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Strategies to Reduce Road Traffic Accidents on the Lubumbashi-Kasumbalesa Road

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Abstract: ***Nowadays, with the mechanization of all sectors of the economy and especially the ever-increasing modernization of road traffic, we are witnessing an exponential increase in the number of road accidents. According to WHO statistics, every year 1.2 million people die on the road. Reason why this article proposes to identify the causes of traffic accidents in order to propose the strategies of reduction of the accidents which would contribute to the decrease of the phenomenon observed on this road. The survey method, supported by questionnaire, non-directive and documentary interview techniques, helped us reach 80 respondents including 40 drivers and 40 traffic police (PCR). We have come to the conclusion that: the causes of traffic accidents on this road are the non-respect of the rules of the highway code and the speeding by the drivers, often it is the trailer trucks which are driven by Zambian drivers and public transport buses (hiace) driven by Congolese drivers who experience many accidents and the awareness of drivers of compliance with the rules of the Highway Code and compulsory recycling of drivers would reduce accidents often observed on this route.***

Keywords: reduction strategies and traffic accidents

1. Introduction

Voices of communications give rise to several transactions which can be of several orders: either for the displacements for simple walks, or for the displacements for commercial businesses. These movements are made by various means: by air, sea, rail and road.

At the local level, the most popular means for commercial transactions is the road. That is to say, it is by the road that the traders make their displacements. But when we do analyzes on different road conditions we realize that despite the conditions of impassability of roads, the road remains the most sought. And these conditions of impassability of the road and the lack of good road regulation, create more accidents and it is the people who are victims.

According to the WHO (2004, p.16), road traffic accidents continue to claim many lives in several countries of the world, 1.2 million deaths from traffic accidents are recorded each year on the roads of the world whole. This increase has prompted many countries to take steps to reduce traffic accidents and put in place mechanisms to make roads safer. This slaughter and the amount of suffering that particularly affects young people do not spare any country. A considerable human heritage is thus destroyed, bringing with it very heavy social and economic consequences. Our country the Democratic Republic of the Congo is also spared by this scourge, because we found that on the Lubumbashi-Kasumbalesa road there is not a week without a complaint of a traffic accident. Our report referred much more to the statistics of the year 2017 where There were 48 cases of accidents. It is right to point out, however, that some cases of accidents are not officially reported to the traffic police department (2017 traffic police directory).

In view of the above, we asked ourselves the following question: what are the strategies for reducing traffic accidents on the Lubumbashi-Kasumbalesa road?

This is the question of our research that we will try to answer throughout this work.

This work aims to identify the main causes of traffic accidents on the Lubumbashi-Kasumbalesa road in order to propose appropriate strategies that would reduce accidents. This study concerns on the one hand the different provincial road regulation services, which will use our results to improve their strategies. And, on the other hand, researchers in psychology, and especially those who are moving towards safety at work, and those in other scientific fields who will use our results to expand their scientific work.

To verify our hypothesis and achieve the objectives of our study, we used the survey method which allowed us, based on an unstructured conversation with our respondents, to gather information on the causes of traffic accidents and the strategies to implement. Questionnaire, documentary and non-directive interview techniques were used as data collection tools and the non-parametric chi-square contingency statistical test was used to test the significance of our results.

2. Theoretical Frame

Theory on strategies to reduce traffic accidents

Any strategies for reducing traffic accidents must focus on three (3) factors, namely:

- The users (drivers, pedestrians, passengers);
- The road (environment);
- The vehicle.

Routes

According to Norman LG (2013, p.80), there are innumerable studies that show that the frequency of accidents has been reduced following the widening of a stretch of road, the construction of a lower passage , or other improvements. Improvements in lighting have also had a positive influence wherever statistics allow comparison of "before" and "after" accident rates.

