
Causes and Effects of Stray Domestic Animals On Public Roads: A Case Study of R37 Between Polokwane and Burgersfort in Limpopo Province

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Abstract

Although coexistence of human beings and domestic animals is natural, interaction between moving machinery such as high speed motor vehicles and stray domestic animals has propensity to results in human fatalities and a number of animals getting killed. Property damage and related costs incurred following collision between motor cars and animals are huge and exorbitant respectively. Damages caused on motor vehicles during collision with animals are often repairable whilst human life and limbs have no readily available spares. The road (R37 between Polokwane and Burgersfort) is notorious for taking precious lives due to crashes between vehicles and stray domestic animals. Stray domestic animals belong to people that have responsibilities of ensuring that they are safely kept and looked after. Although it is also a responsibility of motorists to avoid collision with moving or stationary objects on the road, it is similarly imperative that livestock owners should ensure that their animals do not position themselves in collision course with moving motor vehicles. There must be a reason(s) for domestic animals to stray off thereby interfering with high speed motor vehicles on the road, R37 in particular. Despite the fact that it would seem normal and acceptable for accidents to happen, it cannot be acceptable that human lives, properties and animal lives are recklessly lost while we pretend as though everything is fine when it is in fact not. It is for this reason that, causes of domestic animals getting astray thereby roaming the country's public roads, as well as effect of their collision with moving motor vehicle should be explores.

Keywords: Domestic animals, stray animals, road accidents, fatalities, property loss and orphans.

1. Introduction

This study is theoretically grounded on the emphasis of managing domestic animals whilst increasing awareness on measures to reduce, or eliminate vandalism and/or theft of fences that act as barrier against stray animals from interacting with motor vehicles on public roads and,

was successfully executed through unstructured interview schedules, investigation in loco and observation during which photographs have been taken to augment the findings. The investigation commenced with the introduction to the study thereby indicating the area to be covered. Definitions of terms have been included with the aim of supporting the study from reliable literatures. Findings from the study which highlighted causes and effects of stray domestic animals on R37 road between Polokwane and Burgersfort were finally followed by the recommendations. Risks posed by stray domestic animals on public roads have been highlighted with the aim of ensuring that, while measures are being sort to deal with identified challenge, motorists and members of public are made aware of what await them when travelling on the road in question. Furthermore, benefits of managing and caring for one's own domestic animals have been pointed out with the aim of encouraging communities to help in preserving the life and value of their assets as well as wealth while taking part in the caring for communities of Limpopo and South Africa as a country. Following a relatively thorough investigation, the study developed logical conclusions and recommendations to address the challenges posed by stray domestic animals on public roads, R37 in particular and envisaged benefits of integrative efforts to combat the scourge of road carnage wherein domestic animals are involved. For the purpose of this paper, the targeted section of R37 is the part that connects Polokwane and Burgersfort towns in Limpopo Province of South Africa. Although it might not be the best road in the Province by virtue of its width relative to the number and size of vehicles that it carries on a daily basis, R37 is one of the busiest in the province especially during the pick-hours (Mornings from 06:30AM to 08:00AM and in the afternoon from 16:30 PM to 18:30PM). The targeted stretch runs through a few farming areas whilst the larger part consists of built up sections wherein human beings, motorists and domestic animals often share the same piece of ground. This notorious 151 kilometres stretch also passes through bushy area next to a village that is known as Mashite. It is highly improbable not to have three or four motor vehicle accidents in any months as a result of motor cars colliding with stray domestic animals next Mashite village which is situated between Lebowakgomo and Atok areas. Almost all the aforesaid crashes result in people losing their lives, animals getting killed and numerous vehicles being damaged beyond repair. The stretch in question is allegedly notorious due to the area being utilized as grazing ground for livestock such as cows and donkeys. Additionally, a number of community members are often seen collecting firewood using trucks as well as donkey carts. The built up areas alongside R37 pose risks of encountering domestic animals such as sheep, goats, dogs, cats, pigs and even chicken that either cross the or use the tarred road as unallocated and unauthorized kraals. There are numerous signs of deadly collisions such as pieces and parts from motor vehicles as well as skid marks, animals' skeletons and shrubs that have been flattened down by vehicles that went off road in a bid to avoid collision with stray animals. However, 20 kilometres from the reference starting point (N1 bypass traffic lights in Polokwane) all the way up to Burgersfort (3rd traffic lights), the perimeter fence on both sides has been dismantled allegedly due to vandalism and/or by people who took such fencing materials for their own use on a non-return basis.



Relatively small as it is, Burgersfort is one of the busiest towns in Limpopo. From Motlolo village which is 25 kilometres before Burgersfort, the road runs through a densely populated and built up area whilst the total width of the road averages 8 meters measuring from one edge to the other for 25 kilometres. The road widens up into dual roadway to both directions starting from the first set of traffic lights. Surprisingly, between the second and third sets of traffic lights into the town one almost always gets greeted by large herds of cattle on the right side of the main road (R37) with a modern shopping mall on the left hand side (when driving from Polokwane).

