

EXPLORING THE IMPACT OF CRIME ON ROAD SAFETY IN SOUTH AFRICA

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ABSTRACT

The objective of the paper is to explore the relationship between crime and road safety as well as the impact of criminal activities on the road environment in South Africa. These relationships have not been fully explored in the South African context, with its high road accident and fatality rates, and high levels of exposure to crime. The paper shows that criminal activities in the road environment extend significantly beyond the mere committing of road traffic offences and may have a negative impact on the safe operation of the road network and broader road environment, in addition to endangering the lives of road users and innocent bystanders. The impact of crime on road safety can be considered from various angles, the paper therefore uses a multidisciplinary approach to analyse the extent of the problem more comprehensively. A multi-disciplinary approach to analyse the safety and security of the road environment includes the potential role of sciences such as town-planning, transportation planning, information technology, ITS and traffic engineering, criminology, social psychology and road traffic management. *Firstly*, the paper provides an overview of research findings and practices regarding the relationship between crime and road safety, through the inputs from different disciplines. *Secondly*, the paper describes the criminal activities in South Africa that may have a negative impact on road safety. This includes a wide range of activities within the road environment, vehicle related crimes and road user behaviour. Other crime related incidences include the mugging of pedestrians and cyclists, taxi violence and conflict between taxi associations endangering both drivers and commuters, etc. *Thirdly*, the paper highlights some of the crime prevention and road safety interventions prevalent locally and internationally. Shortcomings and challenges associated with gaining more effective control over criminal activities in the road environment in South Africa are also mentioned. The paper concludes that a more focused operational approach and research are required to determine the impact of crime on road safety in South Africa. In addition, an extensive scoping of international best practices could assist in a better understanding of the impact of the phenomenon, and to develop appropriate countermeasures to effectively deal with it.

1. INTRODUCTION

In South Africa, road traffic fatalities and homicides account for a significant proportion (over 70%) of non-natural deaths (MRC NIMMS, 2005). South Africa's homicide rate of 72,5 per 100 000 population is about five times the world average of 14,0 per 100 000 population, whilst the road traffic death rate of 43,0 per 100 000 population is twice the world average of 21,6 per 100 000 population (WHO, 2002). According to the RTMC (2015), South Africa had 10 613 fatal road accidents in 2015, with a motorised vehicle population of 11.7 million (i.e. an accident rate of the order of 12,5 per 10 000 registered vehicles). The number of fatalities from these road accidents is of the order of 13 800 per year (at a rate of just under 28 per 100 000 population, or 16 per 10 000 registered vehicles). Of these fatalities, approximately 38% are pedestrians. The cost of road accidents to the South African economy is estimated at R306 billion per year.

These high road traffic accidents and fatalities are mirrored by a worrying safety and security situation, with reported violent crime rates amongst the highest in the world. Robbery with aggravating circumstances (such as car and truck hi-jacking, Cash-in-Transit robberies and business robberies) have, over the past three years, grown consistently year-on-year. These crimes are typically carried out with military-like precision by large well-armed and organized crime syndicates, and typically rely on the use of motorised transport and public road network. The most affected areas include the economic heartland of the Gauteng province as well as Kwa Zulu Natal, Eastern and Western Cape.

The crime risks and road safety, are further exacerbated by ongoing civil protests using or blocking public roads (primarily related to service delivery issues), and strike action (including wage negotiations and union related matters) – often accompanied by violence. Protest actions typically occur at a rate of 25 protests a month, with the areas most affected being Gauteng, Limpopo and the North West provinces. This civil unrest consumes scarce police resources which would normally be used to counter violent organized crime syndicates and day-to-day crime prevention, combating and investigation activities.

2. RESEACH FINDINGS, APPROACHES AND PRACTICES REGARDING THE RELATIONSHIP BETWEEN CRIME AND ROAD SAFETY

2.1. Relationship between criminal behaviour, traffic offences and crash involvement

Criminal activities impacting of road safety can occur anywhere in the road environment, i.e. on the road network, in public open spaces and on private road space (shopping centres, parking garages, etc.). The need exists to get a better understanding of the circumstances that lead to these events and to recommend measures to circumvent future occurrence.

According to Rose (2000), “*most drivers are not criminals, but most criminals are drivers*”. Routine traffic duties often bring officers in contact with such criminals and traffic patrols continued to make crime a priority during the year – The UK West

Midlands Police reported that 36% of all arrests made by traffic officers were for crime (UK West Midlands Police, Traffic Division, 1997 (Rose 2000). Furthermore, those criminals who commit serious and violent crimes are less likely to obey the rules of the roads. A significant and increased road safety threat is posed by the following criminal elements:

- Those who use the roads for their criminal activities and transportation of the proceeds of crime.
- Criminals referred to as the “Blue light gangs” who present themselves as being police officials only to hijack and rob innocent road users.
- Criminals on motorbikes robbing the passengers of public transport vehicles.
- Criminals who commit crimes elsewhere and use the roads irresponsibly as an escape route in their attempt at a fast “getaway”.
- Cash in transit robberies not only endangering the lives of security guards but also all of those who share the roads with these vehicles.

