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FACULTY OF MECHANICAL ENGINEERING

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ASSESSMENT OF POTENTIAL RISKS THAT INFLUENCE THE TRAFFIC ACCIDENTS

Dorin Dumitrascu[1]
[1] Transilvania University, Brasov, ROMANIA, d.dumitrascu@unitbv.ro

Abstract: *In this paper are presented some general aspects regarding bicycle crash types, cyclist injury and the assessment of the main potential risks that influences the traffic accidents between cars and two wheeled vehicle and single bicycle – crashes. Traffic accidents are events out of the ordinary, generally characterized by more or less information on the crash causes, on some parameter measurement and observation tools. The statistical analyses of the potential risks and their influences on traffic accidents between cars and two wheeled vehicles it was performed using cumulative density function based on 87th percentile.*
Keywords: *accidents, bicycle, risks assessment, injury, cumulative density function.*

1. INTRODUCTION

The traffic accident is an event produced on public roads, consisting of the collision of two or more vehicles, or of a vehicle with another obstacle, hitting pedestrians, cyclists or other participants to the traffic and resulting in injury to corporal integrity of some persons, material damage, as well as disturbing circulation. The traffic accidents are classified by: severity of injury to persons, type of collision, impact configuration, determined factors.
In road accidents are involved three components of the traffic system: vehicles, people and the road together with the environment.
The bicyclists are included in the category of the most vulnerable road users and the bicycle riding becomes a popular means of transportation. Thereby the bicycles are used for travel to work, shopping and for leisure purposes. In the same time the increasing intensity of bicycles usage was generated by: the growth of urban traffic intensity, some economic facts, a healthy lifestyle, the increasing environmental pollution.
Considering the aspects previously presented it becomes obvious that cycling injuries and fatalities are on an increasing tendency, being necessary that the causes and effects of the road accidents involving this category of traffic participants need to be taken into account.
Analyzing the potential risks that influence the accidents between vehicles and two wheeled vehicles, in particular bicycles can be developed techniques, methods and systems in order to increase the safety of this category of traffic participants.
The events in which is involved the tandem bicycle – cyclist can be split into two categories: bicycle-car crashes and single bicycle – cyclist crashes, including here for example obstacle collision, falls due to road surface condition or quality. Bicycle defects represent a reduced cause in crashes.
Another important factor in accidents incidence is represented by the light condition: night, twilight and daylight. Other determinant factors are: age and sex, speed, bicycle type, knowing the location, alcohol use, physical problems, etc.
Obviously, bicyclists become one of the most exposed participants in traffic, who suffer injuries in case of an accident. Compared to cars, the bicycles have a reduced visibility (preponderantly frontal), are less stable and offer a much less protection to the cyclist. Taking into account the unprotected or partially protected body in comparison to the cars, the bicyclist usually falls from his bicycle and hits some hard elements, non-deformable structures of other vehicles or infrastructures, suffering the most severe injuries: to head and extremities fractures.

2. PROCEDURES AND ANALIZING METHODS

The methodology of assessment of potential risks consist of the following elements, performed, more or less, in the following order: identify, assess the vulnerability of critical assets to specific threats, the quantification of

risk (the expected likelihood and consequences), identify ways to reduce those risks and prioritize risk reduction measures based on a strategy [2],[3].

In figure 1, by using a realistic evaluation of security control effectiveness, a more accurate prioritization can be made. The most extreme risks will obviously take precedence over the low, moderate, and high-risk areas.