2. Problem Statement

Although the South African Constitution says that this country belongs to all that live in it, mingling high speed motor cars with huge domestic animals such as cows and donkeys can only result in fatalities and loss of limbs as well as damage to properties. A number of crashes that involve stray domestic animals and motor vehicles have reached a worrying proportion on R37. Livestock that are not being looked after are indeed resulting in a high number of orphans as well as financial claims in a form of Road Accident Funds (RAF). When livestock owners fail to take good care of their animals, it is inevitable that such livestock will go astray resulting in them getting involved in fatal crashes. The owners of cattle that are found necessary to stray on public road must ensure reasonable care of not letting their animals exposing the travelling public to dangers from their livestock which they ought to both foresee and avoid (Cullinan, 2011). Cattle must have food and water throughout the year because when pastures are dry, the herds may go astray to graze on their own (Joyner, 2018). Similarly, Limpopo province is losing its economic worth due to a number of workers that lose their lives when killed during the said crashes. It is evident that car crashes that involve stray domestic animals are a global outcry. According to Yar Khan (2013), a salesman died while trying to avoid a stray dog on Bairamlagud road. Although motor cars have spares at repair shops, human beings that lose their lives become a burden to both the country's government and orphans that they leave behind. Due to human casualty, a number of cost elements include present and future loss of productivity as well as pain and medical treatment plus funeral costs (Labuschagne, De Beer, Roux and Venter, 2016). Indeed, not all accidents on public roads are directly related to stray domestic animals because vehicle to vehicle collisions also claim a number of lives, Motseo (2013) points out that three people died when a bus that was transporting mine workers collided with a minibus taxi around Ga-Selala village while, twenty-one were treated for minor injuries. Similarly, not only Limpopo Province and/or South Africa experience orphans due to vehicle crashes, two children became orphans after three people, including a woman and her baby-girl died when their car collided with a tree near Victoria western border (Noble, 2015). Despite a number of statistical reports regarding annual road accidents, there seems to be no specific targeted study on the

causes and effect of stray domestic animals on R37 road between Polokwane and Burgersfort towns of Limpopo Province, hence this investigation.

Purpose of The Study

The study seeks to explore the causes of stray domestic animals on the public roads of Limpopo, R37 in particular. Furthermore, the study also seeks to investigate effects of having stray domestic animals on R37 road where motor vehicles moving at high speed have high probability of colliding with them.

3. Objectives of The Research

- To explore factors that cause domestic animals to go astray and end up colliding with motor vehicles on R37 road of Limpopo Province,
- To investigate impact of vehicle collisions with stray domestic animals on R37 road of Limpopo Province and
- To recommend measures that can be taken to help in reducing current carnage that involves motor vehicles and stray domestic animals on R37 road of Limpopo Province.

4. Research Questions

- What are the factors that cause domestic animals to go astray and end up colliding with motor vehicles on R37 road of Limpopo Province?
- What are the impacts of vehicles collisions with stray domestic animals on R37 road of Limpopo Province?
- What recommendations can be suggested in order to help with reduction of current carnage involving motor vehicles and stray domestic animals on R37 road of Limpopo Province?

5. Methodology

Although the road (R37) is a passive subject of the study, it was critically necessary to involve active citizens that utilize the targeted road as well as a number of those that reside alongside the road under investigation. When dealing with the road as a passive subject of the study, the investigator drove through the area 12 times (four times during the evening between 16:30PM and 19:00PM, four times during the afternoon between 12:00PM to 15:00PM and four times early in the morning from 05:20AM to 07:35AM). During the aforesaid travel, the investigation entailed study of domestic animals behaviour on the road as well as possible risks facing motorists. Furthermore, photos of events that involved various domestic animals and their preferred positions on or next to the road have been taken in order to present substantive visual evidence.

Similarly, the state of perimeter fence was also investigated during the study. Photos of the perimeter fence remainders have been taken in order to provide visual state of the barriers for animals to stay out of the busy road. In a bid to elicit data regarding causes of domestic animals to go astray and end up on the public road, members of the public have been interviewed through unstructured interview.

Whilst Limpopo Province has a high number of public roads in which stray domestic animals are known to be the causes of many deaths and atrocities such as people losing their limbs and natural mobility, it was essential that this humongous task had to be dealt with in a manner that ensures simplicity by selecting a small manageable section. It is for this reason that only a small but notorious portion of R37 road that runs between Polokwane and Burgersfort towns was targeted.

During the said interview, the following categories and number of citizens took part in the process of data collection:

Table 1: Interviewed participants

Participants	Numbers	Age range
Truck drivers	9	39-56
Taxi drivers	11	27-53
Private vehicles	9	28-52
Animal owners	6	55-67
Herd-men	7	24-62
Firewood collectors	11	33-51
Street vendors	6	26-48

From a total of 59 interviewees, 36 were males while 23 were females. Due to the nature of the study, a combination of quantitative and qualitative methods was applied. As such the study was conducted through a mixed research design in order to cater for both requirements of utilizing qualitative and quantitative research approaches.

