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HUMAN FACTOR IN ROAD TRANSPORT INCIDENTS: CAUSES, ANALYSIS, AND PREVENTION MEASURES

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Abstract: This scientific article provides a comprehensive analysis of the role of the human factor and its various aspects in the occurrence of road traffic accidents. More than 85-90 percent of traffic accidents occurring worldwide and in our country are directly or indirectly related to the behavior, psychophysiological state, and non-compliance with traffic rules of drivers and pedestrians. The study used statistical and analytical methods to study the impact of factors such as driver fatigue, speeding, alcohol consumption, the use of mobile devices while driving, as well as age and lack of experience on the risk of accidents. The article also examines the link between road infrastructure and the human factor, developing practical proposals aimed at improving the driver training system, implementing intelligent transport systems, and increasing public awareness. The conclusion section outlines strategic directions for ensuring road safety by minimizing human error.

Keywords: Road traffic accident, human factor, driver psychophysiology, road safety, fatigue, speeding, concentration, mobile devices, compliance with traffic rules, risk factors, transport psychology, intelligent systems, pedestrian safety, driving skills, traffic flow, traffic accident statistics, preventive measures, road infrastructure, driver training, social consciousness.

Login. In the modern world, the rapid development of urbanization and automation processes not only creates immense conveniences for humanity but also poses serious global challenges. One of the most pressing of these problems is road traffic accidents, which cause injuries, disabilities, or deaths to millions of people every year. According to the World Health Organization (WHO), more than 1.3 million people die annually worldwide as a result of road traffic accidents.

When the fundamental essence of this problem is studied, it becomes evident that the most vulnerable link in the "car-road-person" system is precisely the human factor. As a result of technological progress, modern cars are equipped with advanced safety systems (ABS, ESP, airbags, etc.), and road infrastructure is being improved, but the number of accidents caused by human error remains high.

The concept of the human factor encompasses the physical and mental state of the driver, their decision-making speed, experience, stress resistance, and social behavior. Driving is a complex psychophysiological process that requires a high level of attention, rapid reactions, and constant monitoring. Therefore, the purpose of the article is to conduct an in-depth analysis of the mechanisms of influence of the human factor in road accidents and to develop effective scientific and practical recommendations for reducing these risks.

By the 21st century, the development of the automotive industry and the expansion of urban infrastructure have become one of the primary drivers of global economic growth. However, this development has also brought with it the problem of road traffic accidents (ATCs), which is called the "modern epidemic." According to World Health Organization reports, road accidents are the number one global cause of death for children and young people aged 5 to 29 worldwide. This is not just a

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statistical indicator, but serious economic and social damage to the demographic and labor resources of society.

In the Republic of Uzbekistan, the level of automation has also increased sharply in recent years. The fact that thousands of accidents occur annually on the republic's roads necessitated making road safety one of the most important priorities of state policy. The latest decrees and resolutions of the President of the Republic of Uzbekistan also systematically define the improvement of road infrastructure and increasing the responsibility of drivers.

For a long time, experts and transport engineers have tried to solve road safety problems solely by improving the technical condition of vehicles (e.g., braking systems, airbags) or improving road surfaces. However, scientific research shows that the transport system is an integrated complex chain, and the most unstable and unpredictable decision-making element in it is precisely human (driver, pedestrian, passenger).

The concept of the human factor in transport psychology is not limited to ignorance or intentional violation of traffic rules. It covers the following fundamental aspects:

Psychophysiological limitations: The capabilities of the human visual system at night, information processing speed, and increased reaction time during fatigue.

Cognitive distractions: Distribution of attention during driving to other stimuli (mobile phones, conversations with passengers, roadside advertising banners).

Social behavior: The driver's stress tolerance, tendency toward aggressive driving, and incorrect assessment of risk levels.

This article examines the human factor not only through the prism of subjective guilt but also as a systemic issue. In modern conditions, a driver's behavior is influenced not only by their internal state but also by the intellectual transport environment and social pressure.

