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Prevention of criminal offences in passenger road transport in EU countries

Профілактика кримінальних правопорушень на автомобільному пасажирському транспорті в країнах ЄС

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Abstract

Effective prevention of criminal offences in passenger road transport includes the development and implementation of safer infrastructure and modern modification of the safety features of vehicles. It is important to adopt and enforce legal initiatives to reduce the main risks that entail serious traffic accidents. One of the main priorities of appropriate prevention is to improve legal education of the public.

The aim of the article was to consider the current state of prevention of criminal offences in passenger road transport on the territory of Europe. Observation and comparative law were the main methodological tools.

The conducted research showed that the EU states apply a variety of approaches to the prevention of criminal offences in automobile passenger transport, such as Vision Zero and the systemic approach Safe System with its Sustainable Safety sub-topic. The need to adopt the experience of Sweden and the Netherlands, which have achieved impressive road safety

Анотація

Ефективні заходи профілактики кримінальних правопорушень на автомобільному пасажирському транспорті включають розробку та впровадження безпечнішої інфраструктури та сучасної модифікації характеристик безпеки транспортних засобів. Важливим є прийняття та забезпечення дотримання правових ініціатив відносно зменшення основних ризиків, що призводять до важких дорожньо-транспортних пригод. Одним із головних пріоритетів відповідної профілактики є підвищення правової освіти громадськості.

Метою статті було розглянути сучасний стан профілактики кримінальних правопорушень на автомобільному пасажирському транспорті на території Європи. Провідним методологічним інструментарієм виступили методи спостереження та правової компаративістики.

Проведене дослідження показало, що держави ЄС застосовують різноманітність підходів до профілактики кримінальних правопорушень на автомобільному пасажирському транспорті,

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indicators, in Ukraine seems justified. The eCall traffic accident detection and prevention system and the ESRA innovative prevention method can be examples for implementation in Ukraine. Belgium's school education program Road Safety Weeks is aimed at minimizing teenage drunk driving, speeding, driver fatigue and distraction. The idea of the programme can be implemented into the relevant preventive activities in Ukraine. A promising vector of further scientific research will be a comparative analysis of the implementation of crime prevention on passenger road transport in the EU countries.

Keywords: zero vision, sustainable safety, intelligent acceleration, traffic calming, passive safety.

таких як нульове бачення «Vision Zero» та системний підхід «Safe System» з його підтемою сталої безпеки «Sustainable Safety». Обґрунтованим видається необхідність запровадження в Україні досвіду Швеції та Нідерландів, у яких досягнуто вражаючих показників безпеки дорожнього руху. Система виявлення та попередження дорожньо-транспортних пригод «eCall» та інноваційний метод відповідної профілактики «ESRA» можуть бути прикладами для імплементації в Україні. Шкільна освітня програма Бельгії «Тижні дорожнього руху» спрямована на мінімізацію водіння підлітками в стані алкогольного сп'яніння, з перевищенням швидкості, в стані втоми та за наявності відволікаючих факторів. Перспективним вектором наступних наукових досліджень стане компаративний аналіз реалізації заходів з профілактики кримінальних правопорушень на автомобільному пасажирському транспорті в країнах ЄС.

Ключові слова: нульове бачення, стала безпека, інтелектуальне прискорення, заспокоєння руху, пасивна безпека.

Introduction

There are many factors affecting traffic accidents. But they can be represented as a multifaceted system of joint actions regarding the surface of the road surface, the characteristics of the car, the influence of the environment and the behaviour of the driver (Faílde-Garrido et al., 2021). A population growth and increased motorization, the development of new technologies such as self-driving, changes in traffic culture and updates to related policies are being observed on a global scale. All this poses new challenges in the field of road traffic safety.

The gradual increase in the number of vehicles affects the traffic intensity, which results in more accidents almost all over the world. Passenger road transport requires special attention because it contains a large number of structural risk factors. Vehicle size, weight, speed, momentum, and a petrol/gas tank that can explode on impact make road vehicles dangerous for transporting passengers. The condition of roads, marking, visibility, maintenance of road vehicle are important structural components of road safety. Passenger road vehicle drivers are key players in ensuring the safety of their passengers (Shariff et al., 2022). In some countries, road users have become more prone to aggressive driving behaviours under the influence of the self-isolation caused by the global spread of COVID-19. Collisions are becoming more deadly as drivers engage in risky driving behaviours (European Transport Safety Council, 2020).

Drinking alcohol and taking drugs before driving impairs the driver's functional capabilities, including reaction time, the ability to analyse the environment, correct speed control, vision, attention, and vigilance. This increases the risk of an accident (Goldenbeld et al., 2020). Young drivers are inexperienced in both driving and drinking, and the potential harm multiplies when these two factors combine (Riaz et al., 2019).

Classic strategies for reducing the number of traffic accidents and serious injuries focus on enforcement, education, and technology (Green et al., 2022). The transport structure in different countries has undergone a number of transformations over the last decade. As a result, a mobility ecosystem was launched that favours a model more focused on "access" to transportation rather than ownership (Lukasiewicz et al., 2022). In becomes necessary to adapt to changes that develop as a global whole (Morimoto, Wang & Kitano, 2022). The opinion and recognition that fatalities and serious injuries are major attributes of the transportation network are prevailing in this sense (Mohan, 2019). They must be avoided by incorporating

elements of modern and innovative approaches to injury prevention.