Creswell (2009) argues that when it is required to strengthen the research design, a combination of quantitative and qualitative approaches becomes essential through application of a design generally known as mixed method or approach. However, Niglas (2000) warns that combining quantitative and qualitative methods of study have different concerns and as such, it is highly questionable whether these methods are tapping the same things even when they are investigating apparently similar issues. In a bid to compensate for aforesaid warning, it was essential for researchers to stay within the scope of study as per the topic in hand. Despite the fact that a number of researchers would call this method a mixed design, it is in fact a mixed research approach (Mawila, 2007:7).

6. Definition of Terms

The concept “domestic animals” refers to animals that are culturally known to reside with and are under control of human beings with the exclusion of, known wild animals that gotten tamed for purposes of keeping then (animals) behind secured cubicles or as pets. As a result, domestic animals are therefore living creatures that may mingle safely and freely with people due to their relative inability to wildly harm humans on encounter unless otherwise they are infested with diseases such as rabies. Amongst the list of known domestic animals found in

Limpopo are: Cows, horses, donkeys, sheep, goats, dogs, cats and chicken. However, according to Condos (2018), domestic animals entail domesticated species such as cats, dogs and a number of others that are intended for pets' life whilst they depend on humans. Webster (2018) asserts that domestic animals include anyone of various animals such as horses and sheep that are domesticated in order to live and breed within a tame condition. On the other hand, according to Mitchell (2017), domestic animals are animal such as a horse and/or cat that have been tamed and kept by people as working animals or for use as food sources and/or pets, especially due to the fact that a number of those species that have, selective breeding have become notably different from their wild ancestors. Stray domestic animals are known to wander public roads such as R37 thereby getting involved in fatal crashes. Public road refers to any road for which public usage is a right as per the National Road Act 7 of 1998. However, the term public road does not include domestic animals' demarcated grazing areas or areas in which such animals are safely kept by humans.

As a result of vandalized or stolen fences, stray farm animals also wander the public roads thereby causing motor car accidents (Bawa, 2000). However, as a preventative measure, the South African Agricultural Union (SAAU) requested the Commission to explore possibility of enacting uniform national legislation on the fencing of public roads but, fences alongside the public roads were at times, intentionally removed and/or vandalized. Judd (2015) argues that although there are laws which are set to prevent domestic animals from making their way onto the roads in a form of fines, such laws are only applied after the fact. Kunambura (2016) points out that collision with large animals can result in severe injuries to drivers and passengers as well as causing extensive damages to vehicles. It is evident from the definitions above that livestock are unfortunately uncomfortably getting closer to the public road in a manner which results in atrocious crashes. Fershtman (2016) argues that livestock facilities are currently closer to the highway and populated cities than before and as a result, there is increase of risk to injuries, claims and consequently law suits. The aftermaths of crashes that involve animals cannot be overemphasised. Khattak (2002) indicates that, it is unfortunate that animals related highway crashes resulting in human injuries and fatalities have received little attention in research and literature. According to Al-Lamki (2010), every road related-crash should raise a question of whether we are doing enough for our communities to prevent road traffic crashes, reduce injuries and deaths as well as long-term negative impact on victims and their families.

7. Significance of The Study

Although it has since become accepted that stray domestic animals and fast moving vehicles on R37 do and will continue to mingle, it is essential to conduct a study which seeks to explore causes of the said problem as well as effects and impact of having stray domestic animals wandering the public road. The significance of conducting the study includes the following amongst others:

- When factors that lead stray domestic to wander unto R37 are revealed, it will be relatively easy for different stakeholders to implement effective preventative measures,
- Domestic animal's owners will most likely be made aware of issues for which they were oblivious and/or took for granted with regard to acts and omissions that lead animals to wander onto the R37 thereby contributing in fatal and serious crashes with moving motor vehicles,

- Sharing of the effects of car crashes that involve domestic animals will make various role-players to think before acting and or omitting such which they intend to do or not to do respectively with their livestock because, people will most likely be aware of consequences of their actions and/or omissions,
- A large number of fatal or horrific car crashes that involve stray domestic animals will most likely be reduced,
- Many valuable and precious lives will most likely be saved. It is a fact that people are destined to die one day due to one cause or the other. However, deaths due to negligence will be drastically reduced following the outcomes of the study,
- Limpopo's road accidents statistics will be somewhat drastically reduced especially those that involve stray domestic animals,
- The study will assist relevant officials by suggesting measures that can be implemented in order to reduce carnage on R37 road and
- The province's economy will most likely improve because less money will be paid by RAF as well as the fact that human capital's lives will have been saved to a greater degree.

Having highlighted the above significance of the study, it is essential to indicate though that, behavioural change is difficult because it entails alteration of embedded cultures. Other than the aforesaid possible challenge, budget constraints as well as the human nature of resistance to change might hinder or slow down the envisaged benefits. This study further presents opportunity for Limpopo Province's officials to showcase that they indeed care for their constituencies that voted them into governmental powers of the day.

However, people shy away from opportunity because, opportunity is wearing an overall and as such, it looks like work. The preceding statement is to the effect that, despite the possibility of positive outcomes, human beings have tendency of doubting opportunities that present themselves, especially when not tested at the time of such presentation. It is for this reason that, attempt to implement the recommendations from the study should be conducted with diligence and effectiveness while respecting and ensuring involvement of the identified role-players.

