of events that result in injury or property damage due to collisions of at least one motorized motor vehicle and may involve another motor vehicle or a non-motorized user such as a bicyclist, a pedestrian or an object. On the other hand, the road severity is defined according to three classifications that is Fatal, injury and Property Damage Only (PDO) accidents (Bagi & Kumar, 2012). On the other hand, the road crashes frequency is examined in terms of number of accidents per unit of time, per volume of traffic, per road section etc. (Geedipally, 2008).



**Figure 1: Road Safety Representation**

**Source; Geedipally (2008)**

Similar to Pooyan (2012), Heydari (2012) also examines road safety in terms of the number of accidents or accident consequences, kind and severity, that is expected to occur on a given section of the road. On the other hand, Gitagama (2014) examines road safety as the measures that a person using the road transport system in place needs to observe for their own personal safety and the safety of other road users. Finally, Al-Dah, (2010) in a study on the causes and consequences of road traffic crashes in Dubai notes that diverse measures can be used for road safety measurement. This includes crashes per motor vehicle kilometer of exposure, crashes per passenger kilometer of exposure , crashes per hour of exposure, crashes per number of trips, crashes per number of participants, crashes per population regardless of individual exposure, and fatal or injury crashes per total number of crashes (Al-Dah, 2010).

Road safety remains a global challenge due to the various lives lost in road accidents. In this context, Vigneshkumar & Vijay (2014) noted that in India the road accidents were approximately half a million with over 125, 000 fatalities in 2009. In Namibia, the National Road Safety Council., (2009) indicated that there were 13, 825 and 15, 537 road crashes in 2008 and 2009 respectively. On the other hand, the numbers of road crashes fatalities were at 259 and 278 in 2008 and 2009 respectively. Finally, National Road Safety Council., (2009) noted that the number of casualties stood at 3,845 and 4,164 in 2008 and 2009 respectively. According to Kemeh (2010), road casualties are still relatively high in Ghana. In this context, Kemeh (2010) noted that in 2008, there were 11, 214 road crashes, 16, 455 road casualties and 1, 938 fatalities. On the other hand, Remi, Adegoke, & Oluwaseun (2010) noted that the road crashes recorded over a five year period from 2000 to 2006 stood at 98,494 cases of traffic crashes of which 28,366 were fatal and resulted into 47,092 deaths. In Uganda, Friday, Tukamuhabwa, & Muhwezi (2012) indicated that road accidents were on the rise. To demonstrate this, the study noted that 14,390 accidents (1,438 fatalities and 12,946 injuries) were reported in year 2000, and had increased to 18,250 accidents (2,334 fatalities and 12,076 injuries) by the year 2008. This represented a 26.8% increase in accident levels over an eight year period.

There are diverse factors leading to the road safety challenges across the globe. These challenges range from human factors, infrastructure related factors, and motor vehicle related aspects (Chattaraj, 2013). The human factors include poor driver attitudes and road practices such as reckless driving, over speeding, incompetency of the driver, driving under influence of alcohol, inconsiderate road usage and lack of compliance to

road safety regulations (Jinadasa & Bishop, 2014). The human factors can also include the road practices of pedestrians on the road. The infrastructure related aspects include the conditions of the road in terms of the road width, speed bumps, and factors affecting visibility along the road (Remi et al., 2010). Finally, the motor vehicle related factors include the road worthiness of the motor vehicle. The diverse factors affecting the road safety aspects contribute differently to road safety compromises around the world. For example, Friday et al., (2012) in examination of road safety in Uganda notes that driver related factors, motor vehicle conditions and road infrastructure contribute to 80%, 10%, and 5% of the road crashes in Uganda respectively.

Diverse countries across the world have formed specialized authorities and regulatory bodies to deal with aspects of road safety. In Namibia, Iipinga & Owusu-afriyie (2014) notes that the National Road Safety Council of Namibia (NRSC) was formed under the Ministry of Works and Transport. The body's objectives includes undertaking of research on road safety aspects, issuance of policy guidelines to law enforcement policies, and creating public awareness on the road safety issues. However, despite the presence of NRSC, challenges of road safety still persist in the county. According to National Road Safety Council (2009), there was an increase of 12.4%, 7.3%, and 7.6% increases in road crashes, road crashes fatalities and number of casualties respectively between 2008 and 2009.

In Ghana, the government formed the National Road Safety Commission (NRSC) in 1999 through an act 567 of parliament (Kemeh, 2010). In Nigeria, the Federal Road

Safety Corps (FRSC) was formulated as a specialized road safety organization (Ajibola, 2015).The Federal Road Safety Commission (FRSC) is a paramilitary organization formed in 1988 by the Federal Government of Nigeria with diverse functions. These functions include undertaking of road safety campaigns, clearing any obstructions on the highway, enforcing traffic rules, issuance of drivers' licenses, advisory roles on road safety issues and taking care of the road accident victims. According to Federal Road Safety Commission., (2016) several measures have been undertaken to improve on the road safety have started to bear fruits. Amongst the aspects that they had undertaken included effective usage of mobile courts, renewed vigor in road safety campaigns especially around festivities, and updating of road signage across the country. The statistics in Nigeria therefore indicate decreasing trends in road safety challenges. In this context, Federal Road Safety Commission., (2016) notes that the road crashes stood at 10, 380 and 9, 734 in 2014 and 2015 respectively. Over the same period, the road fatalities stood at 5, 996 and 5, 440 respectively.

In Kenya, several measures, policies and institutional frameworks have been updated across the years. According to Magolo & Mitullah (2007) diverse institutional reforms have taken place in Kenya to address the aspects of road safety. The study noted that the Kenya Police introduced the highway patrol system between 1972 and 1974, formation of National Road Safety Council (NRSC) and Road Safety Unit (RSU) as a secretariat to the NRSC between 1981 and 1983. Magolo & Mitullah (2007) further noted that NRSC went into limbo between 1987 and 1989. The National Transport and Safety Authority (NTSA) was established by an act number 33 of Parliament in 2012 which was gazette on

26<sup>th</sup> October, 2012 (The National Transport and Safety Authority Act., 2012). The functions of NTSA are spelt under sections 4 (1) and 4 (2) of the National Transport and Safety Authority Act. These functions include advising and making recommendations to the Cabinet Secretary on matters relating to road transport and safety; implementing policies relating to road transport and safety; plan, manage and regulate the road transport system in accordance with the provisions of the NTSA Act and ensuring the provision of safe, reliable and efficient road transport services (The National Transport and Safety Authority Act., 2012). In order to undertake its functions, NTSA undertakes the following additional duties; registering and licensing motor vehicles; conducting motor vehicle inspections and certification; regulating public service motor vehicles; advising the Government on national policy with regard to road transport system; developing and implementing road safety strategies, and facilitating the education of the members of the public on road safety (The National Transport and Safety Authority Act., 2012). Other duties include conducting research and audits on road safety; Compiling inspection reports relating to traffic accidents; establishing systems and procedures for, and oversee the training, testing and licensing of drivers; formulate and review the curriculum of driving schools; and co-ordinate the activities' of persons and organizations dealing in matters relating to road safety (The National Transport and Safety Authority Act., 2012).

The Zusha National Road Safety is an initiative of diverse stakeholders including the University of Georgetown, and United States Agency for Development aiming at reduction of road accidents in Kenya. The road safety project has three components 1) Distribution of Zusha safety stickers in PSVs 2) Complementary messaging through



radio, billboards, social media, newspaper advertisements, editorials, and news articles and 3) National and regional stakeholder conferences to raise awareness. The stickers are placed in all the public service motor vehicles. The plan that was first initiated in Kenya is to be rolled in Tanzania, Uganda and Rwanda. The strategies that have been adopted by NTSA to operationalize the Zusha road safety program includes sensitization and empowerment of road users, road shows and safety awareness campaigns, structuring of informal public service motor vehicle sectors through registration of PSV Savings and Credit Co-operative Organizations (SACCOS) and companies, training and capacity building of the PSV stakeholders.

## **1.2 Statement of the Problem**

The road safety in Kenyan roads and especially in relations to the public road safety continues to be of concern to the government and other diverse stakeholders. According to National Transport and Safety Authority, (2016) the number of road fatalities were 1, 344 pedestrians, 339 drivers, 668 passengers, 637 motor cycle fatalities, and 69 pedal cyclists in 2015. These numbers illustrates the state of road safety in Kenya. The country continues to face relatively high cases of accidents and fatalities despite the formation of NTSA. The NTSA statistics shows that the public road safety is deteriorating in nature. In this context, the passenger fatalities increased from 1340 to 1344 between 2014 and 2015; the PSV drivers fatalities increased from 268 to 339 between 2014 and 2015 (National Transport and Safety Authority., 2016). The Nakuru-Nairobi highway enjoys a high vehicular traffic to both the vehicles terminating their journeys in major towns such as Naivasha and Nakuru as well to the vehicles accessing the western part of Kenya and

Uganda. However, the highway has been declared as one of the most unsafe roads around the world. The World Health Organization in a 2013 report on road safety declared the Nakuru-Nairobi highway as being ranked the second most dangerous road in Africa. The road was also declared as the fourth most dangerous road in the world. This was attributed to the high number of accidents and fatalities on the road compared to other major highways. The accidents were attributed to drink driving, overtaking, and speeding amongst other factors. This study sought to examine the influence of the national transport and safety authority in enhancing public road safety projects in Nakuru County.

### **1.3 Purpose of the Study**

The purpose of the study is to examine the influence of national transport and safety authority strategies on performance of road safety projects in Nakuru county, Kenya

### **1.4 Objectives of the Study**

The study was based on the following objectives;

1. To determine the influence of motor vehicle inspections on road safety projects performance
2. To establish the influence of road regulations on performance of road safety projects
3. To examine the influence of road users' safety sensitization on performance of road safety projects
4. To determine the influence of road safety audits on performance of road safety projects

## **1.5 Research Questions**

The study was guided by the following research questions;

1. What is the influence of motor vehicle inspections on road safety projects performance?
2. How do road regulations influence performance of road safety projects?
3. What is the influence of road users' safety awareness on performance of road safety projects?
4. How do road safety audits influence the performance of road safety projects?

## **1.6 Significance of the Study**

The study was of significance to a diverse range of stakeholders including NTSA, County Governments, Matatu Owners, and researchers in the areas of road safety. The study helped highlight the concepts of road safety, road safety practices around the world and the effectiveness of the NTSA in enhancing the road safety aspects. This information was critical in assisting researchers in the area of road safety to conceptualize their literature review and gain in-depth understanding of the study. The Matatu owners gained an in-depth understanding on the role of motor vehicle and behaviors of their drivers in respect to the road safety aspects. This was critical the Matatu owners and public service motor vehicles place effective policies in respect to the operations of the Public Service Motor vehicles (PSVs). Finally, the NTSA gained from the study through an examination on how other bodies around the world enhance the road safety programs in their respective countries. The NTSA thus gained best practices from the study that they can implement in their study.

### **1.7 Delimitations of the Study**

The geographical scope of the study was Nakuru County due to the limitations of time as well as the financial resources to undertake the study in larger geographical scope. However, the Nakuru County is sufficient enough for the study to collect the required information for the study. The time scope of the study is six months from January to June of 2017 as the study is meant for academic purposes only. The budget scope of the study was Ksh 60, 000 as the study is self-funded.

### **1.8 Limitations of the Study**

The study was limited in diverse ways. The study sought to undertake the study amongst the Matatu drivers and conductors within the Nakuru County. Some of these drivers and conductors may be semi illiterate which may compromise their ability to fill the questionnaire on their own. This was mitigated through use of research assistants to interpret the questionnaires in the local dialects that are understandable to the respondents.