Road infrastructure, as a whole (pavement, signage and layout), also plays an important role for safety. Road design must take into account risk taking and human errors and try to minimize them. Some improvements have been shown to

lower routine mortality at low cost. These include the separation of different types of traffic, improved horizontal and vertical signage, safer pedestrian and two-wheeler lanes, more recognizable sidewalk construction and crosswalks. and limiting traffic speeds (by installing speed bumps, rough strips and roundabouts). On existing roads, this development work must be done in priority on the most dangerous sections, especially at the entrances and exits of agglomerations and very busy places (markets, schools, etc.). This work must also be an integral part of the design of new roads so that they do not become purely and simply the site of additional accidents. (Norman L. G. 2013, p.81)

Vehicle

Norman L. G. (2013, p.81), it is difficult to cite specific cases of accident rate reduction that can reasonably be attributed to changes in plans or vehicle construction; modern automobiles are designed to provide greater driver visibility, which is likely to reduce risk. Surveys of the use of seat belts have shown their influence on injury figures, with a decrease of 60% for both total injuries and the category "medium and fatal injuries".

Recent vehicles are very good in terms of safety. Vehicle manufacturers agree that future technical developments will take time to offer a much higher level of safety than today. Vehicle inspection is almost mandatory in all Western countries, where it is actually carried out and is followed up. It is clear that a major effort must be made in low- and middle-income countries to rejuvenate and maintain the vehicle fleet. These cases include commercial vehicles such as taxis, buses and trucks which represent on average 50% of the fleet of these countries and for which it is necessary to establish as a priority a real and independent technical control. This control must be uncompromising on the vital functions of the vehicle: braking, shock absorbers and lighting. (Norman L. G. 2013, p.82)

Users

For Norman L. (2013, p.91), the most important factor in reducing traffic accidents is probably the behavior of road users. Several cases of accident rate reduction are already known as a result of specific measures in this area. In this respect, the evaluation of the results of driver training should be mentioned.

We can modify the behavior of the user in various ways, there are short-term actions to be put in place in the immediate future and long-term actions, no less important but whose concrete effects take a long time to reach. make you feel. The implementation of massive information campaigns, controls and sanctions related to major risk factors is part of the short-term actions. The combination of campaigns and controls significantly increases the impact on the user's behavior. In the long term, the aim is to reinforce road learning in schools and to improve the quality of teaching provided by driving schools. (Norman L. G. 2013, p.92)

Theories on accidents

In this part of the work, we present the explanatory theory of the causes of accidents. Theory of dominoes

According to Heinrich W. H. (1931, p.68), who developed the so-called domino theory, which states that 88% of accidents are caused by dangerous human acts, 10% by dangerous acts, and 2% by chance. Heinrich proposed an "accidental sequence of 5 factors", in which each factor triggers the next, the imbalance of one domino causes the fall of all others. This sequence is as follows:

- Genetic and social history;
- Fault of the worker or personal imperfections;
- Hard Hazard associated with a mechanical hazard;
- Accident;
- Personal and physical damage.

According to the author, just as removing a single domino from the row to interrupt the succession of falls, so the removal of any of the five factors would prevent the accident and its consequences.

3. Methodological Framework

In this part, the study population being infinite, we will present the study sample, the method and the techniques used.

Study sample

At this level, the stratified simple random sampling method allowed us to extract two samples composed each of 40 subjects, namely 40 traffic police officers from the Lubumbashi staff and 40 drivers operating the Lubumbashi-Kasumbalesa road.

Table 1: Sample Drivers

Age Range	Effective
22-31 years	26
32-41 years	13
42 and over	1
Total	40

The figures in the table above, represent the amounts of drivers by age group whose level of study varies from the patentee to the state graduate.

Table 2: Sample Traffic Police (PCR)

GRADE	SEXE	Effective
Colonel	Male	1
Captain	Male	10
Commander	Male	8
Squadron	Male	16
Squadron	Female	5
Total		40

The figures contained in the table above, represent the amounts of traffic police officers (PCR) of the Lubumbashi staff, by grade and sex, whose level of study varies from two years of study post -primary to the licensee.