Ensuring road safety must constantly evolve. Road users, vehicles, road infrastructure, culture and society are considered as an integrated system in this process (Shi et al., 2021). Improving traffic safety in passenger road transport necessitates the development of preventive measures to maximize the reduction of the number of criminal offences (Kalinina, 2021).

Relevant approaches to ensuring road traffic safety in passenger road transport have been developed in the European Union, and are being successfully implemented in the Member States. The main goal is to reduce the number of deaths and serious injuries in traffic accidents. Prevention approaches in this area fall into various categories that include legislation, enforcement, public awareness/education, driver education, and speed control measures.

In view of the foregoing, the aim of the article is to consider the current state of prevention of criminal offences in passenger road transport in the EU countries. The aim involved the following research objectives:

1) summarize the main innovative legislative initiatives and approaches in the field of road safety on the example of the European Union and Ukraine;
2) identify the current state of application of innovative approaches to the warning of penal offences in passenger road transport on the example of a number of EU states in the context of the possible implementation of relevant arrangements for preventive activities in Ukraine.

Literature review

The choice of the research topic correlates with the modern vectors of the scientific search for representatives of the doctrine in different states. The work of Safarpour et al. (2020) was the main tool and background for the article. The research focused on comparing effective approaches to road safety and identifying the potential for effective use of approaches in relatively similar countries. The authors provide a detailed assessment of the advantages, disadvantages, and justify the use of particular approaches. They emphasized that the choice and implementation of approaches to the prevention of road accidents vary depending on the principles, priorities and infrastructure of each country.

The work of Kalinina (2021) had an impact on the author's position on the topic under research. The author conducted a comprehensive analysis of criminological legislation in the field of road traffic safety. A systemic analysis of the functional purpose of conceptual, programmatic, regulatory and preventive norms of criminological legislation in the field of ensuring road traffic safety was conducted. In turn, Faílde-Garrido et al. (2021) studied the influence of personality traits and anger when driving to explain the risky driving style of persons convicted of traffic safety violations. They also summarized directions for identifying and punishing offenders for traffic safety violations.

The studies of Goldenbeld et al. (2020) on establishing international differences and determinants of driving under the influence were taken into account in the research. The findings of Riaz et al. (2019) regarding the importance of a road safety education programme, which are based on drunk driving and traffic risks for high school students deserve special attention. The articles by Zainafree et al. (2022) on the need to introduce innovative road safety educational programmes for teenagers using social networks are of particular importance.

The need to implement long-term road safety strategies on the positive example of the implementation of the Sustainable Safety and Vision Zero approaches in the Netherlands and Sweden was emphasized in the works of Shi et al. (2021), Kristianssen et al. (2018) used in the article. The author's position also took into account the study of Morimoto et al. (2022), who emphasized the need to create a conceptual framework for road safety consisting of a common vision, road safety indicators, safety system and road safety culture through an international comparison of road safety goals and strategies.

Faus et al. (2021) reflected the need to use communication campaigns in the road traffic sector and ensure its safety in order to increase public awareness of the importance of preventing risky factors in the road user behaviours. The authors outlined such relevant vectors as innovativeness, objectivity, subjectivity, purposefulness, demand, implementation in practice, efficiency, and identified the problem of a lack of academic studies on the formal evaluation of communication campaigns in the field of road traffic and road safety.

An active study of the issues selected for this research confirms that special attention should be

paid to improving the prevention of criminal offences in passenger road transport. Therefore, it is urgent to carry out studies according to new criteria of academic research.

Methods

The research results were based on the complex scientific and practical methods. They were adopted during all stages of the research. Figure 1 illustrates the scientific research procedure detailed in the article.

The methodical basis of the investigation was the complex of objectively determined methods, doctrines and procedures. The variability of the methodological apparatus was justified by the purpose and objectives of the research. The combination of general scientific and special methods made achieved the results of scientific investigation.

The observation was the main practical method that enabled to fulfill of the outlined research objectives with due regard to the basic concepts of legal comparativism. This method revealed the essence and content of the main European security approaches — Vision Zero and eCall. This method helped to identify the effective vectors for the development of the educational activities of Belgium in the field of prevention of criminal offenses in passenger road transport. The method of comparative law revealed the differences and similar features of the legal background for reforming sustainable road safety approaches in Sweden, the Netherlands, Belgium, Ukraine, and the EU. This method made it possible to single out perspective vectors for Ukrainian legislation under investigation. The basic results of this method approbation will be the fundamental background for the reformation and transformation processes of the Ukrainian legal procedures over the long time horizon. Such methodological apparatus acknowledged the priority of the European legislation adaptation.

