Environmental and transport risk management: methodology, features, classification, impact tools

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Abstract. The article discusses the features of environmental and transport risks as a specific management object. The aspects of modifying the components of the formed methodology of modern risk management in relation to environmental and transport risks are disclosed. The author's view on the classification of environmental and transport risks is presented. A toolkit of managerial influence and criteria for its selection are proposed.

1. Introduction

The objective need for risk management in recent years, in a situation of a dynamically changing business environment, an increase in the frequency and likelihood of crises, does not require well-founded evidence. Of all the variety of risks accompanying the functioning and development of enterprises, and the existence of the person himself (both as a consumer, and as an employee, and as an investor, and as an owner, etc.) has recently become increasingly tangible and significant, having, first of all, socio-humanistic consequences are environmental and transport risks.

Among the groups of risk factors affecting human health, the state of the environment (a share of 20-25%) is in second place after conditions and lifestyle (a share of 50-55%), ahead of genetic factors (15-20%) and medical service (10-15%). At the same time, electric power enterprises carry out the largest environmental pollution (up to 65%), and other industrial enterprises account for up to 20% [1].

According to the World Economic Forum (VEM), the most serious global risks of 2018 are (in probability) [2]:
1st place - extreme weather events;
2nd place - natural disasters;
3rd place - cyberattacks;
4th place - data theft and fraud;
5th place - failure to mitigate climate change.
It should be noted that experts from all types of risks identified, first of all, environmental risks (the WEF classifies risks taking 1, 2 and 5 places), and the rest relate to technological ones. The existing trends will not only continue, but will be even more characteristic. To confirm this, the following data can be cited: in 2013, VEM out of the 5 most significant global risks to environmental risks (such as an increase in greenhouse gas emissions and a water supply crisis) assigned 3 and 4 places, respectively.

It is significant that the main reasons for the fall in the value of shares of the 100 leading companies according to Fortune 1000 [3] are financial and environmental risks (dangers), which account for up to 12% after strategic and operational risks.

Without continuing to delve into the analysis of existing statistics, it can be argued that the problems of environmental and transport risk management are very relevant and the management itself is considered as a tool to prevent and / or reduce crises in general and, in particular, industrial enterprises.

2. Results
The title of the article defines such environmental risk management elements as methodology, features, classification, impact tools. Consider these elements in the indicated sequence.

The authors’ experience and the results of the conducted studies suggest that by now the risk management methodology of industrial enterprises as a whole has been created [4,6], although there is still room for development and deepening.

An interesting issue in relation to environmental risks is the question of unambiguity or adaptation of the fundamental components of the existing methodology. In the table. 1, comments are presented on the possibility of using modern risk management tools for environmental risk management [5].

Thus, most of the components of the existing risk management methodology and tools for its implementation are considered applicable to environmental risk management.

However, additional understanding, in addition to clarifying the very concept of environmental, requires the solution of such problems as:
- development of an additional classification of environmental risks according to the most significant classification criteria, most fully reflecting the specifics of the considered type of risk;
- the addition of risk assessment tools with specific models for measuring environmental risks in accordance with the requirements of current standards, among which, first of all, the standards ISO 14001: 2015 and State standard GOST R ISO 14001-2016;
- Prioritization of the use of existing methods and tools of managerial impact on risks, taking into account the characteristics of environmental risks.

We clarify that environmental risk in accordance with Federal Law N 7 “On Environmental Protection” dated 10.01.2002 (as amended on December 27, 2019) should be understood as the probability of an event having adverse effects on the environment and caused by negative economic and other effects activities, emergency situations of natural and man-made nature.

One of the features of environmental risk is that in relation to an industrial enterprise, it can be both external and internal. Based on this, the concept of this risk can be interpreted both, and in a broad sense.

In the narrow sense, i.e. environmental risk is understood as an event or actions of an environmental nature, the probability of occurrence or implementation of which affects the deviation from the planned financial result of the enterprise. In broad - the likelihood of negative changes in the environment caused by anthropogenic or other effects.
| № | Basic components of the risk management methodology / objectives | Brief description of the components in accordance with the general methodology | Peculiarities of application in relation to environmental risks | Comment |
|---|---------------------------------------------------------------|-----------------------------------------------------------------------|---------------------------------------------------------------|----------|
| 1 | Features of risk as an object of management | 1. As an object of management exists only in the future  
2. A variety of risks associated with activities, events and activities  
3. Risk can be appropriately assessed through probability and deviation.  
4. Risks can be prevented, reduced and compensated. | The component is fully applicable, no additional research and development is required | Clarification of the definition of environmental risk in accordance with existing standards |
| 2 | Risk classification | Risks are classified in accordance with the business processes of the enterprise, area and enterprise management environment. | Classification of environmental risks on the basis of a balanced approach [4] does not allow to fully take into account the specifics and identify environmental risks | Requires the development and use of additional classification, taking into account the characteristics of environmental risks |
| 3 | Risk assessment | To assess risks, it is necessary:  
- determine the parameters / indicators of the assessment;  
- choose the most effective methods / assessment tools. | Risk assessment methods and tools as well as risk assessment parameters are applicable | It is necessary to use environmental risk assessment models in accordance with the recommendations and requirements of relevant standards |
| 4 | Risk Management Impact | To implement managerial impact, it is necessary:  
- to form a set of methods of influence;  
- reasonably choose a management method (s) for a specific risk | The methods and tools are universal and can be used in managing environmental risks. | The specificity of environmental risks predetermines the establishment of priorities for the application of the proposed methods of managerial impact on risks |
| 5 | Risk management organization | Determining the type and form of risk management organization in accordance with the current organizational model of enterprise management [4] | Environmental risk management should be integrated into the enterprise risk management system | |
Another feature of environmental risk is that in its essence it can only be clean, therefore, it implies negative impacts or negative deviations.

