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#### **RAILWAY TRANSPORT RISK MANAGEMENT AND INSURANCE**

**Abstract.** The article considers and analyzes railway transport risks. The general risk classification related to the passenger traffic has also been improved. In addition, for more sophisticated study of risk management and insurance issue, the features of railway transport insurance have been identified; the rules of railway transport voluntary insurance of various insurance companies are analyzed. As the result, it was constructed an improved classification of factors influencing the efficiency of the passenger train plying and associated with risks for passenger traffic, based on the studies carried out. The need to take into account the main factors affecting the efficiency of passenger transportation along with railway transport risks were noted. This should ensure an increase in the efficiency of passenger transportations and their competitiveness in the transport market of the country.

**Keywords:** risk, insurance, railway, passenger transportation, classification, efficiency, plying, factor, management.

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## **УПРАВЛІННЯ РИЗИКАМИ ТА СТРАХУВАННЯ НА ЗАЛІЗНИЧНОМУ ТРАНСПОРТІ**

**Анотація.** У статті розглянуті та проаналізовані ризики на залізничному транспорті. Також удосконалена загальна класифікація ризиків стосовно пасажирських перевезень. Додатково для більш досконалого дослідження питання управління ризиками та страхування визначені особливості страхування на залізничному транспорті; проаналізовані правила добровільного страхування залізничного транспорту різних страхових компаній. Згодом на основі проведених досліджень побудована удосконалена класифікація факторів впливу на ефективність курсування пасажирського поїзду у зв'язку з ризиками для пасажирських перевезень. Наголошено на необхідності врахування основних факторів впливу на ефективність пасажирських перевезень разом з ризиками на залізничному транспорті. Це має забезпечити підвищення ефективності пасажирських перевезень та їх конкурентоспроможності на транспортному ринку країни.

**Ключові слова:** ризик, страхування, залізничний, пасажирський, транспорт, класифікація, ефективність, курсування, фактор, управління.

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## **УПРАВЛЕНИЕ РИСКАМИ И СТРАХОВАНИЕ НА ЖЕЛЕЗНОДОРОЖНОМ ТРАНСПОРТЕ**

**Аннотация.** В статье рассмотрены и проанализированы риски на железнодорожном транспорте. Также усовершенствована общая классификация рисков относительно пассажирских перевозок. Дополнительно для более совершенного исследования вопроса управления рисками и страхования определены особенности страхования на железнодорожном транспорте; проанализированы правила добровольного страхования

железнодорожного транспорта различных страховых компаний. Впоследствии на основе проведенных исследований построена усовершенствованная классификация факторов, влияющих на эффективность курсирования пассажирского поезда и связанных с рисками для пассажирских перевозок. Отмечена необходимость учета основных факторов, влияющих на эффективность пассажирских перевозок вместе с рисками на железнодорожном транспорте. Это должно обеспечить повышение эффективности пассажирских перевозок и их конкурентоспособности на транспортном рынке страны.

**Ключевые слова:** риск, страхование, железнодорожный, пассажирский транспорт, классификация, эффективность, курсирование, фактор, управление.

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**Introduction.** Railway transport in the most economically significant sector for Ukraine. It plays an important role in ensuring the livelihoods of different regions of the country. It should be noted that increasing the stability of railway transport, as well as its competitiveness, more often depends on risk management efficiency. Therefore, it is necessary to study risks that can create real losses and affect the reduction of railway transport efficiency, especially for passenger transport. Therefore, solving of this problem is very relevant. To solve it, first, it is necessary to identify railway transport risks. It is also necessary to take measures in future on minimizing the negative impact on financial indicators of the railways' work. One of the mechanisms of reduction risk impact is insurance. Therefore, it is necessary to study the rules of voluntary insurance of railway transport by applying proposals of different companies and determine the main insurance risks of the passenger transport.

#### **Studies analysis and objectives.**

The issues of determining an optimal structure of railway transport management, ensuring its competitiveness, improvement and development of logistic technologies were considered in many studies. They include the studies of such scientists as: Alsonova I. M., Barasha Y. S., Bakaieva L. O., Dykania V. L., Eitutisa H. D., Makarenko M. V., Sycha Y. M. and others.