Junger, West and Timman (2001) stated that the propensity of criminals to engage in risky driving and commit traffic offenses is an area of interest for researchers in different sciences such as criminology, social psychology and road safety. Internationally, it is generally accepted that crime and criminal behaviour has a direct impact on road safety. Driving under the influence of alcohol or drugs, road rage, speeding, not adhering to the general rules of the road, are all traffic related criminal activities that could lead to road casualties and are punishable in terms of judiciary systems. On the other hand, various other criminal related activities occur within the road environment that also endanger the lives of road users.

Research conducted by Brace et al (2010) of the Accident Research Centre of Monash University shows the relationship of criminal activity of individuals and the likelihood of these individuals being involved in fatal or serious injury crashes; negative behaviour and risky driving behaviour; criminal behaviour and traffic offences, relationship between crash involvement, drink driving and general criminal history including theft, car theft, drug and alcohol related crimes, violence, property damage and vandalism. The key findings of the research study, concluded that:

- A proven relationship exists between general negative behaviour and risky driving.
- A positive relationship also exists between criminal behaviour and traffic offences.
- Criminal history increases the risk of crash involvement. Cultural differences may also be a factor.

Impinen and Lillsunde (2013) conducted a study in Finland regarding increased criminal activity among people suspected of *driving under the influence of alcohol or drugs*. They examined the difference in the range of criminal activity between people who had a history of driving under influence of alcohol, drugs and reference population with no history of driving under the influence. The study showed that:

- At least one offence was found in 94% of driving under the influence of alcohol suspects and 96% of driving under the influence of drugs suspects.
- Most common offences were traffic violations and crimes against property.
- Almost half of the suspects driving under the influence of drugs had a history of violent crime.

Zuidgeest, Sinclair and Cable (2015), showed that the incidence of crime associated to road safety, and in particular with pedestrian bridges in Cape Town, both real and anecdotal, appears to be one significant factor influencing the crossing decisions of pedestrians next to common factors like convenience, time saving, and perceptions around traffic risk. Many of those crossing the freeways at-grade seem to be doing this irrespective of whether there is a bridge nearby or not, even though thousands of pedestrians are in fact using the bridges each day. Safety from violence on the bridge or convenience (in terms of time savings) might be reasons for this. Digging more deeply into the bridge crossers motivations, it become clear that while safety is the primary reason that the bridge is selected, for many people this very choice comes with it a degree of insecurity in the form of risk of crime. This has been reported before, but in this survey a significant number of pedestrians reported having direct experience of crime. It is clearly very much a factor, and was given by pedestrians who cross at-grade as a partial explanation of their crossing choice. Pedestrians often are also walking along the freeway, rather than on the adjoining local road network in order to avoid being robbed by gangs.

Road rage is another form of aggression on the road that could end up in criminal behaviour. It involves aggressive or angry behaviour by a driver of a car or other road vehicle. It can be thought of as an extreme case of aggressive driving. Such behaviour might include rude gestures, verbal insults, deliberately driving in an unsafe or threatening manner, or making threats. Road rage can lead to serious crimes such as altercations, assaults, and collisions that result in injuries and even deaths (*Wikipedia Road Rage*).

2.2. International efforts to integrate crime and road safety data

The integration of crime and road safety data is central to understanding the impact of criminal behaviour in the road environment and on road safety. Such a capability enables a more transparent and visible relationship between crime and safety in the road environment thus providing opportunities for the formulation of appropriate strategies to fight crime, and secondly, provides insight into the road safety issues caused by criminal activities.

A review of current best-practices indicate that some international best practices exist that link criminal activities in the road environment to road safety problems being encountered as a result thereof. Some examples are discussed hereunder.

In the *United States of America*, for example, the NHTSA 2013 *Data-Driven Approaches to Crime and Traffic Safety* – DDACTS, (NHTSA 2013) is a law enforcement operational model supported by a partnership among the United States Department of Transportation’s National Highway Traffic Safety Administration and two agencies of the Department of Justice: The Bureau of Justice Assistance and the National Institute of Justice. Drawing on the deterrent value of highly visible traffic enforcement and the knowledge that crimes often involve motor vehicles, the goal of DDACTS is to reduce crime, crashes, and traffic violations across the USA. The model integrates location-based crime and traffic crash data to establish effective and efficient methods for deploying law enforcement and other resources. The model seeks to improve law enforcement operations implemented to reduce crime, traffic crashes, and traffic violations as well as improve public safety. This program furthers the Department’s mission by sponsoring research to provide objective, independent, evidence-based knowledge and tools to meet the challenges of crime and justice, particularly at the State and local levels.

In the *United Kingdom*, official road crash statistics and the contributory factors to casualties, include a specific category shown as *Special Codes* which also covers crime related road casualties by severity. Table RAS50001 in the official UK crash statistics, which covers contributory factors in reported accidents by severity, (Road Crash Statistics, Great Britain, 2013), include casualty categories related to crime such as “*Stolen vehicle*” or “*Vehicle used in the course of crime*”.

2.3. Technologies to address crime in the road environment

2.3.1 Introduction

Technology has a major role to play in assisting law enforcement as a ‘force-multiplier’, and also in detecting criminal activity in the road environment. These technologies typically exploit developments in Surveillance Technology, Information and Communications Technology (ICT) and expanding broad-band communications capabilities and availability. Specific examples include automatic license plate recognition, surveillance technologies such as CCTV monitoring, geographical information systems (GIS) and the use of social media communications platforms.

