International Journal of Strategic Management (IJSM)

Road Safety Strategic Management Practices and Performance of NTSA, Kenya

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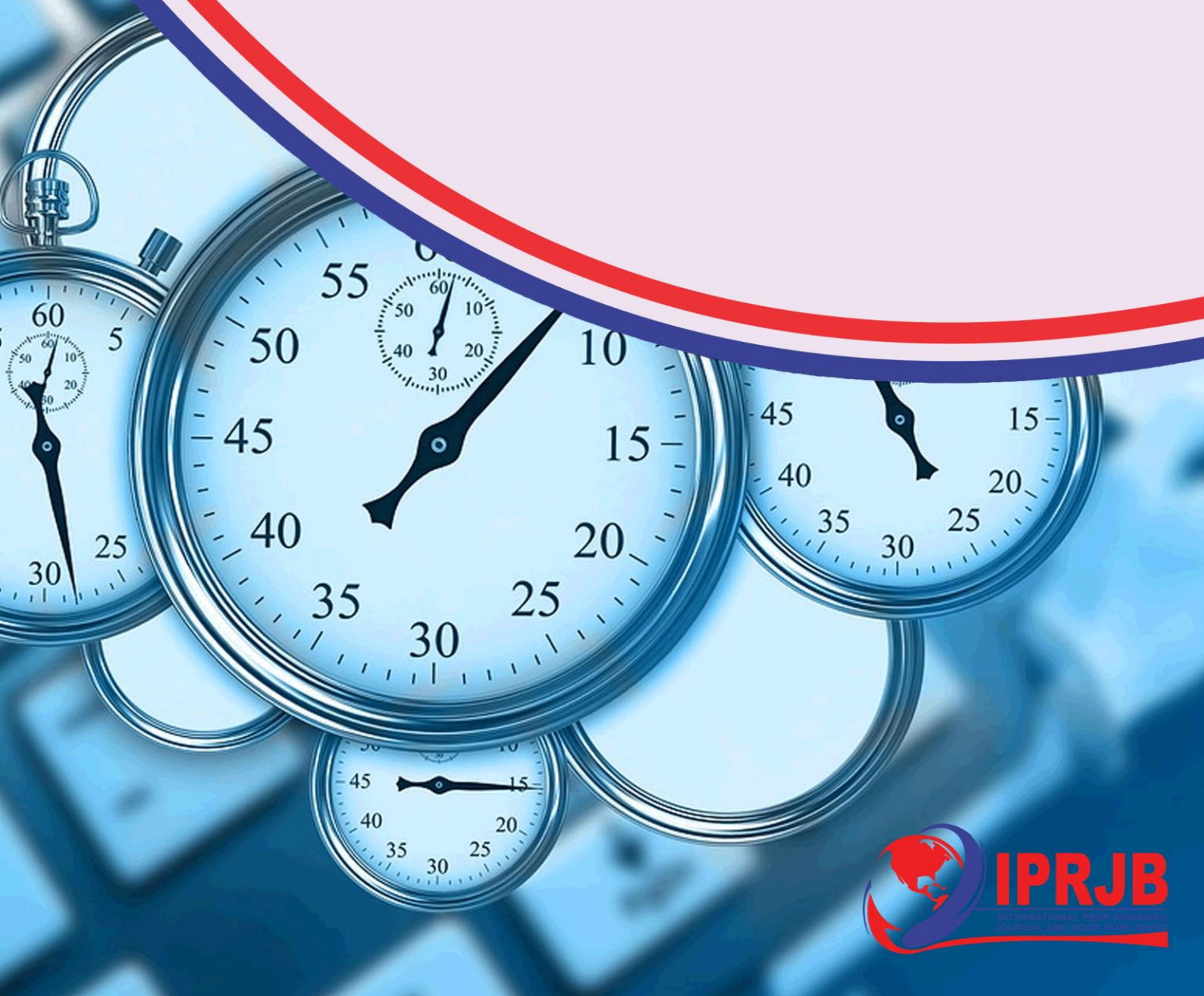

IPRJB

International Journal of Strategic Management
Vol.4, Issue 3, No.2, pp 23 - 39, 2025
ISSN: 2958-9681 (Online)

www.iprjb.org

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Article History

Received 10th October 2025

Received in Revised Form 14th November 2025

Accepted 15th December 2025

How to cite in APA format:

Guyo, B. (2025). Road Safety Strategic Management Practices and Performance of NTSA, Kenya. *International Journal of Strategic Management*, *4*(3), 23–39. https://doi.org/10.47604/ijsm.3584

Abstract

Purpose: The study set to investigate the relationship between road safety strategic management practices and the NTSA performance.

Methodology: The study adopted the descriptive and explorative research design. The usable dataset was composed of primary data collected from the NTSA staff from 15 different branches and offices in Kenya. The study was carried out among the management and technical staff of NTSA situated in 15 branches and numbering 507. The study adopted the statistical packages for social sciences (SPSS) for the estimation of the results and findings. The OLS regression models were estimated as the main inferential statistics in this study.

Findings: It was found, that there was a statistically significant relationship between the Road Safety Management Practices and the performance of the NTSA in Kenya.