8. Results

There is strong argument to the effect that effective management and care of domestic animals by their owners may help in saving lives, limbs and properties of innocent public road users. Furthermore, through integrative efforts, the perimeter fence vandalism and/or theft may be reduced or eliminated thereby confining domestic animals in areas where interaction with motor cars that move at high speed becomes impossible. It is evident from the study that if every role-player could play his/her part with the aim of saving human life and the highly valued properties as well as wealth of livestock owners, Limpopo Province and as such South Africa's economy can be positively enhanced just by reducing dangerous interaction of motor vehicles and stray domestic animals on R37 and any other public road for that matter.

9. Observations and Discussion

The results of the study revealed and confirmed that there are underlying causes of domestic animals getting astray thereby leading them to wander on public roads, R37 of Limpopo in particular. Furthermore, the study confirmed that interaction of stray domestic animals and motor vehicles on public roads result in catastrophic consequences that require urgent but diligent attention. As indicated elsewhere in the report, data collection entailed narrations from participants that were interviewed through unstructured interview schedule. The aforesaid was done in order to collect helpful information that could be used in coming up with generalized findings so that conclusions could be made towards answering critical questions asked under the research questions section of the study. Furthermore, the study involved driving and walking about during inspection in loco where photos have been taken for use as substantive proof of what the study seeks to reveal. The study findings have therefore been categorized following and, in line with the type of observation and/or phenomenal interviews as highlighted below:

i. Unstructured interviews outcomes

During the interviews, participants were highly cooperative to share their knowledge and experiences of car crashes involving stray domestic animals on R37 road between Polokwane and Burgersfort towns as indicated below:

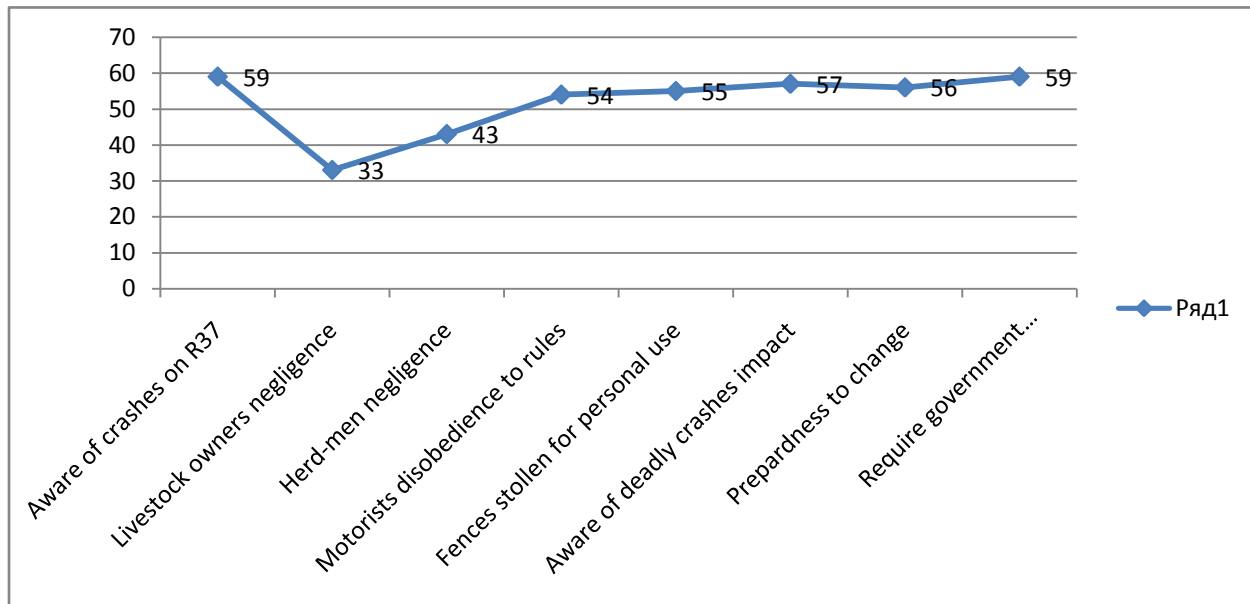
- a. It was clear during the unstructured interviews that everyone that partook in the study is aware of crashes that involve motor cars and stray domestic animals on R37. The awareness by 100% of participant is indicative of the fact that, indeed a road between Polokwane and Burgersfort is notorious of taking human lives whilst depriving livestock owners of their wealth. Similarly, one can deduce that a number of companies continue to loose essential skilled workers due to horrific crashes as a result of animals that could have been securely kept away from the busy road.
- b. The study also revealed that majority of people have been bystanders who have witnessed the aftermaths of crashes cause by fast moving vehicles when they collided with small and large animals on R37. It is shocking to learn that 97% of participants have at numerous occasions been subjected to traumatic situation whilst trying to assist people that were trapped in wreckages as a result of crashes.
- c. Despite the fact that car crashes on R37 are indiscriminate, amongst 52% of participants that apportioned blame on motorists' negligence, have also revealed a degree of negligence in a form of statement that seem to indicate that: "*It may not happen to me*". However, it is inevitable that one's own relatives and/or close friends may fall victims of the same scourge of crashes for which he/she is ignorance. It should be noted though that, people who may not necessarily be known to us could happen to be the critical citizens whose duties are to aid us on our daily living and health. The preceding statement refers to the fact that, some of people that perish in the crashes could be the very doctors, teachers, nurses and public servants whose services could contribute to our well-being.
- d. Although the most notorious part of R37 (in the vicinity of Mashite village) runs through the forest which has potential for livestock to graze, domestic animals such as cows, goats, donkeys and sheep are driven to the roadside because, the grass is usually green on the edge of the tarred road as a result of being constantly watered when little amount of

rain falls. Consequently, a number of domestic animals do not make it to their usual home-kraals but rather find homages alongside R37.

