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## Creating safety in transport – traffic risk approach

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### Abstract

The paper presents essence of traffic risk. Determinants of this derivative of frequency and consequences are enumerated and described. The main attention is focused on kind of consequences, type of vehicle, injury seriousness as well as kind of accident participant. Basing on classical risk approach, traffic risk assessment methodology is created. It plays a crucial role in formulating risk strategies, implemented from most popular, international risk management standards – PRINCE2® and PMI®. Recommendations for traffic safety improvement base on an unique comparison of risk assessment results and general risk strategies, and they are implemented into real data that characterizes the biggest city in Poland – Warsaw.

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**Keywords:** risk; safety; transport; traffic safety; traffic risk; risk management

### Nomenclature

POBR	Polish Road Safety Observatory (orig. <i>Polskie Obserwatorium Bezpieczeństwa Ruchu Drogowego</i> )
TRAQM	traffic risk assessment quantitative method
F	frequency
C	consequences

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## 1. Introduction

Polish roads are said to be very dangerous places accordingly to transport safety conditions. It is emphasized by relatively big number of traffic accidents. Basing on Police and State Fire Service statistics, above 32 000 traffic accidents occurred in 2015. During this period of time more than 360 000 collisions were noticed to the Police and 8328 rescue actions were proceeded [1, 2].

Consequently, traffic safety seems to be very actual and important issue that takes high importance, especially nowadays. In addition, object aspects are permanently taken into consideration by public authorities, services, nongovernmental organizations (NGO's) and media. Increasing a safety and security potential is a challenge from practical point of view. Namely, object aspects are generally unsubstantial and intangible, determining difficulties in measurement and management activities.

As far as safety engineering output is concerned, risk is widely known as a safety measure [3]. Therefore, "Risk is often used to describe the level of safety of transportation systems" [4]. Classical approach for traffic risk assessment highlight a quotient relation between expected number of accidents and exposure (expressed in many ways, with general usage of complex statistic equations) [5,6]. Much modern conceptions also base on complex sets of risk determinants [4,7,8]. One can identify a lack of intuitive solutions for presenting traffic risk plainly to a wide spectrum of stakeholders, especially for safety managers and presenters (e.g. media).

Authors present an approach that faces above problematic aspect. Methodology for traffic risk assessment is described. It is supplied by information permanently collected in databases connected to the Polish Road Safety Observatory (PRSO) that allows to differentiate the risk owing to e.g. kind of consequences, type of vehicle, injury seriousness and kind of accident participant [9]. All these factors are intuitive understandable with positive influence for achievement practical purposes in traffic safety management. The practical dimension is additionally stressed by formulation of general risk strategies implemented into real data characterizing the biggest, capital city in Poland – Warsaw.

## 2. Methodology

Risk is an integral part of human being as well as systems and processes existence. Practically all kinds of relevant actions are related to uncertainty and risk. Taking into account a synthetic definition and basing on approach coming from different areas of practice, the most common risk definition concerns a derivative of accidents frequency and relevant results (consequences) [3]. Following equation visualizes the object relation.

$$R = f(F, C) \quad (1)$$

One need to highlight that traffic safety is very important area of investigation in Poland. In 2013 at the Motor Transport Institute POBR was established. The institution focuses on collecting, analysing and disseminating data related to the most important road safety issues. Referring to the data and information presented on POBR website (e.g. road safety statistics, road safety analyses and accident maps), determinants of accidents' frequency can be divided into three groups: type of accident, accident participant, type of vehicle. That division comes from various road accidents variables (alcohol, speed, location of road accidents, type of road, participants, type of accident, etc.). From the consequences point of view, also three groups of factors can be enumerated: victims killed at the field or died within 30 days, victims seriously injured and victims slightly injured [11]. They express three levels of consequences.

The traffic risk assessment quantitative method (TRAQM) presented in this paper bases on above mentioned frequency and consequences determinants. Thus, the risk assessment must be contextually carried out with respect to multi-parameters consideration. In order to ensure more specific risk values with particular spatial reference, data used in assessment process should be related with selected territories (special areas of analysis). Furthermore, time lapse designation is required as well. In this case the period of at least three years should be taken into account.

Table 1 presents particular equations for traffic risk assessment in risk categories divided on the base of frequency determinants and levels of consequences.

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