Unique Contribution to Theory, Practice and Policy: The study recommends that there should be promotion of road safety and the civil education (road user's sensitization) in order to improve the road safety and performance of the National Transport Safety Authority (NTSA). It will take the collective efforts of the entire society to promote and enhance safety on the Kenyan roads in order to ensure that more lives are saved and that the number of lives lost in the Kenyan roads are reduced significantly. NTSA should strengthen its roadway safety control mechanisms by investing in modern monitoring technologies, enhancing field inspection systems, and enforcing compliance consistently across all transport sectors. Strengthened control mechanisms will improve accountability, reduce traffic violations, and more so reduce road-crashes.

Keywords: *Strategic Management, NTSA, Performance, World Bank*

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INTRODUCTION

Approximately 50 million individuals are wounded and 1.35 million individuals die yearly from crashes on roadways worldwide per UNRSC (2020). This is rated eighth as the top reason for mortality worldwide and the primary reason of mortality for young individuals between 15 to 29 years are both traffic accidents. Road accidents cause huge fiscal and economic costs to people and society in addition to causing suffering for humanity. According to estimates, 12 to 70 million individuals are held in deprivation annually as a result of traffic-related illnesses and deaths, and the cost associated with highway accidents is between 3 and 6 percent of a nation's yearly GDP (IRAP, 2015). People between the ages of 15 and 64 who are in their prime working years frequently bear the greatest cost of long-term disability and death due to traffic accidents, which reduces the labour force and weakens the economy (World Bank, 2018). According to estimates, the yearly cost of crashes on roadways to the world economy is 1.85 trillion dollars. Due to the entirety of these factors, roadway safety is currently among the most important societal, financial, welfare and growth challenges.

In numerous wealthy states during the past four or five decades, the number of fatal traffic accidents has decreased as per World Bank (2018). Despite the fact that roadway traffic accidents continue to be a leading source of fatalities, injuries, and impairment in many nations. Roadway safety is a significant issue for developing nations (World Bank, 2020). Just 40 percent of the globe's licensed automobiles are in low-income nations, where more than 90 percent of traffic deaths happen (EU, 2015). More than 19.63 million people die and suffer major injuries in collisions in low-and middle-income countries (LMICs), which represented over 6.5 percent of GDP while costing the economies 1.7 trillion dollars.

The reports that have been done in the past have found that in Europe and the United States of America there were about 9.3 and 15.6 fatalities per 100, 000 people as a result of road accidents compared to Asia where it was found that there were 20.7 fatalities per 100, 000 people as a result of accidents (AUDA-NEPAD, 2021).

This is comparatively different and higher among the developing nations where it was recorded that about 26.6 deaths were witnessed as a result of road traffic accidents per 100, 000 people as at 2018 among the African countries. The majority of accidents on African roads are brought on by situations that may be easily avoided (AUDA-NEPAD, 2021). As an illustration, multiple collisions have occurred as a consequence of messaging, consuming food or drinks, and/or doing cosmetics during driving.

Intoxication and drunk driving are often major contributors to traffic accidents on African roadways. Accidents occur because of these disturbances making drivers of motor vehicles less attentive to the road. Reckless driving, over speeding and unsafe overtaking frequently brings on Road accidents. Unfortunately, the majority of the roads in African nations are poorly built and maintained, and occasionally there are poor weather conditions as well.

According to Mutune et al. (2017) and the NTSA (2000), the cost of the country's 3,000 fatal crashes on roads and 10,000 injuries per year might reach Ksh.300 billion (or 5% of GDP). About 6,500 people die from traffic-related injuries each year, according to statistics from the Department of Civil Registration, and many more suffer injuries. This is mainly attributable to challenges related to managing and coordinating the implementation roadway safety initiatives into action; this loss is tragic and necessitates action. These collisions and injuries have been linked to a number of risk factors for poor driving habits. These include excessive speeding, fatigued and inebriated drivers, deficiencies in hiring and training of drivers, difficulties with

road engineering, environmental factors, a dearth of understanding of the importance of roadway safety, and poor vehicle maintenance.

The objective of reducing deprivation and achieving the Millennium Development targets has been intertwined with the wider goal of equitable growth and objectives to enhance worldwide roadway safety. (Mitullah, Small & Azzouzi, (2022). The nation's current growth prioritizes bettering individuals' access to healthcare, schooling, and opportunities to engage in economic and social activities in order to support greater lifestyles for everyone.

Global Burden of Road Traffic Injuries

The World Bank report revealed that the number of fatal traffic accidents in the developed countries in the past five decades has been on the decrease (World Bank, 2018). This is despite the fact that the roadway traffic accidents continue to be a major source of fatalities, impairments and injuries across the globe. Despite the fact that roadway traffic accidents continue to be a leading source of fatalities, injuries, and impairment in many nations. Roadway safety is a significant issue for developing nations (World Bank, 2020). Just 40 percent of the globe's licensed automobiles are in low-income nations, where more than 90 percent of traffic deaths happen (EU, 2015). More than 19.63 million people die and suffer major injuries in collisions in low-and middle-income countries (LMICs), which represented over 6.5 percent of GDP while costing the economies 1.7 trillion dollars.

With 26.6 deaths per 100,000 people as of 2018 (AUDA-NEPAD, 2021) compared to the rest of the globe, Africa had more traffic accidents. Asia ranked second with 20.7 fatalities per 100,000 people. 9.3 and 15.6 fatalities per 100,000 people were reported in Europe alongside U.S.A., respectively. The majority of accidents on African roads are brought on by situations that may be easily avoided (AUDA-NEPAD, 2021). As an illustration, multiple collisions have occurred as a consequence of messaging, consuming food or drinks, and/or doing cosmetics during driving.