However, in our opinion, an insufficient attention is turned to the rail transport management problems. The studies, besides, pay insufficient attention to the impact of risks on passenger transportations. This led to the choice of this study direction.

The issues of insurance market development were considered in the studies of Bazylevych V. D., Vnukova N. M., Hovorushko T. A., Zhuravel K.V., Zalietova O. M., Karas O. O., Mnykh M. V., Panchenko O. I., Rychynska A.V. and others.

However, the solution of this railway passenger transport issue remains relevant and requires further studies.

The risks inherent in railway transport should be analyzed at the beginning of the study basing on the researches of various scientists on this topic. Thus, for example, Bakaiev L. O. in his study [1] identified the following main groups of railway transport risks:

- production risk factors (the risk of fixed asset aging, and decrease in traffic safety associated with it, work seasonality, etc.);
- risk factors for financial and economic conditions of railways (the risk of increasing the prime cost of transportations, the increase of material cost, electricity cost, fuel cost, etc., the risks of increasing the passenger transport unprofitability);
- political and macroeconomic risk factors (risks of political instability, the risk of economic growth decrease, inflation risk, competition).

In order to manage risks, within the framework of the study of Bakaiev L. O., much attention is paid to the construction of an integrated risk management system. The problem of quality integration absence is really relevant for rail transport. However, in our opinion, risks should be considered more expendably in relation to various aspects and features of passenger and freight transport. This is especially true for passenger transportations.

The classification of rail transport risks, accounting for the specifics of its functioning, has been created in the next study of Karas O. O. [2]. The author presents a generalized classification of risks using such features as the field of occurrence, duration of influence, the possibility of

predicting the impacts on the results of an enterprise's activities, sources of origin, the degree of impacts, the nature of activity associated with and the cause of occurrence. The external and internal risks of the railway transport activity are also distinguished [3, p. 34].

The expanded classification of railway transport risks, which is given by Karas O. O., gives an opportunity to approach qualitatively to the issue of studying these phenomena in the financial and economic life of the railway transport. However, this classification does not apply to the certain types of passenger or freight transportation routes, taking into account their problems.

The similar approach to the risk classification can also be observed in the study of Rachynska A.V. [4].

The types of railway transport risks were considered in the study of Panchenko O.I. [5]. The definition of their classification features in order to form a system of economic security of the industry, which is based on insurance protection is the peculiarity. The author of this study highlights the following most important features of the railway transport risk classification [5]:

- the object of manifestation;
- the ability to influence risks;
- the sources of origin;
- the time of occurrence;
- the stage of transportation;
- the size of losses;
- the type transportation;
- the organization of insurance protection.

Panchenko O.I. states correctly that it is necessary to create a national system of warning and insurance of risks on railway transport by carrying out an audit of these risks and improving the influence on their implementation. It is possible to add, that it is also necessary to substantiate the insurance of risks in terms of economic benefits.

The next study of Zhuravel K.V. [6] considers the classification of risks for the development of a comprehensive risk management system for rail transport. The signs of such a classification in this case are the nature of accounting, the nature of consequences, the possibility of insurance, the possibility of prediction, the level of financial losses, the action duration, the object of occurrence and the possibility of further classification. One of the most interesting features is the possibility of insurance, since the insurance is one of the most powerful tools that can reduce the impact of one or another risk. According to the study of Zhuravel K.V., by the possibility of insurance the risks are divided into the following groups:

- insurable risks;
- uninsurable risks.

The risks that can be covered include the risks that can be insured under the contract and which should result in loss of incomes caused by such events as reduction of the scope of rendered services, non-fulfillment of contractual obligations by a client and other events. Risks that are not insured are a potential source of an additional income. [6]

The possibility to improve the railway transport risk classification taking into account the railway transport insurance is an interesting point in this study.

A rich foreign experience in studying the types of rail transport risks, their evaluation and analysis based on research was also applied [7 - 11]. The material on rail transportation safety, risks and insurance in railway transport [12 - 14] was applied.

In general, at the beginning of this stage of the study it is necessary to identify the features of the railway transport insurance, then to analyze the rules of voluntary insurance of the railway transport, applying the proposals of various companies, to find a link between the products and types of risk insurance on the rail transport. Then, it is possible to narrow the problem to finding risks for passenger transportation. At the same time, it is possible to substantiate the insurance of risks based on economic benefits by applying certain areas where the passenger trains ply. In this case, the reference should be made to the study of the author [15], which systematizes the factors of influence the optimization of areas where the passenger trains ply in Ukraine. As a result, it is

possible to relate these factors of influence the plying of passenger trains to the railway transport risks that can be insured. This should be one of the novelty elements in this study.