- e. Participants indicated that livestock owners would rather lose their animals in car crashes than let die due to lack of feeds because, the areas away from the road seem more dry when compared to the roadside areas. Furthermore, it was also pointed out that, most livestock owners cannot afford to buy animal feeds due to poverty and unemployment.
- f. Some of the cattle herds have people that are appointed to look after them. However, it was clear that a number of herd-men only occasionally visit the grazing fields when they suspect that livestock owners might visit the sites. As a result, 73% of participants found it unacceptable that people that are tasked to look after the owners' wealth are negligent to an extent of letting road users die and properties getting damaged while the employers are expected to pay monthly salaries.
- g. Although rural communities that reside alongside the R37 are amongst the poorest citizens in the Province, it cannot be acceptable that the same people are known and/or suspected to remove or dismantle the protective perimeter fences for personal uses. Ironically, it is the same citizens whose domestic animals get killed during crashes with cars as a result of lack of fences that could have prevented them from wandering the road. Despite direct crashes with vehicles, stray domestic animals have been pointed out to contribute in head-on collisions which occur when motorists try to avoid them.
- h. It was pleasing to note that, although people are sceptical of the corruption in the government, 95% of them are prepared to cooperate with the officials in a bid to reduce road carnage on R37 provided there are signs of commitment on the part of the officials in conjunction with local communities. However, 100% of the participants are of the view that their taxes and the government funds should be used effectively as and efficiently by the local and provincial government. In essence, a majority of citizens would like to see the provincial government taking over the overall responsibility of overseeing safety of road users and the provincial economy.

From the unstructured interviews and observations, it is clear that every role-player would rather apportion the blame to someone else. It is essential to note that carnages on R37 involving stray domestic animals and motor cars can only be reduced and/or eliminated through integrated efforts rather than by constantly pointing fingers at each other. Outcomes from unstructured interviews are graphically illustrated in figure 2 below.

Figure 2: Graphic illustration of survey outcome



It is evident from the above graphical presentation that:

- 100% of participants indicated being aware of numerous car crashes that involve stray domestic animals on R37,
- 56% pointed out that livestock owners are negligence towards their domestic animals while 44% split the blame over other role-players or contributing factors,
- 73% apportioned the blame of stray domestic animals on herd-men for not taking care of the livestock as per their appointment whereas, 17% blame livestock owners for being lenient when dealing with careless herd-men,
- 52% blame motorists for not obeying road rules such as designated speed limits and signs of risks posed by stray domestic animals as well as lack of fences alongside the major part of R37. On the other hand, 40% of the participants argued that there is not enough signs on the road in question to warn motorists of stray animals. 8% indicated lack of consequence management against livestock owners whose domestic animals are known to have been involved in crashes,
- 93% argued that the perimeter fences are often removed by community members for personal purposes such as own yards and security. However, 7% believe that the fences were just not of good quality and as a result, wear and tear is inevitable with time,
- 97% have witnessed horrific crashes where domestic animals and motor cars were involved and, have experienced the severity of impact of such crashes. However, 1% highlighted being fearful of getting closer to scenes of accidents, hence they could not say with certainty that they are familiar with impact of the said crashes. 2% believe that all crashes involving motor cars cause detrimental impact on human beings and objects that they crash with, and

- 95% are prepared to cooperate with authorities in any strategies that will be intended at reducing and/or elimination of crashes involving stray domestic animals on R37. However 3% highlighted that government officials are allegedly corrupt and as such, initiatives that involve money will most likely enrich them. The remainder 2% reluctantly indicated that involvement of community members by government officials is usually on a window-dressing basis and as such they would not cooperate, and
- 100% argued that local and provincial government have taken more than enough money from Limpopo's citizens in a form of tax, and as such, it is the government's responsibility to ensure that resources and strategies are available in order to fight the scourge of carnage caused by stray domestic animals and motor cars on R37 between Polokwane and Burgersfort towns.

ii. From the inspection in loco

Inspection in loco was conducted by driving and walking through the section of R37 road between Polokwane and Burgersfort whilst collecting relevant data. During the investigation, a number of photos have been taken in order to substantiate the findings as illustrated below:

- a. For 20 kilometres from the start of the targeted study area, the road is properly fenced off on both sides. Although there are domestic animals such as cows and sheep in the farms alongside the road, existence of the fence prevents them from wandering onto the R37 over the said portion, hence no crashes involving stray animals are experienced. However, from this point up to the end of the study area, perimeter fences have been removed, vandalized and or taken without permission for personal or any other use. It is evident from the picture that indeed the perimeter fence did exist but has since been vandalized or have deteriorated beyond repair and/or stolen.