Intoxication and drunk driving are often major contributors to traffic accidents on African roadways. Accidents occur because of these disturbances making drivers of motor vehicles less attentive to the road. Road accidents are frequently brought on by reckless over speeding and unsafe overtaking. Unfortunately, the majority of the roads in African nations are poorly built and maintained, and occasionally there are poor weather conditions as well. According to Mutune et al. (2017) and the NTSA (2000), the cost of the country's 3,000 fatal crashes on roads and 10,000 injuries per year might reach Ksh.300 billion (or 5% of GDP). About 6,500 people die from traffic-related injuries each year, according to statistics from the Department of Civil Registration, and many more suffer injuries. This is mainly attributable to challenges related to managing and coordinating the implementation roadway safety initiatives into action; this loss is tragic and necessitates action. These collisions and injuries have been linked to a number of risk factors for poor driving habits. These include excessive speeding, fatigued and inebriated drivers, deficiencies in hiring and training of drivers, difficulties with road engineering, environmental factors, a dearth of understanding of the importance of roadway safety, and poor vehicle maintenance.

Africa Road Traffic Challenges

Most of the challenges that face the road traffic industry, NTSA and road users or other stakeholders include the issue of wrong application or implementation of the regulations and the recommendations that are made by different reports.

The issue of corruption is also a major problem that affects the road safety regulations and the implementation of the strategic management practices. This means that when an offender of the traffic rules and regulations has been arrested it can easily boil down to a situation where they get away with just a bribe. The issue of corruption and bribes is one of the main challenges because even after there are strict punitive repercussions the same can be melted down by bribes and corruption. This goes to unethical standards among the enforcement officers and the police in general. This is mainly attributable to challenges related to managing and coordinating the implementation roadway safety initiatives into action; this loss is tragic and necessitates action. These collisions and injuries have been linked to a number of risk factors for poor driving habits. These include excessive speeding, fatigued and inebriated drivers, deficiencies in hiring and training of drivers, difficulties with road engineering, environmental factors, a dearth of understanding of the importance of roadway safety, and poor vehicle maintenance across different countries in Africa. In Kenya apart from the above challenges, there is also lack of road safety policy and strategy, inadequate funding/manpower for road safety activities, weak execution of existing statutes and rules, and limited safety education.

National Road Safety Situation

The national road safety situations in Kenya is one of the most critical in terms of fatalities and death rates or permanent injuries. The fact that Kenya has more than 28 deaths per 100,000 people makes it one of the worst cases across Africa. Further, the situation is made worse by the presence of motorbikes referred to as “bodabodas” that are mostly used in public transport. These motorbikes accounted for more than 33% of the death rates in the year 2024. The same is compounded by poor enforcement, poor infrastructure, careless and drunk driving. However, the National Road Safety Action (NRSA) plan was established in 2024-2028 to tackle the stricter laws, public education and technology in order to reduce the fatalities and death rates by the year 2030. Some of the key challenges includes the high fatalities, economic burden, human factors, enforcement gaps and “bodaboda” crisis. In response to these issues the government of Kenya have put in place measures such as technology and data driven actions, the creation of awareness and education and sector-specific focus.

Strategic Management Gaps Leading to NTSA Management Problems

Therefore, despite these efforts, the inadequate strategic management practices that are applied by the NTSA have not been able to offer a solution to the road safety improvements in Kenyan roads. This might be as a result of wrong implementation or application of the strategic management practices by the authority and the acceptance of the same by the road users in Kenya. Some of the primary strategic gaps affecting the National Transport and Safety Authority (NTSA) in Kenya includes the organizational culture, the resource allocation, the strategy implementation and coordination with the stakeholders. If these issues can be corrected and looked into then it would enable the organization to be able to manage the road safety challenges effectively.

Theoretical Rationale

The studies that have been done in the past have been able to demonstrate that there is a relationship between reckless driving and fatalities on the roads. Further, drunk driving have also been found to be a culprit of the same over the years and driving under the influence or when the driver is ill or not feeling well. These have been established causes of road fatalities over the years among others. However, this study was conducted in Kenya and despite the increased strategies and measures put in place to curb road fatalities they continue to increase.

This study investigated the influence and the relationship between the road safety strategic management practices and the National Transport and Safety Association performance in Kenya (NTSA).

Objectives

The main objective of the study is the exploration of the association between the road safety strategic management practices and the performance of the National Transport and Safety Authority in Kenya.

Hypothesis

H_0: There is no statistical significant relationship between road safety strategic management practices and NTSA performance in Kenya.

Empirical Review

Road Safety Planning and Road Safety Performance

In his Bastille Day speech, President Jacques Chirac named roadway safety as among the three national priorities for his Presidency. Chirac then led the creation of a new road safety action plan in France, which was backed by high-level leadership and coordination (World Road Association, 2019). The strategy, which was enacted in December 2002, focused on important safety behaviours such excessive speed. The proposal included 400 million euros for a three-year investment plan to buy, as the initial phase, 1,000 automated radar systems, along with several cars and cutting-edge Breathalyzer and ethylometer equipment. For speeding infractions, which increased from 1.6 million in 2003 to 4.8 million in 2004, new automatic processing facilities were set up. In the initial year after adoption, accident rates decreased by 17.5 percent, severe injuries decreased by 19 percent, and fatalities decreased by 21 percent. Fatalities decreased from 7,242 in 2002 to 4,900 in 2005 over a three-year period. These can be viewed as excellent results of President Jacques Chirac and his cabinet's plans.