### **1.9 Assumptions of the Study**

The study was based on the assumptions that the respondents were truthful in their responses to the set questions on the study and they were willing to voluntarily participate in the study.

### **1.10 Definitions of the Key Terms Used**

**Road Crashes;** Events that result in injury or property damage due to collisions of at least one motorized motor vehicle and may involve another motor vehicle or a non-motorized user such as a bicyclist, a pedestrian or an object

**Road Regulations;** A set of rules that should be adhered to by the road users

**Road Safety Audits;** Formal procedure that is used for an independent assessment of an accident potential and likely safety performance of a specific design for a road or traffic scheme, whether new construction or an alteration to an existing road

**Road Safety Projects;** This is the projects that are undertaken in order to enhance safety aspects of the road

**Road Users' Safety Awareness;** The knowledge of the road users on the risk free usage of the road

**Motor vehicle Inspections;** The checking on the motor vehicle on whether they adhere to a set rule of road regulations

**Zusha Project;** A road safety project to encourage road safety on public service motor vehicle

### **1.11 Organization of the Study**

This study is organized in five chapters that is chapter one, two, three, four and five. Chapter one examined the introduction to the study and consisted of background to the study, statement of the problem, objectives of the study, significance of the study, limitations of the study and definitions of key terms.

Chapter two sought to examine the literature review of the study which examined the theoretical review literature and empirical review of the specific objectives. It also examined the conceptual framework and summary of reviewed literature.

Chapter three examined research design, target population, sample size and sampling procedure, data collection instrument, pilot study, data collection method, data analysis and presentation, ethical consideration, and operationalization of variables.

Chapter four examined the data presentation, analysis, interpretation and discussion. Finally, chapter five examined the summary, conclusions, recommendations of the study and suggestions for further studies.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter examined in detail the aspects of road safety project performance, and influences of motor vehicle inspection, road regulations, road users' safety awareness, and road safety audits on road safety performance. The chapter also examined the theoretical and conceptual frameworks.

#### **2.2 Performance of the Road Safety Projects**

According to Al-Dah (2010) in a study on causes and consequences of road traffic crashes in Dubai, UAE notes that the country has undertaken diverse road safety measure projects. In this context, Dubai formed the Roads and Transport Authority (RTA) in 2005 with a view of centralizing the traffic matters in one authority for better coordination and effective intervention measures on road safety issues. Amongst the functions of RTA include development and maintenance of roads in Dubai as well as licensing of drivers and motor vehicles.

In Ethiopia, Taera (2014) in a study on the country notes that the country has two major challenges affecting effectiveness of road safety programmes. The first major challenge is the coordination challenges as well as overlapping mandates amongst the different organizations involved in road safety issues. The study notes that some of these organizations don't have road safety issues as their primary objective hence leading to neglect on the road safety aspects.

In Uganda, Friday, Tukamuhabwa, & Muhwezi (2012) noted that there were diverse challenges that were facing road safety projects in the country. The study noted that there were inadequate professionally trained traffic officers as required by the Traffic and Road Safety Act. This meant that the enforcement of road traffic rules in the country were hampered. The traffic officers also had inadequate access to road safety equipment such as speed guns and breathalyzers. The study further noted that there is an increasing number of bad motor vehicles in Ugandan roads due to abolition of mandatory motor vehicle inspection.

According to Oburu (2015) in a study on road safety messages in Kenya, one of the projects that Kenyan government has initiated in road safety is the formation of National Transport and Safety Authority (NTSA). According to National Transport and Safety Authority., (2016) the vision of the authority is to provide sustainable and safe road transport system with zero clashes. On the other hand, the mission of the authority is to facilitate the provision of safe, reliable, and efficient road transport services. However, despite the formation of NTSA, Oburu (2015) notes that there is still high prevalence of road safety challenges in the country.

### **2.3 Motor vehicle Inspection and Performance of Road Safety Projects**

The motor vehicle inspection is a critical component of road safety performance aspects. Gitagama (2014) in a study on the public transport sector perception on television programming on road safety notes that motor vehicle inspection is key in enhancing road safety. In this context, the study notes that motor vehicles need regular inspections with a



view of guaranteeing that the components of the motor vehicles are safe to use and in good working conditions. The importance of the motor vehicle inspection to the road safety aspects is further emphasized by Friday, Tukamuhabwa, & Muhwezi (2012) in a study on road safety in Uganda. The study noted that the abolition of the mandatory motor vehicle inspection by the police in the mid-1990s led to an increase in motor vehicles in Dangerous Mechanical Conditions (DMC) on the roads (Friday et al., 2012). This has continually acted to undermine the road safety in the country.

The motor vehicle inspection is key in eliminating the unroadworthy motor vehicles and motor vehicles with DMC from the roads thus improving on the road safety conditions. In this context, commenting on the causes of accidents in Tanzania, Lewis (2013) indicated that the over 15% of the road accidents were caused by unroadworthy motor vehicles . The challenges that were noted in the motor vehicle roadworthiness lay with the fact that Tanzania imported second hand motor vehicles from developed countries. The mechanical conditions of some of these motor vehicles were blamed for the accidents in the Tanzanian roads. The existing mechanisms of motor vehicle inspections which were primarily visual in nature were noted to be unreliable in nature and lacking the comprehensiveness that is required. In emphasizing the role of motor vehicle conditions in road safety, Anini, (2011) further notes that there is a high likelihood of motor vehicles in worn out conditions to be involved in road accidents. In this context, King, (2005) therefore indicates that motor vehicles with adequate and working features such as seatbelts, adequate lights, brakes, steering wheel, tires as well as direction indicators among others and in good condition can help to reduce traffic accident.

In the rural parts of India, the lack of motor vehicle inspections has been blamed for increasing road accidents incidents. The lack of motor vehicle inspection has led to a large number of un-roadworthy motor vehicles that are characterized by faulty breaking system, faulty indicator lighting system, worn out tyres, loose wheels and overloaded axles (Khan, 2011). These aspects have contributed to the poor performance of the motor vehicles in the roads leading to increases cases of road accidents. In Nigeria, Motunrayo (2015) noted that the state of the motor vehicles had become a concern to the authorities leading to the creation of the Motor vehicle Inspection Office (VIO) which is concerned with the task of motor vehicle inspection within Nigeria. In Kenya, Sang (2009) in a study on assessment of the safety regulations noted that in 2009, the country had the Motor vehicle inspection Unit. This unit was responsible for the inspection of the public service motor vehicles before being licenced to operate as PSVs. The PSVs owners were required to pay an annual fee of Ksh 1,000 to the Motor vehicle Inspection Unit under the traffic police which ensured that the motor vehicle was compliant with all the required technical aspects to operate in the Kenyan roads. The owners were then issued with a certificate of inspection that allowed them to get a Transport and Licensing permit to operate as a PSV in Kenyan roads.

#### **2.4 Road Regulation and Performance of Road Safety Projects**

There are diverse regulations that have been enacted in relations to road usage with a view of improving on the road safety performance. In this context, Kim & Wagner (2014) noted that in the United States there regulations on alcohol consumption as well as speed limits in order to enhance road safety. In this context, the study noted that there was

appositive and highly significant influence of Blood Alcohol Consumption (BAC) in the US and the road safety levels. The alcohol regulation enhances the road safety aspects through ensuring that the driver has full control of the motor vehicle hence reducing the road crashes. The study also examined the role of speed limits regulations on road safety performance in the US. In this context, the study noted that over 40% of drivers violated speed limits in highways. The violation of speed limits is correlated with the less control of the motor vehicle as well as more severe injuries to the drivers and passengers in case of an accident.

Juma (2015) in a study on road users' awareness strategies in Tanzania noted that diverse ways in which the adherence to set regulations can impact on road safety. The study noted that over 80% of the motorists in the study sample did not know of the speed requirements/ regulations. Amongst the aspects that were found to engage in over speeding was a result of drinking, drug use and inexperienced learner drivers. These factors were seen to compromise road safety in Tanzania. Friday et al., (2012) in a study on the Road Communication Technologies and Safety Regulation Enforcement on Roads in Uganda noted challenges related to regulations on road safety aspects. The study noted that in Uganda about 80% to 95% of the road accidents are caused by lack of adherence to diverse road safety regulations. Amongst the major road safety regulations in Uganda includes the Traffic and Road Safety Act of 2004 which imposed speed limits, prohibited use of mobile phones while driving, prescribed alcohol limits, and authorized the use of speed governance. The lack of adherence to this road safety regulations resulting in poor road safety performance is manifested in the driver behaviour in Ugandan roads including

reckless driving, over speeding, poor road ethics and drug abuse aspects. The study in the examination of the compliance levels of road safety noted that the mandatory as opposed to voluntary regulatory compliance were correlated positively with road safety performance.

In Kenya, diverse regulations have been historically formulated and implemented in relations to the PSV. The most famous in the recent times were the regulations that were gazette in October of 2003 with an implementation date of 1<sup>st</sup> February, 2004. These regulations were known as the “Michuki” rules after the then Cabinet Minister for transport, John Michuki. According to Sang (2009), the regulation requirements included; Compulsory fitting of speed governors in all PSV and commercial motor vehicles whose tare weight exceed 3,048 kg in order to limit speed to 80 kph; Fitting of safety belts and use of the same on all motor vehicles (public, commercial and private); Employment of drivers and conductors on permanent basis and they must be security vetted and Compulsory wearing of uniforms and badges by all PSV drivers and conductors. Others included reduction of carrying capacity in all PSVs and outlawing transportation of standing passengers; Painting of a yellow band, indication of route details and writing of owner’s details in all PSVs to facilitate PSV identification, compulsory retesting of all PSV drivers after every 2 years and every driver prominently displaying his or her photograph.

The regulations had diverse impacts on the road safety in Kenya. Amongst the profound impact of the regulations included reduction of the speed limits hence reducing on road

fatalities involved as a result of speeding PSV. The PSVs also stopped having standing passengers as well as limiting the number of passengers that the PSVs could carry.

## **2.5 Road Users' Safety Awareness and Performance of Road Safety Projects**

The road safety awareness is critical in road safety performance across diverse road users including the drivers, passengers, and pedestrians. The driver's conduct is of critical importance to the road safety. This is because driving is a complex task requiring auditory, visual, and tactile attention of drivers (Hurtado, 2015). The drivers must therefore stay away from distractions and be focused on the road due to the changing nature of the environment in which they drive the motor vehicles. According to Walker & Strathie (2015) distracted driving involves anything that removes the attention of the driver from the primary task of driving. These distractions could be entertainment systems in the motor vehicles, and hand held devices amongst other distractions. Distracted driving has the capacity to compromise the road safety. In this context, King (2005) indicates that hand held devices increases the probability of being involved in an accident four fold. There could be other distractions that are external to the motor vehicle that the driver must be conscious of. The drivers must therefore at all times maintain an understanding of their immediate environment including the motor vehicle speeds, neighbouring motor vehicles, pedestrians, landmarks, and road signage amongst other aspects. These items collectively contribute to the driver's situation awareness which is critical for decision making while driving.

Pino, Baldari, Pelosi, & Giucastro (2014) in a study on Risk factors of road crash: An empirical analysis among an Italian drivers sample. The driver capacity to address the driving demands occasioned by driving conditions e.g. night driving or infrastructure demands e.g. roads with pot holes. The study notes that in the context where the driving task demands exceed the driver's capabilities then the driver fails to be in control of the motor vehicle which may lead to collision. Therefore, Pino et al., (2014) notes that driving task difficulty is inversely proportional to the difference in task demands and driver capability.

Moraa (2006) undertook a study of road safety in Kenya: a study of knowledge, attitudes and practices of drivers of passenger service motor vehicles. The study used a sample size of 160 respondents drawn from public service motor vehicles with a view of investigating how the knowledge, attitudes and practices of public service motor vehicle drivers contribute to road crashes. The study noted that PSV drivers led to high number of road accidents due to negative attitudes towards road safety regulations, and negative attitude towards law enforcement agencies as well as their work. The study also noted that the driving of public service motor vehicles were not standardized across the country leading to poor road safety practices amongst the drivers.