2.3.2 Automated Licence Plate Recognition

Automated Licence Plate Recognition (ALPR) technologies (both static and mobile) are used globally as a law enforcement tool for speed and by-law enforcement, in addition to enabling more efficient tolling (at roadway toll gates, shopping centre parkades, etc.) and assisting in serious crime investigations. These systems, enhanced by powerful data-analytics, provide a powerful means of preventing and reacting to traffic infringements and other serious crimes. These systems are also more recently being augmented through the use of social media platforms, which increases the rate of communication to key stakeholders and role players – especially in serious and violent crimes. Whilst these systems have incredible capacity and potential, their exploitation is often limited by a number of factors, including the degree to which the primary stakeholders are able and willing to share information, the lack of coordination between these stakeholders, system and

technology deficiencies (and poor specifications and purchasing decisions) and a silo approach.

In South Africa, several ANPR/LPR systems are in use, with recent initiatives looking to provide for an integrated approach through the South African Police Service – thereby leveraging the impact of investment by both government and the private sector to the achieve greater impact on lawlessness and crime. One such successful example is the Cape Town License Plate Recognition (LPR) project which has linked almost 400 private CCTV cameras to the City's surveillance operations, with over 1200 cameras in total sharing crime information about suspicious vehicle registration numbers through a centralised server hosted at the City's control room. This network enables the tracking of targeted vehicles across the City and causes a prioritised response when one of the cameras identifies a vehicle of interest. The City has anticipated that this will cause criminal elements to use false licence plates or remove licence plates altogether and have therefore pre-empted this through the new Provincial Traffic Act regulations that will allow for vehicles with false plates or no plates to be impounded until legal proceedings are concluded.

2.3.3 Surveillance technologies

CCTV is an important technology and tool to ensure safe and secure transportation. But as expansion of CCTV camera use in the field of traffic and roadway monitoring continues, CCTV systems are beginning to meet with limitations: too many cameras, too many monitors, TMC not manned 24/7. Most of the information provided by CCTV cameras is under-used or not used at all because Traffic Operators are not aware of it in real-time. However, time is of the essence when detecting and responding to an incident in order to prevent secondary accidents and congestions. This is the reason why Traffic Management Centres have turned to Advanced Video Surveillance solutions to assist Traffic Operators to efficiently monitor traffic and quickly respond to incidents.

http://www.hoosierco.com/Citilog_PTZ_Cameras_Incident_De1.html

The aim of the SANRAL Freeway Management System (FMS) CCTV network is to reduce recurrent congestion, with its accompanying impact on the environment; to improve road safety; to keep motorists informed of travel conditions; and to respond rapidly to road incidents. The FMS allows for the collection of real-time information, which is conveyed to a transport management centre. One area of CCTV not fully utilised yet, however, is to use the in time footage as a crime detection tool, e.g. to detect incidences where people are being robbed during road crashes, loiterers in the roadway, and other criminal activities on the freeway (<https://www.i-traffic.co.za/about/default.aspx>). The Cape Town Transport Management Centre (TMC), for example, which is the first integrated public transport, traffic and safety and security management centre in South Africa, uses 197 CCTV cameras to monitor the traffic flow and 48 variable message signs to communicate with commuters. The TMC's also provide instant footage to operators to detect security issues within the road network such as people loitering on the freeway, vandalism of road furniture, cash in transit robber's *get-away* cars, and other criminal related activities (<http://www.securitysa.com/>).

2.3.4 Geographical Information System (GIS) platforms

The use of GIS technologies can aid crime analysis in general; but also assist in detecting crime incidences and patterns within the road environment. ESRI (2008), lists the following potential benefits of GIS Technology to Crime Analysis:

- Identifying and highlighting suspicious incidences and events that may require further investigation, attention or response.
- Supporting pattern and crime trend analysis across multiple jurisdictions.
- Enhancing the implementation of various policing methodologies to reduce crime and disorder.
- Integrating traditional and non-traditional law enforcement data to improve overall analysis.
- Educating the public with visual information to clarify crime concerns and enlist community action.
- Providing tools and techniques to capture crime series and forecast future crime occurrences.

2.3.5 Social media communications platforms

Crime prevention is one of the common goals of all law enforcement agencies. Many agencies are leveraging the benefits of social media to educate larger audiences on crime prevention tactics and helpful tips; to promote awareness of important issues such as available resources and victimization data; and to foster partnerships with the community. Agencies can harness social media to engage with neighbourhood watch groups, promote crime prevention events and activities, and by promoting proactive crime prevention partnerships. The most recent IACP social media survey found that 66.7% of agencies use social media for crime prevention activities. - <http://www.iacpsocialmedia.org/Topics/Parent.aspx?termid=125&depth=2#sthash.A0goJwms.dpuf>

2.4. Planning, designing, monitoring and maintenance of the road environment to prevent crime

Various concepts have been developed to describe the role that environmental planning, design practice, monitoring and maintenance practices can play in providing a safe and secure built environment. This include concepts such as *Crime Prevention Through Environmental Design* (CPTED), Situational Crime Prevention (SCP), the Broken Windows concept, and many more. Some of these concepts are discussed hereunder.

2.4.1 Impact of planning and design practices to prevent crime

The concept *Crime Prevention Through Environmental Design* (CPTED) was coined and formulated in 1971 by criminologist C. Ray Jeffery in his book, "Crime Prevention through Environmental Design". He outlined four critical factors in crime prevention that have stood the test of time.