With the idea of a 2+1 layout with median safety, Sweden has played a significant role in establishing novel safety on single-carriageways (IRAp, 2020). They created the wire-rope median layout that possesses significantly decreased head-on crashes around the globe. Through separating vehicles in the middle of the roadway, sometimes with the use of protective fencing or obstruction, this lowers the likelihood of head-on crashes on interurban routes. Generally, single-carriageway roadways are riskier than dual carriageways. That may be due to the fact that there are sometimes simply marked boundaries on the roadway to divide opposing traffic, alongside the possibility of more dangerous roadside conditions and crossroads. Numerous single-carriageway roadways in Sweden have been fitted with wire rope safeguarding fences for added safety, thus converting them to dual carriageways, generally adhering to the single-carriageway speed limits of the original highways.

As an outcome, there were 50 percent fewer deaths and badly injured individuals overall on these roadways, and there were 21 percent fewer injury-related collisions. All this is from unique thinking and planning, which has not been everyone’s cup of tea.

The Swedish layout, nevertheless, has subsequently been widely imitated. It is prevalent in a number of nations, including Spain, Ireland, and New Zealand. Adding the wire-rope midway barrier on single-carriageway highways may be quite advantageous, according to iRAP assessments. For instance, the iRAP estimates indicate that in some studies in southeast Europe, benefit-cost ratios of 3-6 would be obtained with their application, with the possibility of

serious and catastrophic injury reductions of as much as 20 percent of the entire amount to be preserved.

By the late 1990s, two of the globe's top operating nations in the administration of roadway safety had come to the conclusion that in order to continue ongoing performance enhancement, a more determined, all-encompassing, and long-term strategy was needed than had been used previously. The goal of the Swedish "Vision Zero" and Dutch "Sustainable Safety" initiatives was to make the road infrastructure inherently safe (WRA, 2019). New focus was placed on controlling the interchange of kinetic energy in a crash to make sure that the upper limits of human toleration for injuries were not surpassed in both the Sustainable Safety and Vision Zero approaches. Road fatalities and severe injuries have ceased to be an inevitable cost of more freedom.

Road Safety Promotion and Road Safety Performance

In the Russian Federation's Lipetskaya and Ivanovskaya areas, four big campaigns were created and broadcast between 2010 and 2014 (WHO, 2017). Alongside the advertising, there was enforcement that concentrated on seatbelt usage, speeding, and child restrain usage. In Ivanovskaya Oblast, the percentage of cars surpassing the permitted speed limit decreased from 54.7 percent (2012) to 40.1 percent (2013), while in Lipetskaya Oblast, it decreased from 47.0 percent (2011) to 26.1 percent (2013), according to an examination. In the Lipetskaya region, the rate of seatbelt use went from 52.4 percent (2010) to 73.5 percent (2013) among all occupants, and in the Ivanovskaya region, it rose from 47.5 percent (2011) to 88.8 percent (2013).

Positive findings have been reported by multiple investigations analyzing the impacts of initiatives related to learning and public consciousness on roadway safety. In Kenya, a program called Matatus that aimed to increase consciousness among passengers and motorists reduced collisions with just property loss by 7 percent and accidents with fatalities by 6 percent (Habyarimana J. & William J., 2011). By encouraging commuters to voice their concerns about reckless driving in buses, the project raised consciousness. Five stickers containing fear cues (graphic pictures of injuries) and short messages on text were part of the program.

The National Centre for Statistics and Information (NCSI) of Oman recorded a 6.3 percent rise in traffic accidents between 2011 and 2012, a 1.6 percent rise in documented harm, and a roughly 8 percent rise in deaths (ITF, 2020). With 1139 deaths reported by 2012, the accident fatality rate has increased to 31.4 per 100 000. At the time, the National Research Council (NCRS) of Oman noted some of the major issues confronting road safety management, including the improper handling of wounded patients while being transported to medical centers, the lack of first aid at collision scenes, and the lack of widespread access to competent pre-hospital health services. Furthermore, there was certain community opposition to altering trends in road usage behavior, notably in relation to the deployment of speed cameras and larger penalties.

To combat this, the NCRS launched extensive traffic-awareness efforts across various media channels. After reviewing these advertisements, the Directorate General of Traffic came to the conclusion that they had been effective in influencing individual's actions and opinions. The difficulty in forming an agreement on suggested law revisions was attributed to the large number of parties, which complicated collaboration amongst parties. In reaction, the NCRS designated the ROP as its focal point for establishing successful stakeholder collaboration. Consequently, notwithstanding a 70 percent spike in licensed cars and a 71 percent spike in

certified drivers, the overall deaths decreased by nearly 55 percent between 2012 and 2019. Additionally, post-crash injury problems saw a sizable drop.

Roadway safety results have been proven to be somewhat to slightly impacted by educational activities. Kids cycling injuries have become less common in China because to a bicycle safety training program for seventh-graders (Ji Y., 2017). The program consisted of two hours of talks on driving safety, avoiding harm, and ways to deal with injuries for seventh-grade pupils. A safety-riding initiative in Thailand that was aimed at motorcyclists decreased motorbike-related fatalities by 30 percent (Woratanarat P., 2013). According to two studies—one conducted in South Africa and one in Uganda—safety education and the supply of secure gear via ride-sharing services lower the probability of crashes (Muni K., 2019; Huang J. Y., 2019).

