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# INTERNATIONAL CONCEPTS OF TRANSPORT SAFETY AND FOREIGN EXPERIENCE

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***Abstract:*** *Transport safety has become a fundamental component of sustainable mobility, public health, and socio-economic development. The continuous growth of motorization, urbanization, freight transportation, and mobility demand creates new challenges for road safety systems and requires the implementation of evidence-based international approaches. This article examines the major international concepts of transport safety and analyzes selected foreign practices aimed at reducing road traffic deaths and serious injuries. Particular attention is given to the Safe System approach, the Vision Zero concept, the Decade of Action for Road Safety 2021–2030, risk-based road infrastructure management, vehicle safety technologies, speed management, and protection of vulnerable road users. The analysis demonstrates that modern international practice is gradually moving from an accident-prevention model focused primarily on individual road-user responsibility toward a systemic approach in which responsibility for safety is shared among road users, infrastructure designers, vehicle manufacturers, transport authorities, law-enforcement institutions, and emergency services. International experience indicates that effective transport safety policies require coordinated measures covering safe roads, safe speeds, safe vehicles, safe road users, and effective post-crash response. The study concludes that the adaptation of international principles to national conditions can provide an important methodological basis for improving transport safety management.*

***Keywords:*** *transport safety, road safety, Safe System, Vision Zero, road traffic accidents, international experience, sustainable mobility, speed management, vehicle safety, vulnerable road users.*

**Introduction.** Transport systems play a central role in economic development, social interaction, employment, and access to essential services. At the same time, the expansion of road transport generates significant safety risks. Road traffic crashes remain a major global public-health and mobility problem. According to the World Health Organization (WHO), approximately 1.19 million people die annually as a result of road traffic crashes, while road traffic injuries remain one of the leading causes of death among children and young people aged 5–29 years. More than half of road traffic fatalities occur among pedestrians, cyclists, and motorcyclists.

The international community has therefore increasingly recognized that road traffic injuries should not be regarded as an unavoidable consequence of mobility. Instead, they should be treated as a preventable social and systemic problem. The United Nations Decade of Action for Road Safety 2021–2030 established a global objective of reducing road traffic deaths and injuries by at least 50% by 2030. The Global Plan for the Decade of Action emphasizes a holistic approach in which safety should be integrated into road-system planning, design, operation, and management.

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The purpose of this article is to examine the principal international concepts of transport safety and analyze foreign practices that may provide useful methodological lessons for the development of national road safety systems.

**Materials and Methods.** The study is based on a qualitative analysis of international road safety policies, scientific and analytical publications, and institutional reports issued by international organizations. Particular attention was given to materials developed by the World Health Organization, the International Transport Forum of the OECD, and other international institutions involved in road safety.

The research applies the following methods:

- comparative analysis of international road safety concepts;
- systematic classification of transport safety measures;
- analysis of institutional and organizational approaches;
- comparative assessment of preventive strategies;
- synthesis of international experience for potential adaptation to national conditions.

The analysis focuses on five interconnected components of transport safety:

- safe road users;
- safe speeds;
- safe vehicles;
- safe roads and infrastructure;
- effective post-crash response.

This structure corresponds closely to the modern systemic understanding of road safety promoted through the Safe System approach.

**Evolution of International Transport Safety Concepts.** *From Accident Prevention to Systemic Safety.* Historically, road safety policies in many countries focused primarily on correcting individual road-user behavior. Under this model, traffic accidents were frequently interpreted as the result of driver error, non-compliance with traffic rules, or insufficient individual responsibility.

Although human behavior remains an important factor, international road safety policy has increasingly recognized that road users operate within a broader transport system. Road design, vehicle characteristics, speed limits, traffic management, legislation, enforcement, and emergency medical services can either increase or reduce the consequences of human error.

This conceptual change has resulted in a transition toward the Safe System approach. The International Transport Forum describes Safe System thinking as a paradigm shift based on the principle that road crashes are predictable and preventable and that transport systems should be designed so that human mistakes do not result in death or serious injury.

The main characteristics of this approach include:

- recognition of human fallibility;
- recognition of human physical vulnerability;
- shared responsibility for road safety;
- proactive identification of risks;
- design of infrastructure and vehicles that reduce the consequences of human error;
- systematic management of speed;
- continuous improvement based on evidence and data.

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Thus, the Safe System approach changes the central question from "Who caused the crash?" to "How can the transport system prevent a human error from becoming a fatal or serious injury event?"

*Vision Zero as an International Road Safety Concept.* One of the most influential international concepts is Vision Zero, originally developed in Sweden. The central principle is that no loss of human life or serious injury resulting from the transport system should be accepted as an inevitable price of mobility.