These are:

- The degrees to which one can manipulate the opportunity for a crime to occur,
- The motivation for the crime to occur,
- The risk to the offender if the crime occurs, and
- The history of the offender who might consider committing the crime. The first three of these are within the control of the potential victim while the last is not.

Crime Prevention Through Environmental Design (CPTED) is a multi-disciplinary approach to deterring criminal behaviour through environmental design. CPTED strategies rely upon the ability to influence offender decisions that precede criminal acts. Generally speaking, most implementations of CPTED occur solely within the urbanized, built environment. Specifically altering the physical design of the communities in which humans reside and congregate in order to deter criminal activity is the main goal of CPTED. CPTED principles of design affect elements of the built environment ranging from the small-scale (such as the strategic use of shrubbery and other vegetation) to the overarching, including building form of an entire urban neighbourhood and the amount of opportunity for "eyes on the street".
http://en.wikipedia.org/wiki/Crime_prevention_through_environmental_design

While *Safer City Partnerships* are increasingly gaining attention, there is an inadequate understanding of crime prevention through environmental design at the local authority level. Practitioners are more aware that crime prevention should become a central consideration in the design process, but many officials and policy-makers have a poor understanding of the concept. In a case study in eThekweni, prepared for the South Africa Global Report on Human Settlements 2007, Zambuko and Edwards (2007) suggest that the implementation of CPTED should start by training city employees who deal with the environment. Key departments must then work together to incorporate CPTED principles into local government crime prevention plans, building codes, and information campaigns to impact positively on the city. They reiterate that, apart from the fixed city environment, the transport environment must also be considered within an urban crime prevention design strategy.

In 1961, Jane Jacobs in her book *The Death and Life of Great American Cities* (1961) argued that urban diversity and vitality were being destroyed by urban planners and their urban renewal strategies. She was challenging the basic tenets of urban planning of the time: *that neighbourhoods should be isolated from each other; that an empty street is safer than a crowded one; and that the car represents progress over the pedestrian*. She pointed out that *the new forms of urban design broke down many of the traditional controls on criminal behaviour*, for example, the

ability of residents to watch the street and the presence of people using the street both night and day. She suggested that the lack of "natural guardianship" in the environment promoted crime. Jacobs developed the concept that crime flourishes when people do not meaningfully interact with their neighbours. She listed the three attributes needed to make a city street more safe and secure:

- A clear demarcation of private and public space;
- Diversity of use; and
- A high level of pedestrian use of the sidewalks.

Kruger, Landman and Liebermann (CSIR, 2001), in collaboration with the SAPS Division for Crime Prevention, published a *Manual for Crime Prevention through Planning and Design*. They stated that the environment can play a significant role in influencing perceptions of security. Certain environments can impart a feeling of safety, while other can induce fear, even in areas where levels of crime are not high. The Manual lists several security issues that could be resolved through proper planning and environmental design. The main strategic focus areas include:

- **Vacant land:** buffer strips, undeveloped land, transport reserves, etc. often neglected and become unsafe for pedestrians.
- **24-hour land use:** Rigid separation of land uses can leave some areas unattended and vulnerable at certain times, increasing the opportunity for vandalism.
- **Pedestrian use of infrastructure:** Environment not always conducive to the needs of pedestrians, e.g. lack of walkways and lighting, major roads separation neighbourhoods, etc.
- **Equitable provision of facilities:** Inequitable distribution of facilities between different parts of many towns and cities in South Africa, e.g. lack of recreation facilities as a result of which communities rely on *shebeens* (informal taverns) and night clubs for entertainment.
- **Urban renewal:** Urban decay in some parts of cities and towns and abandoned buildings sometimes harbour criminals and streets and public spaces that are not maintained add to the feeling of insecurity.

The Department of Transport *Non-Motorised Transport Facility Guidelines* (DoT 2015) states that the personal safety (security) of NMT users is of utmost importance in order to maximise usage. The following measures should therefore be adopted:

- Personal safety should be taken into account in terms of potential criminal areas of concealment and have clear sight and splayed building and boundary corners wherever possible.
- Alternative connections should be available to avoid insecure spots.

- Street lights should be provided, if not already present, and properly maintained.
- All vegetation should be controlled and managed to avoid offering shelter to potential criminals, i.e. no vegetation between 0.4 m and 1.5 m above ground unless security is provided.
- Parking on walkways should not be allowed.

The Department of Environmental Affairs (DEA) *Green Cities Manual: Promoting the NMT Agenda* (DEA, 2015) suggests that NMT networks should encourage social as well as traffic safety. Social safety (security) can be established by designing pedestrian networks which are secure. Cyclists also need to be protected as much as possible from personal violation i.e. cycle theft, mugging, etc. Facilities therefore need to offer sufficient lighting and visibility to NMT users and reduce 'dark spots' that facilitate crime. The Manual suggests that Crime Prevention through Environmental Design (CPTED) principles of safety in design, need to be taken into consideration when designing land uses for NMT infrastructure.