Road Safety Control and Road Safety Performance

Case reports on optimal practices for Urban Road Safety were provided by the International Transport Forum (ITF) (ITF, 2020). Among the case scenarios was focusing initiatives in New York City on traffic injury statistics. In terms of deaths on the roads, New York City is among the most secure towns in the country. With death rates nearly double that of London, Paris, or Berlin, it is nevertheless below European performance standards (ITF, 2020). The government created a Vision Zero strategy and a course of action incorporating the Department of Transport (DOT), the law enforcement division, and other entities in 2014 to hasten the pace of improvement.

The government extensively depended on data to identify issues, provide solutions based on facts, and track development. They created a connection between healthcare information and police collision data. The connection made it possible to assess the effectiveness of the techniques used to gather information on traffic injuries, which made it simpler to comprehend these injuries. The KABCO severity rating is created by the New York City Department of Transportation (NYC DOT) using data on probable injuries gathered by police officers at the collision scene. The KABCO technique chooses regions for roadway redesign safety initiatives where there is a large population of people who have been killed or badly wounded (K or A). The NYC DOT was able to prioritize initiatives and better understand traffic-related injuries as a result of other results from the KABCO study. The medical institution and law enforcement databases were linked, and the results showed which characteristics pedestrians' serious injuries are predicted by.

Age above 70 was shown to be the most important non-medical factor prior to late-night collisions or crossing against a red pedestrian indicator. In comparison to the general population, older persons were over two times as probable to experience adverse medical results. The KABCO evaluation supported the necessity to look into senior citizen collision sites, kinds, and seriousness consequences.

In New York City, the proportion of senior citizens killed in collisions has not decreased in recent years. Nevertheless, after implementing the Vision Zero strategy in 2014, the number of pedestrian deaths has decreased by over 25 percent. In order to inform its street design initiatives, the NYC DOT carried out an extensive research on collision trends for older citizens. Elderly and younger persons both had comparable crash behaviors, the study revealed, although left-turn collisions killed more elderly. Lower elder injury rates are correlated with reduced crossing durations. Systematic engineering solutions, like roadway dieting (lane decrease), reduced roadways, pedestrian islands, and curb expansions, were found as strategies to safeguard older citizens.

The safety impacts and future use of central hatching on four-lane rural highways in Malaysia were guided by surveillance and review of collision information (WRA, 2019). Two single-carriageway stretches in the state of Perak were found to have an elevated probability of head-on crashes according to the findings of a road safety evaluation along Malaysia's Federal Route 1. Site inspections showed a significant frequency of lane discipline issues and unlawful passing. A practical solution to increase the distance between opposing automobiles and slow down the flow of traffic was found to be implementing central hatching. Other names for central hatching include painted medians and flush.

It additionally states that evaluation and oversight were heavily used in Italy's urban collector road speed reduction programs. The case study shows a series of safety countermeasures implemented on the urban collector route Via Pistoiese in Firenze, Italy, which is designated as a segment with a high accident frequency (WRA, 2019). To determine the potentially relevant safety countermeasures, a comprehensive safety investigation was conducted. Driving simulation studies, roadway safety checks, and accident evaluations were all carried out. Physical and cognitive therapy were mixed in the therapy.

Road Safety Coordination and Road Safety Performance

In recent times, research was conducted in Indonesia to examine the impact of team coordination on the completion of tasks with intermediate levels of complexity at the Organization of Office of Public Works, Housing and Settlement Area (Nurrochmawardi M., Subyantoro A., & Wahyuni P., 2018). The research's null hypothesis was that teamwork enhances the Regency of Sleman's work team's efficiency. Gathering information included both literature study and primary information collecting via questionnaires.

The study showed that team coordination positively and significantly influenced team performance with a regression coefficient of 0.770. This means the higher the team coordination score, the higher the team's performance score is predicted, and vice versa. This study emphasizes the vital role of coordination in management. However, the study was not specifically on road safety management.

A report in India has illustrated that coordinated road safety engagement is able to bring some positive results across the country. The World Bank has gradually developed an all-encompassing plan for roadway safety that not only takes into account the layout of infrastructure yet also brings jointly all major stakeholders who have a stake in creating and maintaining safe roadways, from law enforcement to transportation and medical divisions alongside infrastructure vendors (Gupta N., 2018). The 138.6-km-long Kadapa to Renigunta safety demonstration corridor, developed by the Government of Andhra Pradesh as part of the Andhra Pradesh & Telangana Road Sector Project (APTRSP), is a great illustration of this strategy. The route was selected based on an International Road Assessment Programme (iRap) report that looked at its subpar safety ratings in 2010. Numerous actions were taken in 2014 to improve the demonstration corridor's protection. They included infrastructural upgrades, the opening of a brand-new, fully-equipped trauma center at a nearby hospital, better traffic authorities, and tailored campaigns aimed at certain motorists.

A Road Safety Cell was established inside the Transport Department, which was chosen as the Lead Agency for executing the Safe Road Corridor. Among of the earliest intentional multi-sectoral initiatives to raise roadway safety in the nation was the undertaking. The study was almost finished, and early findings were encouraging. Deaths decreased from 0.26 to 0.16 every ten thousand automobiles between 2009 and 2017, a 40 percent decrease.