According to Thomson Reuter (2018), vandalism has potential to result in millions of dollars against the states each year in clean-up efforts and other programs costs and, may result in psychological or emotional damage to owners of properties as well. Webster (2017) refers to vandalism as wilful or malicious destruction of public or private property. Furthermore, this author regards legal definition of theft as referring to criminal taking of the property or service of another without consent.

- b. At a distance of 4 kilometres from the beginning of a section under study, there is a sign that warns road users about stray domestic animals on the road due to the absence of fence as per the following picture:



- c. It was shocking find a large number of domestic animals wondering amongst high speed vehicles. The picture below is indicative of what motorist may encounter on a daily basis and at any time.
- d. As indicated elsewhere in this report, there are many fresh and old signs or indications of carcasses and pieces of motor cars parts that serve as proof that stray animals related crashes are rive on R37 road.



As illustrated in the picture above, one can deduce without that an R37 road between Polokwane and Burgersfort is a notorious and dangerous stretch of ground that one would rather

like to avoid if he/she had an alternative. Motor vehicles damage, domestic animal's deaths, loss of human lives and serious injuries are inevitable on the study area.

10. Conclusion

The study confirmed that the R37 road between Polokwane and Burgersfort towns is infested with high risks that are presented by stray domestic animals that are found wandering in areas including other public roads in Limpopo Province. Furthermore, it was confirmed through photographic presentations and interviews that the effect of accidents due to motor vehicles and animal's crashes result in atrocious outcomes. However, a long list of findings as well as excellent conclusion is not useful if theoretically implementable remedial measures are not suggested and/or recommended.

11. Recommendations

The following recommendations are made from the above findings:

i. Short-term recommendations

Under section, the study suggests that different categories and/or role-players should play their roles in collaboration and cooperation with other stakeholders through due diligence as following:

a. Livestock owners

Livestock owners should tag or clearly as well as distinctively mark each of their domestic animals especially cows, donkey, sheep and goats. Identification marks can help owners of the livestock to identify stray animals even when they are mingled with other herds. On the other hand, in the event of collision with motor vehicle, the rightful owner(s) of the killed or injured animals will be easily traced in order for him/her to carry liability and/or claim his/her animal(s).

Unlike in the case of wild animals, domestic animals require healthcare and accountability on the part of their owners. Consequently, livestock owners should account for them to a point of knowing their whereabouts on a daily basis. According to the legal position on broken fences and animals related accidents, currently there are no expressed positions in national legislations or provincial ordinances relating to liability for dangers that are caused due to damaged fences (Cullinan, 2011). As indicated in this paper, domestic animals such as cows, donkeys, sheep and goats are often left to wander as though they were wild animals. Stray animals that wander away from their holding areas get, regarded as trespassers and as such, their destinations and people they harm determine what legal theories apply (Medina 2014). Although the degree of care is relative from one livestock owner to the other, it is theoretically justified that owners of domestic animals will be able to implement the recommendations listed above in order to save their wealth as well as lives and limbs of innocent public road users.

b. Livestock keepers (Herd-men)

It is not always possible and/or feasible for domestic animal's owners to look after their livestock by themselves. In the event that someone is tasked with the responsibilities to look after such livestock, it is recommended that a person who is dully tasked should look after the

aforesaid animals as though they were his/her. After all, livestock keepers that have been interviewed indicated that they get paid by owners of the herds being looked after.

As a result, cattle herd-men should refrain from neglecting the animals to wander while they (herd-men) get remunerated for ensuring that such livestock do not interfere with traffic on public roads. It is further recommended that livestock owners should frequently conduct job-observation in order to ascertain whether money being paid is worth the job being done by the herd-men. Because livestock keepers get paid for taking care and accounting for the owners' assets, it is theoretically justified that easy implementation of aforementioned recommendations is possible on the part of livestock keepers.

c. Firewood collectors

Firewood collectors who utilize donkey carts or tucks to transport wood materials from the forests require access in and out of the areas. More often than not, clearing the access routes entails partial dismantling of the perimeter fence that is intended at preventing stray animals from entering the public road.

It is therefore recommended that the wood collectors should refrain from damaging and/or dismantling perimeter fences, unless they will be able to repair or replace the intentionally broken or partially removed pieces of fence to their original state immediately to prevent stray animals from passing through. The fact that firewood collector are able to dismantle and/or remove all or part of perimeter fence alongside the public road, it is justifiable that the same perpetrators can be able to restore the same assets to their original condition. As a result of aforesaid capabilities, it is further justifiable that it will be possible to implement the recommendations provided wood-collectors are commitment.

d. Traditional leaders

The wealth of traditional leaders is measured by number of domestic animals that he/she owns. Culturally, the distinguishing factor between headmen/women and his/her people in the main is characterized by quantity of livestock that is large than what ordinary citizens own. The aforesaid phenomenon is often so because of the fact that a traditional leader's people would frequently donate some of their livestock as a token of appreciation to the headman/woman. Mabandu, Bongela, Mkhwanazi, and Sosibo (2016) argue that, in beliefs that have survived by development through the ages, despite colonial interruption and erosion, cows are not categorized as animals in many Southern African cultures, however, beyond their significance as physical symbols of material wealth, cattle are the source of memory and history.

