

UDC 330.3.338.2:656.2

JEL Classification M21 G 32 G31 O22 O31

**Olena Pylypenko, Candidate of Economic Sciences, Associate Professor**  
(Associate Professor of the Department of Economics, Marketing and Business Administration, State University of Infrastructure and Technologies)  
ORCID ID 0000-0003-3096-2377

**Olena Tsvirko, Doctor of Economics, Professor**  
(Professor of the Department of Economics, Marketing and Business Administration, State University of Infrastructure and Technologies)  
ORCID ID 0000-0003-3391-942X

**Valerii Kravchenko,**  
(Postgraduate Student, State University of Infrastructure and Technologies)

## **RISK MANAGEMENT OF INVESTMENT ACTIVITIES IN THE CONTEXT OF ENSURING INNOVATIVE DEVELOPMENT OF RAILWAY TRANSPORT**

*The expediency of implementing of innovative and invest projects in Ukraine in the context of military operations is substantiated in the article. The implementation of such projects ensures the functioning of critical infrastructure facilities and contributes to the growth of the country's defense capabilities. Consequently, there is a need to ensure effective risk management of investment activities. Given the importance of rail transport in the country's transport supply, investments in its restoration and development are critical.*

*The identity of the concepts of "investment risks" and "risks of investment activity" is established. The sources of investment risk formation are analysed and it is defined that the risks of investment activity are primarily associated with the existence of a time gap between the moment of investment and the time of income generation and payback of the project. This time gap (lag) introduces uncertainty into the business environment and project implementation, which in turn creates the risk of deviations of actual results from projected indicators.*

*The algorithm for managing risks of investment activity, based on the classical risk management approach and taking into account the specific features of the sources of investment risk formation as such, is proposed in the article. The primary instruments of investment risk management, along with the particularities of their application, are characterized in the article. The most promising and urgent investment projects, the implementation of which is particularly relevant for ensuring the functioning of railway transport in times of war, are described.*

*Prospective opportunities for financing investment projects are identified based on the financial performance indicators of JSC "Ukrainian Railways" using the financial statements for 2020-2023. The authors also analyzed the indicators of the company's financial condition over time. It is established that, despite positive trends reflected in the financial indicators over the past two years, the company's financial capabilities are still not sufficient for self-financing. In order to increase the attractiveness of Ukrzaliznytsia as an investment object it is necessary to implement a series of measures, including reforming its operations.*

© Olena Pylypenko, Olena Tsvirko, Valerii Kravchenko, 2024

*Concurrently, Ukrzaliznytsia's key advantage as an attractive investment opportunity is its resilience and capacity to function effectively despite considerable risks.*

**Keywords:** investment activity, innovations, investment projects, investment risks, risk management, Ukrzaliznytsia, financing, financial indicators, war.

**Problem statement.** In accordance with traditional riskological and investment approaches, military actions are considered a component of the political country risk assessment. As outlined by Sheremetynska O. V. and Kovalchuk A. V. (2018), country risk is the risk that changes in the business environment of the country where the business activity is carried out may adversely affect the enterprise, resulting in losses [1]. Military actions can lead to loss of lives, physical destruction of real investments, losses of assets due to losing control over territories, disruption of communications etc. As a result, the threat or conduct of hostilities in a specific territory inevitably results in a cessation of investment and a drop in the investment attractiveness of a particular country to almost zero. Concurrently, the experience of the war in Ukraine demonstrates that the country's survival and capacity for defence are dependent on the functioning of critical infrastructure, which includes energy, transportation, communication, water, heating, gas supply, and other essential services [2].

Furthermore, the railway, along with road transport, has remained the only means of transport connecting Ukraine with the world during the war. The railway also serves as the primary supply route for strategic commodities and the principal vehicle for the export of goods. This means that investments in the restoration and development of transport are critically important for Ukraine to survive. Hence, we are faced with a paradox: military operations usually lead to a cessation of investment, while the country's defence capability in times of war depends on financing of investment in a range of critical activities, such as the defence industry, communications, transport, digital technologies, innovations in these areas, and much more.

Ukraine's transport system, primarily railways, performs important functions for the country's defence capabilities. These include the transportation of cargo, including military and defence items, the export of commercial goods, and the movement of passengers, including the evacuation of people from regions affected by military operations. Sometimes, infrastructure enterprises come under attacks, and may be destroyed or damaged, disabling them and making operation impossible. In such circumstances, the implementation of essential infrastructure projects becomes a critical factor in maintaining the ability to operate rail transport. Therefore, Ukrainian railways require investments in restoration and development to ensure their future operational capacity.

In our opinion, Ukraine now has a unique advantage that makes it attractive for investment. This unique advantage, no matter how cynical it may sound, is the ability to apply the products and advanced technologies of the military-industrial complex during real combat operations and evaluate their effectiveness.

