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ELABORATION OF THE ROAD TRAFFIC SAFETY PROBLEM RESEARCH METHODOLOGY

Increasing traffic safety on national roads is the general objective of the paper, highlighting the aspects characteristic of road accidents, the circumstances and dynamics of their occurrence, and identifying best practices to increase road safety, which could be implemented. In line with the approach, we proposed the following objectives for research: analysis of road safety at present and highlighting the characteristic aspects of road accidents, the circumstances and the dynamics of their occurrence.

Keywords: *pedestrian, professional driver, road accident, road traffic safety, safety factors, safety system*

Determining the main factors influencing road safety. The transport and infrastructure sector is the field with the most economic connotations able to contribute to the visible economic growth of the country and to facilitate the development of other areas. In the Republic of Moldova, the main operator of land transport of goods and passengers is the road sector, with 97% of passenger traffic and 87% of freight traffic.

Road traffic is an element of the organization of any social space, so it is necessary to ensure road safety for all its participants. In this sense, the need to study safety factors and the causes of accidents in the road traffic system in order to reduce them has not only scientific and practical significance and relevance.

According to the Road Traffic Regulations, an accident in road traffic is considered the event caused by the violation of road safety regulations, which involved one or more vehicles in circulation on the public road, which resulted in damage to health, integrity bodily injury, death of one or more persons or material injury. From a technical point of view, however, the road traffic accident can be considered the discrepancy of the interactions between the elements of the DVRE system - Driver - Vehicle - Road - Environment.

According to the notion of road traffic accident, it is found that one of the main causes that contribute to accidents is deviations from the requirements of the Regulation. However, according to the Regulation, it can be emphasized that only its observance will guarantee the security of all road users, environmental protection, protection of the rights and legal interests of natural and legal persons, as well as the protection of their property.

The factors contributing to accidents can be subjective and objective.

Subjective factors are considered:

- Non-compliance with the Road Traffic Regulations;
- Failure to comply with traffic safety and vehicle operation rules.

Objective factors are considered:

- Improper planning and arrangement of streets and roads;
- The condition of the road pavement, as well as the improper use of the means of organization and regulation of the traffic (road marking indicators), also, the improper lighting of the roads at night;
- Improper technical condition of vehicles (malfunctions of braking and steering systems, malfunctions and malfunctions of lighting devices, malfunctions of the running system, etc.

Determining the interaction of risk factors in road traffic. The combination of the influence of different factors and their consequences on the possibility of an accident is highlighted by the research data of N.P. Pakhomova (1995), conducted in the Nizhny Novgorod region together with employees of the road patrol service. The authors revealed the imperfection of the road surface, the width of the roads that did not meet the standards, the lack of telephone and radio communications,

the considerable distance (more than 50 km) from each other of traffic police stations, the absence of signs to the location of medical institutions. The audit showed that 72% of state cars and 36% of private cars did not have first aid kits, and 69% of the drivers surveyed did not know the purpose of the drugs they contained. None of the drivers and almost none (95%) of the road transport employees had the skills to provide first aid.

Thus, there are a significant number of interdependent factors that determine both the risk of road accidents and their possible consequences. A special role among them belongs to a rational model of medical care.

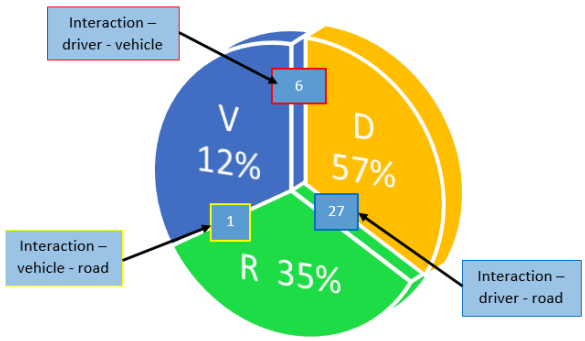


Fig.1. System factors – Driver, Vehicle, Road, Environment. The role of risk factors and their interaction with people.

Table 1. The interaction of risk factors

Interaction of factors	Industry	Degree of study	Result
Driver - vehicle 6%	Car construction	Active research	Safety standards, rules and guidance for the technical operation of vehicles
Vehicle - road 1%	Car construction - road psychology	Active research	Traffic rules, road design rules, safety standards
Driver - road 27%	Road psychology, etc.	Stage of information collection and theoretical justification	Elaborated recommendations, the most difficult

The systemic and complex approach is the basis of the methodology of research and increase of road safety. The use of the word "accident", with its connotations of being an inevitable event, weakens the determination to intervene to reduce accidents and resulting damage. Evans (1991) argues that the word "crash" indicates in a simple way what is observed, while "Accident" seems to suggest in addition a general explanation of why it occurred.