Vision Zero is closely related to Safe System thinking. Instead of establishing a target based solely on reducing the number of crashes, the emphasis is placed on preventing fatal and serious injuries.

The concept is based on several principles:

- human life has priority over mobility efficiency;
- humans make mistakes;
- the transport system should accommodate human limitations;
- speed should be compatible with the safety level of roads and vehicles;
- responsibility should be shared among all participants in the transport system.

The practical implication is that a road network should be designed according to the consequences that can reasonably be expected when a mistake occurs.

**The UN Decade of Action for Road Safety 2021–2030.** The United Nations Decade of Action for Road Safety 2021–2030 provides a global policy framework for reducing road traffic deaths and injuries. WHO and the UN regional commissions developed the Global Plan as a guiding document for governments and other stakeholders.

The Global Plan promotes a holistic approach to road safety and places particular emphasis on:

- multimodal transport planning;
- safe road infrastructure;
- vehicle safety;
- speed management;
- safe road-user behavior;
- effective post-crash care;
- evidence-based road safety management.

The global target is to reduce road traffic deaths and injuries by at least 50% by 2030.

This framework is significant because it treats road safety as a cross-sectoral policy issue rather than the exclusive responsibility of traffic police or transport agencies.

**International Experience in Road Safety Management.**

*Sweden: Vision Zero.*

Sweden is internationally associated with the development and implementation of Vision Zero. The Swedish model emphasizes the design of roads and transport infrastructure in accordance with human physiological limitations.

Important measures include:

- separation of opposing traffic flows;
- safer road intersections;
- speed management;

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- extensive use of median barriers;
- pedestrian and cycling infrastructure;
- systematic analysis of fatal and serious injury crashes.

The underlying principle is that eliminating all human errors is unrealistic; therefore, the transport system should be designed to minimize the consequences of such errors.

*The Netherlands: Sustainable Safety.*

The Netherlands has developed a road safety approach often referred to as Sustainable Safety. The approach emphasizes road-function classification, predictable road environments, appropriate speeds, and separation of incompatible traffic flows.

An important principle is that road users should be able to understand the function and expected behavior associated with a particular road environment. Infrastructure should therefore be designed to minimize ambiguity and conflicts.

The Dutch experience demonstrates the importance of integrating road safety into spatial planning and transport infrastructure rather than treating safety as an isolated enforcement issue.

*United Kingdom: Risk-Based Road Safety Management.*

The United Kingdom has developed extensive systems for identifying high-risk locations and implementing targeted road safety interventions. Road safety management combines engineering measures, enforcement, education, vehicle standards, and data analysis.

The use of collision data enables authorities to identify locations where particular types of crashes occur repeatedly. This allows limited resources to be directed toward specific risk factors and locations.

*Australia: Safe System Implementation.*

Australia has incorporated Safe System principles into national and state-level road safety strategies. The approach emphasizes safe roads, safe speeds, safe vehicles, and safe road users.

Australian experience demonstrates the importance of establishing measurable targets and performance indicators. Road safety strategies can therefore be evaluated not only according to the number of accidents but also through indicators such as fatality rates, speed compliance, infrastructure safety, and protection of vulnerable road users.

*Speed Management as a Key International Practice.*

Speed management is one of the most important components of international road safety policy. Vehicle speed affects both the probability of a collision and the severity of its consequences.

International Safe System practice therefore seeks to ensure that speed limits correspond to the function and design of the road, the level of interaction between road users, and the vulnerability of pedestrians and cyclists.

Effective speed management may include:

- appropriate statutory speed limits;
- automated speed enforcement;
- traffic-calming infrastructure;
- speed-sensitive road design;
- public information campaigns;
- monitoring of average and excessive speeds.

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The objective is not simply to impose lower speed limits but to create a road environment in which the desired speed is naturally supported by infrastructure.

*Vehicle Safety and Technological Development.*

Vehicle technology has become an increasingly important component of international road safety policy. Modern vehicles may incorporate active and passive safety systems designed to prevent collisions or reduce injury severity.

Examples include:

- electronic stability control;
- anti-lock braking systems;
- autonomous emergency braking;
- lane-departure warning systems;
- intelligent speed assistance;
- advanced occupant protection systems;
- pedestrian and cyclist detection systems.

The development of vehicle safety standards is particularly important because improvements in vehicle design can provide protection independently of individual driver behavior.

International experience demonstrates that vehicle safety regulation should be supported by technical inspection systems and appropriate standards for both new and used vehicles.

*Protection of Vulnerable Road Users.*

Pedestrians, cyclists, and motorcyclists represent a particularly important group within international road safety policy. According to WHO, more than half of global road traffic deaths occur among pedestrians, cyclists, and motorcyclists.