In the context of pedestrians, Kim & Wagner (2014) examined pedestrian safety in the United States of America. The study noted that mobile phone usage reduced the situation awareness amongst pedestrians hence increasing unsafe road practices. The study noted that impact of cell-phone use on pedestrian collision risk, with the finding that talking on

the phone (69.5 percent) accounted for more dangerous behavior than texting (9.1 percent) for pedestrians. The study also noted that pedestrians listening to music on the headphones. Juma (2015) in a study on the road User's Awareness on Strategies for Controlling Road Traffic Accidents in Tanzania noted that lack of awareness of road safety rules among various road users leads to unsafe road user behavior and habits. The lack of awareness on road safety amongst passengers, pedestrians, motorists and cyclists make the road users vulnerable to road accidents. The lack of awareness of the road safety aspects is particularly manifested through bad road usage ethics and lack of adherence to set road regulations.

## **2.6 Road Safety Audits and Performance of Road Safety Projects**

According to Bagi & Kumar (2012), the road safety audits started in the United Kingdom in the 1980s before spreading to Australia, New Zealand and United States in the mid-1990s. The road safety audit refers to a formal procedure that is used for an independent assessment of an accident potential and likely safety performance of a specific design for a road or traffic scheme, whether new construction or an alteration to an existing road (Sayed & Mhaske, 2013). The road safety audit is often used for the purposes of policy formulation in relations to the prevention of accidents within the road system.

European Transport Safety Council., (2007) indicates that there are diverse ways in which the road safety audits improves the road safety performance. These benefits include better planning aspects in transport infrastructure, creating of road safety awareness amongst policy makers, and reduction of unintended effects of transport

infrastructure designs. Therefore, the formal systematic safety audit procedures have been demonstrated to effective in the area of road safety. This is because the road safety audits should be in a position to reduce the number and severity of accidents in the roads, and enable good usage of the roads amongst road users.

Stephen (2001) in a study on the Safety analysis without the legal paralysis: The Road Safety Audit Program noted the diverse uses of road safety audits in enhancing road safety performance. The road safety audit is used for the purposes of proactively identifying and putting action plans for areas within the road network that compromises the road safety. The study noted that the ultimate aim of the safety audits is the minimization of the risks to pedestrians, motor vehicle passengers and drivers, and even people close to the roadways. Similarly, Loughheed (2006) indicates that there are five purposes of the road safety audits including the reduction of the likelihood of accidents, reduction of the severity of accidents, elevation of road safety amongst stakeholders, reduction of costly remedial work , and reduction of the overall cost of road accidents such as trauma, hospitalizations etc. In helping the road safety audit meet its objectives, there are diverse aspects that the safety auditor should illustrate including the roadside features, road surface markings, signing and delineation, intersections and approaches, and special road users.

Diverse countries across the world have formulated regulatory bodies that undertake the road safety audits. In the United Kingdom, the road safety audits started in the 1980s which was made mandatory in 1991 for all the national trunk roads and freeways. In



Australia, the guidelines for road safety audits were published in 1994 while in New Zealand the Transit New Zealand (TNZ) which is the road safety regulatory authority published the road safety audit guidelines in 1989. There has been diverse aspects of road safety that have been achieved as a result of road safety audits. Lougheed (2006) in a study on Road Safety Audits: Quantifying and Comparing the Benefits and Costs for Freeway Projects demonstrated tangible and practical benefits of safety audits. The study notes that benefits associated with road safety audits are often expressed in terms of collision frequencies reduction and or severities. Even when collisions occur, the road safety audits ensure that the severity of the collisions is not so severe in nature. The study in detailing the impact of road safety audit documented the comparative case of the old Trans-Canada Highway and a new highway that had been constructed. In recognition of the role of the road safety audits, the study noted that the new highway had a reduced collision rate of 0.259 collisions per million-motor vehicle-kilometers.

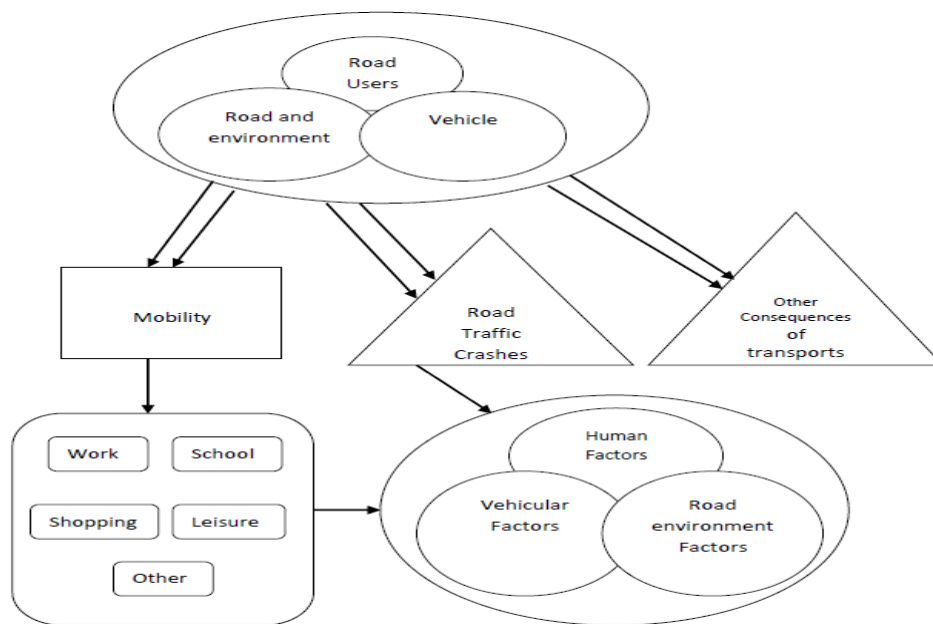
## **2.7 Theoretical Framework**

The study was based on the systems theory and Haddon's Matrix Theory.

### **2.7.1 Systems Theory**

Systems theory proposes the existence of behavior of certain elements in their natural environments through interactions with each other forming a certain order of functioning (Griffith, 2013). Normally, the elements of the systems are interrelated and rely on a feedback mechanism between each other. Within the context of road use and road safety, there are several elements all diverging from human performance to ensure smooth-or the lack of it in the use of the roads. The interaction of human and non-human factors whose

interaction forms a system has an impact on the road performance. The elements of the road usage system include human behaviors of other motorists, mechanical condition of motor vehicles, traffic policies and road factors (Muvuringi, 2012). The theory focuses on the diverse ways in which the system actors and parties inter relate to ensure safe transportation of people and goods from point A to point B. Its richness in suggesting factors that negatively and positively influence road safety provide particular importance to this study (Friday et al., 2012). In addition, the paper examines challenges that impact on the different elements of road systems that in turn affect road safety, through the incorporation of the systems theory.



**Figure 2: System's Theory on Road Safety**

**Source: Gumah (2015)**

### **2.7.2 Haddon's Matrix Theory**

Haddon's Matrix Theory is a refinement of the systems theory, in that it specifically suggests elements in the road that have been proven to impact road safety (An, Zhang,

Zhang, & Wang, 2014). The matrix theory suggests motor vehicle and equipment factors, environmental factors, human factors, pre-crash phase and post-crash-phase, and human factors as the six most important contributors to road safety. Different areas of research on road safety would then further refine on these elements, and pick the most applicable ones for the study. For this study, the most important elements of the study are the human and motor vehicle aspects of the Haddon's Matrix theory.

**Table 2.1: Haddon's Matrix**

Phase	Human Factors	Vehicles and Equipment Factors	Environmental Factors
Pre-crash	Information Attitudes Impairment Police Enforcement	Roadworthiness Lighting Breaking Speed Management	Road design and road layout Speed limits Pedestrian facilities
Crash	Use of restraints Impairments	Occupant restraints Other safety devices Crash-protective design	Crash-protective roadside objects
Post-Crash	First-aid skills Access to medics	Ease of access Fire risk	Rescue facilities Congestion

**Source: Yang (2012)**

## 2.8 Conceptual Framework

The study is guided by four independent variables, a moderating variable and a dependent variable. The independent variables include motor vehicle inspections, road regulations, road users' awareness, and road safety audits. The independent variables include the road safety project performance while the moderating variable is the judicial system and traffic laws

Independent Variables

Dependent Variable

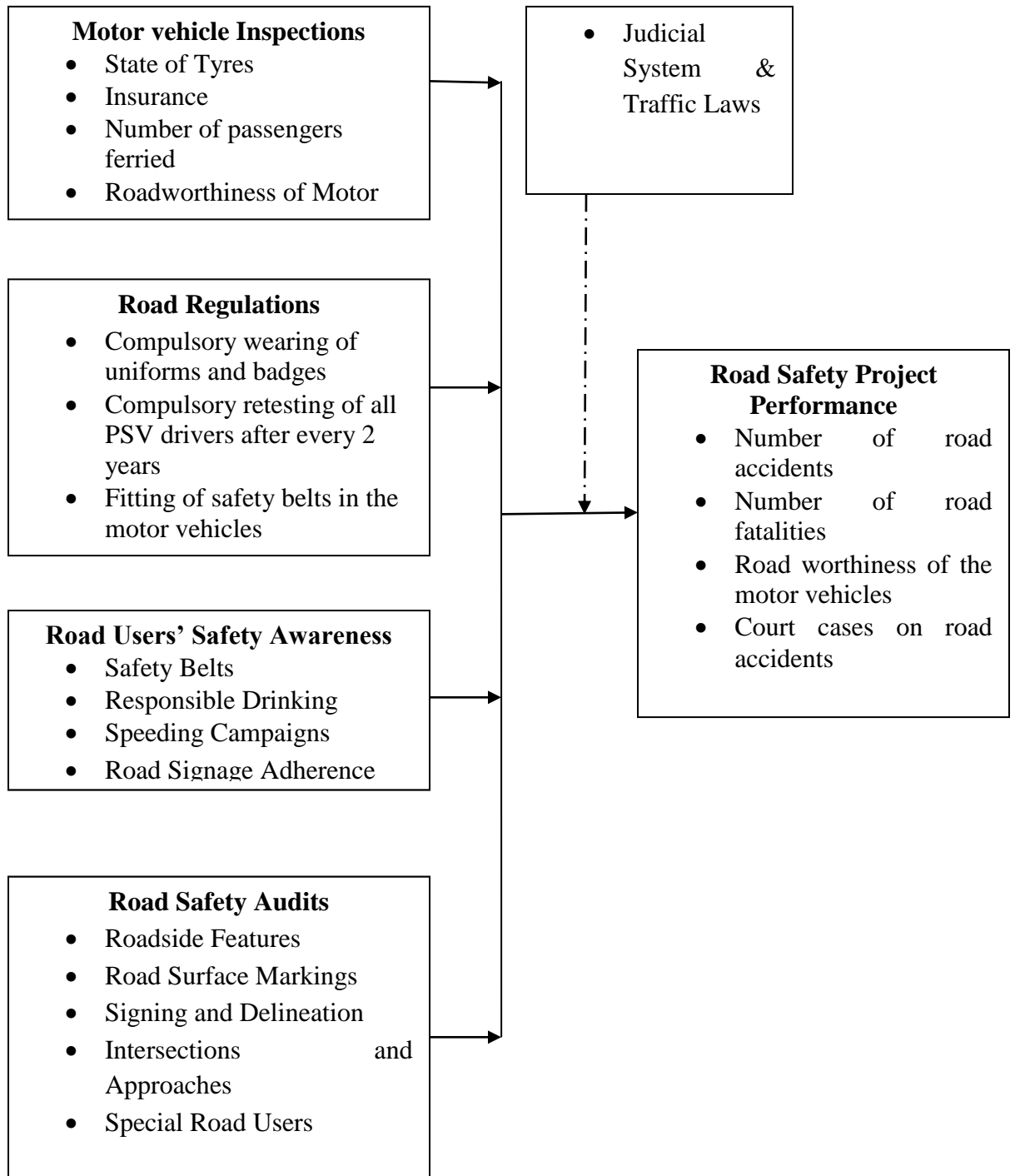


Figure 3: Conceptual Framework

## **2.9 Summary of Reviewed Literature and Research Gap**

There were diverse challenges noted with the performance of road safety projects including challenges with implementation bodies of the road safety campaigns, inadequate access to road safety equipment such as speed guns and breathalyzers and financial support of the activities. In respect to motor vehicle inspections, there is need regular inspections with a view of guaranteeing that the components of the motor vehicles are safe to use and in good working conditions. The motor vehicle inspection is key in eliminating the unroadworthy motor vehicles and motor vehicles with DMC from the roads thus improving on the road safety conditions. The challenges faced in motor vehicle inspection included the existing mechanisms of motor vehicle inspections which were primarily visual in nature were noted to be unreliable in nature and lacking the comprehensiveness that is required. The motor vehicle with adequate and working features such as seatbelts, adequate lights, brakes, steering wheel, tires as well as direction indicators among others and in good condition can help to reduce traffic accident.

