American Journal of Advanced Scientific Research (AJASR)
ISSN: 2195-1381
Vol. 2 Issue 9, January – 2025, Pages: 144-148

Minimizing Risks In Railway Transportation During Transportation Of Special Loads

Abdazimov Sh.Kh., Ph.D., Associate Professor

Abdullaev Zh.Y, Ph.D., Associate Professor

Nurmamatov Sh.R. applicant

ANNOTATION: The article considers the important problem of minimizing risks in the transportation of dangerous goods by rail. Given the increasing damage from emergency situations (ES), especially in the case of insufficient coordination of actions during the elimination of consequences, it is important to pay attention to emergency risk management strategies. Reducing the impact of hazardous events and improving the functions of recovery in emergency situations on railways is a key goal of effective risk management.

KEYWORDS: Risk, minimization, transportation, dangerous goods, safety, accident risk, level of traffic safety.

INTRODUCTION.

Risk minimization in the context of emergency situations in railway transport implies their comprehensive management in order to reduce the probability of occurrence of unfavorable events and reduce the consequences of their implementation. Risk management is a multi-task process that combines elements of planning, analysis, coordination and control, in order to optimally distribute resources to prevent or minimize damage [1-3].

To effectively manage accident risks, it is important to consider several key aspects: Risk identification and analysis – the first step is to identify potential threats and assess their likelihood and possible consequences. This may include an analysis of hazardous cargo, infrastructure conditions, climatic and technological factors.

Cost-benefit assessment – rational redistribution of resources requires careful assessment of the costs of risk reduction measures and their relationship to possible consequences. For example, the use of safer and more innovative technologies requires additional investment, but can significantly reduce the risk of accidents.

Prioritise measures – in conditions of limited resources, priority should be given to measures that can significantly reduce risks and minimise damage in the event of an emergency. This may include strengthening infrastructure, training personnel and introducing new security systems. Interdisciplinary approach – risk management requires interaction between various industries, such as transport, ecology, law, economics and technology. This allows taking into account all aspects of risk and implementing comprehensive measures to minimize it.

Monitoring and control – after implementing risk mitigation measures, it is necessary to regularly monitor the situation and adjust actions depending on changing conditions and emerging new threats.

Forecasting and preparing for emergencies – an important element of risk management is forecasting probable emergency situations and preparing all participants in the process

for them. This includes creating evacuation plans, training emergency services and regular training.

Ultimately, the goal of accident risk management is to achieve a level of safety that is consistent with real economic and social conditions and the potential for continuous improvement.

The term "emergency risk management" covers a set of actions and activities aimed at reducing the level of technological risks, minimizing material losses and reducing other negative consequences of accidents. The main goal of this process is to prevent emergency situations, as well as promptly localize their consequences if they occur. As a result of a comprehensive approach to emergency risk management, it is possible to significantly reduce the likelihood of emergency situations, as well as promptly and effectively respond to them, minimizing the consequences and damage to the population, the environment and the economy.

From the analysis of the formula of "acceptable" risk (1) we have: risk R(t) is the product of the frequency of a dangerous event P_D and the severity of the consequence S_D

$$R(t) = P_D \times S_D. \quad (1)$$

Thus, the goal is to minimize the dangerous event D, and it will occur if the calling agent T (the danger) interacts with the vulnerability V, so that

$$D=T+V \quad (2)$$

where T is the calling agent (potential source of damage), characterizing the adverse or dangerous impact of natural, anthropogenic or man-made nature caused by the process of cargo transportation, D is a dangerous event in the form of a failure, accident or emergency depending on the severity of the consequences. V is vulnerability, characterized by the degree of susceptibility of the object to the calling agent - danger.

From this we can conclude that danger is not synonymous with the concept of risk; it will not lead to a dangerous event unless it affects people or environmental properties.

Analyzing the formula of a dangerous event (2), we can come to the conclusion that the risk of an emergency is most likely if there are weaknesses in the planning of the transportation process, warning systems are poorly developed, preventive measures are neglected, and the geographic location contains a set of dangerous factors in the form of vulnerabilities.

Analysis of cause-and-effect relationships is necessary to organize an adequate response and correct the situation.

To minimize risks in railway transport, it is necessary to extend the area of controlled objects and states both to the source (hazard) and to the objects of perception of emergency situations – vulnerabilities, which are the main factor that can be controlled [4,5].