Despite the pronounced socio-humanistic features, environmental risk is reflected in the financial results of the enterprise, while providing a synergistic effect, i.e. enhancing the negative impact of other risks on financial results.

Significant features of environmental risk that should be taken into account when managing them include the high “speed” of its impact on the results of the enterprise, much higher than other risks. The consequence of this is the need for the priority use of preventive measures of managerial impact, i.e. the use of tools to prevent environmental risks and, above all, to minimize the likelihood of occurrence / implementation of environmental risk.

It is advisable to classify environmental risk, similar to other types of risks, by conducting a basic classification of risks, using a balanced classification approach [4], together with an additional classification according to certain most essential features, allowing to take into account the qualitative features / state of each basic risk. On dwelling in detail on the consideration of the distinctive features of such categories of environmental risk, we note the classification features and the types of risks themselves:

1) according to the approach to assessment, depending on the results: absolute and relative environmental risks;
2) at regulatory levels: acceptable; maximum permissible; negligible background and individual;
3) due to the occurrence of: natural - environmental; techno - environmental; sustainable technogenic impacts; catastrophic effects; social and environmental risks; ecological - regulatory; environmental - political and economic - environmental risks;
4) by the amount of the fine (sanctions) under the Code of Administrative Offenses of the Russian Federation (Code of the Russian Federation on Administrative Offenses), there are 6 categories of environmental risk:
   1st category - the maximum sanction limit is 10,000 rubles.
   2nd category - the maximum sanction limit is 50,000 rubles.
   3rd category - the maximum sanction limit is 100,000 rubles.
   4th category - the maximum sanction limit is 500,000 rubles.
   Category 5 - the limit of maximum sanction - 1 000 000 rubles.
   Category 6 - maximum sanction - administrative suspension of activity.

3. Discussion
When assessing any risk, two questions arise: determining the parameters or indicators of the assessment and the choice of assessment methods. In accordance with the accepted definition of environmental risk, the assessment indicators are the probability of occurrence of risk (P) and loss / loss or deviation from the planned financial result of the enterprise (-Δ FR). Moreover, estimation methods are also traditional - these are statistical methods, expert methods and methods of mathematical modeling. It should be noted that in relation to environmental risks, methods of foresight, i.e. methods for forecasting environmental risk parameters.

As noted in the table 1, when assessing environmental risks, it is necessary to use assessment models in accordance with the recommendations of the relevant standards. So in the automated system of environmental management and ecology - ACS ECOURS "ISO 14001" the following model is recommended for calculating environmental risks associated with failure to comply with environmental requirements:

\[
R_e = (Q_t \times I_{er} \times I_s \times 100): Q_{total}
\]

where \( R_e \) - the environmental and transport risk of the organization, incl. and enterprises;
\( Q_t \) - the number of non-compliance with environmental requirements;
\( Q_{total} \) - the total number of environmental and transport requirements applicable to the organization;
I_e - index of the total number of applicable environmental and transport requirements;
I_s - the index of the highest sanction (amount of fines) under the Code of Administrative Offenses of the Russian Federation for non-observed environmental and transport requirements.

The determination of management tools for environmental risks depends on a reasonable choice of the most effective or efficient management methods for a specific environmental risk, depending on its assessment. The whole variety of these methods is well known and there are also ways to justify their choice [5, 6]. But taking into account the specifics of environmental risks, 4 of the most significant should be distinguished from this variety:

1) loss prevention and control (or risk prevention);
2) abolition (or evasion); 3) insurance; 4) absorption. These methods are indicated in order of decreasing priority.

The abolition excludes any activity in the risk zone or implies a refusal to implement an event that could lead to environmental risk. The method is absolutely reliable and is aimed, first of all, at minimizing (or even reducing to zero) the probability of a risk, but its widespread use means a partial or complete cessation of the enterprise.

Prevention of losses means the implementation of preventive measures that exclude or reduce the risk of an unwanted process or the implementation of an unwanted action and / or event. This method also aims to minimize the likelihood of risk.

Insurance allows you to distribute possible losses among a large group of individuals and / or legal entities exposed to the same risk, or to compensate for damage resulting from the occurrence of an insurance event or event.

Absorption involves the recognition of risk without distribution or compensation through insurance. The managerial decision on takeover can be made for two reasons: 1) in cases where it is not advisable to use other risk management methods (for risks whose probability is sufficiently small); 2) when using self-insurance tools.

4. Conclusions
The considered features of environmental and transport risks, the recommendations presented on the modification of the components of the risk management methodology as applied to environmental risks, as well as recommendations on the classification of environmental and transport risks, their assessment and application of management impact methods, allow for the purposeful and more justified development and implementation of an enterprise risk management system, and environmental monitoring and audit of enterprises, as well as compile and comply with the environmental passport of enterprises.

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