Consequently, modern transport planning increasingly emphasizes:

- protected pedestrian crossings;
- safe sidewalks;
- separated cycling infrastructure;
- appropriate street lighting;
- traffic-calming measures;
- safe school zones;
- motorcycle safety measures;
- reduced vehicle speeds in areas with high pedestrian activity.

The protection of vulnerable road users is also closely connected with sustainable urban mobility because walking, cycling, and public transport are increasingly recognized as important components of healthy and sustainable transport systems. The WHO Global Plan explicitly promotes policies supporting safe walking, cycling, and public transport.

*Data-Driven Road Safety Management.*

A modern road safety system cannot operate effectively without reliable data. International practice increasingly uses integrated databases combining information from:

- police reports;
- hospitals and emergency services;

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- road authorities;
- vehicle registration systems;
- driver licensing databases;
- traffic monitoring systems;
- intelligent transport systems.

Data analysis makes it possible to identify high-risk locations, road-user groups, time periods, vehicle types, and behavioral patterns.

An important development is the transition from reactive analysis to proactive risk assessment. Instead of waiting for serious crashes to occur, authorities can identify hazardous road characteristics and dangerous traffic behavior before they produce severe consequences.

*Institutional Coordination.*

International experience demonstrates that road safety cannot be effectively managed by one institution alone. A successful system requires cooperation among:

- transport authorities;
- road infrastructure agencies;
- police and enforcement institutions;
- healthcare organizations;
- municipalities;
- vehicle manufacturers;
- educational institutions;
- emergency services;
- research organizations;
- civil society.

This institutional model is consistent with the Safe System principle of shared responsibility.

The role of government is to establish appropriate legislation, standards, funding mechanisms, monitoring systems, and institutional coordination. At the same time, private-sector and community stakeholders should contribute to the implementation of safety measures.

*Adaptation of International Experience to Developing Transport Systems.*

International practices cannot simply be copied without considering national conditions. Differences in road infrastructure, vehicle fleets, traffic composition, urbanization, legislation, institutional capacity, and economic resources must be taken into account.

For countries experiencing rapid motorization and urban development, several elements of international practice are particularly relevant:

- development of a national Safe System strategy;
- establishment of measurable road safety targets;
- creation of integrated road accident databases;
- systematic identification of high-risk road sections;
- implementation of evidence-based speed management;
- improvement of pedestrian and cycling infrastructure;
- strengthening of vehicle technical inspection;

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– introduction of modern vehicle safety standards;
– development of intelligent transport systems;
– improvement of emergency medical response;
– systematic road safety education;
– strengthening of inter-agency coordination.

The WHO country profile for Uzbekistan is specifically designed to provide baseline information for monitoring progress under the 2021–2030 Decade of Action and contains country-level road safety indicators.

**Discussion.**

The analysis of international approaches shows that modern transport safety policy is increasingly based on prevention rather than reaction. The most significant conceptual change is the recognition that human error is unavoidable and that the transport system must therefore be designed to tolerate such errors.

The Safe System approach provides an integrated framework in which road infrastructure, vehicle technology, speed management, enforcement, education, and emergency response are considered interconnected components.

The experience of countries such as Sweden, the Netherlands, the United Kingdom, and Australia demonstrates that successful road safety policy requires long-term institutional commitment. Individual interventions may produce local improvements, but sustainable results depend on coordinated implementation at the national, regional, and local levels.

The international evidence also suggests that road safety indicators should not be limited to accident numbers. Fatalities, serious injuries, speed compliance, infrastructure risk, vehicle safety, and the safety of vulnerable road users should all be monitored.

Therefore, the adaptation of international experience should be based on a risk-oriented and evidence-based approach, rather than direct institutional copying.

**Conclusions.**

International experience demonstrates a clear transition from traditional accident-prevention policies toward integrated, systemic transport safety management. The Safe System and Vision Zero concepts represent important stages in this development.

The principal elements of an effective modern transport safety system include:

- recognition of human limitations;
- safe road infrastructure;
- appropriate speed management;
- safe vehicles;
- protection of vulnerable road users;
- effective enforcement;
- reliable road safety data;
- rapid post-crash medical response;
- institutional coordination;
- continuous evaluation of safety measures.

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The international target of reducing road traffic deaths and injuries by at least 50% by 2030 provides a common strategic framework for national road safety policies.

For countries undergoing rapid growth in motorization, the adaptation of Safe System principles can provide a methodological basis for strengthening transport safety. However, successful implementation requires consideration of national infrastructure, legal, institutional, technological, and socio-economic conditions.

Ultimately, transport safety should be understood not as the responsibility of a single agency or individual road user, but as a shared responsibility of the entire transport system.

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