**The article goal.**

To analyze the risks on railway transport and to improve their classification for passenger transportations. To identify the features of railway transport insurance and to analyze the rules of voluntary railway transport insurance of various insurance companies in order to build an improved classification of factors influencing the efficiency of passenger train plying in relation to the risks for passenger transportations on the basis of the general classification of railway transport risks for passenger transportations and taking into account the determined features of the railway transport insurance.

**The study results.**

First of all it is necessary to define the main stages of the study:

1. Analysis of risks on railway transport and improvement of their general classification for passenger transportations.

2. Determination of the features of the railway transport insurance.

3. Analysis of the rules of voluntary railway transport insurance from various insurance companies and definition of insurance risks.

4. Relationship between the factors influencing the plying of passenger trains and railway transport risks that are insured.

**1. Analysis of railway transport risks and improvement of their general classification for passenger transportations.**

Having analyzed the scientific studies on the definition of the railway transport risks, at the first stage of this study it is necessary to highlight the general risks relevant to the passenger transportations (Table 1). The following classification features should be defined:

- the sphere of occurrence;
- the duration of influence;
- the source of origin;
- the nature of consequences;
- the possibility of insurance;
- possibility of prediction;
- the object of manifestation.

Table 1

General risk classification for railway passenger transportations

<i>Risk types</i>	<i>Classification feature</i>
- internal - external	Sphere of occurrence
- temporarily - constant	Duration of influence
- natural - technical - social and demographical	Sources of origin
- acceptable - critical - catastrophic	Nature of consequences
- insurable - uninsurable	Possibility of insurance
- predictable - unpredictable	Possibility of prediction
- passengers, employees - movable stock - buildings, constructions - cargo - environment	By the object of manifestation

Reference: [2], [4], [5], [6] with author's amendments.

*By sphere of occurrence* risks should be divided into internal and external. Risks caused by the activity of the railway transport divisions are related to internal risks. The external risks, in turn, are the risks which are not directly associated with the activity of the railway transport divisions and occur during interaction with external environment.

*By the duration of influence* temporarily risks show the risks which appear periodically. Constant risks exist throughout the whole period of activity of the railway transport divisions and under the influence of constant factors.

*By the source of origin* there are natural, technical, social and demographical risks are distinguished. Natural risks are caused by the natural disasters: an earthquake, a hurricane, frost, typhoons and others. Technical risks are associated with conditions of infrastructure and movable stock. Social and demographic risks are associated with processes in demographic and social spheres.

*By the nature of consequences* acceptable risks causes a partial loss of profit, but the losses do not exceed the expected profit. The result of a critical risk is gaining zero income. The consequence of catastrophic risk is the company's insolvency.

*By the possibility of insurance* there are insurable and uninsurable risks. Insurable risks should be indicated in insurance agreement. Uninsurable risks, in turn, become potential sources of an additional profit for railway transport enterprises.

*By the possibility of prediction* there are predictable and unpredictable risks. It is necessary to define, that predictability of risks on passenger railway transportations has relative character.

*By the object of manifestation* risks are divided into those for the objects of railway transport, associated with high risk. These objects are passengers and employees, movable stock, buildings and constructions, cargo, environment.

## **2. Features of the railway transport insurance.**

After disclosing the risk types, it should be noted that the railway transport risks are the basis for the insurance formation. Insurance protection cannot be organized without a risk. Thus, the need to cover a loss in the event of a risk requires the organization of insurance protection. It should also be noted, that the risk type and the probability of its occurrence make it possible to determine the terms and the content of the insurance agreement.

For the further research, it is necessary to identify some terms and concepts that are related to insurance on the railway transport.

Insurance risk is a probable event or a set of occasions, in case of which the insurance is carried out. Consequently, insurance risks are those which are specified in the insurance agreement or stipulated by the legislation. [5]

Insurance risks (events) foreseen a potentially possible damage to the insurance object, and the insurance case - is already done damage to the insurance object. Insurance risks on the railway transport are divided into property and personal risks. [5]

Property insurance risks on the railway transport include:

- fire;
- accidents (road and traffic accidents);
- natural disasters;
- damage to or destruction of the vehicle;
- illegal actions of the third parties;
- non-fulfillment of contractual obligations and others.