Road safety recognizes that accidents and their consequences are multifactorial events, Ogden (1996) states: "An approach based on notions of cause and fault is extremely simplistic". In short, blockages have factors, not causes.

The old approaches emphasize the concept of solving problems in road safety, but it is more correct to recognize that road safety activities do not solve problems. For example, when a safer road design is implemented, we hope that the number of accidents or their severity will decrease, but will not disappear. It is fairer to say that implementing the right policies, programs and measures will reduce the number or consequences of blockages, but they will not be "resolved".

This achievement is important because it changes the focus from a problem that will disappear if we allocate sufficient resources to it, in a situation that requires continuous management. In turn, this management requires the development of science-based techniques that will allow us to confidently predict that security resources are well spent and likely to be effective.

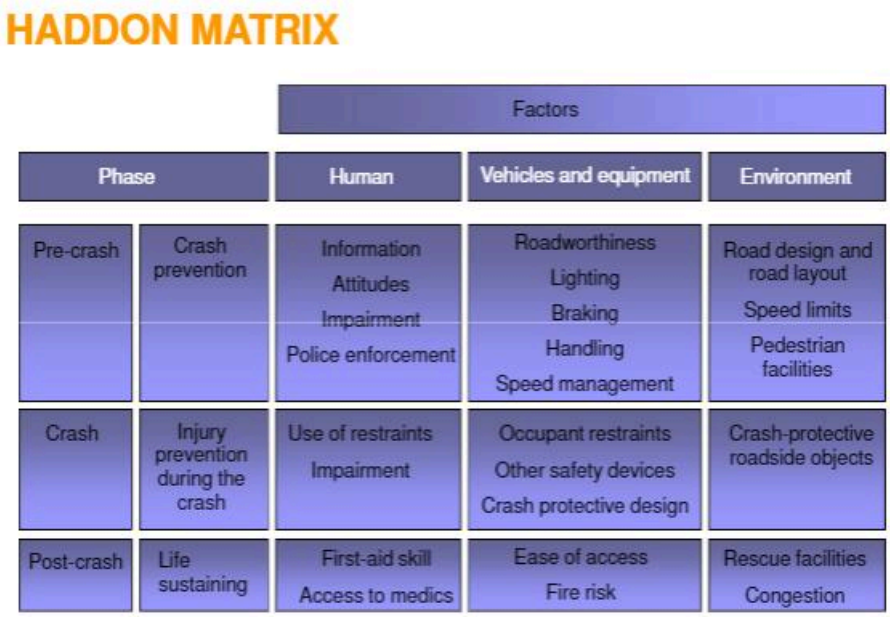
Progress in the field of prevention is formulated in an environment of opinions, called paradigms, as can be seen in the following table (Table 2). Some of them can be called professional folklore, ie a set of opinions widely supported, without a real basis. For example, the “accident-prone driver” was a “trust” supported by data in the sense that a small number of drivers participate in a disproportionate number of accidents, it turns out that identifying and removing these drivers will reduce accidents. A more scientific analysis of the data indicates that this phenomenon can be explained simply by the random nature of accidents and not by a specific error-prone attitude of these drivers.

Table 2. Evolution of road safety paradigms

ISSUES	PARADIGM I	PARADIGM II	PARADIGM III	PARADIGM IV
Decades of dominance	1900 - 1925/35	1925/35 - 1965/70	1965/70 - 1980/85	1980/85 - prezent
Description	Motorized transport control	Mastery of traffic situations	Traffic system management	Transport system management
The main disciplines involved	Law enforcement	Car and road engineering, psychology	Traffic engineering, traffic medicine, advanced statistics	Advanced technology, systems analysis, sociology, communications
Terms used about unwanted events	Collision	Accident	Crash, accident	Suffering, costs
The premise regarding insecurity	Transition problem, transient stage of maladaptation	Individual problem, morale and inadequate skills	Defective traffic system	Risk exposure
Data ideals in research	Basic statistics, answers to "What"	Causes of accidents; "Why"	The cost / benefit ratio of the "How" means	multidimensional
Organizational form of safety work	Separate efforts based on trial and error	Voluntary coordinated efforts	Scheduled, politically authorized efforts	Decentralization, local management
Typical countermeasures	Vehicle codes and inspection, school patrols	The doctrine of the three E's, the examination of drivers prone to accidents	Combined samples of risk mitigation measures	Network and prices
Effects	Gradual increase in traffic and health risks	Rapidly increasing health risk with decreasing traffic risk	Successive cycles to reduce health and traffic risks	Continuous reduction of serious road accidents

A road traffic accident results from a combination of factors related to the components of the system that include roads, the environment, vehicles and traffic participants and the way everything interacts. Some factors contribute to a collision and are therefore part of the cause of accidents. Other factors aggravate the effects of the collision and thus contribute to the severity of the trauma. Some factors may not seem directly related to trauma from participating in road traffic. Some causes are immediate, but can be supported by medium and long-term structural causes. Identifying the risk factors that contribute to blocking road traffic is important in identifying interventions that can reduce the risks associated with these factors.