A scientific approach to decision-making is needed to ensure the safety of humans and the environment, based on a quantitative analysis of the risks and consequences of decisions taken [6].

These decisions are made within the framework of a risk minimization system, which includes:

- a system of monitoring, risk analysis and forecasting of emergency situations as the basis for risk minimization activities;
- emergency warning system;
- a liquidation system, including prompt response to emergency situations, technical

American Journal of Advanced Scientific Research (AJASR)
ISSN: 2195-1381
Vol. 2 Issue 9, January – 2025, Pages: 144-148

means and technologies for carrying out emergency rescue operations for the primary life support and rehabilitation of the affected population;

- a system for training specialists and management personnel of management bodies in the field of risk reduction and mitigation of emergency situations.

The process of management, and, consequently, risk minimization in railway transport can be described by the following diagram (Figure 1).

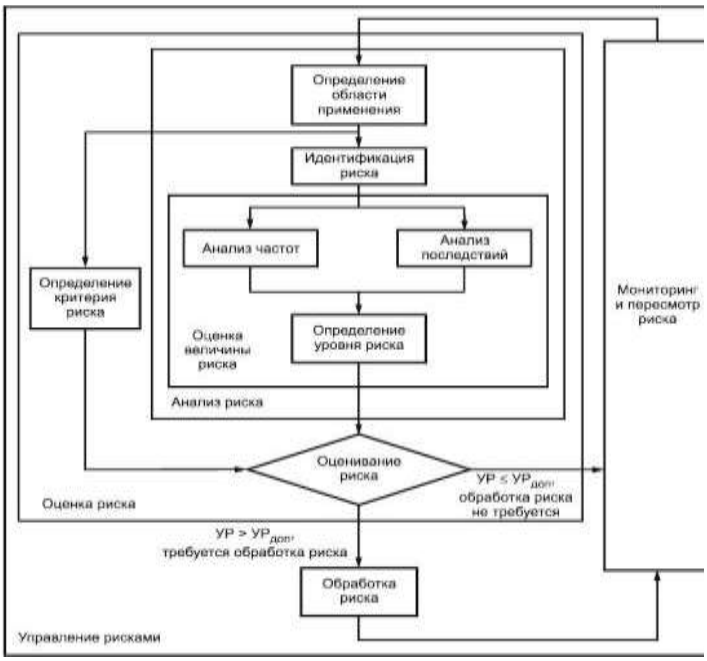

Figure 1. Risk management process in railway transport: RL – risk level, RL_{arl} – acceptable risk level.

The main stages of the risk management process are:

risk identification - at this stage, all possible threats and risks that may arise in the course of activities are identified, for example, during the transportation of dangerous goods by rail;

risk assessment - at this stage, an assessment is made of the probability of each risk occurring, as well as the scale of possible consequences if it is realized; developing a risk management strategy - once risks have been identified and assessed, strategies are developed to minimize or prevent them;

taking measures to reduce risks - at this stage, the implementation of developed measures aimed at reducing the level of risks is carried out; risk monitoring and control - after the implementation of risk management measures, it is necessary to constantly monitor the situation to ensure their effectiveness and promptly adjust actions if the situation changes or new threats appear;

analysis and improvement - as experience is gained, it is important to analyze the effectiveness of the measures taken and identify opportunities for improvement.

These stages are cyclical, as risks and the conditions under which they occur may change over time. Regularly updating and adjusting the risk management strategy helps to adapt to new threats and maintain a high level of security [6].

Currently, there is a general tendency towards increasing damage from emergencies, often due to uncoordinated measures to eliminate the consequences. Therefore, the goal of emergency risk management is to minimize them, which means reducing the impact of a hazardous event and improving the recovery function in emergency situations in rail transport. Of primary importance in this context is the concept of "convergence" - the concentration of forces and means, human and material resources directed to an adequate response to the challenges arising from an emergency. Another important concept is "integration", which characterizes the degree of interaction between the structures involved in the

American Journal of Advanced Scientific Research (AJASR)
ISSN: 2195-1381
Vol. 2 Issue 9, January – 2025, Pages: 144-148

process. A successful risk management strategy should be based on an adaptive approach to a changing situation, so the following algorithm is very important in this context: monitoring → analysis → response → analysis. The model of risk assessment and risk management dependence is shown in Figure 2.