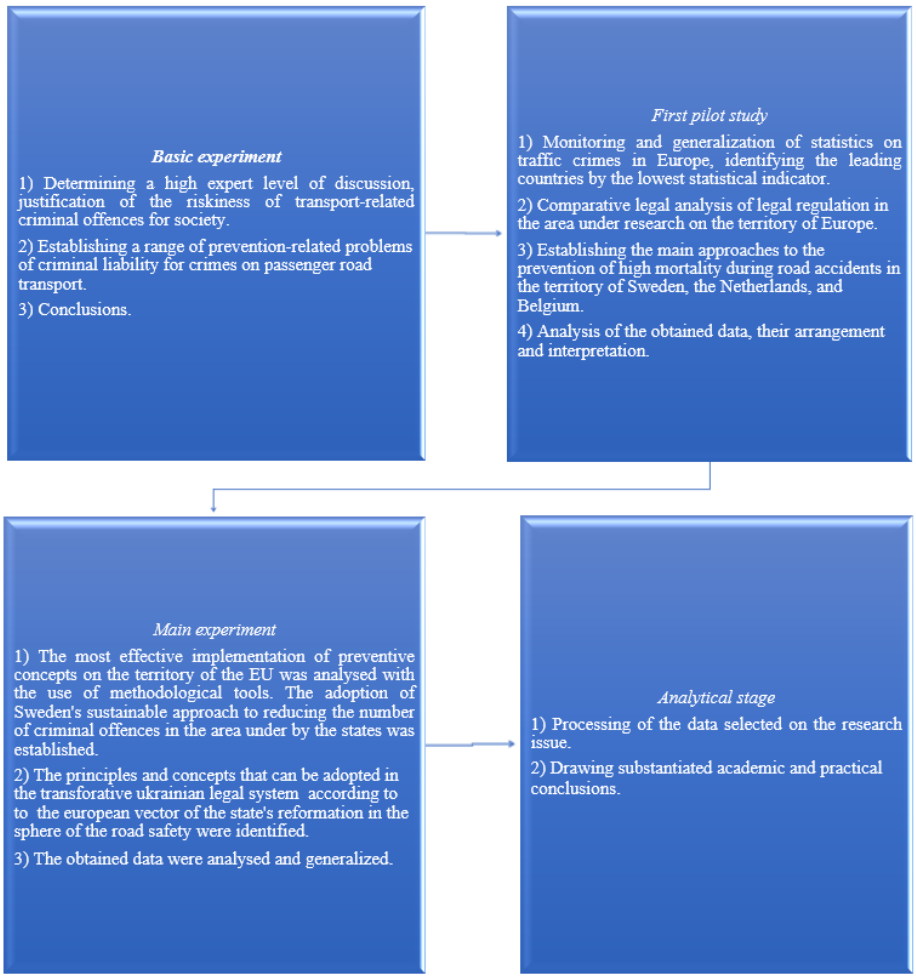

Figure 1. *Abstract research procedure (developed by authors)*

During the research process, the historical-legal method was successfully used at each stage. Thanks to him, the gradual changes' implementation in the sphere of road safety regulation was revealed, and the legal aspect of the transformations was detailed. Thanks to the chronological method, the architecture of scientific research was formed. The empirical analysis contributed greatly to the process of comparative analysis of the approaches transformations in the global tendencies of the crime prevention based on saving lives in Europe.

Together with the above-mentioned methods, classification and typology methods were used - to generalize the results of reforms aimed at the prevention of crimes on road transport in the context of social transformations and global changes of realities.

The logical method was used as a multifunctional basic argumentation of the author's concluding observations in the sphere of the specified problem.

The works of leading Ukrainian and European scientists were used in the research. There were 51 sources reviewed, among which special attention was paid to the studies on the subject of this investigation. The legal background of the problem, detected in the article, produced the great impact on the author's results. The complex representation of the main purpose of the research was formed under the authentic, scientific and statistical data. The whole variety of methods and techniques used during the research helped to propose scientifically grounded innovations in the sphere of legislation reformation.

Results

The main types of risky driving of a passenger road vehicle include driving clearly exceeding the speed limit, performing dangerous overtaking, driving too close to the vehicle in front, using a mobile or other electronic device to talk or text, driving under the influence, avoiding safety equipment such as seat belts and helmets. According to WHO (2022), about 1.3 million people die in road traffic accidents every year. Road traffic injuries are the main cause of death of children and young people aged 5 to 29 years. Traffic accidents cost most countries 3% of their gross domestic product. This situation in the world made the UN General Assembly set itself the goal of halving the global number of deaths and injuries caused by road accidents by 2030. The 3rd Global Ministerial Conference on Road Safety held in Sweden in February 2020 had the same goals, which culminated in the Stockholm Declaration (WHO, 2020). The above-mentioned documents offer new prospects for solving the problem of road safety and its transition to a new level in accordance with all the UN sustainable development goals.

The prevention system aimed at reducing the number of criminal offences committed in passenger road transport includes legal (criminal prosecution), technical, organizational (observance of current legislation), educational and psychological measures. Many countries and international organizations have published road safety strategies and policies to address the relevant issues. These strategies or policies have similar goals but different focus. The traditional approach to road safety emphasizes that human factor is considered the main cause of road accidents. The road user bears almost full legal responsibility for safety. Much attention is paid to the prevention of road accidents. Countermeasures are mainly aimed at adapting the road user to the system. This approach is characterized by improving human behaviour in relation to speeding, drinking, using seat belts and helmets through legislation and enforcement. Planning and design to create a safer infrastructure is also being tested. Safer vehicles are upgraded in order to provide better crashworthiness with an emphasis on proactive vehicle safety and vehicle inspections. In this context, the Vision Zero concept, which was first implemented in Sweden in 1997, is worth noting. People are considered as the highest value in Vision Zero, and the system must be designed in such a way that accidents do not result in death or serious injury. Figure 2 provides a number of key principles.