It stands to reason therefore that local headmen/women should encourage their followers to take more care of domestic animals because, after all, the headmen/women's wealth is dependent on the community members' ability to make it work. It is theoretically justified that traditional leaders will be able to implement these recommendations because safety of the livestock determines the reputation of headmen/women.

e. Local government

In a democratic country such as South Africa, effective management of community's standard of living requires integrated efforts from both traditional as well as political leadership. In a bid

to reduce domestic animals and motor vehicles crashes related injuries and/or deaths, local government officials should conduct public education to ensure that their constituencies are made aware of risks and dangers that are posed by stray animals on public roads, R37 in particular. Theoretical justification to the aforementioned recommendation is based on the following facts possibilities:

- Local government is highly represented in all villages because of the availability of local steering committees,
- There is a relatively high number of community interaction by local government officials with community members as compared to the frequency at which headmen/women interact with their people and
- Local Councillors that are motivated by a need to win the majority of votes in order to secure and retain the current status will most likely come to play their roles with greater eager.

f. Provincial government

It is public knowledge and procedural that provincial government acts as an overseer of what happens in all the wards within the boundaries of their responsibilities. It is therefore recommended that Limpopo provincial government officials should demand safety performance from local councillors in as far as domestic animals related motor vehicle accidents are concerned.

After all, a province's reputation gets detrimentally impacted by high number of fatalities on its roads. The drive to be amongst the best performing provinces is indeed essential for provincial government officials to outperform their competitors. It is therefore theoretically justified that, because of fear of being placed under administration, Limpopo provincial government officials will find it necessary to implement the suggested recommendation(s).

g. Motorists

While it is essential for the above role-players to partake in taking care of domestic animals, motorists have a paramount duty to obey road rules as presented by the road signs and markings at all times when driving on the public roads, R37 in particular. Despite the possibility that the above recommendations will most likely be implemented, it is probable that some stray domestic animals will still find their way into the busy public roads thereby getting involved in atrocious crashes with motor cars.

It is therefore further recommended that motorists should reduce speed when driving on R37 between Polokwane and Burgersfort especially within the distance between Lebowakgomo and Ga-Selala. Road signs and markings are legible and, the speed at which a vehicle moves is determined by the driver whose foot is on the pedal at the time of driving. It is for the above reasons that recommendations mentioned here are theoretically justified and as such, are implementable.

All the above recommendations require urgent and immediate implementation in order to ensure safety of road users and reduction of damage to properties and, loss of livestock. Benefits of implementing the above short-term recommendations include:

- Effective preparation for the long-term recommendations,

- Every life saved through short-term recommendations will result in elimination of the number of orphans,
- Limpopo Province's reputation and competitiveness can be maintained if initiated by implementing relevant efficient recommendations as listed above, and
- When more human lives are saved, and the wealth from livestock is preserved, the economy of Limpopo Province will most likely improve and as a result, the standard of living for community members will improve in direct proportion.

However, one will be naïve to solely have an optimistic perspective thereby obscuring the anticipation of challenges that have potential to deterrence against attainment of aforementioned benefits. Consequently, one can develop contingency plans if there is a possibility of encountering challenges. The following challenges that may hinder implementation of all or some of the above recommendation are regarded as critical:

- Livestock owners failing to pay minimum wages to their workers thereby negatively affecting their (workers) morale,
- The imbedded culture whereby herd-men often leave livestock to wander unguarded may prove difficult to let go of,
- It is inevitable that firewood collectors might be reluctant to repair broken or partially removed fences after the act. Furthermore, there is a possibility that some of firewood collectors could develop a notion that, "everybody is doing it and as such, it is not worth a trial," and
- Motorists that are naturally disobedient to road rules will most likely refrain from relinquishing their habits of over speeding despite the clear signs which are written: "*No fence, Stray animals*".

Acknowledgement of the possible challenges against attainment of set of goals is not enough if contingency measures are not put in place. It is therefore recommended that Limpopo Province officials should consider the following preparedness measures that may be applied in case of encountering above challenges:

- Develop incentive schemes that will motivate reluctant community members to cooperate,
- Demonstrate practical support for the local headmen/women as well as local political leaders, and
- Utilize local and community radio stations to advocate the need to preserve human lives and reduction of property damage caused during vehicle crashes with stray domestic animals.

ii. Long-term recommendations

Motor vehicle accidents involving domestic animals on R37 had been left to go on for many years while people lose their lives and property damage has reached an alarming proportion. The period between the initial accident and the time of this investigation is an indication that, an abnormal situation has been accepted as normal amongst the communities that live along R37. Vandalism or intentional removal of perimeter fence is not regarded to be a crime by members of communities that have given up hope that something could still be done to arrest the situation. It is for these reasons that although short-term remedial actions are essential, the task of ensuring

permanent normalization of the situation will require long-term solutions from all role-players as suggested below.

a. Local government

Officials of the local government reside within the communities that own both the livestock and motor vehicles. Other than in cases where vehicle collisions with domestic animals affect foreign motorists, local road users are also known to have lost their lives and properties in a similar fashion due to animals that stray onto R37. It is therefore recommended that the local government officials should take a lead in driving long-term solutions by conducting meetings with communities that live alongside the notorious R37 road.