Research method and techniques

For clarification, let's say that in our investigation, we used the survey method, having been supplemented with the following techniques:

Questionnaire, non-directive and documentary interview techniques for data collection as well as the non-parametric

contingency Chi-Square statistical test were used to test the significance of the differences observed with the formula:

X^2 = (fo-fe) 2 / fe knowing that f = (fr x fk) / N and dl □ (K-1) (n-1), the only retained □ α 0.5

Legend: fo = observed frequency; fe = thermal frequency; X2 = Chi-square or Chi-square; N = total number; K = number of categories; r = number of ranks.

Search Results

To make our study more explanatory, the presentation, the analysis and the interpretation of the results were carried out according to all the variables.

Table 3: Causes of accidents

causes	Frequencies	Pourcentages
Speeding	12	15
Non-compliance with the rules of the Highway Code	13	16,25
Imprudence of the driver	7	8,75
Driving drunkenness	10	12,5
Bad passing	8	10
Inattention of the driver	9	11,25
Narrowness of the road	9	15
Refusal to give way	2	2,5
Bad crossing	3	3,75
Lack of breaks on the road	4	5
Total	80	100

This table shows that 16.25% of our respondents say that the traffic accidents on the Lubumbashi-Kasumbalesa road are caused by the non-compliance with the rules of the highway code by the users, 15% say that the speeding and narrowness of the road, 12.5% talk about drunk driving, 11.25% say the driver's inattention, 10% speak of bad passing, 8.75 speak of recklessness of the driver, 5% say the lack of breaks speed on the road, 3.75% say bad crossing and 2.5% speak of refusal to give way.

With regard to the Chi-square test, X^2cal 470,16 which is greater than the X^2tab 16.92 with dl = 9, there is a significant difference between the frequencies because the accidents on this road are often caused by the non-compliance with the rules of the code of the road.

Table 4: Types of vehicles involved in traffic accidents

Vehicle Types	Frequencies	pourcentages
Trailer trucks	56	70
Trucks with two decks	15	18,75
Light cars of 1.5 T	5	6,25
Vehicles of 1 T	4	5
Total	80	100

In our sample as a whole, 70% say that road accidents on the Lubumbashi-Kasumbalesa road are caused by truck trailers, 18.75% say two-decker trucks, 6.25% say vehicles at 1T and 5% say light cars.

With regard to the test, χ^2cal 1352.58 which is greater than χ^2tab7.82 with dl = 3, the test is significant because the accidents on this road are often caused by the trailer trucks.

Table 5: When accidents happen often

Moments	Frequencies	pourcentages
During the night	49	61,25
During the day	31	38,75
Total	80	100

It follows from this table that 61.25% of our respondents say that traffic accidents on the Lubumbashi-Kasumbalesa road often occur at night and 38.75% say during the day.

With regard to the test, χ^2cal1464.42 which is superior to χ^2tab3.84 with dl = 1, the test is significant because traffic accidents on the Lubumbashi-Kasumbalesa road often occur at night.

Table 6: Days of the week when we notice more accidents

Days of the week	Frequencies	%
Monday	10	12,5
Tuesday	8	10
Wednesday	12	15
Thursday	18	22,5
Friday	11	13,75
Saturday	15	18,75
Sunday	6	7,5
Total	80	100

In our entire sample, 22.5% of our respondents say that traffic accidents on the Lubumbashi-Kasumbalesa road often occur on Thursdays, 18.75% say on Saturdays, 15% say on Wednesdays, 13.75 % say Friday, 12.5% say Monday, 10% say Tuesday and 7.5% say Sunday.

Given the test, χ^2cal602.27 which is greater than χ^2tab12.59 with dl = 6, the test is significant because traffic accidents on this road often occur on Thursdays and Saturdays.