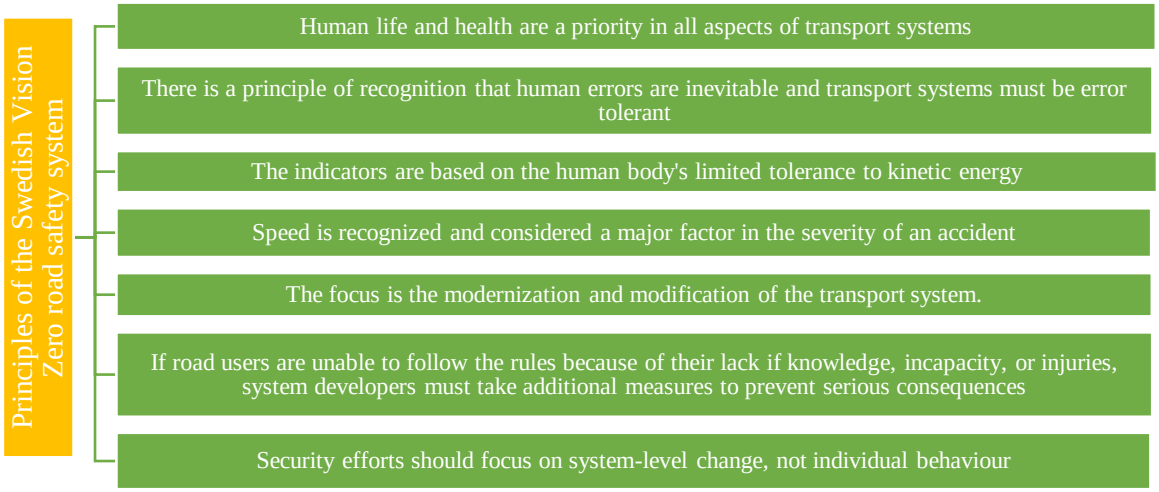

Figure 2. *Guiding principles of the Vision Zero concept in Sweden (summarized based on research results)*

The Dutch approach to sustainable safety aims to reduce accidents. Where this is not possible, efforts are made to minimize the consequences of the relevant incidents. The goal of Sustainable Safety is to prevent such errors as much as possible or reduce their consequences through human limitations in the road traffic system design. This strategy is based on five principles that are necessary for a sustainable transport system (Figure 3).

In view of the importance of the implementation of such concepts, the Safe System - an Australian road safety strategy - is worth analysing. It was based on the Vision Zero and Sustainable Safety principles, but is implemented with due regard to local specifics. The Safe System consists of a number of elements working together to create a safe operating system: roads, vehicles, people, speed and accident assistance. Licensing, training, traffic regulations, enforcement and sanctions are all part of the Safe System. In 2008, the Organization for Economic Co-operation and Development (OECD) described the Safe System as a best road safety practice (OECD, 2008).

Since 2000, the number of road deaths has halved in the European Union thanks to a combination of measures implemented at national, regional and local levels. However, more than 25,000 people still die and more than 135,000 get seriously injured on EU roads each year (European Commission, 2020). According to available 2020 data, 52% of deaths occurred in in EU countries on rural roads compared to 40% in cities and 8% on motorways (European Commission, 2022). Car drivers and passengers accounted for 43% of all road deaths out of the total number of fatalities. The Directive 2008/96/EC of the European Parliament and of the Council is the main EU document governing road safety (European Parliament, & Council of the European Union, 2008). The Directive outlines Road Safety Audits (RSA), Road Safety Impact Assessment (RIA), Network Safety Ranking (NSR), High-Risk Sites (HRS) and Road Safety Inspections (RSI).