2.4.2 Surveillance practices and the combating of crime

Surveillance and access control strategies limit the opportunity for crime in the built environment

https://en.wikipedia.org/wiki/Crime_prevention_through_environmental_design. Territorial reinforcement promotes social control through a variety of measures. Natural surveillance occurs by designing the placement of physical features, activities and people in such a way as to maximize visibility and foster positive social interaction among legitimate users of private and public space. Potential offenders feel increased scrutiny and limitations on their escape routes. Some examples to improve security and to limit crime opportunities are listed below:

- Design streets to increase pedestrian and bicycle traffic.
- Place windows overlooking sidewalks and parking lots.
- Use passing vehicular traffic as a surveillance asset.
- Create landscape designs that provide surveillance, especially in proximity to designated points of entry and opportunistic points of entry.
- Use the shortest, least sight-limiting fence appropriate for the situation.
- When creating lighting design, avoid poorly placed lights that create blind-spots for potential observers and miss critical areas. Ensure potential problem areas are well lit: pathways, parking areas, phone kiosks, bus stops, children's play areas, recreation areas, pools, etc.

- Avoid too-bright security lighting that creates blinding glare and/or deep shadows, hindering the view for potential observers. Use shielded or cut-off luminaires to control glare.
- Place lighting along pathways and other pedestrian-use areas at proper heights for lighting the faces of the people in the space (and to identify the faces of potential attackers).
- Utilizing curved streets with multiple viewpoints to multiple houses entrances as well as making the escape route difficult to follow.
- Natural surveillance measures can be complemented by mechanical and organizational measures. For example, closed-circuit television (CCTV) cameras can be added in areas where window surveillance is unavailable.

2.4.3 Poor maintenance practices and potential for criminal activities

The impact of poor maintenance of the road environment on the safety of road users has been a longstanding challenge. This challenge dates back to the 13th century: The Statute of Winchester already quoted: “*The highway from one merchant town to another shall be cleared so that no cover for malefactors should be allowed for a width of two hundred feet on either side; landlords who do not effect this clearance will be answerable for robberies committed in consequence of their default, and in case of murder they will be in the King’s mercy.*” — *Statute of Winchester of 1285, Chapter V, King (in Edward I. Kuo, Sullivan / Does Vegetation Reduce Crime? ENVIRONMENT AND BEHAVIOUR, May 2001).*

The impact of poor maintenance on crime is well covered in international literature. One of the most outstanding theories is the "Broken Windows" theory, put forth in 1982 by James Q. Wilson and George L. Kelling. It explored the impact that visible deterioration and neglect in neighbourhoods have on behaviour and criminal elements. Property maintenance was added as a CPTED strategy on par with surveillance, access control and territoriality. The Broken Windows theory, therefore, goes hand in hand with CPTED. Crime is attracted to the areas that are not taken care of or abandoned. CPTED adds a pride of ownership feeling to the community. With no more "broken windows" in certain neighbourhoods, crime will continue to decline and eventually fall out completely. Generally, poor maintenance practices that could subject road users to criminal risk include: poorly lit roads, sidewalks, intersections, footbridges and subways; lack of vegetation management allowing assailants or robbers to hide close to the roadway; and lack of street light maintenance allowing insecure situations at night, and others. http://en.wikipedia.org/wiki/Crime_prevention_through_environmental_design

2.4.4 Others circumstantial approaches to crime prevention

Situational Crime Prevention (SCP), in general, attempts to move away from the "dispositional" theories of crime commission, i.e. the influence of psychosocial factors and/or genetic makeup of the criminal, and to focus on those environmental/situational factors that can potentially influence criminal conduct. Hence rather than focus on the criminal, SCP focuses on the circumstances that

lend themselves to crime commission. Understanding these circumstances leads to the introduction of measures that alter the environmental factors with the aim of reducing opportunities for criminal behaviour - https://en.wikipedia.org/wiki/Crime_prevention.

3. OVERVIEW OF CRIMINAL ACTIVITIES THAT COULD IMPACT ON ROAD SAFETY IN THE SOUTH AFRICAN CONTEXT

This section explores the criminal activities in South Africa that could have an impact on road safety. This includes criminal activities within the road environment, vehicle related crimes, illegal road user behaviour and other criminal related activities. Each of these areas will be discussed separately hereunder

Crimes in the road environment impacting on road safety

There are several criminal activities which are being conducted in the road environment in South Africa that could endanger road users. Examples include the theft of cables or vandalising of substations leading to a reduction in street lighting or the mal-functioning of traffic signals; the theft of crash barriers, man-hole covers and the removal of bridge railings (all these items are sold as scrap metal); the theft of road signs which are used as roof tiles for houses in informal settlements, fences vandalised or illegally removed in rural areas and next to informal settlements increasing the risk of animals entering and crossing roads. Several examples have also been recorded where rocks and other large obstructions were placed on the roadway or thrown from road- or foot-bridges with the intention of causing vehicles to crash and providing an opportunity to rob crash victims.

Criminal activities like these could have a negative impact on the safety of road users through the vandalising of the safety design features that are built into the road environment to protect road users.

3.1. Vehicle-related crimes endangering road users

Vehicle related crimes include various activities such as: theft of vehicles and/or its contents through immobilizer jamming devices and other clever use of technology, high jacking, smash-and-grab, fraud with licensing, roadworthiness and bribery, cash in transit robberies endangering the lives of other road users, bicycle-jacking and many more. Vehicle-related criminal practice comprise a major part of the road safety challenge in South Africa and will be discussed in much detail hereunder.