Table 3. Haddon matrix



Source: reference 1

William Haddon [1] Developed by William Haddon in 1970, the matrix analyzes factors related to personal attributes, vector or agent attributes, and environmental attributes; before, during and after an accident or death, in relation to the person, the vehicle and the environment. By using this framework, one can then think about assessing the relative importance of the different factors and

designing interventions (Table 3). Haddon described road transport as a poorly designed "human machine" system that needs systematic treatment. Each phase - pre-accident, accident and post-accident - can be systematically analyzed for human, vehicle, road and environmental factors. The Haddon matrix is an analytical tool to help identify all the factors associated with an accident. After identifying and analyzing the multiple factors associated with an accident, countermeasures can be developed and prioritized for implementation over short-term and long-term periods. For the pre-accident phase, it is necessary to select all measures that prevent the occurrence of injury. The injury phase is associated with countermeasures that prevent trauma or reduce its severity, if any. Finally, the post-accident phase involves all activities that reduce the adverse outcome of the accident after it has occurred.

Systematic approach Traditionally, factor analysis separately examines road traffic participants, vehicle and road environment. Moreover, there is a tendency for researchers and practitioners to look for one or more factors, when in fact they should analyze several factors. Based on Haddon's knowledge, the systems approach (which takes into account the interactions between different components) aims to identify and remedy the major sources of error or to design weaknesses that contribute to fatal accidents or accidents that lead to serious trauma. , as well as to alleviate the severity and consequences of trauma. The essence of using a systemic approach is to take into account not only the basic factors, but also the role of different agencies and actors in prevention efforts. Road injuries are a multidimensional problem that requires a comprehensive vision when examining determinants, consequences and solutions. Any road traffic system is extremely complex and can be dangerous to human health. The elements of the system include cars, roads and traffic participants, along with their physical, social and economic environments. In order to develop a less dangerous road traffic system there is a need for a systemic approach - understanding the system as a whole and the interaction between its elements and identifying where there is potential for intervention. In particular, it requires recognition that the human body is extremely vulnerable to injury and that people make mistakes. A safe road traffic system is one that accommodates and compensates for human vulnerability and fallibility [2].

Each accident and its consequences can be represented by the system of interconnected factors (Figure 2). As the components of the road and the transport system interact, connections between the factors of accident and trauma appear. For example, some road features or vehicle characteristics could influence certain aspects of the behavior of road users, and the effects of some vehicle defects could be aggravated by certain road features.

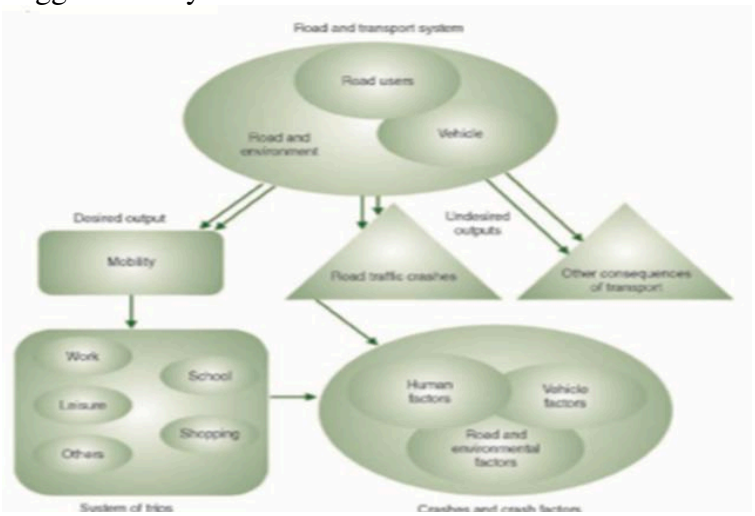


Figure 2. Systems approach

In order to plan collision avoidance measures, it is essential to understand the complex causal process, as it provides vital information and usually leads to a wide range of possible areas of preventive action. There is an opportunity to intervene in all aspects of the transport system and related systems shown in Figure 2, to reduce the risk of road traffic injuries and deaths. The key

message to be taken from Figure 2 is that a traffic accident or collision is the result of an interaction between a number of factors and the subsystem.

SOURCES AND LITERATURE

1. Haddon Jr W. Advances in the epidemiology of injuries as a basis for public policy. Public Health Report, 1980, 95:411–421.

2. Peden M et al. World report on road traffic injury prevention. Geneva, World Health Organization, 2004