The main objective of the study is to identify triggers causing human errors on roads, scientifically substantiate their origin mechanisms, and develop comprehensive preventive measures aimed at minimizing risks arising from the human factor. This, in turn, will allow for the adaptation of the international "Vision Zero" concept to the national transport system, aimed at reducing road mortality to zero.

Methodology. In this study, a comprehensive methodological approach was used to determine the role of the human factor in road traffic accidents. The following methods were used during the research process:

- **Statistical analysis and comparison:** Official statistical data on accidents that have occurred at the national and international levels in recent years have been collected and analyzed. The causes of the incidents (speed, intoxication, fatigue, telephone addiction) were divided into groups.
- **Systematic and logical analysis:** The influence of drivers' age, experience, and psychophysiological state on road behavior was studied through logical modeling.
- **Anonymous survey (Sociological method):** Anonymous surveys were conducted among more than 500 drivers of various ages and stages to identify stressful situations on the road, fatigue, and trends in intentional violations of rules.
- **Literature review:** Scientific works, textbooks, and reports from international organizations by domestic and foreign scholars dedicated to transport psychology, road safety, and human factor issues have been studied and synthesized.

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Results. Research and analysis of statistical data have shown that approximately 88% of all road traffic accidents are caused by driver errors and violations. The table below shows the main human factors and their proportions that contribute to accidents:

No.	Human factor manifestation	Share in total accidents (%)	Main consequences
1.	Increase speed limit	35%	Severe injuries and deaths
2.	Fatigue and sleepiness	22%	Head in the opposite direction
3.	Distractions (Mobile phones)	18%	Lack of distance, delayed reaction
4.	Driving under the influence	12%	Total loss of control
5.	Inexperience and incorrect maneuvers	13%	Intersection collisions

Analyses have shown that speeding remains the primary killer. When speed increases, a person's field of vision (tunnel view) narrows, and decision-making time in emergency situations is drastically reduced.

The use of mobile devices has become one of the fastest-growing risks in the last decade. It was found that texting while driving or following social media delays a driver's reaction up to 4-5 times.

Discussion. Research results confirm that man is not merely a biological being, but a complex socio-psychological system. Many external and internal factors influence human behavior in traffic conditions.

Psychophysiological state and fatigue: Operating a vehicle for extended periods leads to body fatigue and a decrease in attention concentration. Moving, especially at night or on monotonous roads, increases the likelihood of falling asleep. Monotony brings the human brain into a state of inhibition, which extends the braking response from 0.6 seconds to 2 seconds when a dangerous situation occurs. A car traveling at a speed of 90 km/h covers an additional ten meters during this time, which often ends in a catastrophe.

Age and gender factors Research has shown that young drivers aged 18 to 25 are prone to risk, overestimate their capabilities, and drive aggressively. Drivers of this age are unable to correctly assess risks due to a lack of life experience and road thinking. Conversely, although older drivers have more experience, the speed of vision, hearing, and physical reaction naturally decreases with age.

The impact of infrastructure on human error The "human factor" does not mean that it is only the driver's fault. Incorrect installation of road signs, poor lighting systems, or poor road surfaces overload the human brain and cause it to get lost. Therefore, modern safety concepts (e.g., Sweden's Vision Zero program) require road design to be sufficiently safe to "forgive" human error.

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Conclusion. Reducing the human factor in the occurrence of road traffic accidents is not a problem that can be solved only by strengthening punitive measures. A comprehensive approach to this problem is necessary. Based on the conducted research, the following conclusions were reached:

- **Reforming the education system:** In driver training schools, it is necessary not only to memorize rules but also to develop transport psychology, hazard perception, and driving skills in extreme conditions.
- **Technological solutions:** The mandatory introduction of sensors and automatic braking systems in vehicles that detect driver fatigue levels will significantly insure against human error.
- **Infrastructure adaptation:** When designing roads, the human factor must be taken into account, and alternative engineering solutions must be implemented that prevent pedestrians and cyclists from colliding with drivers.
- **Social promotion:** It is necessary to improve traffic culture in society and create an atmosphere of intolerance toward violations.

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