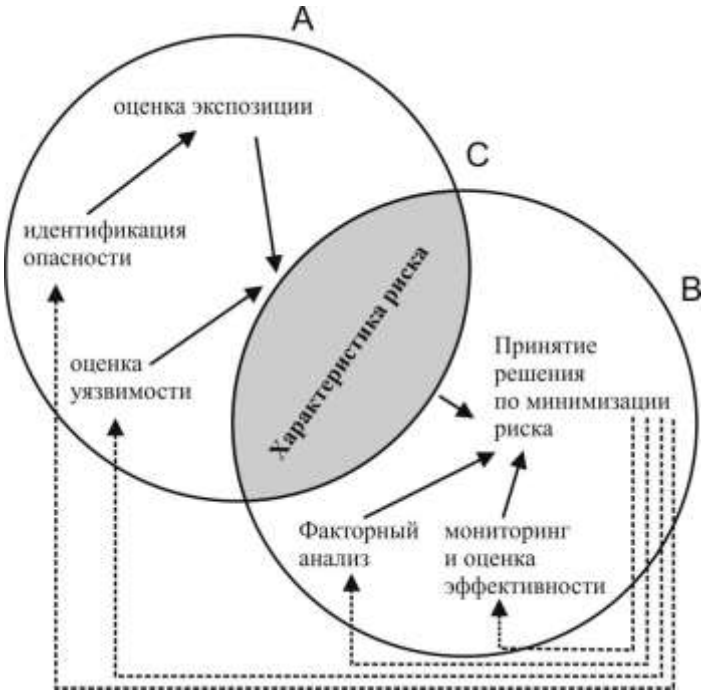

Figure 1.2 - Model of dependence of risk assessment and its management: A - risk assessment; B - risk management; C - zone characterizing the risk.

Risk assessment is based on a comprehensive study of the source (transportation of oil and oil products by rail) and risk factors (oil as a pollutant, in the context of the environmental conditions and the technology used), as well as the mechanism of interaction between these components.

The risk assessment procedure is necessary for the process of research and determination of risk management measures based on the action algorithm. Risk characteristics are the final phase in the risk assessment procedure, and they are also the first link in the risk minimization procedure.

Risk management is based on the legislative framework, economic and technological analysis. It is stated above that the goal of risk management is to minimize risk.

It is known that risks are usually divided into natural and anthropogenic (arising from human activities).

Natural risks in their pure form are beyond human control (earthquakes, avalanches, catastrophic floods, meteorite falls, etc.). These risks can be calculated and measured, but they are uncontrollable in their pure form. In principle, emergency risk management is only possible when the source of risk is accessible to human influence, in our case these are anthropogenic risks.

Conclusions. When considering risk management, great importance should be given to the synergistic principle, where the combined effect of a set of measures greatly exceeds the impact of individual, uncoordinated efforts to respond to emergencies.

Thus, for effective risk management in an organization or industry, it is necessary to integrate approaches and methods aimed at both reducing human errors and increasing the sustainability of technological and information systems. This requires comprehensive coordination of the efforts of all participants in the process, from engineers and technicians to managers and security specialists, as well as the use of modern technologies that allow monitoring and minimizing possible risks.

LIST OF REFERENCES

1. ORDER Minister transport Republics Uzbekistan «About approval rules transportation cargo on railway transport republics Uzbekistan (registered ministry justice republics Uzbekistan from21September2023G.registration No.3457).

2. Tariff policy of the railways of the Republic of Uzbekistan for the transportation of goods in international traffic. T 2024.

3. Abdazimov Sh.Kh., Zukhriddinov H.K. "Analysis of the causes of transport accidents in railway transport, including during the transportation of dangerous goods through the mountainous regions of Uzbekistan" ARTICLES Published 2023-05-02.

4. Katin, V.D. Ranking of the territory of influence of the railway in minimizing the risks of emergency situations [Text] / V.D. Katin, A.N. Lutsenko // Eurasian Union of Scientists (ESU). - 2014. - No. 4. - P. 109-111 (ISSN).

5. Emergency cards for dangerous goods approved for transportation by rail in the CIS member states, the Republic of Latvia, the Republic of Lithuania, and the Republic of Estonia. – M.: Transport, 2000. – 847 p.

6. Abdullaev, Zh., Rasulov, M., Masharipov, M. Features of determining capacity on double-way lines when passing high-speed passenger trains. E3S Web of Conferences, 2021, 264, 05002.https://doi.org/10.1051/e3sconf/202126405002.