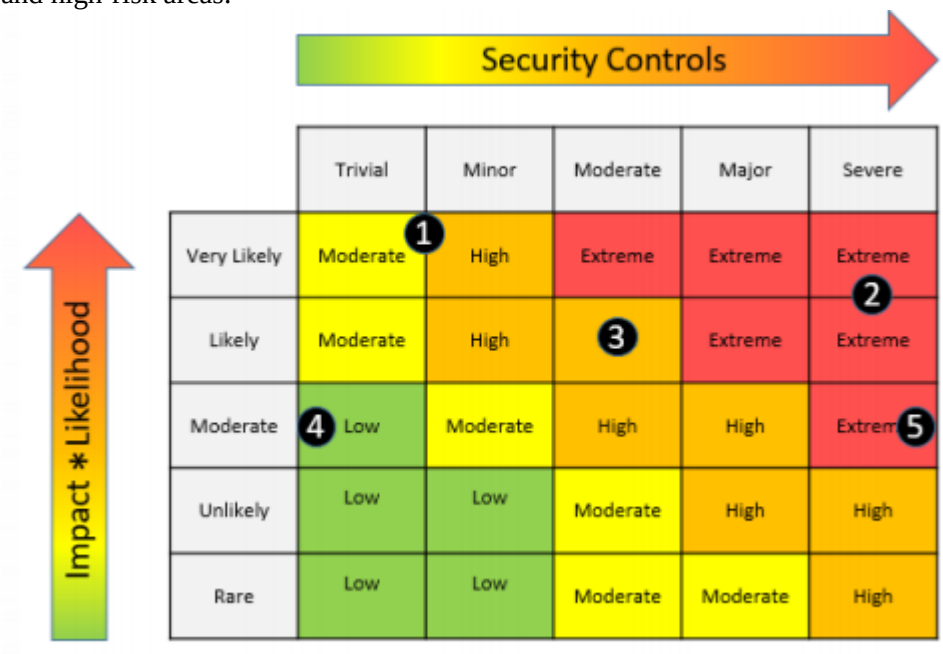

Figure 1: Overlaying control effectiveness enables differentiation between risks and illustrates residual risk [1]

The present study refers to the estimation of the potential risks that can be manifested in the case of cyclists traveling on public roads. 29 potential risks were identified, being quantified both qualitatively and quantitatively.

The assessment of risk impact is graphically detailed in figure 2. It can be observed that a number of 17 potential risks can have a significant impact.

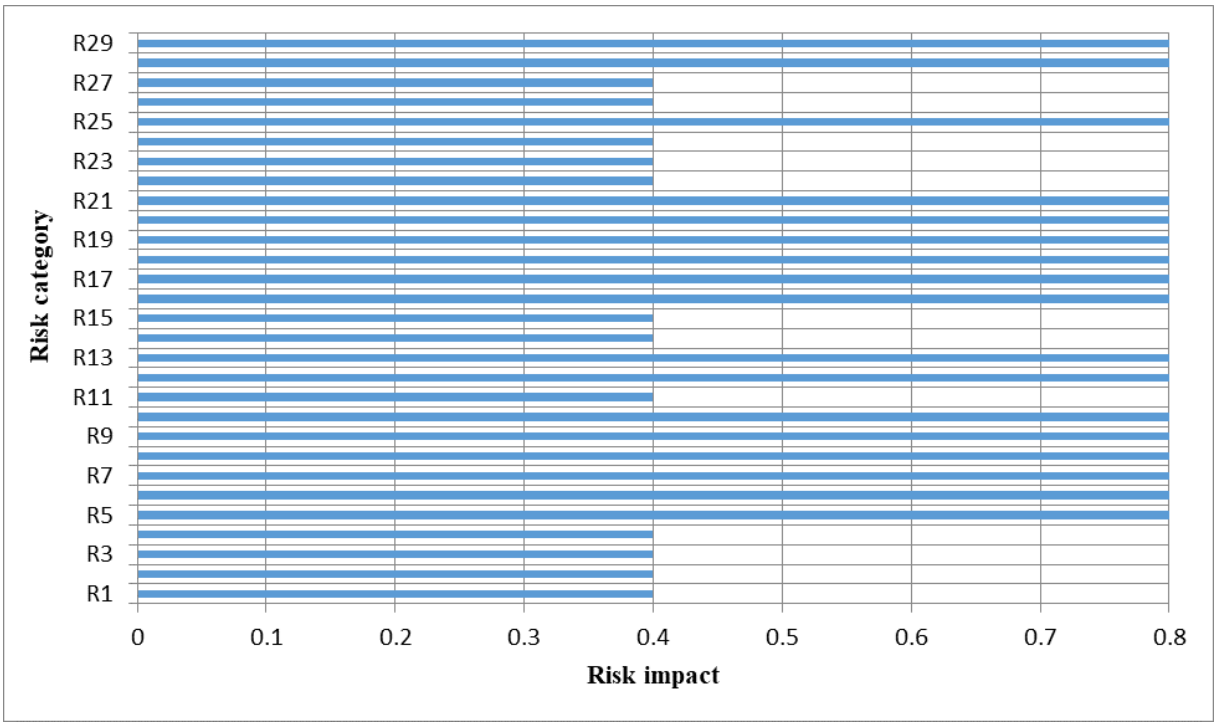

Figure 2: The distribution of risks impact

Analyzing figure 3, it can be pointed out that the vast majority of the estimated risks have a high probability of occurrence.