It is further recommended that such meetings should be conducted in a cordial manner in order to ensure communities buy-in. Local government officials are also urged to seek adequate financial assistance from the provincial government because, long-term permanent solutions may entail purchases of special equipment's and/or materials as well as employment of intensive labour-forces. With the preceding statement in mind, it is recommended that local government officials should introduce fencing materials that have distinct marks and install them alongside the R37 road. According to Walsh (2015), one of the precautionary measures to ensure that domestic animals do not get mingled with motor vehicles is to ensure that livestock owners have adequate stock-proof fencing in place.

On the other hand, local communities' that need to collect firewood should be taken into consideration and catered for by erecting devices that prevent livestock from passing through onto the public road while at the same time, allowing access for trucks to and from the surrounding forests. It should also be noted that a number of firewood collectors utilize donkey carts and would also like to have similar access to the fields. As such they should be considered during decision making process.

As a result of the above requirements, donkey carts operators should be equipped with solid sheeted materials by which they will cover livestock barriers when passing through and, able to remove them for safe keeping after use. Although the recommendations above sound costly, it is theoretically justifiable that implementation of such suggestions can be feasible and possible when all the above role-players commit to save human and livestock lives as well as reduction of the aftermath of crashes between motor cars and stray domestic animals.

However, it is further recommended that the local government officials should be open for suggestions from local community members because evident, they are faced with daily traumatic experience of watching severely injured motorists as well as carcasses of their livestock being left to rot on R37 roadside. Officials of the local government are also urged to refrain from practising positional arrogance when engaging the community members because, such act of ignorance have propensity to aggravate resistance to change on the part of the audiences.

b. Provincial government

The study takes cognisance of the fact that the provincial government acts as an overseer over all local governments under its control to ensure overall sustainability and competitiveness. It is therefore recommended that provincial government officials should refrain from implementing long and wide red-tapes that could impede the achievement of intended goals.

The National government and as such, National Treasury are most probably in the position to accept reasonable and effectively motivated budget requests provided: proper, effective and efficient management of public funds is in place. As a result, it is further recommended that the provincial government should demand from the local government, feasible plans and zero-based budgets that are measurable as per the set milestones and, presented to the provincial offices.

It is further recommended that, the office of Limpopo's provincial government should demand and receive monthly presentations of progress reports that entail actions taken, number of local labourers employed as well as the financial expenditure to effect changes that are intended at reduction of fatal accidents on R37. Finally, Limpopo Province's office of the Premier should dedicate committed inspectors that will perform sites inspections with the aim of verifying tangible implementation of recommendations as well as ascertaining the quality of measures being applied in relation to allocated funds.

Where there are signs of maladministration and/or misappropriation of public funds, the provincial government should apply the relevant rule of law in order to ensure corrective actions. It is theoretically justifiable that all the above recommendations can be implemented because, a province whose people perish at a high rate has propensity to equally reduce its chances to be sustainable and as such, any Premier that would like to stay in the office for long, would not let his/her followers killed in accidents that are avoidable is decisive actions are taken.

c. Drivers and passengers

Although commuters in the province's public transport such as: taxis as well as those that hitch-hike have little, or no say on how to be transported once they embark into aforementioned modes of transport, it is recommended that occupants of such modes should start taking ownership of their lives and safety by respectfully confronting rude and careless drivers who intentionally and arrogantly subject passengers' lives of into jeopardy.

Commuter should chose life over fear of being harassed by drivers because, it is better to be left out stranded on the open field by a rude driver than to respect a man/woman that care less about human life. However, drivers of motor vehicles are urged to respect the lives of people that they (drivers) carry on a daily basis because of the following reasons amongst others:

- Drivers' salaries and income are dependent on the number of public transport users and as such, customers are a determinant factor of the size of the meal that rests on a table of any driver of a taxi and or motor car that transport people,
- A public transportation vehicle's destination is no-existent when there are no passengers to ferry,
- When drivers of public transportation vehicles behave in a manner that results in commuters losing their lives, chances are high that there will be no one to transport in long-term, and
- A number of people being commuted on a daily basis are workers that contribute immensely towards the economy of Limpopo Province and South Africa as a country. As such, continued killing of commuters due to vehicle collisions with stray domestic animals on the country's roads has potential to impact negatively on the economic, and sustainability of valuable human capital in the country.

It cannot be overemphasized that people that lose their lives and limbs due to stray animals on the R37 road form part of human capital which ensures prosperity and sustainability of the province's economy. Furthermore, an increase in Road Accident Funds (RAF)

expenditure/payments impacts negatively on finances that could be used on other infrastructures which would otherwise improve living standards of many South Africans. It is essential that integrative efforts are made an order of day in Limpopo Province so as to ensure reduction of carnages on R37 and indeed on any other public roads which as a result, lead to loss of lives, limbs and property damages.

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