There are diverse regulations that have been enacted in relations to road usage with a view of improving on the road safety performance. These regulations include alcohol consumption as well as speed limits regulations in order to enhance road safety. Other measures taken around the world include imposition of speed limits, prohibition of use of mobile phones while driving, prescribed alcohol limits, and authorized the use of speed governance. In Kenya, amongst the road regulations included Compulsory fitting of speed governors in all PSV and commercial motor vehicles whose tare weight exceed

3,048 kg in order to limit speed to 80 kph; Fitting of safety belts and use of the same on all motor vehicles (public, commercial and private); Employment of drivers and conductors on permanent basis and they must be security vetted and Compulsory wearing of uniforms and badges by all PSV drivers and conductors. Others included reduction of carrying capacity in all PSVs and outlawing transportation of standing passengers; Painting of a yellow band, indication of route details and writing of owner's details in all PSVs to facilitate PSV identification, compulsory retesting of all PSV drivers after every 2 years and every driver prominently displaying his or her photograph.

The road safety awareness is critical in road safety performance across diverse road users including the drivers, passengers, and pedestrians. The driver's conduct is of critical importance to the road safety. This is because driving is a complex task requiring auditory, visual, and tactile attention of drivers .The drivers must therefore stay away from distractions and be focused on the road due to the changing nature of the environment in which they drive the motor vehicles. The road safety audits are key in road safety through an independent assessment of an accident potential and likely safety performance of a specific design for a road or traffic scheme, whether new construction or an alteration to an existing road .

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter examined the researcher methodology of the study. The research methodology has been defined as the systematic and theoretical analysis of the methods to be used in the field of the study. This chapter examined the research design, target population, sample size and sampling procedure, data collection instrument, pilot study, data collection procedure, and data analysis procedure.

#### **3.2 Research Design**

The research design refers to the framework on how data was collected to enable adequate answering of the objectives of the study (Cooper & Schindler, 2008). The study utilized the descriptive research design. The descriptive research design is used to describe the characteristics and traits of the research subject through answering aspects of what happened, who is involved, where did it take place, when did it take place, why did it place and how did it take place (Sekaran, 2003). The descriptive study always addresses the research subject as it is on the ground without any variable manipulation. The descriptive research design was ideal for this study as the study sought to examine the influence of the NTSA strategies on performance of Zusha Road Safety Projects in Nakuru Kenya. The researcher examined the strategies as they are on the ground without any manipulation but simply described the manner in which they influence road safety performance.

### 3.3 Target Population

Target population has been defined as a group of individuals with a certain desired characteristic who provide the sample members and with which the results of the analysis will be extrapolated (Saunders, Lewis, & Thornhill, 2009). The target population of this study was the people with information on the road safety projects performance in Nakuru. These people include the drivers, pedestrians, motor cyclists, motor vehicle passengers, NTSA officials and traffic police officers.

### 3.4 Sample Size and Sampling Procedure

The process of including population members that have the desired characteristic into a smaller group that will be used to make inferences about the population is referred to as sampling (Kombo & Tromp, 2009). The appropriate number of these individuals in the smaller group (sample) is referred to as a sample size. This study utilized the Fisher formula in the calculation of the sample size as follows;

$$n = \frac{z^2 pq}{d^2}$$

where n is the desired sample size if sample population is bigger than 10,000

z= standard normal deviation at the required confidence interval

q=1-p

d=level of statistical significant set

Therefore;

$$n = \frac{1.96^2 * 0.5 * 0.5}{0.05^2} = 384$$

Since the population was less than 10,000 then

$$nf = \frac{n}{1+n/N} = \frac{384}{1+384/4,500} = 353 \text{ respondents where}$$



$n_f$ =desired sample size is less than 10,000

$n$ = desired sample population if sample is more than 10,000

$N$ =estimated population size

### **3.5 Data Collection Instrument**

The data collection instrument involves the platform used for the purposes of collecting information from the sample members in order to address the objectives of the study. This research utilized the structured questionnaire to address the specific objectives of the study. The structured questionnaire involve a set of written questions that the respondents are given options in relations to the answers that they can provide. The structured questionnaire will be divided into six sections in which the first section will have characteristics of the respondents while the other five sections will address the specific objectives. The structured questionnaire has diverse advantages that influence their use in this study. These advantages include the ease of the respondents filling the questionnaires compared to unstructured questionnaire, ease of data analysis using the SPSS software, and ease of administration to a huge number of respondents.

### **3.6 Pilot Study**

The pilot study of this research was undertaken. The pilot study is a small study aimed at testing the data collection procedures on a selected smaller number of sample with similar characteristics to the final sample that will be used but not in the same location (Sekaran & Bougie, 2011). This is to avoid the aspect of area for the final study from being contaminated or introducing an element of bias. The pilot study was also used for

testing aspects of data validity and reliability. The pilot study was undertaken in Naivasha sub county using 10% of the respondents that is 10 respondents.

### **3.6.1 Validity of Data Collection Instrument**

Validity has been defined as the accuracy of the research instruments in measuring what the researchers claim the instruments measure (Jankowicz, 2005). Validity is important in order to not get misleading results. The validity of the questionnaire was examined using supervisor and expert opinions.

### **3.6.2 Reliability of Data Collection Instrument**

The reliability of the questionnaires refers to the precision of the research instrument (Upagade & Shende, 2012). The precision of the research instrument refers to the ability of the research instruments to arrive at similar results after repeated trials. This researcher Used split half method to test reliability of the research instruments. The cronbach alpha test was used for checking the internal reliability of the study. The reliability of the study was calculated using the cronbach alpha coefficient which was above 0.7. The cronbach alpha coefficient of performance of road safety projects, motor vehicle inspection, road regulation, road users' safety awareness, and road safety audits had cronbach alpha coefficients of 0.765, 0.832, 0.765, 0.746, and 0.798 respectively. These cronbach alpha coefficients were greater than 0.7 leading to a conclusion that the data collection instrument was reliable.

### 3.7 Data Collection method

The data collection commenced after successful defense of the proposal document. The researcher first obtained a field work authorization letter from the University of Nairobi. The researcher then administered the consent statement and thereafter the questionnaire. The questionnaires were filled while we waited.

### 3.8 Data Analysis and Presentation

Data analysis is the process of using proven logical methods to interrogate data in order to gain insight on the objective requirements of the study. The collected data was first edited to remove any errors that may be associated with the data collection process. Data will then be coded to the SPSS software for the purposes of data analysis. Both the descriptive and inferential data analysis were utilized for the study. The descriptive statistics involved the frequency distributions and the means while the inferential statistics involved the multiple linear regression. The multiple linear regression that was used is as follows;

$$y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

Where; Y= Zusha Road Safety Projects

$\beta_0$  = constant

$\beta_1, \dots, \beta_4$  = Coefficients of estimates

$X_1$  = Motor vehicle Inspections

$X_2$  = road regulations

$X_3$  = road users' safety awareness

$X_4$  = road safety audits

### **3.9 Ethical Consideration**

The ethical consideration of the study was considered through an administration of the consent statement that advised on the purpose of the study, confidentiality of the responses given by the respondents and anonymity of the respondents.

### 3.10 Operationalization of Variables

The operationalization of the dependent and independent variables was examined through an examination of objectives, variables, indicators, measurement, measurement scale, data collection instrument, data collection tool, type of analysis, and tool of analysis.

**Table 3.1: Operationalization of Variables**

Objective	Variable	Indicator	Measurement	Measurement Scale	Data Collection Tool	Type of Analysis
To determine the influence of motor vehicle inspections on road safety projects performance	Motor vehicle Inspection	-State of Tyres -Insurance -Number of passengers ferried -Roadworthiness of Motor vehicle	-Likert Scale	-Ordinal	Questionnaire	-Descriptive Statistics (mean, frequency distributions, standard deviations) -Inferential Statistics (Regression analysis)
To establish the influence of road regulations on performance of road safety projects	Road Regulations	-Compulsory wearing of uniforms and badges -Compulsory retesting of all PSV drivers after every 2 years -Fitting of safety belts in the motor vehicles	Likert Scale	-Ordinal	Questionnaire	-Descriptive Statistics (mean, frequency distributions, standard deviations) -Inferential Statistics (Regression analysis)
To examine the	Road Users'	-Safety Belts	Likert Scale	-Ordinal	Questionnaire	-Descriptive

influence of road users' safety awareness on performance of road safety projects	Safety Awareness	-Responsible Drinking -Speeding Campaigns -Road Signage Adherence				Statistics (mean, frequency distributions, standard deviations) -Inferential Statistics (Regression analysis)
To determine the influence of road safety audits on performance of road safety projects	Road Safety Audit	-Roadside Features -Road Surface Markings -Signing and Delineation -Intersections and Approaches -Special Road Users	Likert Scale	-Ordinal	Questionnaire	-Descriptive Statistics (mean, frequency distributions, standard deviations) -Inferential Statistics (Regression analysis)

## CHAPTER FOUR

### DATA ANALYSIS, PRESENTATION, INTERPRETATION AND DISCUSSION

#### 4.1 Introduction

This study sought to examine the influence of national transport and safety authority strategies on performance of Zusha road safety projects in Nakuru County, Kenya. The study was based on four objectives, that is, examination of influence of motor vehicle inspection, road regulations, road users' safety awareness, and road safety audits on performance of Zusha road safety projects in Nakuru County.

#### 4.2 Questionnaire Response Rate

The study utilized a sample size of 384 respondents who were the people with information on the road safety projects performance in Nakuru. These people include the drivers, pedestrians, motor cyclists, motor vehicle passengers, NTSA officials and traffic police officers. Out of the 353 questionnaires distributed, 344 questionnaires were returned. The incomplete questionnaires were rejected, that is, 51 questionnaires, which left 293 complete questionnaires. The 293 questionnaires were the ones used for data analysis purposes and formed the basis for the results of this study. The response rate was 83.0% which was deemed sufficient for the study as indicated by Kothari (2010).

**Table 4.1: Response Rate**

Sample Size	Returned Questionnaires	Analyzed questionnaires	Response Rate
353	344	293	83.0%

### 4.3 Respondent's Characteristics

The gender and education levels of the respondents were used to study the respondents' characteristics.