Table 7: Accident Reduction Strategies

Reduction Strategies	Frequencies	%
Sensitize drivers to respect the rules of the Highway Code	18	22,5
Compulsory recycling of all drivers	15	18,75
Speed limit control by radar	13	16,25
Widening of the road	12	15
Use the breathalyzer	9	11,25
Introduce the teaching of the rules of the highway code from primary school	8	10
Periodical technical inspection required	5	6,25
Total	80	100

In our entire sample, 22.5% say that raising the awareness of all drivers to the respect of the rules of the highway code can reduce road accidents on the road Lubumbashi-Kasumbalesa, 18.75% say mandatory recycling of all the drivers, 16.25% say the speed limit control by radar, 15% say the widening of the road, 11.25% say the use of the breathalyzer, 10% say of the introduction of the rules of the road rules from the primary school and 6.25% say the mandatory periodic technical inspection.

With regard to the test, χ^2cal 621, 01 which is greater than χ^2tab 12, 59 with dl = 6, the test is significant because the sensitization of the drivers to the respect of the rules of the Highway Code and the obligatory recycling of all the drivers can reduce accidents on this road.

Table 8: The nationality of drivers involved in traffic accidents

Nationalities	Frequencies	%
Zambian	21	26,25
Somali	19	23,75
Tanzanian	17	21,25
Zimbabwean	12	15
South African	7	8,75
Congolese	4	5
Total	80	100

In our entire sample, 26.25% of our respondents say that Zambian nationality is often involved in traffic accidents on the Lubumbashi-Kasumbalesa road, 23.75% say the Congolese nationality, 21.25% say the Tanzanian nationality, 15% say Zimbabwean nationality, 8.75% say South African nationality and 5% say Somali nationality.

With regard to the test, χ^2cal 752.41 which is greater than χ^2tab11, 07 with dl = 5, the test is significant because the drivers of the Zambian nationality often cause accidents on this road.

4. Results and Discussion

Concerning the causes of traffic accidents on the Lubumbashi-Kasumbalesa road, the non-compliance by drivers with the rules of the Highway Code and speeding are the main causes of accidents on this road insofar as drivers trivialize the potential risks of accidents, getting drunk before driving ... (tab n ° 3). As support for the WHO (2010, p.23), accident studies show that inappropriate behavior of road users is at the root of the vast majority of traffic accidents. This inappropriate behavior is often linked to a failure to comply with the rules of the Highway Code which concern in particular speed, alcohol, etc., or to a poor appreciation of the particular traffic conditions that require greater caution, such as driving at night, in tunnels etc.

With regard to the types of vehicles often involved in traffic accidents on the Lubumbashi-Kasumbalesa road (tab 4), our results show that trailer trucks are often involved in traffic accidents and public transport buses (hiace), since many of these trucks are driven by drivers from southern Africa who do not have a good command of the Congolese road code where they drive to the right while in most of these countries left and times these drivers drive beyond the authorized speeds of 60km / h. Concerning the high-speed bus, the proliferation of car fleets and the dilapidated nature of these vehicles, often driven by drivers who have no notion of the rules of the road.

Compared to the time when accidents often occur (tab n ° 5), the results show that accidents on this road often occur during the night. This could be explained by the fact that it is during the night that truck and bus traffic increases.

As for the days of the week when we often notice accidents (tab n ° 5), the static conclusion shows that on Thursday and Saturday we notice a slight increase in the number of accidents compared to other days, because the days end of the week are characterized by the fluidity of the movement of trailer trucks and public transport buses. As confirmed by Pascale A. (20 15, p.5), the days of the beginning of the week have a lower average of accident cases than the days of weekends.