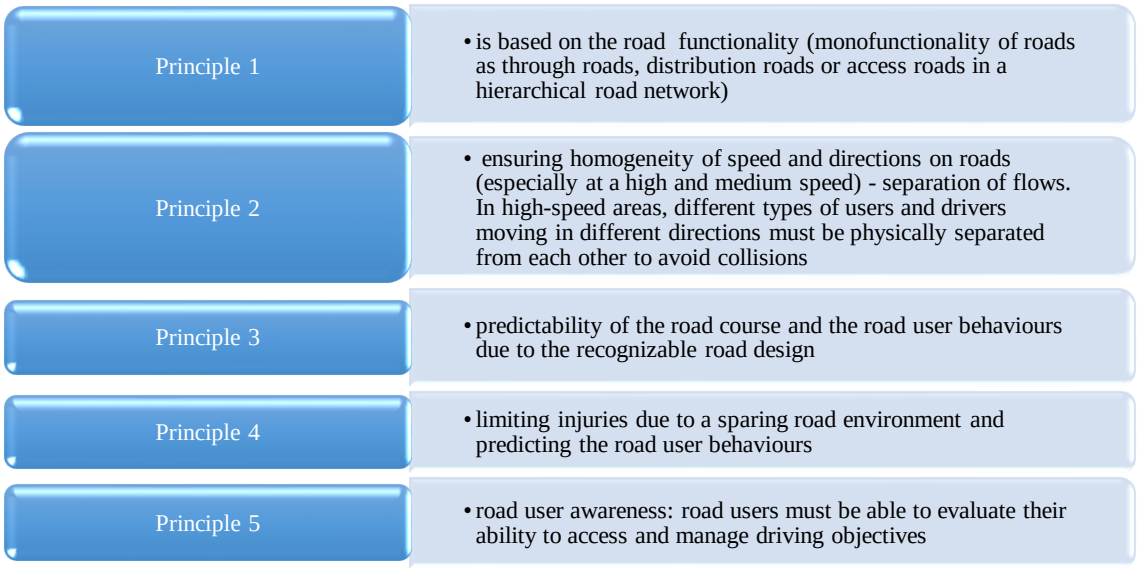

Figure 3. *Basic principles of the Sustainable Safety approach to ensuring road safety in the Netherlands (grouped by the author)*

The European Commission proposed a new approach to EU road safety policy based on the Vision Zero and Safe System strategy (European Commission, 2018), and the Medium-Term Strategic Action Plan in 2018. The set of actions is aimed at improving the functions of active and passive safety of vehicles to protect passengers, pedestrians and other vulnerable road users. Attention is paid to improving road infrastructure, vehicle testing protocols, measures to combat speeding, the use of smartphones while driving, and the creation of a fully digital and harmonized environment for the exchange of information between transport operators and the authorities.

In 2021, the European Parliament adopted a new Road Safety Strategy 2030 (European Parliament, 2021). In July 2022, the new Vehicle General Safety Regulation entered into force (European Union Press release, 2022). It introduces a number of mandatory advanced driver assistance systems to improve road safety, establishes the legal framework for the approval of automated and fully driverless vehicles. It is expected to save more than 25,000 lives and prevent at least 140,000 serious injuries by 2038. New measures that introduce safety features to assist the driver currently include intelligent acceleration, reverse traffic detection systems using a camera or sensors, driver drowsiness and attention warning systems, event data recorders, and also an emergency stop signal for all road vehicles. Additional features introduced for passenger vehicles and minibuses include as lane keeping systems and automatic braking. It is expected to implement technology to better recognize possible blind spots, warnings to prevent collisions with pedestrians or cyclists, and tire pressure monitoring systems for buses and trucks. It is also proposed to set a default maximum speed of 30 km/h in residential areas and areas with a high number of cyclists. The European Commission is working on technical regulations for automated and networked vehicles, with a particular focus on automated vehicles that replace drivers on motorways and fully autonomous vehicles such as city shuttles or robotaxis.

The accident emergency call system - eCall - was developed by the European Commission and is mandatory for installation in every vehicle designed after 2015 (European Parliament, & Council of the European Union, 2015). This system consists of a Global Positioning System (GPS) and a communication module (3G/4G/5G). When eCall identifies an accident, the system informs the emergency service - 112. The legal framework of eCall is constantly adapting to new telecommunication technologies, and the possibility of expanding the use of eCall for two-wheeled vehicles, trucks, buses and agricultural tractors is being considered.

ESRA (E-Survey of Road users' Attitudes) is an example of an innovative method of preventing traffic accidents (E-Survey of Road users' Attitudes, 2022). It is a network of road safety research organizations and institutes around the world with the aim of studying regional differences. Its projects include collecting comparative data on the state of road safety and

the cultural peculiarities of road users, such as lifestyles, attitudes, beliefs, norms and values. ESRA's goals and objectives are to provide scientific support for the development of road safety policies at the national and international levels. The objectives also include the development of a number of reliable, economical and comparable indicators of road traffic safety, time series of indicators of road traffic safety. The ESRA survey is widely used in EU countries. The results of the 2022 survey are presented in Table 1.

Table 1.
The results of the 2022 ESRA Survey on the territory of the EU

%	**Use of modes of transport for the last 12 months of 2021-2022**	**A sense of security**	**For the last 30 days**
Car driver	75.9	7.4	drove a vehicle exceeding the legal drink driving limit – 13
Car passenger	68.2	7	travelled without a seat belt in the back seat – 36.9
Public transport	54.4	7.6	-
Pedestrians	92.3	7.7	crossed the road not at a pedestrian crossing – 74.1
Motorcycles	13.1	5.6	read text messages and browsed social networks while driving – 21.9
Bicycles	42.3	6.4	cycled out of a bicycle lane – 39.0

(Source: E-Survey of Road users' Attitudes (2022))

The survey results also show the following facts: acceptability for a driver to drive a motor vehicle one hour after consuming drugs - 1.5%, the need to conduct an alcohol test for the motor vehicle driver - 22.6%, support for the mandatory equipment with seat belts on the front and rear seats in new cars - 78.8%; full or partial automation of passenger transport was supported by 33% and 40.3% of respondents, respectively. It was found that the majority of respondents provide truthful information and support policies and measures aimed at limiting dangerous behaviour on the roads.