In one Brazilian city, the number of fatalities from traffic accidents was cut by an impressive 40 percent. Fortaleza The fatality rate from traffic accidents in the 2.5 million-person metropolis decreased by 40 percent in just a four-year period, from 2014 to 2018 (GRSF/World Bank, 2020), according to a recent statement by Mayor Roberto Claudio. Traffic and health officials reported 226 traffic fatalities in 2018, down from 377 in 2014. Mayor Claudio attributed the achievement to "power of will." That would encourage Fortaleza to gradually invest in steps to boost road safety, including greater data collecting, advertising campaigns, stronger police enforcement regarding crucial risk variables, and reconfigured crossings that give priority to pedestrians and bicycles. According to Jonas Romo, Regional Deputy Director for Latin America at Crucial Techniques, "Fortaleza has seen excellent outcomes due to an integrated effort of political management, an outstanding technical workforce, and ever-growing public involvement." The city adopted a multi-pronged strategy to crack down on drunk driving, over speeding, and the usage of helmets, and it reconfigured roadways to offer greater room to bicycles and pedestrians. It took a lot of preparation and organization to transform the way we think about road safety from merely a transportation problem to a matter of public safety.

The UN's Sustainable Development Goals road safety aim of decreasing traffic deaths by 50 percent by 2020 is now only being met by a select few towns, including Fortaleza.

In China, the pre-existing decline in death and injuries was enhanced by the criminalization of driving while intoxicated (Zhao A. et al., 2016; Xion X., 2019). The Act established BAC restrictions. Penalties were given to offenders as part of enforcement. A BAC of 0.02-0.08 g/dl resulted in a minimum six-month license suspension as well as a $160–320 fine. A driver's license suspension of five to ten years and criminal charges were the outcomes for blood alcohol concentrations more than 0.08 g/dl. Although there was better law enforcement in cities, it was in suburban regions that there was a greater fall in the proportion of fatalities.

The implementation of a new speed restriction in Brazil accelerated the decline in death after the measure was taken (Leito P. A., 2019). Pedestrian safety is the focus of traffic-calming policies, another speed control approach that has been successfully implemented in Ghana and China. According to two investigations conducted in China (Guo Y., 2015; Liu P., 2011), parallelogram-shaped sidewalks and transverse rumble zones before pedestrian crossings both lower the incidence of vehicle-pedestrian collisions by 25 percent and 21 percent, correspondingly. According to Damsere-Derry J. (2019), speed tables, speed barriers, and speed bumps in Ghana reduced the likelihood of pedestrian fatalities.

Multifaceted Approaches to Road Safety and Road Safety Performance

The literature reviewed in this section reported road safety initiatives that utilized a combination of strategies to scale down the occurrence and impact of road crashes in different places. Therefore, the outcomes of such initiatives were not attributed to individual strategies but to their combined effect.

Twenty elementary schools in the Naivasha and Thika sub-counties of Kenya participated in a school road safety programme from 2011 to 2014 (WHO, 2017). The initiative targeted almost 20,000 disadvantaged school students, 49 percent of whom were females, with the primary goal of ensuring that kids commute securely to and from school. A baseline review from January 2008 to July 2011 found 266 injuries near schools, which resulted in the deaths of 38 students. The probability of fatalities and injuries from automobile accidents varied among schools. Children who were already at risk were more at danger in areas near busy highways

and roadways. The educational institutions that were exposed to the greatest risk were chosen using strict standards. 20 elementary schools were chosen for the project, which conducted high-impact interventions to lower the risk of road traffic accidents for kids traveling to and from school (ten in each of Naivasha and Thika). The solutions included reducing traffic speeds near schools, improving sight of kids and crossing points, altering the surroundings, monitored crossing, and raising consciousness among learners, educators, and parents. Over the course of the project's four years, significant successes were made and valuable lessons were learnt. The most notable benefit was the gradual decline in fatal accidents and traffic fatalities around the chosen schools. Thika and Naivasha both saw a reduction in accidents of 37 percent and 49 percent from the baseline data four years prior. Similarly, to Thika, fatalities decreased by 60 percent while decreasing by 83 percent in Naivasha.

Singapore was identified as among the top performing nations internationally and regionally in terms of roadway safety in a World Bank study of Singapore's safety administration method done in 2019 (World Bank, 2019). Road traffic deaths were on the decline, according to statistics published by the Singapore Traffic Police. The overall death toll decreased by 32 percent, from 183 in 2009 to 124 in 2018. It was linked to a number of things, including programs to reduce speed, improved driver consciousness, safer cars and roadways, and better post-collision treatment.

Driver Licenses and Traffic Records; Interjurisdictional Cooperation; National Road Observation; General Management; Road Safety Education and Programs; and Legal and Administrative Matters are the six primary directorates that the ANSV established in its organizational framework. The well-branded initiatives of the recently founded ANSV helped to focus and increase the visibility of road safety initiatives across the country. Road policing programs particularly expanded and grew more focused, encompassing more and larger portions of the high-risk transportation system. The effectiveness of roadway safety increased as a result. In some high-risk passageways, the average fatality rate per 1 million vehicle kilometres driven was 0.019 by 2012, representing a 29.87 percent decrease from the project initial measurements implemented in 2010. The research was unable to link these performance improvements to any particular initiatives, though.