The institutional frameworks dealing with both vehicle crime and road accidents are associated with the national driver and vehicle management system used by South Africa, as well as the criminal justice system. The former is a complex system of legislation, structures, responsibilities and relationships which transverse all spheres of the public and private sectors. At the core of this driver and vehicle management system are the following functions:

- Motor vehicle registration and licensing.
- Motor vehicle roadworthiness testing.
- Driving license testing.
- Public Transport Operator Licensing.

Underpinning these functions is the National Traffic Information System (NaTIS), which forms the information hub for each of the separate components associated with the management of vehicles and drivers.

- The motor vehicle management sphere of influence also extends to the law enforcement arena, comprising the following functions:
- Motor vehicle clearance (undertaken by the South African Police Service (SAPS)).
- SAPVIN (SAPS vehicle identification sections).
- Vehicle Safeguarding Units (SAPS).
- Investigations (including vehicle identification sections).
- Roadside law enforcement (including border control).

These functions are in turn supported by the SAPS Circulation System and specialist support functions such as the National Vehicle Information Centre (NAVIC) at SAPS National Head Quarters in Pretoria. The efficiencies of the abovementioned driver and vehicle management system depends critically on a close relationship between the abovementioned transport functions, as well as between these and those undertaken by the law enforcement community (particularly the SAPS) and the broader criminal justice system.

Additional functions which impact the vehicle management system in various ways include the following:

- Controlling the importation and exportation of vehicles (primarily performed by SARS and DTI, but also include a number of other agencies).
- Regulating the cross border permit system for transport operators (Cross Border Road Transport Agency).
- Ensuring proper accountability and disclosure in so far as revenue is concerned (SARS).

- Performing of inspections of vehicle test stations and the inspection of vehicles and the issuing of letters of authority, etc. (SABS).

The efficacy of the components of this driver and vehicle management system has a significant influence on the level of vehicle-related crimes across the country, through the systematic reduction of fraud and corruption and improvement of service delivery. These factors, in combination, underpin the ongoing vehicle crime and road safety problems in the country. These illegal and fraudulent activities exacerbate road safety – through, for example, obtaining drivers licences without the completion of the necessary competence training, and the illegal obtaining of vehicle roadworthiness certificates for vehicles which are not fit for road use. These and others have been summarized in Table 1.

Table 1: Summary of the key enablers of vehicle theft and hijackings and road accidents

Threat	Market or Causal Factors	Primary Modus Operandi	Key Driver and Vehicle Management System Enablers
Vehicle Theft and Hijackings	50% - Re-sold into local market	<ul style="list-style-type: none"> ➤ Vehicle ID changes, ➤ Vehicle ownership changes, ➤ Falsification of documentation (e.g. Identity Documents) 	<ul style="list-style-type: none"> ➤ Illegal registration and licensing, ➤ Fraudulently obtained Roadworthiness Certificates, ➤ Fraudulently obtained Police Clearance and SAPVIN, ➤ Inadequate roadside law enforcement.
	30% - Illegal export	<ul style="list-style-type: none"> ➤ Change of exterior vehicle identifiers (Registration number & license disk), ➤ Incorrect declaration at Ports of Entry/Exit 	<ul style="list-style-type: none"> ➤ Fraudulent clearances, ➤ Lack of titleholder status checks at Ports of Entry/Exit ➤ Inadequate roadside law enforcement.
	20% - Chopping for parts market	<ul style="list-style-type: none"> ➤ Removal of all vehicle ID particulars 	<ul style="list-style-type: none"> ➤ Vehicle status coding manipulation, ➤ Inadequate change of ownership, ➤ Inadequate law enforcement and investigations

Threat	Market or Causal Factors	Primary Modus Operandi	Key Driver and Vehicle Management System Enablers
Road Safety	35% - Human Factors	<ul style="list-style-type: none"> ➤ Poorly trained drivers, ➤ Driver fatigue, ➤ Pedestrian jay walking, ➤ Drunkenness, under the influence of intoxicating liquor or a drug having a narcotic effect (driver/ pedestrian), ➤ Reckless/ Negligent driving. ➤ Recklessness. 	<ul style="list-style-type: none"> ➤ Fraudulently obtained Driver's License ➤ Insufficient roadside law enforcement.
	35% - Vehicle Factors	<ul style="list-style-type: none"> ➤ Un-roadworthy vehicles 	<ul style="list-style-type: none"> ➤ Fraudulently obtained Roadworthiness Certificates, ➤ VTS not online with eNaTIS, ➤ Inadequate roadside law enforcement.
	30% - Road Factors	<ul style="list-style-type: none"> ➤ Road maintenance and design factors. 	

The various core processes and systems comprising the driver and vehicle management system of the country directly influence both vehicle theft/hijacking and road safety in the manner illustrated in Table 2.