The foregoing additionally substantiates the appropriateness of the educational awareness-raising. Traffic Weeks is a large-scale school-based road safety education programme implemented in the Flemish-speaking part of Belgium (VSV, 2022). It focuses on increasing knowledge and understanding of traffic rules and situations, enhancing and strengthening positive attitudes towards risk and safety awareness. Participants of this programme are schoolchildren aged 16–19. In Belgium, a driver's license is issued from the age of 18, and a temporary license - from the age of 17. The programme is adapted for young drivers and focuses on drink driving and road risks (speeding, fatigue and distraction). The drunk driving seminar involves presenting facts about the dangers of alcohol and drugs to the participants. Students are given several assignments related to understanding of the risks associated with drunk driving. Students learn about all the major and minor risks in a road situation and discuss precautions to avoid them during the road risk seminar.

The EU countries which have the lowest death rate in road accidents can be an example of the implementation of modern strategies for the warning of penal offences in passenger road transport. Sweden has 18 road deaths per million inhabitants in 2021 (European Commission, 2021), this is why Sweden has one of the best road safety scores in the EU. Road transport passengers account for 52% of road deaths (WHO, 2009).

The current approach to road safety in Sweden is based on the Vision Zero concept. The Swedish Transport Administration bears the main responsibility for the implementation and development of Vision Zero. Other important participants are the Swedish Transport Agency, transport organisations, the car industry, etc. In particular, the tasks of the Swedish Transport Administration (Trafikverket, 2022) include the careful design and implementation of appropriate modern infrastructure, as well as the planning, construction, operation and maintenance of public roads. The implementation of the global road safety plan led by the WHO and the UN is coordinated by one of the road safety experts of the Swedish Transport Administration. The official website of the Swedish Transport Administration offers a page that provides real-

time information about road traffic in the country. It can be used to check traffic conditions before travelling, such as road works, accidents, as well as road and weather conditions (Trafikverket, 2022). The Swedish Transport Agency works to ensure a high level of accessibility, quality, safety and environmental friendliness, including passenger road transport. For example, it was decided to solve safety problems at four-way inter-sections through traffic lights. It is generally recognized that this type of arrangements reduces accidents and injuries in general. But the still occurring accidents, including those involving passenger vehicles, will be more serious because of the high speed. On the other hand, a roundabout increases the likelihood of accidents, but reduces the risk of serious accidents due to lower speeds. Therefore, they came to the conclusion in Sweden that it is better from the Vision Zero perspective to increase the number of traffic roundabouts for urban passenger transport. Sweden initiated a number of specific actions and projects following the creation of Vision Zero: management and regulation actions, 2 speed limits, transport quality, coordination activities.

The Traffic Ordinance of Sweden requires drivers to pay enough attention to driving. The country established the following speed limits: city roads: 30-50 km/h; rural roads: 60-100 km/h; highways: 110 or 120 km/h. In 2019, Sweden recorded 85% of new cars with automatic braking at low speeds. The automatic emergency braking system for vulnerable road users was included in 74% of the vehicle configuration (OECD, 2021a). About 2,200 speed cameras were used across the country in 2020, yielding a positive effect on speed enforcement.

Drunk driving is a particular concern in Sweden (Sveriges Riksdag, 2019). As of 2020, there were 53 deaths in traffic accidents involving alcohol or drugs in the country (28% of all traffic accidents). If a driver, motorcyclist, pedestrian, or cyclist can be shown to have a blood alcohol level greater than 0.2 g/l, it may be defined as an alcohol-related accident. Drivers found to have amphetamines in their blood or saliva were responsible for 17 deaths in 2020.

In 2018, they prohibited the use of hand-held mobile phones while driving. The use of seat belts has been mandatory in Sweden since 1975 in the front seats, and since 1986 in the rear seats. Since 1988, appropriate child seats must be provided for children under 135 cm. In 2020, 97.6% of passenger road transport drivers used seat belts. 96.8% of minors and 86.2% of adult passengers adhered to similar actions in the back seats of motor vehicles.

Ensuring road safety is consistently carried out with the involvement of the management model, conditions are measured using appropriate markers (SPI). The Government of Sweden has also set a new interim target to reduce mortality by 50% between 2020 and 2030 (OECD, 2021a). The Swedish Transport Administration developed a road safety action plan for 2022-2025. It includes 111 arrangements to be implemented by 14 authorities and stakeholders. In Sweden a special e-learning course Vision Zero in the field of road safety was developed. The aim of the course is to promote the relevant principles.

The Dutch current approach to road safety is based on the Sustainable Safety concept, which was developed after thousands of people took to the streets in the cities with the slogan “Stop de Kindermoord!” (“Stop the killing of children!”) in the 1970’s. These demonstrations forced officials to take fatal traffic accidents seriously. As of 2021, the Netherlands has 28 road deaths per million inhabitants (European Commission, 2021), being one of the lowest rates in the EU. The death rate of drivers of 4-wheeled vehicles is 32% of the total number of deaths in road accidents, while the death rate of passengers of 4-wheeled vehicles – 14% (WHO, 2009). The Ministry of Infrastructure and Water Management, the Road Safety Section of the Directorate-General for Mobility of the Netherlands works closely with the provinces, urban areas and municipalities for the successful implementation of the road safety policy. These bodies are responsible for the traffic safety on the roads under their jurisdiction. Aa independent organization SWOV conducts road safety research in order to improve road safety.