Rising fatalities in Korea, which had a peak in 1991 of 13 429, spurred the nation to take various road safety intervention measures (ITF, 2021). Road fatalities have been going down since, and by 2004, they had been cut in half. For the first occasion in 37 years, the number of traffic fatalities fell below 5,000 in 2013, and Korea achieved a record-low annual fatality total for the eighth straight year in 2020. This impressive record of decreases was credited to a number of actions, beginning with legislation mandating the use of front seat belts in 1990, enforcement of drunk driving laws in 1998, and the placement of median obstacles on national routes. Other measures included the police enforcing speed limits, notably automated speed camera monitoring from 2008, lowering speed limits in residential zones of metropolitan highways in 2014, mandating the use of rear seat belts in 2018, and lowering the legal blood alcohol concentration to 0.3 g/l in 2019.

A review of the theories and empirical studies has revealed the best practices of road safety management, thereby minimizing road crash trauma. Efforts of change agents such as WHO and the World Bank have successfully introduced strategic approaches in tackling the road carnage menace and significantly reduced the menace in most developed countries. There have also been standout cases like that of Sweden. This country came up with the ‘Vision Zero

Strategy,' an ideal that endeared the whole world and led to the advancement of the universal 'Safe System Approach' model. In countering the road crash menace, this approach recommends strategic road safety management encompassing safety planning, safety coordination, safety legislation, safety funding & resource allocation, safety promotion, and safety R & D, and information sharing.

Several knowledge gaps were evident after reviewing the literature in the earlier stages of this chapter, both theoretical and empirical. Generally, there were scanty studies on road safety management in the Kenyan scenario. Therefore, many works of literature wanted context as they were not conducted in Kenya. Others, like the study by Mc Opiyo, cover a small region of the country; therefore, findings cannot be generalized to the whole country. In some other studies analytical approach was wanted. For instance, many bundled variables are being investigated, such that it's impossible to single out the effect of each of the studied initiatives on road safety. Such studies were classified under 'multifaceted approaches' in this study. Many of the studies were also descriptive with no inferential input. They just present the road safety management strategies and results utilized in different places. Still, they do not compute inferences that can be used in replication efforts in the future.

METHODOLOGY

The mixed research methods were utilized in the investigation of the phenomenon under study that is the road safety in Kenya and the strategic management practices applied therein. The researcher collected primary dataset that was adopted for the current investigation.

Data Collection

For the purpose of this study, questionnaires were used to collect data. Every respondent was asked to reply to an identical list of inquiries in a pre-set order as part of the questionnaire data-collecting approach (Saunders et al., 2009; Bryman, 2012). The main tool was a self-completion questionnaire. In this process, the respondents completed the questionnaire on their own to react to the questions. Because it is speedier and faster, the procedure is favoured for interviews (Bryman, 2012). Additionally, it allows for less researcher involvement, consistent interviewers, and respondent convenience.

Empirical Model Specification

The study utilized simple regression models to address each of the objective and one main model for the summary of the objectives. Therefore, the main ordinary least square regression model has been presented in this study to demonstrate the relationship between the explanatory variables and the dependent variable. Further, the model to be estimated has also been presented in this section as show in the equation below.

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

Whereby:

Y = Performance of NTSA

β_0 = Constant performance of NTSA in the absence of the strategic management strategies

β_1, β_2, β_3, &β_4 are the independent variables' correlations
X_1 = Roadway Safety Planning
X_2 = Roadway safety coordination
X_3 = Roadway safety promotion
X_4 = Roadway safety control
ε = Error term.

The data collected was assessed using SPSS version 25 to generate descriptive and inferential statistics. Using summary graphs, pie charts, and frequency distribution tables were presented descriptive statistics, including frequency, modes, percentages, and means. The study employed descriptive and inferential statistics.

The study conducted a regression analysis to address the specific research objectives on road safety strategic management strategies and their influence on NTSA performance. The efficacy of NTSA were dependent variable, with road safety strategic management techniques (Planning, Coordinating, Promotion, and Control) acting as the independent factors. The equation beneath served as the proposed framework.

RESULTS AND DISCUSSION

Descriptive Statistics

The table presented below shows the descriptive statistics that is the summary statistics showing the measures of dispersions and the measures of central tendency. This includes the means, standard deviation and variance.

Table 1: Descriptive Statistics of Key Variables

	N	Mean	Std. Deviation
Roadway Safety Control	247	28.1498	7.80282
Roadway Safety Promotion	247	29.1377	7.40065
Roadway Safety Coordination	247	30.8988	6.48026
Roadway Safety Planning	247	26.3887	6.29902
Ntsa performance	246	20.0610	5.77188

The variable road safety control was established to have a mean of 28.15 while the deviation from the mean was 7.80. Further, the road safety promotions that is one of the explanatory variables was established to have a mean of 30.90 while the deviation from the mean was 6.48. Finally, safety planning and NTSA performance were established to have an average value of 26.34 and 20.06 respectively while the deviations from the mean for the two variables were 6.30 and 5.8 respectively.

Correlation

Prior to conducting regression analysis, diagnostic tests were performed to determine the suitability of the data for inferential analysis. The correlation analysis established strength and direction of the linear relationships between the independent variables namely roadway safety control, roadway safety promotion, roadway safety coordination, and roadway safety planning and the dependent variable, NTSA performance.