The personal insurance risks on the railway transport include:

- injuries;
- poisoning;
- burns;
- electric shock and others.

There are also insurance events in case of the carrier liability insurance. These risks include:

- damage to the third parties' health or life;
- damage to the third parties' property;
- environmental harm.

An insured persons on the railway transport can be legal entities or natural persons who legally own and dispose vehicles.

The following vehicles can be insured on the railway transport:

- locomotives;
- motor-wagon movable stock;
- freight and passenger wagons;
- railway containers;
- a special movable stock.

The purpose of insurance is to reimburse the damage to the health or life of the insured person as a result of an accident on transport. Insurance is carried out on the basis of the Resolution of the Cabinet of Ministers of Ukraine of August 14, 1996 No 959 "On Approval of the Regulations on Compulsory Personal Insurance against Transport Accidents".

Insurance of passengers on the railway transport is carried out by the carrier. He concludes an agreement with the insurance company. The insurance payment is included in the ticket price - it is 1.5 - 3% of the transportation cost. Thus, after receiving a travel ticket, the passenger also has insurance coverage.

The specific features of the railway transport in Ukraine are that the state is the customer of insurance services, and the choice of insurance companies and the list of insurance services is carried out on a tender basis.

The railway insurance is developed inefficiently due to the following problems:

- mistrust of insurance companies;
- low level of insurance culture;
- weak information provision on insurance services;
- inadequate assessment of the railway carriers' risks;
- imperfection of insurance market infrastructure;
- imperfection of insurance legislation.

After pointing out some features of railway transport insurance, it should be noted that the problem of risk accounting and assessment is an important issue. Reducing their impact on rail transportations should ensure the efficient development of the railway transport.

### **3. Analysis of rules of voluntary railway transport insurance of various insurance companies and determination of insurance risks.**

At the next stage of the study, some provisions of voluntary railway transport insurance rules should be analyzed in order to determine the link between insurance products of different companies with railway transport risks. Let us indicate the list of insurance companies, the rules of voluntary insurance of which are being studied:

- ALC "ROSNO Ukraine" [16];
- OJSC "IC "Profesiyne strakhuvannia" [17];
- CJSC IC "ONIKS" [18];
- ALC "Insurance company "Dominanta" [19];
- CJSC "IC "Garant-Systema" [20];
- PJSC "Ukrainian Joint Stock Insurance Company ASKA" [21];
- CJSC "IC "Arsenal Dniepr" [22].

According to the rules of voluntary insurance, the object of insurance is the property interests of the insured persons, which are related to the possession, usage and disposal of the insurance object - movable stock of the railway vehicles:

- locomotives (electric locomotives, diesel locomotives, steam locomotives and others);
- motor-wagon vehicles (electric units, diesel trains, turbo-trains and others);
- freight wagons (semi-wagons, platforms, special-purpose wagons and others);
- passenger wagons;
- containers.

According to the rules of voluntary insurance, individual units of movable stock are not subject to insurance:

- a) which are subject to confiscation under a court decision;
- b) which are museum exhibits;
- c) which are used for purposes not provided by their design.

According to the rules of voluntary insurance, insurance risks include:

- an explosion or fire on a vehicle;
- fall of aircrafts on a railway vehicle;
- spontaneous phenomena (earthquake, hurricane, storm, etc.);
- illegal actions of third parties;
- transport events in train and shunting work.

As a result of analysis of voluntary insurance rules, it should be noted, that almost all risks foreseen by the general improved classification of passenger railway transportation risks are covered.

Secondly, it should be noted that, the insured person and the insurer shall indicate a specific list of insurance risks in each separate agreement.

In addition, there is no clear general approach to the railway transport insurance and a clear structuring of the rules themselves. Some common points exist, but each company essentially form them on its own discretion.

The limitation of insurance products and imperfection of insurance legislation in general are also should be noted.

#### **4. Relationship between the factors influencing the plying of passenger trains and insurable railway transport risks.**

It was previously identified in the author's study [15] on systematic basis the key factors affecting the efficiency of passenger transportations and the proposed measures that allow to optimize the plying areas of different train types.