In the Netherlands, speed limits vary in the following way: city roads 30/50 km/h; rural roads 60/80 km/h; highways 100/130 km/h. They build new roads in line with the latest road design concepts, recommendations and standards. The result is the classification of roads and adequate restructuring of the network. Separate bicycle lanes were created and other measures were taken in cities to avoid collisions between motorized vehicles and bicycles. The maximum permissible blood alcohol level was 0.5 g/l for all drivers of vehicles until 2006, but in 2006 a lower limit of 0.2 g/l was set for novice drivers for the first five years (Global-regulation, 1994). The Netherlands imposed legal restrictions on the use of drugs while driving on July 1, 2017. However,

the Dutch police said that the number of traffic accidents related to the use of nitrous oxide was 1,000 cases from the beginning of 2019 to June of the same year (CAM, 2019). Since April 2002, the use of a mobile phone while driving has not been allowed in the Netherlands. In 2019, more than 121,000 violators of this ban were fined (OECD, 2021b). The average seat-belt wearing rate recorded in 2020 was 97% (OECD, 2021b). The Netherlands has introduced new sanctions for drunk drivers. A breathalyzer in the form of an electronic bracelet is worn on the offender's ankle to monitor daily alcohol consumption during the entire period of the temporary prohibition on alcohol. The device is used for drunk driving offenders under the supervision of a probation officer. As of January 2020, drunk driving is punishable by 1 year in prison (Traffic Act 1994). In 2019, driving tests in the Netherlands included questions regarding the implementation of navigation systems.

In 2020, Ukraine ranked 125th in the ranking of countries by the traffic-related death rate with an indicator of 9.34 deaths per 100,000 people (WHO, 2020). In 2021, the National Police recorded more than 190,000 traffic accidents in Ukraine, of which 24,520 had casualties. There were 3,238 people who died and 29,735 who were injured (Ukravtodor, 2021). The obstacles in the management of the road safety system in Ukraine include: an increasing number of cars; imperfect road network; a multiple increase in the number of driver training most often entails a decreased quality of the qualification; insufficient awareness of road users regarding the changing traffic conditions; insufficient development of active relationships between all structural components of the traffic safety system.

Ukraine continues its course to ensure proper conditions for road traffic and pays maximum attention to road safety. The main task of state regulation and control in the field of road transport in Ukraine is to create conditions for safe, high-quality and efficient transportation of passengers and goods, provision of additional transport services (Law of Ukraine No. 2344-III, 2001). The 2024 Road Traffic Safety Strategy was approved (Decree No. 1360-2020-y, 2020) to enshrine the basic principles of the Vision Zero concept, and the 2023 State Road Traffic Safety Programme was approved (Decree No. 1287-2020-п, 2020) in Ukraine. Relevant regional and district programs are being developed. In Ukraine, the DSTU ISO 39001:2015 standard is being introduced, which is an analogue of the ISO 39001 international standard that sets out the requirements for a Road Traffic Safety Management System. The State Agency of Motor Roads of Ukraine (Ukravtodor, 2021) has taken responsibility for joining the Vision Zero strategy with the support of the Ministry of Infrastructure of Ukraine. New traffic calming measures were one of the first elements introduced by Ukravtodor by making changes to DSTU 4123:2020 Road traffic safety. Traffic calming means. General technical requirements. From 2020, safety islands, curb extensions, chokers, dividing lanes were added to roundabouts, noise lanes, raised pedestrian crossings, narrowing of traffic lanes, guide islands and speed bumps. In 2021, the road safety auditors were trained in Ukraine with the issuance of certificates (GRSF, 2021). There is a system of automatic photo and video recording of violations of traffic rules in Ukraine. There were 128 cameras operating in Ukraine in 20 cities and 10 regions as of May 2022. Relevant information is provided to the data processing centre for automatic recording of violations of the Traffic Rules of the Patrol Police Department.

It should be emphasized that the violation of the Road Traffic Rules (Decree No. 1306-2001-п, 2022) in Ukraine that caused serious injuries or death entails criminal liability (Decree No. 2341-III, 2022). A maximum speed of 50 km/h is allowed in populated areas, while a maximum of 20 km/h is allowed in residential and pedestrian areas. The speed of passenger road transport should not exceed 80 km/h outside the city. Drivers with up to 2 years of experience must drive at a maximum speed of 70 km/h. The maximum speed for buses is 90 km/h. Driving on highways involves acceleration of the vehicle to a speed of no more than 130 km/h. The maximum permissible blood alcohol content is 0.2 ppm. It is forbidden to be under the influence of drugs while driving, as well as to use hand-held communication devices, to ignore passive safety devices, to transport children up to 145 cm tall without special child seats.

Discussion

It can be stated that proper modelling combined with the principles of good practice can help to improve safety, prevention and management of road accidents in different countries. Greater international cooperation, mutual learning and information sharing are required for further significant improvements in order to overcome the stagnation in global road safety (Morimoto et al., 2022). According to the ethical philosophy and special attention to the value of human life,

the Vision Zero concept is a more comprehensive approach and a comprehensive view of security (Safarpour et al., 2020). The case of Sweden shows that Vision Zero road safety policy involves measures that imply structural changes to the physical environment where injuries occur, i.e. roads, vehicles, buildings, tools, etc. This so-called safety engineering approach enables using passive safety strategies that do not require human intervention to be effective because they compensate for human mistakes (Kristianssen et al., 2018).

