



УДК 332.64:631.111.3

**FORMATION OF SECURITY OF THE ROAD ECONOMY ENVIRONMENT****Boginska L.***Sumy National Agrarian University,  
40021, Sumy, Ukraine*

**Abstract.** *The article is devoted to the development of proposals for the formation of an effective organizational and economic mechanism of the road sector, which must meet the environmental safety requirements. Among them, functioning within the framework of the current regulatory framework and ensuring the ability to predict and timely prevent threats and unfavorable processes. In addition, effective functioning both in normal and in emergency situations and avoiding environmental and economic damage from environmental pollution by road enterprises. As well as defining a clear structure and functional delineation of responsibility.*

*The content of the economic category "environmental safety of the road sector" is revealed. It is proposed to perceive environmental safety as a functional component of economic security, the purpose of which in the road sector is to protect its economic interests from the presence of environmental threats and prevent environmental damage.*

*A systematic approach to environmental management has been improved through an expert assessment algorithm of environmental safety by the road sector.*

*The author's approach to conducting an effective express-study of the ecological state of road enterprises to ensure environmental safety and environmental monitoring is stated.*

**Keywords:** *environmental safety, road economy, organizational and economic mechanism.*

**INTRODUCTION**

Modern construction technogenesis significantly affects all components of the biosphere: atmosphere, hydrosphere, lithosphere and biological community. This influence has its consequences for the processes that occur in natural complexes and ecosystems and requires the adoption of urgent measures to maintain ecological balance in order to prevent the degradation of natural systems and the occurrence of ecological and economic consequences.

Each type of economic activity is accompanied by risks. But in road production, the risk is much greater due to the characteristics that are characteristic only for this type of management. The main sources of risk are the spontaneity of natural processes and phenomena, natural disasters; randomness; conflicting interests; the probabilistic nature of scientific and technological progress; incompleteness and unreliability of information about an object, phenomenon; limited and insufficient resources; the impossibility of unambiguous knowledge of the object, the insecurity of economic interests of the road sector from real and potential environmental threats.

The current situation in the real sector of the Ukrainian economy necessitates the formation of methodological foundations and the development of practical recommendations for the formation of an effective organizational and economic mechanism for regulating the activities of the road sector while observing the conditions of environmental safety. The issue of forming an economic mechanism for supporting the environmental safety of the functioning of the road economy at the regional and production levels is of particular relevance.

Sustainable development and efficient functioning of the road economy is a necessary condition for stabilization, economic recovery at all territorial levels,



compliance with national security, ensuring comfortable conditions and a high standard of living.

The purpose of the article is to develop theoretical foundations, improve scientific and methodological provisions and develop practical recommendations for the formation of an organizational and economic mechanism for ensuring the environmental safety of the road sector.

The hypothesis of the research is to assume the need to develop new approaches to environmentally - oriented management of enterprises, which will increase the environmental acceptability of their activities, as well as the effectiveness and efficiency of environmental protection measures.

## METHODS

The theoretical and methodological basis of the article is the fundamental provisions of the economics of nature management, strategic management, the theory of environmental and economic damage, as well as scientific works of scientists on social and environmental aspects of the responsibility of the road economy.

Methods of logical analysis, a systematic approach are used (when determining the essence of the concept of ecological safety of road management). To diagnose the ecological and economic condition of road enterprises, a system of information support for the processes of assessment of environmental and economic safety of road management has been developed.

## 1. RESULTS OF THE RESEARCH AND DISCUSSION

On the basis of the studies carried out, the main approaches to the interpretation of the concept of "environmental safety" are systematized and the author's definition of the definition. "Environmental safety of the road economy" is provided as "a set of actions, conditions, processes aimed at ensuring ecological balance in the area of influence of road facilities on the environment in the process of their construction and operation".

It has been proved that effective road management ensures the operation of the entire automobile and road complex, the saving of its production and material resources contributes to the intensification of production, the development of new territories, and the development of territorial production complexes.

The scientific and methodological approach to the calculation of environmental and economic damage during the performance of road works has been improved. In contrast to the officially valid provisions, it takes into account the relationship between the indicators of road fatigue and the growth of actual costs for repairs (influence factor) in comparison with the regulatory level and allows effectively determine the potential of the road enterprise:

$$Y_{ij} = \sum_{i=1}^n \sum_{j=1}^p \theta_{ij} * \eta_{ij} * I_{ms} * F_r \rightarrow \min \quad (1)$$

where:  $\theta_{ij}$  – the volume of road works of the  $i$ -type, carried out by the road enterprise;

$\eta_{ij}$  – the specific indicator of environmental and economic damage per unit of road work, differentiated by the type of work;

$I_{ms}$  – index of macro stability (takes into account inflation, the exchange rate of the national currency, as well as the natural state of the environment);



$F_r$  – road fatigue.