#### 4.3.1 Gender Distribution

The gender of the respondents is critical for this study because different genders have different perception of road safety. The characteristic of gender was examined using Table 4.2 below. Most of the respondents (63.5%) in this study were male, while the female were 36.5%. This could be attributed to the disposition of most drivers and motor cyclists being male.

**Table 4.2: Distribution by Gender**

	<b>Frequency</b>	<b>Percentage</b>
Male	186	63.5%
Female	107	36.5%
Total	293	100.0%

#### 4.3.2 Education Level Distribution

The education level of the respondents was examined using Table 4.3 below. Most of the respondents, that is, 55.6% in the study having secondary level of education followed by those who had graduate, primary school and post graduate levels at 20.8%, 13.3%, and 10.2%.

**Table 4.3: Distribution by Education Level**

	<b>Frequency</b>	<b>Percentage</b>
Primary School	39	13.3%
Secondary School	163	55.6%
Graduate School	61	20.8%
Post Graduate School	30	10.2%
Total	293	100.0%



#### 4.4 Influence of Motor vehicle Inspection of Road Safety Performance

The study utilized a Likert scale of 1-5 where 1-Strongly Disagree, 2-Disagree, 3-Uncertain, 4-Agree And 5-Strongly Agree. The study examined which motor vehicle inspection aspects played a significant role in road safety, that is, among state of tyres, insurance, number of passengers ferried, roadworthiness of motor vehicle, and presence of seat belts. The findings were presented in Table 4.4.

**Table 4.4: Frequency Distributions of Motor vehicle Inspection**

	<b>SA</b>	<b>A</b>	<b>U</b>	<b>D</b>	<b>SD</b>
	<b>Freq.</b>	<b>Freq.</b>	<b>Freq.</b>	<b>Freq.</b>	<b>Freq.</b>
	<b>(%)</b>	<b>(%)</b>	<b>(%)</b>	<b>(%)</b>	<b>(%)</b>
State of Tyres	91	140	34	20	8
	31.1%	47.8%	11.6%	6.8%	2.7%
Insurance	72	102	72	47	0
	24.6%	34.8%	24.6%	16.0%	0.0%
Number of passengers ferried	94	144	23	28	4
	32.1%	49.1%	7.8%	9.6%	1.4%
Roadworthiness of Motor vehicle	156	76	34	27	0
	53.2%	25.9%	11.6%	9.2%	0.0%
Presence of Seat Belts	81	137	56	15	4
	27.6%	46.8%	19.1%	5.1%	1.4%

In the context of state of tyres, 47.8% of the respondents responded with agree, while 31.1% chose strongly agreed. The least number of respondents in the aspect of state of tyres was 2.7% who responded with strongly disagreed, while those who were uncertain and disagreed were 11.6% and 6.8% respectively. There was no strongly disagreed response on roadworthiness of motor vehicle and insurance aspects of motor vehicle inspection and 53.2% of the respondents chose strongly agree and 25.9% chose agree in respect to roadworthiness of motor vehicle which meant that it was a major influence on road safety.

Insurance was also critical in road safety as a cumulative majority of 59.4% of the respondents affirmed it. Presence of seat belts and number of passengers ferried scored an equal number of respondents who strongly disagreed (1.4%) that it played a role in road safety. However most of the respondents affirmed that they both did with each getting strongly agreed responses from 27.6% and 32.1% of the respondents respectively and agree responses from 46.8% and 49.1% respectively. A few of the respondents (19.1% and 7.8% respectively) were uncertain whether presence of seat belts and number of passengers ferried played a part in road safety while (5.1% and 9.6% respectively) disagreed.

The means denoted by,  $\mu$ , in the study were grouped into five intervals with the interval  $4.5 < \mu \leq 5$  interpreted as tendency to strongly agree,  $3.5 < \mu < 4.5$  as tendency to agree,  $(2.5 < \mu < 3.5)$  as tendency to be uncertain,  $(2.5 < \mu < 1.5)$  as tendency to disagree, and  $(1 \geq \mu < 1.5)$  as tendency to strongly disagree. The study examined which motor vehicle inspection aspects on average played a significant role in road safety, that is, among state of tyres, insurance, number of passengers ferried, roadworthiness of motor vehicle, and presence of seat belts. In this context, the mean of the various metrics was generated. In interrogating the influence of the motor vehicle inspection metrics on road safety, on average the respondents tended to agree that they all have an influence as the mean scores of all the metrics on motor vehicle inspection were in the range of  $3.5 < \mu \leq 4.5$ , that is, state of tyres (3.976), insurance (3.679), number of passengers ferried (4.010), roadworthiness of motor vehicle (4.232), and presence of seat belts (3.942). This implied that on average, the respondents were inclined to agree that the role of motor vehicle inspection was significant in performance of road safety.

The importance of the motor vehicle inspection to the road safety was consistent with a study by Friday, Tukamuhabwa, & Muhwezi (2012) on road safety in Uganda. The study noted that the abolition of the mandatory motor vehicle inspection by the police in the mid-1990s led to an increase in motor vehicles in Dangerous Mechanical Conditions (DMC) on the roads (Friday et al., 2012) which has continually acted to undermine the road safety in the country. Additionally in Nigeria, Motunrayo (2015) noted that the state of the motor vehicles had become a concern to the authorities leading to the creation of the Motor vehicle Inspection Office (VIO) which is concerned with the task of motor vehicle inspection within Nigeria. In Kenya, Sang (2009) in a study on assessment of the safety regulations noted that in 2009, the country had the Motor vehicle inspection Unit which was responsible for the inspection of the public service motor vehicles before being licenced to operate as PSVs.

Roadworthiness of the motor vehicle on average had a greater influence on road safety compared to the other metrics of the business skills matrix as it scored the highest mean. This was consistent with a study by Anini, (2011) which emphasized on the role of motor vehicle conditions in road safety noting that there is a high likelihood of motor vehicles in worn out conditions to be involved in road accidents. Additionally, lack of motor vehicle inspection has led to a large number of un-roadworthy motor vehicles that are characterized by faulty breaking system, faulty indicator lighting system, worn out tyres, loose wheels and overloaded axles (Khan, 2011). These aspects have contributed to the poor performance of the motor vehicles in the roads leading to increases cases of road accidents. In this context, King, (2005) therefore indicates that motor vehicles with

adequate and working features such as seatbelts, adequate lights, brakes, steering wheel, tires as well as direction indicators among others and in good condition can help to reduce traffic accident.

The standard deviations denoted by,  $\sigma_x$ , in this study were interpreted as high consensus for  $\sigma_x \leq 0.5$ , moderate consensus for  $0.5 < \sigma_x \leq 1$  and no consensus  $\sigma_x > 1$  among the respondents on the given metric. The standard deviation of state of tyres was 0.974, that of number of passengers ferried was 0.955, that of roadworthiness of motor vehicle was 0.983, and that of presence of seat belts was 0.89. These standard deviations were moderately distributed around the mean which implied that there was moderate consensus  $0.5 < \sigma_x \leq 1$  among the respondents that state of tyres, number of passengers ferried, roadworthiness of motor vehicle, and presence of seat belts each had an influence on road safety. The standard deviation of insurance was 1.017 meaning the responses were widely distributed around the mean which indicated there was no consensus ( $\sigma_x > 1$ ) on whether the insurance aspect of motor vehicle inspection had an influence on road safety.

**Table 4.5: Means and Standard Deviation of Motor vehicle Inspection**

	<b>Mean</b>	<b>Std. Deviation</b>
State of Tyres	3.976	0.974
Insurance	3.679	1.017
Number of passengers ferried	4.010	0.955
Roadworthiness of Motor vehicle	4.232	0.983
Presence of Seat Belts	3.942	0.891

#### **4.5 Influence of Road Regulations on Road Safety Projects Performance**

The respondents were asked which road regulations aspects have played a significant role in road safety aspects among compulsory wearing of uniforms and badges, compulsory

retesting of all PSV drivers after every 2 years, fitting of safety belts in the motor vehicles, drivers' having driving license, and maintenance of the recommended speed levels. The results were presented in Table 4.6 below.

**Table 4.6: Frequency Distributions of Road Regulations**

	<b>SA</b>	<b>A</b>	<b>U</b>	<b>D</b>	<b>SD</b>
	<b>Freq.</b>	<b>Freq.</b>	<b>Freq.</b>	<b>Freq.</b>	<b>Freq.</b>
	<b>(%)</b>	<b>(%)</b>	<b>(%)</b>	<b>(%)</b>	<b>(%)</b>
Compulsory wearing of uniforms and badges	141 48.1%	84 28.7%	48 16.4%	19 6.5%	1 0.3%
Compulsory retesting of all PSV drivers after every 2 years	132 45.1%	83 28.3%	49 16.7%	29 9.9%	0 0.0%
Fitting of safety belts in the motor vehicles	85 29.0%	125 42.7%	82 28.0%	1 3.0%	0 0.0%
Drivers' having driving license	54 18.4%	104 35.5%	111 37.9%	24 8.2%	0 0.0%
Maintenance of the recommended speed levels	53 18.1%	97 33.1%	93 31.7%	50 17.1%	0 0.0%

Most of the respondents who chose strongly agree did so in respect to the aspect of compulsory wearing of uniforms and badges (48.1%) followed by compulsory retesting of all PSV drivers after every 2 years (45.1%) which means they are the road regulation's aspects which the respondents feel mostly play a role in road safety. Further affirmation on the same metrics was from the respondents who chose agree, that is, 28.7% and 28.3% respectively. Only a negligible number of respondents chose to respond with strongly disagreed (0.3%) on whether compulsory wearing of uniforms and badges has played a significant role in road safety, with no similar responses on all the other metrics. Additionally the disagree prompt received the least number of responses on each of the aspects of road regulations, that is, 6.5%, 9.9%, 3.0%, 8.2%, 17.1% further supporting the importance of the role played by road regulations on road safety.

On average, the study sought to examine which road regulations aspects have played a significant role in road safety among compulsory wearing of uniforms and badges, compulsory retesting of all PSV drivers after every 2 years, fitting of safety belts in the motor vehicles, drivers' having driving license, and maintenance of the recommended speed levels. Compulsory wearing of uniforms and badges had a mean score of 4.178, compulsory retesting of all PSV drivers after every 2 years had a mean score of 4.085 while fitting of safety belts in the motor vehicles had a mean score of 4.003. The drivers having driving license scored a mean of 3.642, and maintenance of the recommended speed levels scored a mean 3.522. On average, compulsory wearing of uniform was the road regulation aspect that played a greater significant role in road safety than the others as it had the highest mean score (4.178) among the metrics on road regulations.

Maintenance of the recommended speed levels played the least significant role on average of all the metrics on road regulations as it had the least mean score (3.522). This was contrary to a study on the Road Communication Technologies and Safety Regulation Enforcement on Roads in Uganda by Friday et al., (2012). The study found that amongst the major road safety regulations in Uganda is the Traffic and Road Safety Act of 2004 which imposed speed limits, prohibited use of mobile phones while driving, prescribed alcohol limits, and authorized the use of speed governance. Kim & Wagner (2014) noted that in the United States there are regulations on alcohol consumption as well as speed limits in order to enhance road safety. The study also examined the role of speed limits regulations on road safety performance in the US.

In this context, the study noted that over 40% of drivers violated speed limits in highways. The violation of speed limits is correlated with less control of the motor vehicle as well as more severe injuries to the drivers and passengers in case of an accident. Friday et al., (2012) in a study on the Road Communication Technologies and Safety Regulation Enforcement on Roads in Uganda noted that amongst the major road safety regulations in Uganda includes the Traffic and Road Safety Act of 2004 which imposed speed limits, prohibited use of mobile phones while driving, prescribed alcohol limits, and authorized the use of speed governance. The lack of adherence to this road safety regulations resulting in poor road safety performance is manifested in the driver behaviour in Ugandan roads including reckless driving, over speeding, poor road ethics and drug abuse aspects. In Kenya, regulations known as the “Michuki” rules were formulated and implemented in relations to the PSV. According to Sang (2009), amongst the profound impact of the regulations included reduction of the speed limits hence reducing on road fatalities involved as a result of speeding PSV.