Table 2: Impact of the components of the driver and vehicle management system on vehicle theft/hijackings and road safety

Component of the driver and vehicle management system	Direct impact on vehicle theft and hijackings	Direct impact on road safety
Vehicle registration and licensing;	High	Low
Vehicle roadworthy testing;	High	High
Driving license testing;	Low	High
Public Transport Operator Licensing	Low	High
Police Clearance, VSUs and SAPVIN.	High	Low
Investigations and prosecutions	High	High
Roadside Law Enforcement	High	High

3.2. Road traffic offences as “road user crime” in the road network

Road traffic offences covers a wide range of activities that are punishable in terms of the National Road Traffic Act (Act 93 of 1996) and the National Road Traffic Regulations. The Administrative Adjudication of Road Traffic Offences Act 46 of 1998, is seeking to decriminalise many of these through the implementation of the Act. It seeks to introduce a point’s demerit system for violations of traffic law. This topic is not covered in this paper since the focus is on the impact of crime on road safety.

3.3. Other criminal activities in the road environment

Other crime related incidences that impact negatively on road safety include activities such as the *mugging of pedestrians and cyclists, taxi violence and conflict between taxi associations* endangering both drivers and commuters. Taxi violence and conflict between taxi associations are placing the lives of both drivers, commuters and the general road user community at risk. (*Arrive Alive website – Adv. J Jonck: Crime as a Threat to Road Safety in South Africa*).

Hawkers, beggars and window washers at busy intersections can often be decoys for criminals. The Metro Police Department of the City of Johannesburg (IOL News 2014), for example, reported that these people cause numerous problems for motorists, their safety and themselves. Window washers, especially, were creating many problems. Cases were reported where if motorists don’t pay, they squirt dirty, muddy water on the windscreen to obscure their vision. Some hawkers, too, operated illegally as they had to be 5m from an intersection. Many of these hawkers were decoys for criminals. On the pretext of selling, they check what is inside the vehicles and signal to their accomplices, who execute smash-and-grabs. *Don’t give cash to window washers – police IOL News 24 Nov 2014 by Anna Cox*

Street children begging at intersections and elsewhere on the road network are also a threat to road safety by standing in the roadway during day and night. Zambuko and Edwards (2008) indicated that the numbers of street children in Durban, like Johannesburg, Pretoria and Cape Town are growing. The management of street children is a strategic priority since they are in need of care and are vulnerable to crime, exploitation and abuse. Most of these neglected youngsters lack social and practical skills which increase the likelihood that they will participate in criminal activity. In addition, they congregate in business and tourist districts they can intimidate residents and tourists to the detriment of the city's economic growth.

4. DISCUSSION

The impact of crime on road safety in South Africa needs greater elucidation. Various criminal activities in the road environment can, and are in fact, leading to road safety challenges but the opportunity to ascribe these mishaps, where appropriate, to crime is not always possible because of insufficient data, and more specifically the lack of integrated data systems.

The lack of sufficient data to identify crime as a contributing factor to road accidents is a major hurdle that needs to be resolved. The contributing factors listed in the

current police accident report form is not covering this question adequately. For example, the removal of road fences (a criminal activity) could lead to animals straying onto the roadway and cause a crash and casualties. The SAPS, metro police or traffic department will normally report the crash as animal related but the real cause was the illegal removal of the fencing. Other criminal related activities such as traffic offences are more visible and is punishable in terms of the Crime Procedures and Road Traffic Acts. As mentioned, in the United Kingdom, for example, official crash statistics and the contributory factors to casualties, include a specific category shown as Special Codes which also covers crime related road casualties by severity such as “Stolen vehicle” or “Vehicle used in the course of crime”. The United States of America has also made progress with its *Data-Driven Approaches to Crime and Traffic Safety* (DDACTS), a law enforcement operational model to reduce crime, crashes, and traffic violations across the USA. The *integration of data systems* in South Africa is needed to pinpoint specific crime activities as contributing factors to road crashes.

Improved design of the road environment to reduce the opportunities for crime is also important. Implementing CPTED principles starts by the training of city officials and consultants who deal with road design and the environment. Key city departments must work together to incorporate CPTED principles into local government crime prevention plans, building codes, and information campaigns to impact positively on the city. Crime Prevention through Environmental Design works best when integrated within a broader crime prevention strategy which includes law enforcement and social crime prevention. CPTED can range in scale from small to medium to large. Small and medium scale interventions can involve landscaping, building design and increased surveillance. It is important to include transport and the road environment in an urban crime prevention design strategy.

The *role of technology and innovative thinking* must be applied more vigorously by road authorities to reduce or detect crime in the road environment. *Surveillance technology* is an important tool to ensure safe and secure transportation counteract crime in the road environment. Many road authorities and city governments have started with the application of CCTV monitors across their areas of jurisdiction, but a wider and more general application would be beneficial to drive down crime in the road environment and in general. The wider use of technologies such as number plate recognition systems (ANPR/LPR) and other detection systems across South Africa could also be used to track stolen vehicles by government public entities such as the Cross Border Road Transport Agency (C-BRTA), for example, stolen vehicles leaving the country. Other useful technology examples include GIS applications to map crime in the road environment and to display this visually so that appropriate action and countermeasures can be developed to combat road related crime. Examples of *innovative thinking include the use of alternative materials*, for example, to curb the removal of metal road furniture, aluminium bridge hand railings and drain covers for economic gain. A best practice example has been the replacement by the City of Cape Town and the Cape Winelands District Municipality of aluminium hand railings with carbon fibre applications.