It can be concluded that military actions do not result in a complete cessation of investment activity. Instead, it leads to a more selective approach to investment, with a focus on identifying the most suitable investment opportunities. Therefore, the relevance of managing investment activities to ensure their effectiveness in the context of military operations is growing.

**Analysis of the latest research and publications.** Ukraine has adopted an international risk measurement standard, titled "Risk Management: General Risk Assessment Methods", which has been officially translated and implemented as a national standard. The present standard describes a set of risk assessment methods, particularly those risks related to the functioning of systems [3]. However, it does not provide a general definition of risk, nor does

it address the specific category of investment risk. Furthermore, the standard does not delineate the procedure and conditions for applying the proposed methods.

The issue of determining and managing investment risks is now underpinned by a solid theoretical and methodological foundation, as well as a range of well-established methodological tools, as correctly noted by scholars [4]. The theoretical and practical aspects of risk management of investment activities of enterprises in various sectors of the economy are of professional interest to many researchers and have been extensively studied. In this regard, it is worth noting the extensive scientific work of renowned scholars such as I. Blank, A. Sukhorukov, V. Kovalev, T. Kovalchuk, N. Kovalchuk, A. Matviichuk, and F. Fabozzi. Concurrently, an investigation of investment risks in a country experiencing external aggression and forced to respond to it represents a relatively new and unconventional area of research into investment activity.

For example, Voronina V. and Nechytailo Yu. (2022) highlight the pivotal role of investment in post-war economic recovery and emphasize the need to ensure investment attractiveness as a key factor for sustainable and stable territorial development [5]. The authors compare the situation before the war and after it began, noting that after 24 February 2022, a number of additional risks emerged, including logistical obstacles, the possibility of destruction or seizure of assets, infrastructure problems, the inability to attract foreign loans and insurance, and force majeure in payments.

Stetsiuk P. (2017) examines investment risk management in terms of adhering to financing schedules during the implementation of innovation and investment projects, while also considering risk factors when developing financial models [4]. Undoubtedly, financial support for the implementation of innovation and investment projects is an important component of project management and an essential factor in ensuring their overall success.

With regard to manageability, Stetsiuk P. outlines the following characteristics of risk: a) risk is, in most cases, a manageable parameter whose level can and should be actively influenced; b) the potential for influence exists only with respect to risks that have been identified, analysed, and assessed; c) a high initial level of risk is not a sufficient reason to refuse activities associated with this risk; d) there is always the potential to find a solution that ensures an acceptable compromise between expected benefits and the threat of losses [4]. In our view, this approach is appropriate and forms the basis of the developed risk management algorithm.

Nikiforov A. (2015) notes the following functions of risk: creative (stimulates the generation of new knowledge and the search for unconventional solutions to problems faced by innovators); preventive (involves planning measures and actions to prevent the occurrence of negative events. It also aims to eliminate or mitigate the consequences of such events and their impact on enterprise performance); regulatory; stabilisation (entails conducting innovation and investment activities following a defined algorithm aimed at reducing or eliminating the impact of negative factors); protective, etc. [6].

Algin A. [6] highlights alternativeness as one of the key properties of risk, emphasizing the need to choose a solution from a set of two or more potential options. The absence of alternative options eliminates the potential for risk [ibid]

In our opinion, the risk classification proposed by Kret I. and Petrushka T. (2018) is appropriate in terms for delineating responsibility. The researchers categorized enterprise investment risks into three groups: 1) The risk associated with selecting investment projects (risk group), which falls under the responsibility of the company's managers; 2) The risk tied to making strategic investment decisions (attributed to current owners); 3) The risk related to selecting areas of investment (attributed to future owners and company creditors). The authors thus emphasise the dependence of risk both on the choice of the investee and on the existence of time parameters, which also aligns with our own position [7].

Shepilenko V. (2022) posits that "...investment risk is associated with the loss of the real value of invested capital due to the depreciation of the national currency" [8], which, in our opinion, represents a narrow interpretation of the true nature of investment risk. This approach confines the scope of investment risk to the effects of inflation. Shepilenko V. suggests distinguishing three types of risk that may arise during the implementation of investment projects: initial, current, and final. Initial risks relate to circumstances that may arise prior to the commencement of investment activity, while current risks concern those that may surface during the management of investment activities. Finally, final risks involve those that may emerge during the process of obtaining or implementing the results of an enterprise's investment activity [ibid].

In their study, Tarasenko A., Boichuk T., and Dankov A. (2023) classified the risks and threats to the financial and economic security of industrial and transport companies. They identified both general risks and threats common to these companies and other business entities across various economic sectors, as well as specific risks and threats unique to the industrial or transport sectors. They postulated that since companies are interconnected through logistics, the risks may share common origins or be derived, for example, for transport companies, from industrial sectors [9].