The ecological and economic damage during the construction and reconstruction of roads in Sumy region is 5831 UAH/year per 1 km of the road.

When implementing the greening of road works, the most effective preventive measures are recognized that allows preventing environmental pollution, provided that environmental priorities are included with the goals of the economic activity of the road sector.

The need to comply with environmental requirements, to ensure the stable development of the domestic road economy, an increase in the volume of road works led to the need to determine the assessment of the level of environmental and economic safety.

The formation of ecological culture of the functioning of road enterprises and ensuring the formation of ecological and economic safety depends on the availability of information about the possible consequences of their economic activities. The complex of information support for assessing the environmental and economic safety of road enterprises forms indicators that are calculated on the basis of internal and external sources of information.

The objective function of the organizational and economic mechanism for supporting the environmental safety of the road management is to minimize the negative impact of the activities of road enterprises on the environment without reducing the amount of profit while observing the current environmental standards in the process of road works: design, construction, maintenance (operation) and repair of roads.

We made an attempt to present our vision of solving problems of reducing the negative impact on the environment by the road sector and to propose a program project (Table 1).

Systematized information support should promote awareness of road service consumers on the quality of natural resources of ecosystems, road products and will help to increase the competitiveness of road enterprises.

The main legislative acts of Ukraine, which guide the road sector of Ukraine in their environmental activities, do not take into account many international environmental requirements that do not meet environmental requirements.

It should also be noted that there is still no environmental monitoring in the road industry, thanks to which would make it possible to form a database of the actual environmental state of roadside territories.

In order to substantiate specific solutions to improve road conditions, in addition to a full-fledged legislative framework, it is necessary to develop instructive and methodological documentation, and a number of programs to calculate the values of dimensions, environmental pollution from the functioning of the road economy.

In fig. 1, a comprehensive system for assessing the effectiveness of the strategy for achieving environmental safety by road enterprises is proposed.

It includes the main stages: selection and assessment of functioning road entities; selection and assessment of effective strategies for achieving environmental safety by road industry enterprises; monitoring of compliance with environmental safety, which provides information for making effective decisions to prevent risks.



**Table 1. Program project “Reduction of negative impact on the environment by road management”**

Main complex tasks	Expected results of implementation
1. Development and improvement of the regulatory framework for environmental protection in the road sector	Reducing the impact of the transport and road complex on the environment (development of a standard for the method of determining the noise and vibration load in the area adjacent to the road; creating a regulatory framework to protect such places from vibration and noise load.)
2. Development and improvement of the methodological base on environmental protection in the road sector	An improved scientific and methodological approach to the calculation of environmental and economic damage during road works, which in contrast to the official provisions takes into account the relationship between road fatigue and the growth of actual costs of repairs (influence factor) in comparison with the regulatory level and will allow to effectively determine the potential of the road enterprise
3. Development and creation of methods for forecasting and operational accounting of environmental safety conditions	Improving the efficiency of environmental safety measures (use of industrial waste to create reliable and durable road structures; installation of the strong, cost-effective poroelastic road surface (PERS) based on the use of worn tires; reduction of harmful emissions from road transport)
4. Preparation of programs and organization of environmental training for managers of all levels and engineering and technical workers in the road industry	Improving the efficiency of planning measures to ensure environmental safety and the level of knowledge of engineering and technical workers of the road industry