It is believed that the *fundamental enablers of fraud and corruption*, and poor service delivery in the driver and vehicle management system, include poorly structured business processes, inadequate training of staff, lack of service level agreements,

poor distribution of resources, inadequate financially structured entities, lack of adequate audit and inspection functions, etc. Significantly also, where there are allegations of fraud and corruption, few of these are timeously dealt with. It is believed that this results in a perpetuation of these activities because staff and public believe that even if they are caught, nothing will come of this. Additionally, then, it is necessary to improve on the hand over investigations to the authorities charged with prosecutions etc. Transformation of this sector consequently remains high on the agenda of the Department of Transport (DoT) and the Road Traffic Management Corporation (RTMC). Transformation is, however, not easy – especially when the sector comprises a number of role players and stakeholders (including local, provincial and national government, as well as the private sector). The challenge is to convert this objective into meaningful and unified action by building on past learning, mobilizing resources through the involvement of key role players and committing to an agreed plan of action. What is important and useful though is to focus on what can be achieved within the provincial context at provincial and local authority level.

Law enforcement agencies should *harness social media* to a larger extent to engage with neighbourhood watch groups, promote crime prevention events and activities, and by promoting proactive crime prevention partnerships.

5. CONCLUSION

The objective of the paper was to compile a synthesis of existing data on the topic, to explore the relationship between crime and road safety as well as the possible impact of criminal activities on the road environment in South Africa. The paper showed that the relationship has not been fully explored in the South African context, with its high road accident and fatality rates, and high levels of exposure to crime. The paper showed that criminal activities in the road environment extend significantly beyond the mere committing of road traffic offences and may have a negative impact on the safe operation of the road network and broader road environment, in addition to endangering the lives of road users and innocent bystanders. The paper aimed to highlight the extent to which crime is impacting on road safety in South Africa, and to identify some of the challenges, shortcomings and issues involved. Some building blocks are in place, yet there is the need, however, to integrate these building blocks. Research is required to link all these pieces of information in order to provide a clearer picture of the impact of crime on road safety.

In conclusion, a more focused operational approach is required to counteract the impact of crime on road safety. Furthermore, an extensive scoping of international best practices could assist in a better understanding of the impact of the phenomenon, and to develop appropriate countermeasures to effectively deal with it.

6. REFERENCES

- Advocate J. Jonck, Arrive Alive Website. Crime as a Threat to Road Safety in South Africa. <https://arrivealive.co.za/Crime-as-a-Threat-to-Road-Safety-in-South-Africa>.
- Brace, C., Scully, M., Clark, B. and Oxley, J. The relationship between crime and road safety. Monash University, Report No. 284, November 2000.
- Department of Environmental Affairs (DEA 2015). Green Cities – Promoting the NMT Agenda, 2015.
- Department of Transport (DoT 2015). NMT Facility Guidelines. March 2015.
- ESRI (2008). Applying GIS Technology to Crime Analysis. <http://www.esri.com/library/brochures/pdfs/crime-analysis.pdf>
- Impinen, A. and Lillsunde P. 2013. Increased criminal activity among people suspected of driving under influence of alcohol and drugs - A register based study. Proceedings of the 20th International Council on Alcohol, Drugs and Traffic Safety Conference (ICADTS) Conference, 2013.
- Jacobs, J. The Death and Life of Great American Cities, 1961. Random House Publishers, 2002 Edition.
- Jeffery, C. R. Crime Prevention through Environmental Design, Sage Publications Inc., 1971.
- Junger, M., West, R. and Timman, R. (2002). Crime and risky behaviour in traffic: An example of cross-situational consistency. *Journal of Research in Crime and Delinquency*, Vol. 38 No. 4, November 2001, pp 439-459.
- Kruger, Landman and Liebermann (CSIR, 2001). Designing Safer Places. A Manual for Crime Prevention through Planning and Design. CSIR and SAPS, 2001.
- Lau, E., Jordaan, E., Sukhai, A. and Swart, L. The Relationship between Homicide and Road Traffic Fatalities MRC-UNISA Crime, Violence & Injury Lead Programme South African Medical Research Council, MRC website. Not dated.
- Medical Research Council of South Africa, National Injury Mortality Surveillance System (MRC NIMSS 2005) Provincial Reports. 7th Annual Report of the National Injury Mortality Surveillance System, 2005.
- National Highway Traffic Safety Administration (NHTSA 2013). Data-Driven Approaches to Crime and Traffic Safety (DDACTS 2013). Operational Guidelines (DOT HS 811 185) Brochure (DOT HS 811 186), July 2013.
- Rose, G. (2000). The criminal histories of serious traffic offenders. UK Home Office Research Study. London. 2000.
- RTMC (2015). Road Traffic Report 1 January – 31 December 2015. RTMC, Pretoria.

South Africa. National Road Traffic Act (Act 93 of 1996) and the National Road Traffic Regulations, 2000.

United Kingdom. Road Crash Statistics, Great Britain, Table RAS50001.

Wikipedia Road Rage - http://en.wikipedia.org/wiki/Road_rage.

World Health Organisation (WHO). The World Health Report 2002 - Reducing Risks, Promoting Healthy Life. 2002.

Zambuko and Edwards (2007). Effective Crime Prevention in Durban - Case Study. Africa Global Report on Human Settlements, 2007.

Zeeman. M., Sinclair, M and Cable, R. Pedestrians on Cape Town Freeways. A growing challenge for road safety professionals. Proceedings of the *Permanent International Association of Road Congresses (PIARC)*, Seoul, 2015.