In the next study we will narrow the problem to finding risks for passenger transportations. At the same time, risk insurance is grounded on the basis of economic benefits by applying the certain areas of plying of passenger trains. In this case, it is only necessary to relate the factors influencing the passenger trains' plying with railway transport risks.

First, it is necessary to indicate which risks associated with the key factors influencing the efficiency of passenger transportations affect such economic factors as incomes and expenses for passenger transportations (Table 2).

Table 2

Risks and key factors affecting the efficiency of the passenger train plying

<b>Economic factors</b>	<b>Key factors influencing the efficiency of a certain train</b>	<b>Risks under classification feature</b>
Incomes from transportations	Movable stock fullness The amount of transportation tariffs Travel time Running speed The cost of movable stock Qualitative indicators of the movable stock Quality of the passenger servicing Distance of travelling Availability of effective competitors The railway infrastructure condition Train timetable	By the object of risk manifestation Duration of influence Sphere of occurrence Source of origin Possibility of prediction
Expenses for passenger transportations	Type of the movable stock Movable stock fullness Technical characteristics of the movable stock Running speed Distance of travelling Qualitative indicators of the movable stock Quality of the passenger servicing The cost of the movable stock Number of wagons in the train and their technical characteristics The railway infrastructure condition Number of train stops The cost of the train maintenance and equipment The cost of planned repairs	By the nature of the consequences Sphere of occurrence Possibility of insurance Source of origin By the object of risk manifestation Possibility of prediction

Reference: [15] with author's amendments.



Second, it is possible to classify the factors influencing the efficiency of passenger trains' plying in connection with the risks for passenger transportations (Table 3).

Therefore, it can be stated that the proposed improved classification of the key factors influencing the efficiency of plying of the different types of passenger trains takes into account not only the main five groups of factors (factors that depend on the characteristics of the movable stock, factors that depend on the train running organization, factors that depend on competition between the types of transport, factors that depend on the infrastructure condition and the travel distance, factors that depend on the quality of the passenger servicing), but also the risks of the passenger railway transportations.

Table 3

Classification of factors influencing the efficiency of passenger trains' plying in connection with risks for passenger transportations

Feature of risks classification	Group of factors	Factors influencing the efficiency of passenger trains' plying
By the object of risk manifestation Nature of consequences Possibility of insurance	Factors that depend on the characteristics of the movable stock	The cost of the movable stock The type of the movable stock Technical characteristic of the movable stock Number of wagons in the train Running speed Qualitative indicators of the movable stock The cost of planned repairs The cost of maintenance
Duration of influence Sphere of occurrence	Factors that depend on the organization of train running	Number of train stops Train timetable Travel time
By the object of risk manifestation Source of origin	Factors that depend on competition between the types of transport	The amount of transportation tariffs Movable stock fullness Availability of effective competitors
Possibility of prediction By the object of risk manifestation Nature of consequences	Factors that depend on the infrastructure condition and the travel distance	Distance of travelling Railway infrastructure condition
Source of origin	Factors that depend on the quality of passenger servicing	Quality of servicing

Reference: [15] with author's amendments.

### **The novelty of the study.**

Improvement of the railway transport risk classification for passenger transportations.

Improvement of the approach to classification of the factors influencing the efficiency of the passenger trains' plying using the risks for passenger transportations.

### **Summary**

This study analyzed the risks on railway transport and improved their general classification for passenger transportations. The features of insurance on railway transport are determined and the rules of voluntary railway transport insurance of different insurance companies are analyzed. On the basis of the general railway transport risk classification for passenger transportations and taking into account the specific features of railway transport insurance, an improved classification of factors influencing the efficiency of the passenger train plying in connection with risks for passenger transportations has been built.

Such an approach to the use of the key factors influencing the efficiency of passenger transportation, together with the risks on railway transport, shows a more grounded impact on such economic factors as incomes from passenger transportations and expenses on them. This should

allow not only more reasonably to determine the rational areas of passenger trains' plying, but also to expand the diversity of insurance products and to improve insurance legislation.

Taking into account these factors and risks allows to ensure the adoption of informed decisions on improving the efficiency of passenger transportations and their competitiveness in the transport market of the country.

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