Regarding the nationalities of drivers often involved in traffic accidents (tab n ° 7), the statistical conclusion shows that the Zambian and Congolese nationalities are often involved in several accident cases. As we can see with the WHO (2010, p.51), the constant increase in international traffic requires from all countries and even more the countries of transit or those which are very visited by tourists. ensure transparent information on the specific traffic rules in force in their territory. These rules concern in particular: speed limits by category of vehicle and road, seat belt use or helmet use, maximum permissible speed limits with regard to blood alcohol content and the equipment required on board the vehicles.

Concerning the strategies for reducing traffic accidents (tab n ° 6), the statistical conclusion shows that raising drivers' awareness of compliance with the rules of the road code makes it possible to reduce accidents in the short term. As Norman LG (2013, p.92) argues, the behavior of the user can be modified in various ways, there are short-term actions to be put in place immediately and long-term actions, not less important but whose concrete effects take a long time to be felt.

The implementation of massive information campaigns, controls and sanctions related to major risk factors is part of the short-term actions. The combination of campaigns and controls significantly increases the impact on the user's behavior.

In addition, according to Pascal G. (2002, p.3), it is on users that the effort to reduce road traffic accidents must focus mainly. The better they will behave, the more the number of fatal accidents will decrease. No measure can really be effective on its own; continuous action is needed in many areas.

Road education must begin in childhood by teaching rules that pedestrians must observe on modern roads. As long as children do not go to school, it is up to parents to train them. It is therefore important to advise them by all means available today: press, radio, TV, etc. The child who lives in an urban center must know very early how to behave so as not to risk being injured or killed accidentally.

5. Conclusion and Recommendations

We have arrived at the end of our work, our research recall, focused on the theme entitled "Strategies for reducing traffic accidents on the Lubumbashi-Kasumbalesa road". Only one concern was raised in this study: what are the strategies for reducing traffic accidents on the Lubumbashi-Kasumbalesa road? To address this concern, we started from the premise that the strategies for reducing traffic accidents on the Lubumbashi-Kasumbalesa road would be:

- The speed limit control by the radars;
- The use of the breathalyzer;
- The mandatory recycling of all drivers;

- The awareness of drivers to respect the rules of the Highway Code;
- The mandatory periodic technical inspection;
- The widening of the road;
- The introduction in the teaching of rules of the Highway Code from primary school.

This approach has two objectives:

- To identify the main causes of traffic accidents on the Lubumbashi-Kasumbalesa road;
- Propose strategies to reduce traffic accidents.

In order to test our hypothesis and achieve our objectives, we used the survey method, supported by interview, documentary and questionnaire techniques for collecting data in the field. Regarding data processing, the chi-square test was used. And we have reached the following results: The main causes of traffic accidents on the Lubumbashi-Kasumbalesa road are: non-compliance with the rules of the highway code and speeding; the types of vehicles often involved in traffic accidents on the Lubumbashi-Kasumbalesa road are truck trailers commonly called trucks and public transport buses (hiace); accidents on this road often occur at night and the mandatory recycling of all drivers and the awareness of all drivers of compliance with the rules of the Highway Code can be used as strategies to reduce accidents in the short term.

With this, we suggest that:

- The Congolese state introduces into the curriculum a course on the rules of the highway code;
- The Congolese state ensures the strict application and strengthening of national legislation on risk factors (speed, drunk driving ...).

References

[1] Davind, C. (2008), statistical methods in the human sciences, Boeck s.a, Brussels.
[2] Deketele, J.M. (2009), information gathering methodology, Boeck s.a, Brussels. Heinrich, W.H (1931), Industrial Accident Prevention, Mcgraw-hill, New York. Madani, A and Tello, G. (2015), "the main causes of traffic accidents and mitigation measures in Algeria" in europaen scientific journal, vol 11, n ° 20.
[3] World Health Organization (WHO 2004), report on the fatal road traffic accident rate per 100,000 population by region, WHO, Geneva.
[4] WWW.who.int/mediacentre/factsheets accessed December 4, 2017
[5] WWW.unil> esc> shared> thesis-hafsi accessed September 15, 2017