**Table 4.7: Means and Standard Deviation of Road Regulations**

	<b>Mean</b>	<b>Std. Deviation</b>
Compulsory wearing of uniforms and badges	4.178	0.952
Compulsory retesting of all PSV drivers after every 2 years	4.085	1.005
Fitting of safety belts in the motor vehicles	4.003	0.765
Drivers’ having driving license	3.642	0.875
Maintenance of the recommended speed levels	3.522	0.978

There was no consensus among the respondents on whether the road regulation aspect of compulsory retesting of all PSV drivers after every 2 years played a significant role in road safety as it has a standard deviation of 1.005 ( $\sigma_X \geq 1$ ). The responses on compulsory wearing of uniforms and badges were moderately distributed around the mean with a

standard deviation of 0.952 implying that there was moderate consensus ( $0.5 < \sigma_x < 1$ ) that it played a significant role in road safety. The same was implied on fitting of safety belts in the motor vehicles which had a standard deviation of 0.765, drivers' having driving license which had a standard deviation of 0.875, and maintenance of the recommended speed levels which had a standard deviation of 0.978.

#### 4.6 Influence of Road Users' Safety Awareness and Performance of Road Safety Projects

The study sought to know whether road users' safety awareness aspects have played a significant role in road safety. The metrics which were used to examine this were safety belts, responsible drinking, speeding campaigns, road signage adherence, and presence of black spots. The results were presented in Table 4.8 below.

**Table 4.8: Frequency Distributions of Road Users' Safety Awareness**

	<b>SA</b>	<b>A</b>	<b>U</b>	<b>D</b>	<b>SD</b>
	<b>Freq.</b>	<b>Freq.</b>	<b>Freq.</b>	<b>Freq.</b>	<b>Freq.</b>
	<b>(%)</b>	<b>(%)</b>	<b>(%)</b>	<b>(%)</b>	<b>(%)</b>
Safety Belts	112 38.2%	107 36.5%	55 18.8%	19 6.5%	0 0.0%
Responsible Drinking	84 28.7%	155 52.9%	54 18.4%	0 0.0%	0 0.0%
Speeding Campaigns	59 20.1%	104 35.5%	82 28.0%	48 16.4%	0 0.0%
Road Signage Adherence	64 21.8%	143 48.8%	45 15.4%	41 14.0%	0 0.0%
Presence of black spots	85 29.0%	131 44.7%	77 26.3%	0 0.0%	0 0.0%

Presence of black spots had no disagree or strongly disagree responses and a cumulative majority of 73.7% affirmed that it has played a significant role in road safety, with only 26.3% unsure. There was no strongly disagreed response on all the aspects road users' safety awareness and most of the respondents chose agree in response to whether



responsible drinking, speeding campaigns, road signage adherence have played a significant role in road safety, that is, 52.9%, 35.5% and 48.8% respectively.

The study used mean scores of safety belts, responsible drinking, speeding campaigns, road signage adherence, and presence of black spots to know whether on average road users' safety awareness aspects have played a significant role in road safety. The mean scores from highest scored to lowest were responsible drinking (4.102), safety belts (4.065), presence of black spots (4.027), road signage adherence (3.785), and speeding campaigns (3.594). On average, the respondents tended to agree that all the metrics on road users' safety awareness played a significant role in road safety ( $3.5 < \mu < 4.5$ ). This was consistent with a study on the road User's Awareness on Strategies for Controlling Road Traffic Accidents in Tanzania by Juma (2015) which noted that lack of awareness of road safety rules among various road users leads to unsafe road user behavior and habits. Additionally, the study found that lack of awareness on road safety amongst passengers, pedestrians, motorists and cyclists make the road users vulnerable to road accidents. The drivers must therefore at all times maintain an understanding of their immediate environment including the motor vehicle speeds, neighbouring motor vehicles, pedestrians, landmarks, and road signage amongst other aspects (King, 2005). These items collectively contribute to the driver's situation awareness which is critical for decision making while driving.

On average, responsible drinking was perceived to have played a greater significant role than the other metrics on road users' safety awareness as it had the highest mean score. This was consistent with a study by Kim & Wagner (2014) where they noted that there

was a positive and highly significant influence of Blood Alcohol Consumption (BAC) in the US and the road safety levels. The alcohol regulation enhances the road safety aspects through ensuring that the driver has full control of the motor vehicle hence reducing the road crashes. Also, a study by Juma (2015) noted that amongst the aspects that were found to engage in over speeding was a result of drinking, drug use and inexperienced learner drivers.

In the context of speeding campaigns, the respondents perception on average was that they have played a significant role in road safety. This was also noted in a study in Tanzania by Juma (2015) . The study noted that over 80% of the motorists in the study sample did not know of the speed requirements/ regulations. These factors were seen to compromise road safety in Tanzania.

The standard deviations of the various metrics were used to examine whether there was consensus whether the various metrics on road users' safety awareness played a significant role in road safety. The standard deviation for safety belts was 0.910, standard deviation for responsible drinking was 0.680, and standard deviation for speeding campaigns was 0.987. Road signage adherence and presence of black spots had standard deviations of 0.943 and 0.744 respectively. There was moderate consensus among the respondents that each metric on average road users' safety awareness aspects had played a significant role in road safety ( $\sigma_X \geq 1$ ).

**Table 4.9: Means and Standard Deviation of Road Users' Awareness**

	<b>Mean</b>	<b>Std. Deviation</b>
Safety Belts	4.065	0.910
Responsible Drinking	4.102	0.680
Speeding Campaigns	3.594	0.987
Road Signage Adherence	3.785	0.943
Presence of black spots	4.027	0.744

#### **4.7 Influence of Road Safety Audits and Performance of Road Safety Projects**

The study examined whether road safety audits aspects have played a significant role in road safety through the aspects of roadside features, road surface markings, signing and delineation, intersections and approaches, and traffic policies adherence. The results were presented on table 4.10 below.

**Table 4.10: Frequency Distributions of Road Safety Audits**

	<b>SA Freq. (%)</b>	<b>A Freq. (%)</b>	<b>U Freq. (%)</b>	<b>D Freq. (%)</b>	<b>SD Freq. (%)</b>
Roadside Features	74 25.3%	144 49.1%	39 13.3%	28 9.6%	8 2.7%
Road Surface Markings	70 23.9%	123 42.0%	72 24.6%	16 5.5%	12 4.1%
Signing and Delineation	28 9.6%	139 47.4%	84 28.7%	38 13.0%	4 1.4%
Intersections and Approaches	76 25.9%	140 47.8%	26 8.9%	43 14.7%	8 2.7%
Traffic Policies Adherence	151 51.5%	115 39.2%	11 3.8%	12 4.1%	4 1.4%

In the context of roadside features, 49.1% and 25.3% of the respondents who chose agree and strongly agreed affirmed that roadside features played a significant role in road safety. 13.3% of the respondents were uncertain while 9.6% and 2.7% disagreed and strongly disagreed with the metric. In the context of road surface markings, a cumulative

majority of 65.9% felt they played a significant role in road safety while 9.6% were of the contrary opinion.

Signing and delineation had the highest number of unsure respondents (28.7%) in comparison to the other metrics on road safety audit, but had an equivalent number of respondents who strongly disagreed as traffic policies adherence. Intersections and approaches had agree and strongly agreed responses from 47.8% and 25.9% respectively while traffic policies adherence had 51.5% of the respondents choosing strongly agree implying that most of the respondents felt it was a very critical aspect of road safety audit and had a very significant role in road safety.

The means of various road safety audit aspects were examined to find out whether on average they have played a significant role in road safety. These aspects included roadside features, road surface markings, signing and delineation, intersections and approaches, and traffic policies adherence. The mean scores for road surface markings, intersections and approaches, and traffic policies adherence were 3.761, 3.846, and 3.795 respectively. The respondents tended to agree that all the metrics on road safety audits played a significant role in road safety with all mean scores being in the interval  $3.5 < \mu < 4.5$ . This implied that road safety audits was a critical aspect in road safety projects performance. The European Transport Safety Council., (2007) indicates that there are diverse ways in which the road safety audits improves the road safety performance. These benefits include better planning aspects in transport infrastructure, creating of road safety awareness amongst policy makers, and reduction of unintended effects of transport

infrastructure designs. Therefore, the formal systematic safety audit procedures have been demonstrated to effective in the area of road safety. This is because the road safety audits should be in a position to reduce the number and severity of accidents in the roads, and enable good usage of the roads amongst road users.

Stephen (2001) in a study on the Safety analysis without the legal paralysis: The Road Safety Audit Program noted the diverse uses of road safety audits in enhancing road safety performance. The road safety audit is used for the purposes of proactively identifying and putting action plans for areas within the road network that compromises the road safety. The study noted that the ultimate aim of the safety audits is the minimization of the risks to pedestrians, motor vehicle passengers and drivers, and even people close to the roadways. The respondents tended to agree that on average roadside features with a mean score of 4.355 played a greater significant role than the other aspects on road safety audit as it was the highest mean score while signing and delineation played the least significant role on average with the least mean score of 3.509.

The standard deviations for road surface markings and traffic policies adherence were 1.009 and 1.069 respectively indicating that the responses were widely distributed around the mean which implied there was no consensus ( $\sigma_x \geq 1$ ) among the respondents whether both aspects of road safety audit played a significant role in road safety. Roadside features, signing and delineation, and intersections and approaches had standard deviations of 0.846, 0.886 and 0.997 indicating the responses were moderately distributed

around the mean implying there was moderate consensus ( $0.5 < \sigma_x < 1$ ) that each of the metrics played a significant role in road safety.

**Table 4.11: Means and Standard Deviation of Road Safety Audits**

	<b>Mean</b>	<b>Std. Deviation</b>
Roadside Features	4.355	0.846
Road Surface Markings	3.761	1.009
Signing and Delineation	3.509	0.886
Intersections and Approaches	3.846	0.997
Traffic Policies adherence	3.795	1.069

#### **4.8 Road Safety Projects Performance**

Within the context of road use and road safety, there are several elements all diverging from human performance to ensure smooth-or the lack of it in the use of the roads. Systems theory proposes the existence of behavior of certain elements in their natural environments through interactions with each other forming a certain order of functioning (Griffith, 2013). The elements of the road usage system include human behaviors of other motorists, mechanical condition of motor vehicles, traffic policies and road factors (Muvuringi, 2012). The study sought to examine whether motor vehicle inspection, road regulations, road users' safety awareness, and road safety audits have impacted road safety projects using various metrics. These included reduction on number of road accidents, reduction of road fatalities, improvement in road worthiness of the motor vehicles, and reduction of court cases on road accidents. Most of the respondents agreed that the number of road accidents (64.5%) reduced same as road fatalities (63.5%) as a result of motor vehicle inspection, road regulations, road safety awareness, and road safety audits with those who chose strongly agreed (17.7%) further supporting this. The respondents, who were unsure, disagreed and strongly disagreed were 10.9%, 5.5% and

1.4% respectively in respect to reduction on number of road accidents, and 2.4%, 6.8% and 4.1% respectively in respect to reduction of road fatalities.