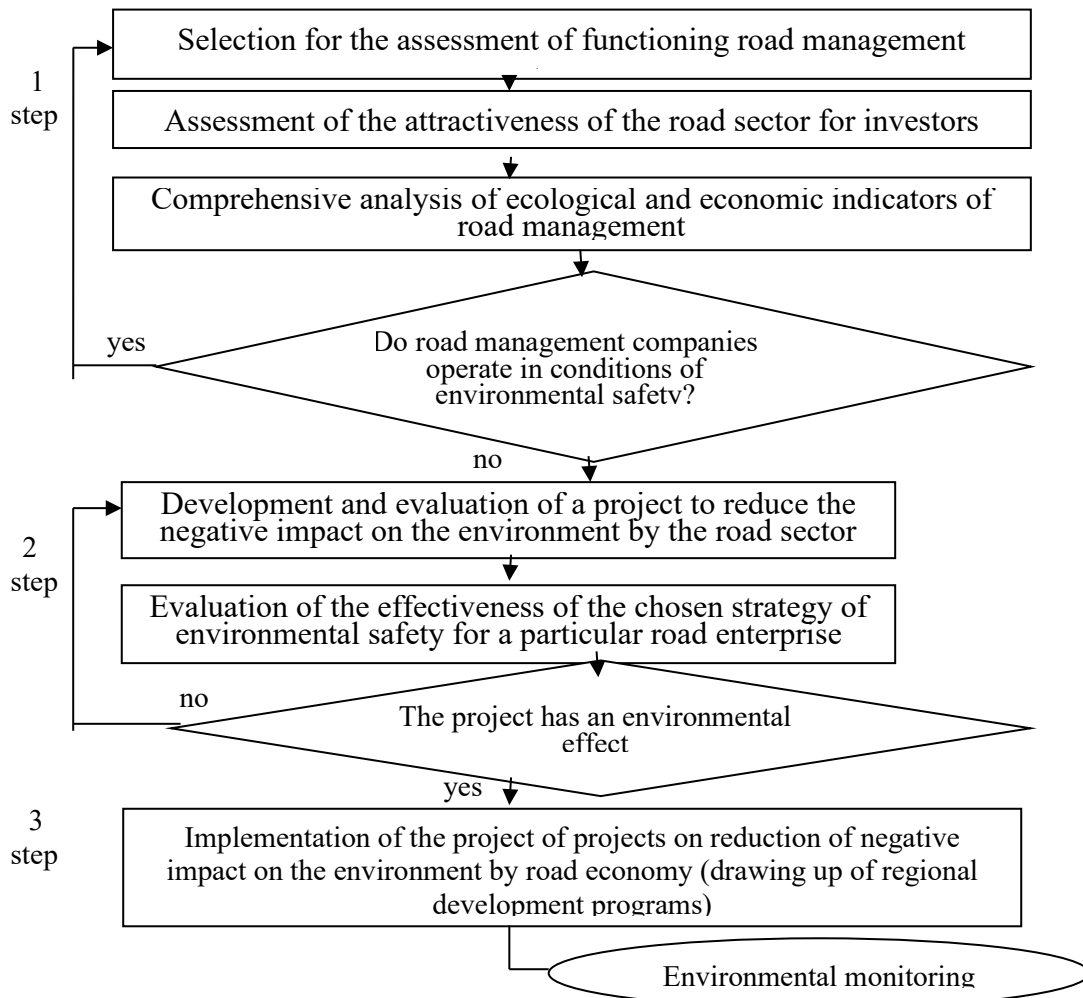
*\*developed by author*

The main tasks of monitoring the environmental safety by the road sector are the collection, analysis and dissemination of information on the status and prospects of implementation of the proposed projects. As a result, coordination and control over the implementation of the strategic ecological and economic development of road enterprises are ensured [1].

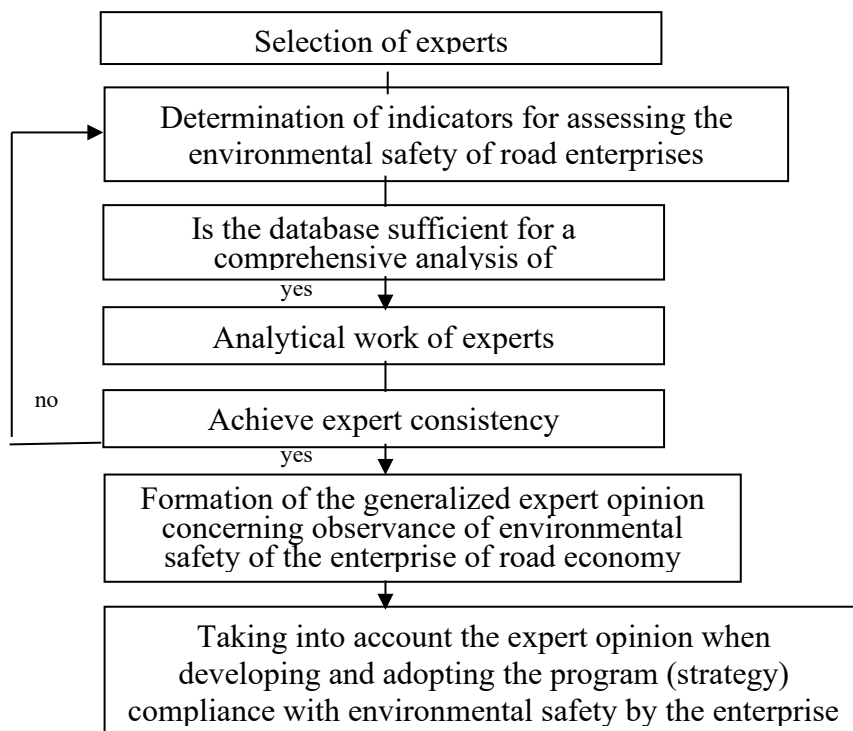
The stated author’s approach is an effective way to express research of their state of environmental safety and is important for determining further ways to achieve environmental security. Although it does not replace the need for a detailed environmental and economic analysis of the results of the activities of road enterprises using well-known methods.