There is no doubt that the Vision Zero concept is flexible in the sense that it is constantly evolving by including new road conditions and new areas of transport safety. However, very few studies dealt with the evaluation of the impact of risky driver behaviour on road accidents involving children (Cloutier et al., 2021). While the literature provides numerous risk factors for child pedestrian accidents, it is becoming apparent that many of the variables are not being addressed in current prevention interventions. This can further limit the effectiveness of the relevant programmes. The authors state that there is a need to conduct new studies to identify the relationship between driving and child traffic-related injuries, especially in view of the legalization of cannabis in some countries. Increased activity of wild animals in certain months (animal breeding, ripening and harvesting of agricultural crops) also poses a danger on the roads, which requires raising drivers' awareness. Accurate knowledge of the relevant spatial and temporal patterns becomes mandatory. This view was also supported by other academic circles. The expressed position enables researchers, hunters and road administrations to adequately apply preventive measures in order to achieve the best possible result of reducing the number of animal-related traffic accidents in the places of collisions of automobile passenger transport. According to researchers, intensive information campaigns, as well as digital guide-boards and warnings in navigation device, activated only during peak accident periods could help to improve this situation (Steiner et al., 2021).

It can be concluded that it is still important to ensure compliance with the laws that correspond to the real situation on the roads in order to maintain efficiency and improve road safety. This requires a careful coordination matrix between community groups, educational and road agencies, policy makers, road safety engineers and automotive experts (Alonso et al., 2021). Supplementing the researchers' position, the author of this article notes that the specific measures to combat traffic-related mortality and injuries should be developed on the basis of uniform statistics. The development of a unified methodology for calculating road accident cases should be one of the urgent tasks in solving the problem of significantly reducing mortality and injuries on European roads (Batyrgareeva, 2021). The use of teenager-oriented mass media can lead to constructive changes in the perception of traffic rules. Adolescent road safety programmes should be developed based on the use of social media as a means of obtaining information accompanied by group instructor-led discussions involving the police (Zainafree et al., 2022). It is undeniable that critical evaluation is very important to identify commonly used ineffective strategies and practices. The researchers conducted systemic reviews and concluded that there is a lack of literature on the formal evaluation of communication campaigns in the field of road traffic and road safety. This is why information about the effectiveness of individual campaigns is scares (Faus et al., 2021).

It was found that most preventive measures aim at changing the behaviour of road users through education, legislation and enforcement. Speed cameras, police interventions help to significantly reduce the number of traffic accidents compared to other categories of measures, such as legislation and structural improvements (Fisa et al., 2022). But very little attention is paid to the elimination of hazards in the road system (Tavakkoli et al., 2022). According to researchers, a comprehensive understanding of the traffic system requires a transition from the dominant paradigm of "correcting the road user" to a systemic approach of "correcting the system" taking into account the synergy and interaction between the system components.

Conclusions

Factors that cause traffic accidents with serious consequences in passenger road transport include speeding, driving under the influence, as well as failure to use seat belts or helmets. There is a growing tendency to lose attention because of the use of mobile devices while driving, which requires a serious approach. The share of deaths and injuries caused by vulnerable road users, especially cyclists and pedestrians, has increased.

Different countries have different approaches to road traffic safety, which can be classified as a traditional approach, system approach — Safe System and Vision Zero. The system approach

also includes the sub-topic of Sustainable Safety. The EU implements a strategy based on the Vision Zero and Safe System approaches through safety of vehicles, infrastructure and road use, as well as through provided recommendations. The choice and implementation of road safety prevention approaches in the EU depends on the principles, priorities and infrastructure of each country.

The Vision Zero approach is a long-term goal which is based on such elements as ethics, responsibility, safety philosophy and change mechanism creation. This approach takes road safety policy to a new level with a focus on the prevention of deaths and serious injuries. The key principles of Sustainable Safety are based on the road functionality, uniformity of mass or speed and direction. The principles also include the predictability of the course of the road and the road users' behaviour due to the recognizable road design, indulgence towards the environment and road users, the appropriate level of the road users' awareness.

Sweden and the Netherlands are examples of countries in the EU with the lowest death rates from road traffic crashes. These countries share a unifying vision of road safety. This has become an important strategic rethinking of the problem, which is based on the belief that prevention and improving safety is a much more effective than simply changing user behaviour or developing more perfect technologies.

Ukraine, relying on the Vision Zero approach components, is gradually joining this strategy. The EU's eCall smart accident detection and prevention system, which shall mandatorily be installed in every vehicle designed after 2015, and ESRA innovative road accident prevention method can be examples for the implementation in Ukraine. Traffic Weeks, the large-scale school educational programme on road traffic safety in Belgium, can also be considered as an option for the prevention of criminal offences on passenger road transport in Ukraine.

New research on the relationship between driving and traffic-related child injuries is relevant. Road safety programmes for teenagers should be developed based on the use of social media as a means of obtaining information. This is the basis for further research and analysis of the implementation of existing European approaches in Ukraine.

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