**Table 4.12: Frequency Distributions of Road Safety Projects Performance**

	<b>SA Freq. (%)</b>	<b>A Freq. (%)</b>	<b>U Freq. (%)</b>	<b>D Freq. (%)</b>	<b>SD Freq. (%)</b>
Reduction on number of road accidents	52 17.7%	189 64.5%	32 10.9%	16 5.5%	4 1.4%
Reduction of road fatalities	68 23.2%	186 63.5%	7 2.4%	20 6.8%	12 4.1%
Improvement in road worthiness of the motor vehicles	31 10.6%	179 61.1%	43 14.7%	40 13.7%	0 0.0%
Reduction of court cases on road accidents	52 17.7%	143 48.8%	47 16.0%	35 11.9%	16 5.5%

While no respondent chose the strongly agree prompt in response to whether improvement in road worthiness of the motor vehicles impacted road safety projects, 61.1% of the respondents who agreed and 10.6% who strongly agreed affirmed that improvement in road worthiness of the motor vehicles impacted road safety projects, as shown in Table 4.12. Reduction of court cases on road accidents had a cumulative majority of respondents (66.5%) who asserted that it had impacted road safety projects.

The study sought to examine whether on average motor vehicle inspection, road regulations, road users' safety awareness, and road safety audits have impacted road safety projects using the mean scores of various metrics. These included mean scores of reduction on number of road accidents, reduction of road fatalities, improvement in road worthiness of the motor vehicles, and reduction of court cases on road accidents. The mean score from the highest scored mean to the lowest were on reduction on number of

road accidents (3.949), reduction of road fatalities (3.918), improvement in road worthiness of the motor vehicles (3.686) and reduction of court cases on road accidents (3.614). On average, the respondents tended to agree ( $3.5 < \mu < 4.5$ ) that each of the metrics on road safety projects have been impacted on by motor vehicle inspection, road regulations, road users' safety awareness, and road safety audits.

Reduction on number of road accidents has been impacted on the most on average as it scored the highest mean. Loughheed (2006) indicates that road safety audits help in reduction of the likelihood of accidents, reduction of the severity of accidents, elevation of road safety amongst stakeholders, reduction of costly remedial work, and reduction of the overall cost of road accidents such as trauma, hospitalizations etc. The respondents on average were inclined to agree that of road fatalities have reduced. This was consistent with Sang (2009), who noted that amongst the profound impact of the regulations known as "Michuki" rules in Kenya included reduction of the speed limits hence reducing on road fatalities involved as a result of speeding PSV.

The respondents were inclined to agree that there has been an improvement on road worthiness of the motor vehicles as a result of the various road safety aspects that have been undertaken. Sang (2009) in a study on assessment of the safety regulations in Kenya also noted that in 2009, the country had the Motor vehicle inspection Unit which was responsible for the inspection of the public service motor vehicles before being licenced to operate as PSVs. The PSVs owners were required to pay an annual fee of Ksh 1,000 to the Motor vehicle Inspection Unit under the traffic police which ensured



that the motor vehicle was compliant with all the required technical aspects to operate in the Kenyan roads. The owners were then issued with a certificate of inspection that allowed them to get a Transport and Licensing permit to operate as a PSV in Kenyan roads.

The standard deviation was used to examine the distribution of responses on the various aspects of road safety projects around the mean. The standard deviations of reduction on number of road accidents (0.948), reduction of road fatalities (0.790), and improvement in road worthiness of the motor vehicles (0.838) indicated that responses were moderately distributed around the mean implying that there was moderate consensus ( $0.5 < \sigma X < 1$ ) that these aspects of road safety projects had been impacted by motor vehicle inspection, road regulations, road users' safety awareness, and road safety audits. On the other hand, reduction in court cases on road accidents had responses widely distributed around the mean which implied that there was no consensus ( $\sigma X \geq 1$ ) on whether it had been impacted by motor vehicle inspection, road regulations, road users' safety awareness, and road safety audits.

**Table 4.13: Means and Standard Deviation of Road Safety Projects Performance**

	<b>Mean</b>	<b>Std. Deviation</b>
Reduction on number of road accidents	3.949	0.948
Reduction of road fatalities	3.918	0.790
Improvement in road worthiness of the motor vehicles	3.686	0.838
Reduction of court cases on road accidents	3.614	1.078

#### 4.9 Multiple Linear Regression

A multiple linear regression analysis is a statistical process that estimates the effect of the predictor variables (independent variables) on the outcome variable (dependent variable). In this context, the effect of the independent variables (road users' safety audits, road regulations, motor vehicle inspection and road safety awareness) on the dependent variable (performance of Zusha road safety projects) was examined. The multiple regression coefficient (R) that resulted from the multiple linear regression was 0.687 which implied that there was a moderate positive correlation between the independent variables and the dependent variable.

**Table 4.14: Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.687 <sup>a</sup>	.472	.464	.54674

a. Predictors: (Constant), Safety Audits, Road Regulations, Motor vehicle Inspection, Safety Awareness

The coefficient of determination ( $R^2$ ) was 0.472 which implied that 47.2% effect on performance of Zusha road safety projects can be accounted to the road users' safety audits, road regulations, motor vehicle inspection and road safety awareness. This therefore indicates that there are other factors which were not considered in this study which have a 52.8% influence on the performance of Zusha road safety projects.

The analysis of variance (ANOVA) was undertaken to determine whether the regression model was reliable. The p value from the ANOVA was 0.000 which indicated that the regression model had no likelihood or probability (0.0%) of giving a wrong prediction. The threshold for reliability is 0.05 which was reached since the p value was 0.000 implying that the model was reliable.

**Table 4.15: ANOVAa**

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	76.834	4	19.208	64.257	.000 <sup>b</sup>
1	Residual	86.092	288	.299		
	Total	162.925	292			

a. Dependent Variable: Performance

b. Predictors: (Constant), Safety Audits, Road Regulations, Motor vehicle Inspection, Safety Awareness

The coefficients of the individual independent variables (road users' safety audits, road regulations, motor vehicle inspection and road safety awareness) were examined. This gave the following regression model;

Performance of Zusha Road Safety Projects = 0.691 + 0.889 (Road Users' Safety Audits) + 0.073 (Road Regulations) - 0.200 (Motor vehicle Inspection) + 0.047 (Road Safety Awareness)

This regression model indicates that one-unit increase in road users' safety audits while other factors are kept constant would result in a 0.889 increase in performance of Zusha road safety projects. A one-unit increase in road regulations and road safety awareness would result in a 0.073 and 0.047 increase in performance of Zusha road safety projects respectively with the other variables kept constant. A one-unit increase in motor vehicle inspection would result in a 0.200 decrease in performance of Zusha road safety projects. This indicates that safety audits, road regulations and road safety awareness have a positive influence on the performance of Zusha road safety projects. On the other hand, it indicates that motor vehicle inspection has a negative influence on performance of Zusha road safety projects.

**Table 4.16: Coefficients<sup>a</sup>**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	
	B	Std. Error	Beta			
1	(Constant)	.691	.411		1.681	.094
	Motor vehicle Inspection	-.200	.061	-.147	-3.271	.001
	Road Regulations	.073	.070	.050	1.048	.296
	Safety Awareness	.047	.086	.026	.549	.583
	Safety Audits	.889	.056	.709	15.748	.000

a. Dependent Variable: Performance

## **CHAPTER FIVE**

### **SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS**

#### **5.1 Introduction**

This study examined influence of the National Transport and Safety Authority Strategies on the performance of Zusha road safety projects with a reference to Zusha project in Nakuru, Kenya. The specific objectives were to determine the influence of road users' safety audits, road regulations, motor vehicle inspection, and road safety awareness on the performance of Zusha road safety projects in Nakuru, Kenya. The study utilized the descriptive research design with a sample size of 293 respondents who included the drivers, pedestrians, motor cyclists, motor vehicle passengers, NTSA officials and traffic police. Most of the respondents (63.5%) in this study were male, while the female were 36.5%. The education level of the respondents was examined with most of the respondents (55.6%) in the study having secondary level of education followed by those who had graduate, primary school and post graduate levels at 20.8%, 13.3%, and 10.2%.

#### **5.2 Summary of the Findings**

The summary of the findings of the study are as follows;

##### **5.2.1 Motor vehicle Inspection and Performance of Road Safety Project**

The study examined which motor vehicle inspection aspects on average played a significant role in road safety projects, that is, among state of tyres, insurance, number of passengers ferried, roadworthiness of motor vehicle, and presence of seat belts. In this context, the mean of the various metrics was generated. In interrogating the influence of the motor vehicle inspection metrics on road safety, on average the respondents tended to

agree that they all have an influence as the mean scores of all the metrics on motor vehicle inspection were in the range of  $3.5 < \mu \leq 4.5$ . This implied that on average, the respondents were inclined to agree that the role of motor vehicle inspection was significant in performance of road safety projects. Roadworthiness of the motor vehicle on average had a greater influence on road safety projects compared to the other metrics of the business skills matrix as it scored the highest mean.

The standard deviations for state of tyres, number of passengers ferried, roadworthiness of motor vehicle, and presence of seat were moderately distributed around the mean which implied that there was moderate consensus  $0.5 < \sigma_x \leq 1$  among the respondents each had an influence on road safety projects. The standard deviation of insurance was 1.017 meaning the responses were widely distributed around the mean which indicated there was no consensus ( $\sigma_x > 1$ ) on whether the insurance aspect of motor vehicle inspection had an influence on performance of road safety projects.

### **5.2.2 Road Regulations and Performance of Road Safety Project**

On average, the study sought to examine which road regulations aspects have played a significant role in road safety projects among compulsory wearing of uniforms and badges, compulsory retesting of all PSV drivers after every 2 years, fitting of safety belts in the motor vehicles, drivers' having driving license, and maintenance of the recommended speed levels. On average, all metrics of the road regulations matrix had an influence on the performance of road safety projects (mean scores  $3.5 < \mu \leq 4.5$ ). On average, compulsory wearing of uniform was the road regulation aspect that played a

greater significant role in road safety projects than the others as it had the highest mean score (4.178) among the metrics on road regulations. On the other hand, maintenance of the recommended speed levels played the least significant role in road safety projects performance on average of all the metrics on road regulations as it had the least mean score (3.522).

There was no consensus among the respondents on whether the road regulation aspect of compulsory retesting of all PSV drivers after every 2 years played a significant role in road safety projects as it has a standard deviation of 1.005 ( $\sigma_x \geq 1$ ). The responses on compulsory wearing of uniforms and badges, fitting of safety belts in the motor vehicles, drivers' having driving license, and maintenance of the recommended speed levels were moderately distributed around the mean with a standard deviation implying that there was moderate consensus ( $0.5 < \sigma_x < 1$ ) that they played a significant role in road safety projects.

### **5.2.3 Road Users' Safety Awareness and Performance of Road Safety Project**

The study used mean scores of safety belts, responsible drinking, speeding campaigns, road signage adherence, and presence of black spots to know whether on average road users' safety awareness aspects have played a significant role in performance of road safety projects. On average, the respondents tended to agree that all the metrics on road users' safety awareness played a significant role in performance of road safety projects ( $3.5 < \mu < 4.5$ ). This was consistent with a study on the road User's Awareness on Strategies for Controlling Road Traffic Accidents in Tanzania by Juma (2015) which

noted that lack of awareness of road safety rules among various road users leads to unsafe road user behavior and habits.

On average, responsible drinking was perceived to have played a greater significant role than the other metrics on road users' safety awareness as it had the highest mean score. This was consistent with a study by Kim & Wagner (2014) where they noted that there was a positive and highly significant influence of Blood Alcohol Consumption (BAC) in the US and the road safety levels. In the context of speeding campaigns, the respondents' perception on average was that they have played a significant role in performance of road safety projects. This was also noted in a study in Tanzania by Juma (2015). The study noted that over 80% of the motorists in the study sample did not know of the speed requirements/ regulations. These factors were seen to compromise road safety in Tanzania.

