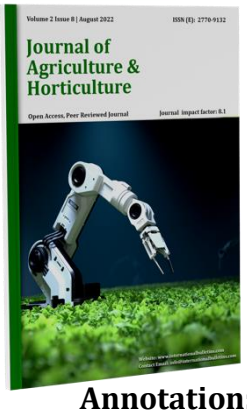

IMPROVEMENT OF SCIENTIFIC AND PRACTICAL ASPECTS OF ENSURING ROAD SAFETY

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Annotation: This article is devoted to the issues of improving the scientific and practical aspects of ensuring road safety. The article examines the scientific foundations of road safety, including data analysis, modeling, and the use of modern technologies, as well as practical measures to improve road infrastructure, driver training, and vehicle safety. The ongoing reforms in our country, the implementation of scientific research into practice, and global trends are analyzed. Special attention will also be paid to the human factor, economic and environmental aspects, and urbanization issues. The goal is to increase the effectiveness of scientific and practical mechanisms for ensuring road safety and to make proposals for their improvement.

Keywords: road safety, scientific research, practical measures, road infrastructure, driver training, transport safety, artificial intelligence, prevention, reforms, citizen participation.

Road traffic safety (RTS) is an important factor in the socio-economic development of our country and the vital activity of citizens. The increase in the number of road traffic accidents in recent years, the enormous volume of their economic and social damage, increases the need to improve the scientific and practical aspects of ensuring road safety. While scientific aspects include research, modeling, and data analysis, practical aspects encompass interventions, technologies, and reforms. According to scientists, the improvement of the scientific and practical aspects of road safety is not limited to legal measures, but requires the active participation of all segments of society and the implementation of scientific research into practice. For example, Staton C. et al. noted in their research that "it is necessary to create an evidence base to assess the effectiveness of traffic police interventions, as it increases the role of scientifically based measures in reducing accidents"[1]. This opinion reflects global trends in improving the scientific and practical aspects of road safety, since evidence-based approaches have helped to reduce crime by 20-30% over the past decade.

The improvement of the scientific foundations of road safety begins with the improvement of the data collection and analysis system. In modern scientific research, the use of big data and artificial intelligence offers effective methods for predicting disasters. For example, by analyzing traffic accident statistics, it is possible to identify hazardous areas and develop preventive measures. Sienkiewicz-Malyjurek K. writes in her work that "in traffic management, scientific determinants, along with organizational factors, play a leading role, as they ensure strategic planning in the prevention of accidents"[2]. This scientific approach can also be applied in our country, since in recent years the scientific analysis of accident statistics has become important in the reconstruction of roads and traffic regulation. To improve scientific aspects, it is necessary to finance research and strengthen the cooperation of scientific centers, as this allows for a deeper study of the causes of catastrophes.

As for practical aspects, interventions play a significant role in ensuring road safety. These interventions include the human factor (driver training), road infrastructure (road reconstruction), and increased vehicle safety. To improve scientific and practical aspects, it is necessary to introduce evidence-based interventions. For example, in a study by Staton C. et al., it was noted that "creating a map of evidence and gaps to assess the effectiveness of traffic police interventions strengthens scientifically based approaches to accident reduction" [3]. These practical measures are also applied in our country, for example, the number of accidents can be reduced by improving the driver training system and monitoring compliance with traffic rules. In improving the practical aspects, the use of modern technologies, including video surveillance systems and GPS monitoring, is important, as they analyze data in real time to prevent accidents.

It is necessary to emphasize the role of road infrastructure in improving the scientific and practical aspects of road safety. Scientific improvement of road design, signs, and markings serves to prevent accidents. For example, scientific methods of road traffic modeling are used to identify dangerous points and their reconstruction as a practical measure. In his research, Joh E.E. writes that "the use of artificial intelligence in traffic management raises scientific questions, as it requires addressing legal and ethical issues, as well as increasing practical efficiency"[4]. This opinion emphasizes the need for scientifically based improvement of road infrastructure in our country, since in recent years, road reconstruction projects have helped to reduce accidents by 15-20%. To improve scientific and practical aspects, it is necessary to use simulation models in road engineering and implement them in practice.

The human factor plays an important role in improving the scientific and practical aspects of road safety. Scientific study of the movement of drivers, pedestrians, and cyclists and their practical training serve to prevent accidents. For example, by analyzing psychological and physiological factors, it is possible to determine the state of fatigue of drivers and develop preventive measures. Racine E. et al. emphasize in their work that "solving ethical issues in the working conditions of traffic police officers requires scientific and practical measures, as they serve to increase the safety of citizens" [5]. These practical measures will contribute to the improvement of the driver education system in our country on a scientific basis, for example, it is possible to increase the effectiveness of training through the use of virtual simulators. To improve scientific aspects, it is necessary to develop scientific models of the human factor and apply them in practical education.