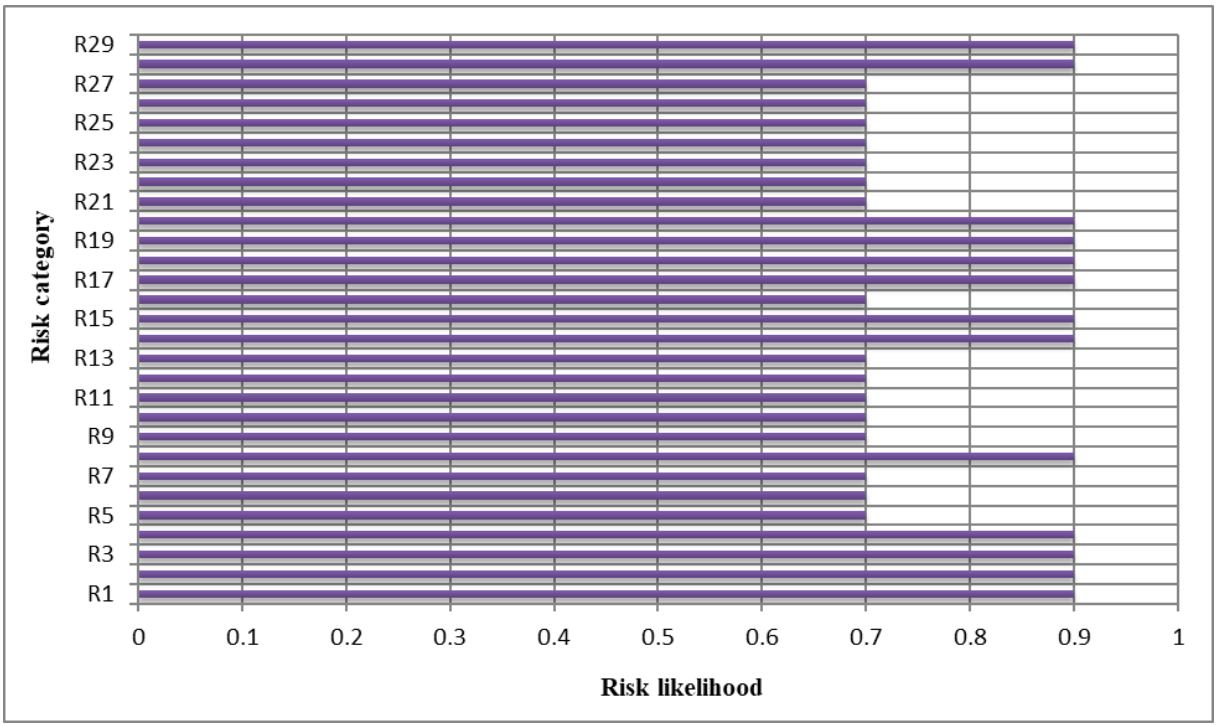

Figure 3: The distribution of risks likelihood

The priority score of the potential risks is established according to the probability of occurrence and the impact score of the risk.
The quantification of the risk score indicates that the risks fall into the high-risk area (figure 4).