The findings indicate a positive and statistically significant correlation between roadway safety control and NTSA performance, with a coefficient of 0.692 ($p < 0.05$). This suggests that improvements in roadway safety control are associated with enhanced NTSA performance. Similarly, roadway safety promotion was found to have a positive correlation coefficient of

0.624 ($p < 0.05$), implying that greater emphasis on safety awareness and promotional activities corresponds to improved organizational performance.

Additionally, roadway safety coordination and roadway safety planning both demonstrated positive correlation coefficients of 0.598, each statistically significant at the 0.01 level. These results indicate that enhanced coordination among stakeholders and effective planning contribute positively to NTSA performance. Importantly, none of the correlation coefficients were excessively high ($r < 0.8$), suggesting the absence of multicollinearity among the predictor variables. This implies that each variable provides a unique contribution to the model and that it is appropriate to proceed with regression analysis.

Regression

To examine the combined effect of all road safety strategic management practices on NTSA performance, a multiple regression model was developed. The results in Table 4.2 show that the four independent variables collectively explain 51.8% ($R^2 = 0.518$) of the variation in NTSA performance. This indicates that, together, roadway safety control, promotion, coordination, and planning have a substantial influence on NTSA's operational outcomes.

Table 2: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.720a	.518	.510	4.03934

The ANOVA results in Table 4.58 indicate that the regression model is statistically significant ($F = 64.811$, $p = 0.000$), confirming the overall fitness of the model. This suggests that the combination of the four strategic management practices significantly influences NTSA performance.

Table 3: ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	4229.868	4	1057.467	64.811	.000b
Residual	3932.217	241	16.316		
Total	**8162.085**	**245**			

Table 4: Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	(B)	Std. Error	(Beta)		
(Constant)	2.29	1.288		1.778	0.077
Roadway Safety Control	0.314	0.057	0.424	5.521	0
Roadway Safety Promotion	0.111	0.06	0.142	1.845	0.066
Roadway Safety Coordination	0.061	0.069	0.069	0.884	0.378
Roadway Safety Planning	0.145	0.065	0.158	2.228	0.027

The findings indicate that while all road safety strategic management practices contribute positively to NTSA performance, roadway safety control and roadway safety planning are the most influential predictors. Their significance highlights the importance of strict regulatory enforcement and comprehensive planning frameworks in enhancing organizational efficiency. Conversely, although safety promotion and coordination positively affect performance, their effects are comparatively weaker and statistically insignificant in the joint model.

CONCLUSION AND RECOMMENDATIONS

Conclusion

The issue of safety by the NTSA is the main issue that would bring about the better performance. The performance of the NTSA cannot be in absence of the safety of the road users and the travelers and other stakeholders. Therefore, there is need for intensified coordination and cooperation between the law enforcers that is the police and the NTSA in Kenya if the safety within the roads will be achieved.

In its latest strategy the NTSA was able to bring in the issue of speed detection cameras that are mostly mobile which means that the road user are most able to communicate with each other within the roads and know where these cameras are elected. Therefore, this study concludes that the speed detection gadgets should permanently placed in strategic locations across the country in order to be working consistently which will the change the culture among the road users.

In summary, the performance of the NTSA has been improving since inception. However, there is need for better implementation such as stationary speed cameras that would not be moved. This is because it has been revealed that drivers have a tendency to warn each other when they have knowledge of the cameras on the roads. This makes it difficult for the enforcement officers to be able to get the real or actual culprits.

Recommendations

The Intelligent Road Safety Management Systems is a digital platform rolled out by the Kenya National Transports and Safety Authority (NTSA) to monitor and enforce road safety for the public service vehicle (PSVs) and commercial fleets in real time. However, despite the establishment and the development of the systems the same is yet to be fully applied or implemented in a way that it would actually inform the safety in the Kenyan roads and the performance of the NTSA. Despite partial implementation of this systems, there is still an increase in the road crashes whine brings about need for new strategy on how implementation van be made more effective.

On the issues of road safety, there is a concern and need for integrity and trust in NTSA where stakeholders have always raised. NTSA therefore needs to highly invest in systems and human resources that can bring trust and integrity to the organization as raised by stakeholders.

The study also recommends the change in general driver’s behaviors. As a society, there is need for people to be responsible towards their personal safety. This is because in most cases drivers would just bypass road signs with impunity especially when they think that they are not been watched. This also happens on weekends when most people think that there are no government officers on Kenyan roads. However, if the responsibility is bestowed upon the drivers and is self-motivated then the same would not be ignored.

The study recommends that there should be annual or periodic retraining of drivers and road users in order to ensure that they curriculum or what they had learned is updated. This would allow the road users to adhere to safety standards because they would be able to have updated information in relation to the rules, regulations and the Highway Code.

The study and the stakeholders within the transport sector in Kenya recommends that the future scholars should investigate how the issue of trust can be addressed in relation to road safety. This is because in most cases even the systems put in place can be overrun by the decisions of an officer who can waive of the mistakes and the crimes of a driver after they have been corrupted. Therefore, future scholars should investigate how these phenomenon's can be addressed so that there is a culture of upholding ethical standards and trust.

During police/NTSA speed enforcement on our roads, an officer would operate a mobile speed camera to intercept speeding vehicles however motorists will communicate amongst them presence of speed enforcement at a specific location hence all vehicles slows down. The study therefore concludes that speed detection gadgets should be permanently be placed in strategic locations across the country in order to be working consistently in order to change the culture among the motorists.

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