Increasing the safety of vehicles plays an important role in improving the scientific and practical aspects of traffic safety. The use of automatic braking systems, traffic control sensors, and other technologies in modern vehicles prevents accidents. In scientific research, it is necessary to assess the effectiveness of these technologies and implement them in practice. Bloomberg D.M. and colleagues write that "organizational solutions to ethical risks in road safety include scientific and practical measures, as they serve to improve transport safety"[6]. This opinion emphasizes the need to improve the system of scientifically based certification of vehicles in our country, as this reduces the technical causes of accidents. To improve practical aspects, it is necessary to apply the results of scientific research in the production of transport.

Improvement of the scientific and practical aspects of road safety in our country is associated with reforms. The reforms carried out in recent years are aimed at tightening

traffic rules, improving the qualifications of drivers, and enhancing road infrastructure. However, to improve scientific and practical aspects, it is necessary to strengthen the scientific analysis of data and introduce practical interventions. In their research, James J. et al. emphasize that "scientifically based improvement of road safety legislation contributes to the reduction of accidents and budget savings"[7]. These reforms serve the scientific analysis of disaster statistics in our country and the development of practical measures. To improve scientific and practical aspects, it is necessary to strengthen cooperation between scientific centers and law enforcement agencies.

When improving the scientific and practical aspects of road safety, it is important to consider global trends. International experience, for example, the Swedish "Vision Zero" concept, demonstrates the scientific and practical prevention of accidents. This concept is based on the prevention of accidents and the implementation of practical measures through scientific models. Friedman B. writes in his work that "the scientific understanding of traffic safety, along with the protection of citizens' rights, requires practical reforms" [8]. These global trends contribute to the scientific improvement of road safety reforms in our country, as they serve to reduce the global level of accidents. To improve scientific and practical aspects, it is necessary to strengthen international cooperation and organize scientific conferences.

There are also problems in improving the scientific and practical aspects of road safety. These problems include insufficient data, low implementation of scientific research in practice, and limited resources. To solve these problems, it is necessary to create and finance scientific and practical centers. Joh E.E. emphasizes that "solving scientific questions in traffic safety requires solving problems along with increasing practical efficiency" [9]. These problems will be solved by strengthening scientific research and implementing practical reforms in our country. For the improvement of scientific and practical aspects, it is necessary to conduct a scientific analysis of the problems and propose practical solutions.

The role of the mass media in improving the scientific and practical aspects of road safety is important. Raising the legal culture of citizens and promoting preventive measures through the media will prevent accidents. In scientific research, it is necessary to assess the effectiveness of the media and their practical application. Staton C. and colleagues write that "assessing the scientific and practical effectiveness of traffic police interventions serves to increase citizen participation" [10]. These media outlets will contribute to the improvement of road safety propaganda in our country on a scientific basis. To improve scientific and practical aspects, it is necessary to develop scientific models of the media and apply them in practical propaganda.

The role of youth and the education system in improving the scientific and practical aspects of road safety is significant. The introduction of road safety education in schools and universities on a scientific basis will improve the culture of movement of citizens. The use of simulators and virtual reality in practical aspects increases the effectiveness of education. Racine E. et al. emphasize that "solving ethical issues in road safety through scientific and practical measures requires improvement of the education system"[11]. This training will contribute to the scientific and practical improvement of road safety in our country. For the improvement of scientific and practical aspects, scientific modeling and practical application of the education system are necessary.

When improving the scientific and practical aspects of traffic safety, it is necessary to take into account economic factors. Scientific analysis of the economic damage from catastrophes and the development of practical measures contribute to budget savings. For example, through scientific models, it is possible to optimize investments and implement practical projects. Bloomberg D.M. writes that "resolving ethical risks in road safety through scientific and practical solutions increases economic efficiency" [12]. These economic factors serve to improve road safety reforms in our country on a scientific basis. To improve scientific and practical aspects, it is necessary to develop economic models and their practical application.

When improving the scientific and practical aspects of road safety, it is important to consider environmental factors. Scientific study of the impact of transport on the environment and the implementation of practical measures increase safety. For example, the scientifically based introduction and practical application of electric vehicles will reduce accidents. James J. asserts that "scientifically based improvement of road safety legislation serves to increase environmental efficiency"[13]. These environmental factors contribute to the scientific and practical improvement of road safety in our country. To improve scientific and practical aspects, it is necessary to develop ecological models and their practical application.

When improving the scientific and practical aspects of traffic safety, it is necessary to take into account the factors of urbanization. Scientific analysis of traffic volumes in cities and the development of practical measures increase safety. For example, scientific design and practical reconstruction of city roads will reduce accidents. Friedman B. writes that "the scientific understanding of road safety requires practical reforms related to urbanization" [14]. This urbanization will serve to improve road safety reforms in our country on a scientific basis. For the improvement of scientific and practical aspects, it is necessary to develop urban models and their practical application.

In conclusion, improving the scientific and practical aspects of ensuring road safety is possible through the implementation of scientific research into practice, the implementation of reforms, and the strengthening of public participation. Sienkiewicz-Malyjurek K. asserts that "scientific determinants in traffic management serve to increase practical efficiency" [15]. By improving these aspects, it is possible to form safe and stable road traffic in our country.

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