The modern concept of sustainable development is based on the assumption that economic development depends on the quality of the environment and services to the society by the environment. Sustainable development is a controlled, stable development, in the dynamics of which new potentials for future positive changes in any industry are revealed [4].

With regard to road management, it is important to draw up an expert assessment of the development of a road enterprise in compliance with environmental safety (Fig. 2). An expert assessment is formed during the environmental monitoring of a particular enterprise.



**Fig 1. A comprehensive system for assessing the strategy for achieving environmental safety by road enterprises (developed by the author)**



**Fig 2. Algorithm of expert assessment of environmental safety by road management (developed by the author)**



In this algorithm, an important step is the definition of indicators for assessing the state and prospects of compliance with the environmental safety of enterprises and their competitiveness.

## 2. CONCLUSIONS

The growth of environmental tension in the world has caused an objective need to take into account the environmental factor in the transition to a sustainable development model, which, having great scientific and educational value, is also important in terms of the applied aspects of its implementation. Conceptual ideas and model representations of the development of industries, in particular the road sector, in compliance with environmental safety are designed to be integrated into national, regional policies and programs, and should be reflected in the mechanisms of international cooperation.

The authors have improved the scientific and methodological approach to determining the magnitude of environmental and economic damage from environmental pollution by road enterprises, which, in contrast to the existing ones, takes into account the relationship between the indicators of road fatigue and the increase in actual costs of repair work (influence factor) in comparison with the legislative level.

The author's approach is stated, which is an effective way to express research of the state of road enterprises in terms of environmental safety and is important for determining further ways to achieve environmental safety.

Also, an algorithm has been drawn up for an expert assessment of environmental safety compliance by the road sector, which will create a sustainable base for the development of road production. With regard to the prospects for further research, we consider the development of measures and a system for carrying out radical transformations and the implementation of an applied analysis of environmental and economic processes in road production to be an urgent area.

### Bibliography

1. Boginska L.O. Determination of the development strategy of the construction enterprise. Electronic scientific and practical journal "Market Infrastructure", issue 30, Black Sea Research Institute of Economics and Innovation, Odessa, 2020.P.123-127

2. Koval N. Investment climate in Ukraine: assessments of international experts / N. Koval // Zaporizhzhya Pravda. 2013. No. 9. - [Electronic resource]. – Access mode: URL: [http://www.zp-pravda.info/?option=com\\_content&view=article&id=6423:2013-09-25-18-55-31&catid=34:2009-04-14-10-24-35&Itemid=63](http://www.zp-pravda.info/?option=com_content&view=article&id=6423:2013-09-25-18-55-31&catid=34:2009-04-14-10-24-35&Itemid=63).

3. Frolina K.L. Scientific principles of state regulation of investment activity in the construction sector of Ukraine. Economic management: theory and practice: [Coll. of science pr.] / NAS of Ukraine, Institute of Industrial Economics. 2015. P. 222-238.

4. Frolina K.L. Semenov V.F. Regulation of investment processes in the construction sector of the national economy. Scientific Bulletin of the Uzhhorod National University. Series: International economic relations and the world economy: [Coll. of science pr.] 2016. No. 7. Part 3. P. 71-75.

5. Shmorgun, L. G. Direct foreign investments in the economy of Ukraine: problems of attraction and sectoral direction // Formation of market relations in Ukraine. 2013. No. 5. P. 67-71.