The standard deviations of the various metrics were used to examine whether there was consensus whether the various metrics on road users' safety awareness played a significant role in performance of road safety projects. There was moderate consensus among the respondents that each metric on average road users' safety awareness aspects had played a significant role in performance of road safety projects ( $\sigma_x \geq 1$ ).

#### **5.2.4 Road Safety Audits and Performance of Road Safety Project**

The means of various road safety audit aspects were examined to find out whether on average they have played a significant role in performance of road safety projects. These



aspects included roadside features, road surface markings, signing and delineation, intersections and approaches, and traffic policies adherence. The respondents tended to agree that all the metrics on road safety audits played a significant role in performance of road safety projects with all mean scores being in the interval  $3.5 < \mu < 4.5$ . This implied that road safety audits was a critical aspect in road safety projects performance. The respondents tended to agree that on average roadside features with a mean score of 4.355 played a greater significant role than the other aspects on road safety audit as it was the highest mean score while signing and delineation played the least significant role on average with the least mean score of 3.509.

The standard deviations for road surface markings and traffic policies adherence were 1.009 and 1.069 respectively indicating that the responses were widely distributed around the mean which implied there was no consensus ( $\sigma_x \geq 1$ ) among the respondents whether both aspects of road safety audit played a significant role in performance of road safety projects. Roadside features, signing and delineation, and intersections and approaches had responses that were moderately distributed around the mean implying there was moderate consensus ( $0.5 < \sigma_x < 1$ ) that each of the metrics played a significant role in performance of road safety projects.

### **5.3 Conclusion of the Study**

It can therefore be concluded that road regulations, road users' safety awareness, and road safety audits have positively influenced the performance of road safety projects. On the other hand, motor vehicle inspection has negatively influenced the performance of

road safety projects. The findings on the ground are that although vehicle inspection is mandatory each and every year, the results on the road safety improvement are not achieved. This is because most vehicles are given stickers of inspection without even being visually seen by the vehicle inspectors. The unit of motor vehicle inspection is highly corrupt and in most cases only a few vehicles are inspected.

#### **5.4 Recommendations of the Study**

The study made the following recommendations;

1. Motor Vehicle inspection should be enforced in order to improve on the roadworthiness of motor vehicles on the road
2. More road safety awareness efforts should be undertaken in order for the road users to utilize the road responsibly
3. The road safety audits should be undertaken more regularly to gain insights into the emerging road safety concerns
4. The results of the road safety audits should be fully implemented.

#### **5.5 Suggestions for Further Studies**

The study made the following suggestions for further studies;

1. An examination on the reasons behind lack of effectiveness of motor vehicle inspection has not been effective in road safety projects.
2. An examination on the influence of insurance uptake on the road safety performance
3. An examination of the compulsory retesting of all PSV drivers after every two years on the road safety performance

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**APPENDIX A**  
**INTRODUCTION LETTER**

**Julius Mathenge Kabue,**

**P.O Box, Nakuru.**

**0721323518**

**TO WHOM IT MAY CONCERN**

**REF: REQUEST FOR PARTICIPATION IN THE RESEARCH STUDY**

I am writing to request your participation in the provision of responses to enable me undertake a study on **“Influence of National Transport and Safety Authority Strategies on Performance of Zusha Road Safety Projects in Nakuru County, Kenya”**. This is a requirement for my study in Masters of Arts in Project Planning and Management at the University of Nairobi. I assure that your responses and identity will be kept confidential. Should you wish to access the complete report, the same will be availed to you.

Yours’ Sincerely,

Julius Kabue

## APPENDIX B

### INFLUENCE OF NATIONAL TRANSPORT AND SAFETY AUTHORITY STRATEGIES ON PERFORMANCE OF ZUSHA ROAD SAFETY PROJECTS IN NAKURU COUNTY, KENYA

#### QUESTIONNAIRE FOR DRIVERS AND TOUTS

**Instructions:** Please complete the following questionnaire appropriately.

**Confidentiality:** The responses you provide will be strictly confidential. No reference will be made to any individual(s) in the report of the study.

Please tick or answer appropriately for each of the Question provided.

#### PART A: BACKGROUND INFORMATION

- |                                  |                  |     |
|----------------------------------|------------------|-----|
| 1) What is your gender?          | Male             | [ ] |
|                                  | Female           | [ ] |
| 2) What is your education level? | Primary School   | [ ] |
|                                  | Secondary School | [ ] |
|                                  | Graduate         | [ ] |
|                                  | Post Graduate    | [ ] |

#### PART B: MOTOR VEHICLE INSPECTION

For each of the following parts, please tick where applicable to the extent to which you agree using the following likert scale.

SA= Strongly Agree    A=agree    U=Uncertain    D=Disagree    SD=Strongly

	<i>The following motor vehicle inspection aspects have played a significant role in road safety aspects;</i>	SA	A	U	D	SD
5)	State of Tyres					
6)	Insurance					
7)	Number of passengers ferried					
8)	Roadworthiness of Motor vehicle					
9)	Presence of Seat Belts					



### PART C: ROAD REGULATIONS

For each of the following parts, please tick where applicable to the extent to which you agree using the following likert scale.

SA= Strongly Agree A=agree U=Uncertain D=Disagree SD=Strongly

	<i>The following road regulations' aspects have played a significant role in road safety aspects;</i>	SA	A	U	D	SD
10)	Compulsory wearing of uniforms and badges					
11)	Compulsory retesting of all PSV drivers after every 2 years					
12)	Fitting of safety belts in the motor vehicles					
13)	Drivers' having driving licence					
14)	Maintenance of the recommended speed levels					

### PART D: ROAD USERS' SAFETY AWARENESS

For each of the following parts, please tick where applicable to the extent to which you agree using the following likert scale.

SA= Strongly Agree A=agree U=Uncertain D=Disagree SD=Strongly

	<i>The following road users' safety awareness aspects have played a significant role in road safety aspects;</i>	SA	A	U	D	SD
15)	Safety Belts					
16)	Responsible Drinking					
17)	Speeding Campaigns					
18)	Road Signage Adherence					
19)	Presence of black spots					

### PART E: ROAD SAFETY AUDITS

For each of the following parts, please tick where applicable to the extent to which you agree using the following likert scale.

SA= Strongly Agree A=agree U=Uncertain D=Disagree SD=Strongly

	<i>The following road safety audit aspects have played a significant role in road safety aspects;</i>	SA	A	U	D	SD
20)	Roadside Features					
21)	Road Surface Markings					
22)	Signing and Delineation					
23)	Intersections and Approaches					
24)	Traffic Policies adherence					

**PART F: PERFORMANCE OF ROAD SAFETY PROJECTS**

For each of the following parts, please tick where applicable to the extent to which you agree using the following likert scale.

SA= Strongly Agree    A=agree    U=Uncertain    D=Disagree    SD=Strongly

	<b>The motor vehicle inspection, road regulations, road safety audits, and road safety audits have impacted on the following road safety projects;</b>	<b>SA</b>	<b>A</b>	<b>U</b>	<b>D</b>	<b>SD</b>
25)	Reduction on number of road accidents					
26)	Reduction of road fatalities					
27)	Improvement in road worthiness of the motor vehicles					
28)	Reduction of court cases on road accidents					

**APPENDIX C**  
**NACOSTI AUTHORIZATION**

**THIS IS TO CERTIFY THAT:**  
**MR. JULIUS MATHENGE KABUE**  
of UNIVERSITY OF NAIROBI, 0-20100  
NAKURU, has been permitted to conduct  
research in Nakuru County

**Permit No : NACOSTI/P/17/75091/17499**  
**Date Of Issue : 15th June, 2017**  
**Fee Received : Ksh 1000**

on the topic: **INFLUENCE OF NATIONAL  
TRANSPORT AND SAFETY AUTHORITY  
STRATEGIES ON PERFORMANCE OF  
ZUSHA ROAD SAFETY PROJECTS IN  
NAKURU COUNTY, KENYA**

for the period ending:  
**15th June, 2018**

  
**Applicant's  
Signature**

  
**Director General  
National Commission for Science,  
Technology & Innovation**

**CONDITIONS**

1. You must report to the County Commissioner and the County Education Officer of the area before embarking on your research. Failure to do that may lead to the cancellation of your permit.
2. Government Officer will not be interviewed without prior appointment.
3. No questionnaire will be used unless it has been approved.
4. Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.
5. You are required to submit at least two(2) hard copies and one (1) soft copy of your final report.
6. The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice

  
**REPUBLIC OF KENYA**

  
**National Commission for Science,  
Technology and Innovation**

**RESEACH CLEARANCE  
PERMIT**

Serial No. **A4407**

**CONDITIONS: see back page**

**APPENDIX D**  
**COUNTY GOVERNMENT AUTHORIZATION**



**THE PRESIDENCY**  
**MINISTRY OF INTERIOR AND**  
**CO-ORDINATION OF NATIONAL GOVERNMENT**

Telegram: "DISTRICTER" Nakuru  
Telephone: Nakuru 051-2212515  
When replying please quote

DEPUTY COUNTY COMMISSIONER  
NAKURU EAST SUB COUNTY  
P.O. BOX 81  
NAKURU.

Ref No. EDU.12/10 VOL.V/175

23<sup>th</sup> June 2017

TO WHOM IT MAY CONCERN

**RE:- RESEARCH AUTHORIZATION**  
**JULIUS MATHENGE KABUE**

---

The above named person has been authorized to carry out research on "***influence of National Transport and Safety Authority strategies on performance of Jusha Road safety projects***" in Nakuru County for the period ending 15<sup>th</sup> June, 2018

Please accord the necessary support.

**EDITH KOECH**  
**FOR DEPUTY COUNTY COMMISSIONER**  
**NAKURU EAST SUB COUNTY**



## APPENDIX E

### MINISTRY OF EDUCATION AUTHORIZATION

**MINISTRY OF EDUCATION**  
State Department of Basic Education

Telegrams: "EDUCATION",  
Telephone: 051-2216917  
Fax: 051-2217308  
Email: cdenakurucounty@yahoo.com  
When replying please quote  
Ref. NO.  
CDE/NKU/GEN/4/1/21 VOL.V/87



COUNTY DIRECTOR OF EDUCATION  
NAKURU COUNTY  
P. O. BOX 259,  
NAKURU.

22ND JUNE, 2017

TO WHOM IT MAY CONCERN

**RE: RESEARCH AUTHORIZATION:  
JULIUS MATHENGE KABUE  
NACOSTI PERMIT NO/P/17/75091/17499**

Reference is made to letter ref. NACOSTI permit  
No.P/17/75091/17499 dated 15<sup>th</sup> June, 2017.

Authority is hereby given to the above named to carry out research  
on "*Influence of National Transport and Safety Authority strategies on  
performance of Zusha Road safety projects in Nakuru County  
Kenya,*" for a period ending 15<sup>th</sup> June, 2018.

Kindly accord him the necessary assistance.

A handwritten signature in black ink, appearing to read "Moses Kiari".

**MOSES KIARIE  
FOR: COUNTY DIRECTOR OF EDUCATION  
NAKURU COUNTY**

**Copy to:**

University OF Nairobi  
P.O. Box 30197 - 00100  
**NAIROBI.**

**APPENDIX F  
PLAGIARISM PAGE 1**



Turnitin Originality Report

INFLUENCE OF NATIONAL TRANSPORT AND SAFETY AUTHORITY STRATEGIES ON PERFORMANCE OF ZUSHA ROAD SAFETY PROJECTS IN NAKURU COUNTY, KENYA by Julius M. Kabue

From INFLUENCE OF NATIONAL TRANSPORT AND SAFETY AUTHORITY STRATEGIES ON PERFORMANCE OF ZUSHA ROAD SAFETY PROJECTS IN NAKURU COUNTY, KENYA (Innovative resources)

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**APPENDIX G  
PLAGIARISM PAGE 2**

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