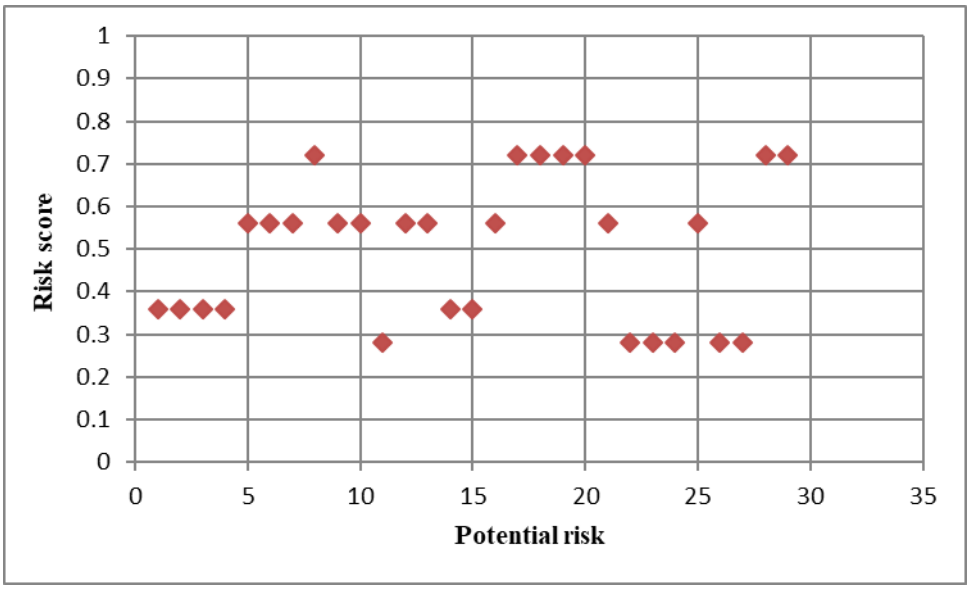

Figure 4: The distribution of risk based on risk score

By using the specific cumulative density functions applied to each identified risk, the influence of cumulative risks was analyzed (figure 5). The results expressed by the cumulative density functions show that for a probability of 87th, the risks have a score of 0.6876. Thus, these risks can be classified in the category of high risks with negative influences.

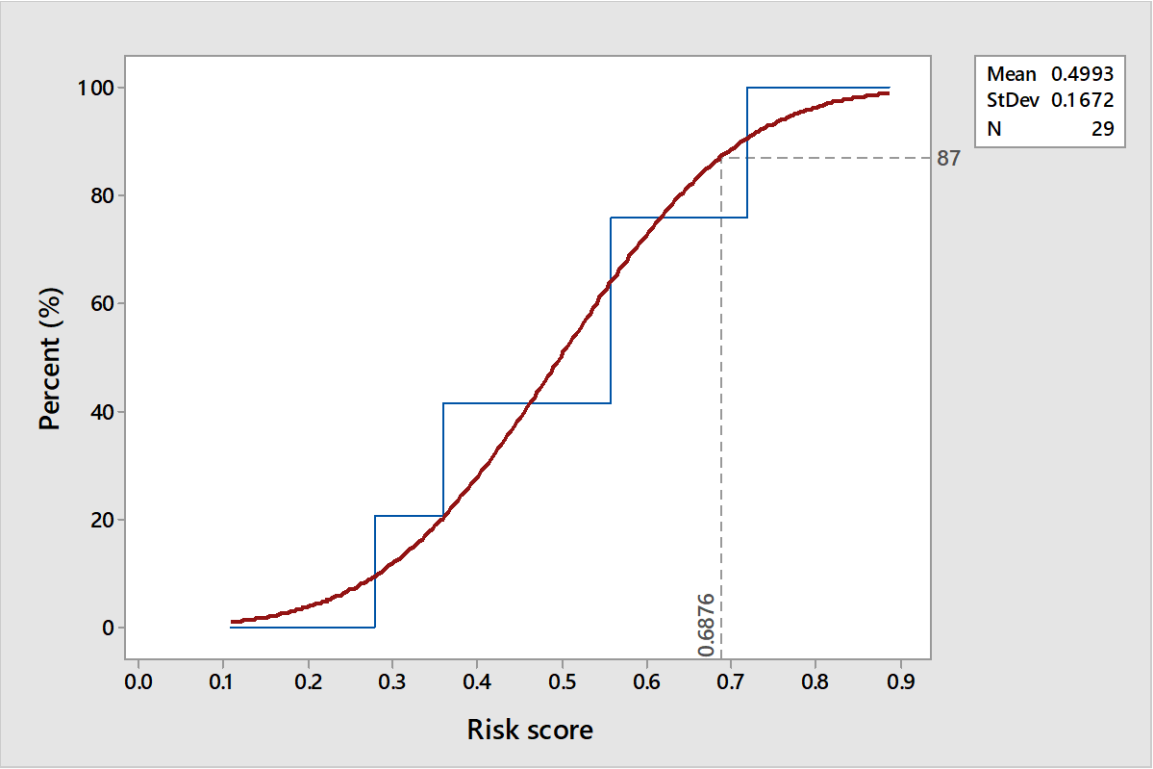

Figure 4: The cumulative density functions of potential risk

3. CONCLUSION

Analyzing the results of the risk score evaluation, the significant risks are the following:
- Frontal accident with a vehicle;
- Rear accident with a vehicle;
- Overtaking on the left side;
- The intersection on the right side;
- Door open in front of the bicyclist;
- Transit on the red color of the traffic light;
- Driving under the influence of alcohol;
- Failure to observe the limit distance that is needed to be maintained both, for moving vehicles and for parked cars;
- The cyclist driving at night time;
- The condition, quality of the road and the presence of different obstacles on it.

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