In the words of Matviichuk A., risk can be defined as "...an uncertain event or condition that, if it occurs, has a positive or negative impact on the company's reputation and leads to profit or loss in monetary terms" [10]. As is evident from this definition, even a positive deviation that results in profit should be regarded as a risky situation. While this definition is arguably justified, it seems unlikely that such an approach to defining a risk situation should be considered a standard.

In her research on the risks inherent to the railway sector of the global economy, Nakaliuzhna A. (2023) identifies the state of infrastructure as a significant source of risk for railway operations. According to Nakaliuzhna A., deficiencies in the railway infrastructure and deterioration of fixed assets can not only result in injuries to personnel but also lead to accidents involving passengers [11].

The issue of managing the risks associated with the duration of investment was considered in the work of Pylypenko O. (2014) [12]. The author proposes a methodical approach to the management of the duration of an investment project through the optimisation of the project costs for its implementation [12].

Thus, it becomes evident that the issue of investment risk management has been explored from various perspectives in existing research. However, the question of the feasibility of investments themselves and the management of investment risks in wartime remain insufficiently studied.

**The objective of this article** is twofold: first, to propose an algorithm for management of investment risks in railway transport enterprises within the context of military operations; and second, to evaluate the capability of JSC Ukrzaliznytsia to implement investment projects aimed at ensuring the innovative development of the company.

**Research result.** The experience of a state of martial law in Ukraine demonstrates that its implementation does not entirely preclude investment activity. It is therefore necessary to identify those areas of investment activity that are likely to be promising and which should ensure the feasibility of their implementation. These are innovation and investment activities designed to guarantee and enhance the country's defense capabilities and strengthen the resilience of business entities during wartime.

Accordingly, all investment activity objects can be classified into two distinct categories based on the aforementioned criterion. The first category comprises those objects in which investments can and should be made during wartime, and which are therefore appropriate, necessary, and urgent. The second category, by contrast, includes objects in which

investments are not appropriate and can be postponed. Given limited financial resources, the second category pragmatically encompasses investments in the development of social and civilian infrastructure.

First and foremost, it is strategically advantageous to invest in projects related to defence capability, including innovative initiatives such as:

- war and disaster medicine, war trauma medicine;
- manufacturing of military hardware;
- critical civilian infrastructure, including transport, energy, and other essential systems.

In the current context, innovations must ensure not only the efficiency of business entities but also the survival of Ukraine as a sovereign state. Modern warfare underscores the pivotal role of technology. According to the StartUs Insights agency, the utilization of military innovative technologies represents a critical factor for achieving competitive advantage on the battlefield.

This includes the deployment of artificial intelligence, which enhances data analysis, decision-making, and automation; the integration of robotics and autonomous systems, such as unmanned aerial vehicles (UAVs) and ground robots capable of operating independently of human intervention; the Internet of Military Things (IoMT), a network of devices designed to collect and exchange real-time data on the battlefield; 5G Internet, which facilitates communication and coordination of autonomous systems in real time; nanotechnology, enabling the development of ultra-light and durable materials essential for military equipment; ultra-fast weaponry, which provides advanced capabilities for modern combat scenarios; and biotechnology, genetics, and bioengineering, which contribute to breakthroughs in medical treatment, performance enhancement, and material science [13]. These innovations collectively shape the landscape of modern warfare and contribute to bolstering Ukraine's defense and resilience.

New technologies have the potential to radically transform approaches to warfare; however, their implementation undoubtedly requires significant investment. In the context of the Russian-Ukrainian war, the rapid and effective adoption of such innovations is crucial for Ukraine's survival and the possibility of achieving victory. The sooner Ukraine identifies opportunities to invest in the development of innovations in this field, the stronger and more resilient its position in the war will be, and the fewer its losses in terms of human lives and non-renewable resources.

The Law of Ukraine "On Critical Infrastructure" outlines a broad spectrum of activities that fall under the category of critical infrastructure [2]. Consequently, it should be acknowledged that the prioritization of investments serves only as an indicative framework, defining general directions rather than an absolute hierarchy of priorities.

Investment activities are associated with various types of risks that, to varying degrees, affect the investment process and the ultimate financial outcome. Investment risk is most commonly defined as the probability of failing to achieve a return on investment, whether in the form of profit or income, or incurring a loss of assets or invested capital. The investment process typically involves a time interval between the initial investment and the generation of returns from the investment project. The duration of this interval depends on various factors. However, the time lag between the initial investment and the moment when the discounted returns from the investment project equal the original investment (i.e., the payback period) is often significant. This temporal lag inherently contributes to the risk associated with investment activities. The conditions for project implementation and business operations, both external and internal, may change and deviate from the projected scenario, which gives rise to uncertainty, and consequently, risk. In our view, this approach to defining the essence of risk is characteristic of investment risks.

In defining the essence of risk, the renowned Ukrainian mathematician Andrii Matviichuk identifies several key characteristics, including the following:

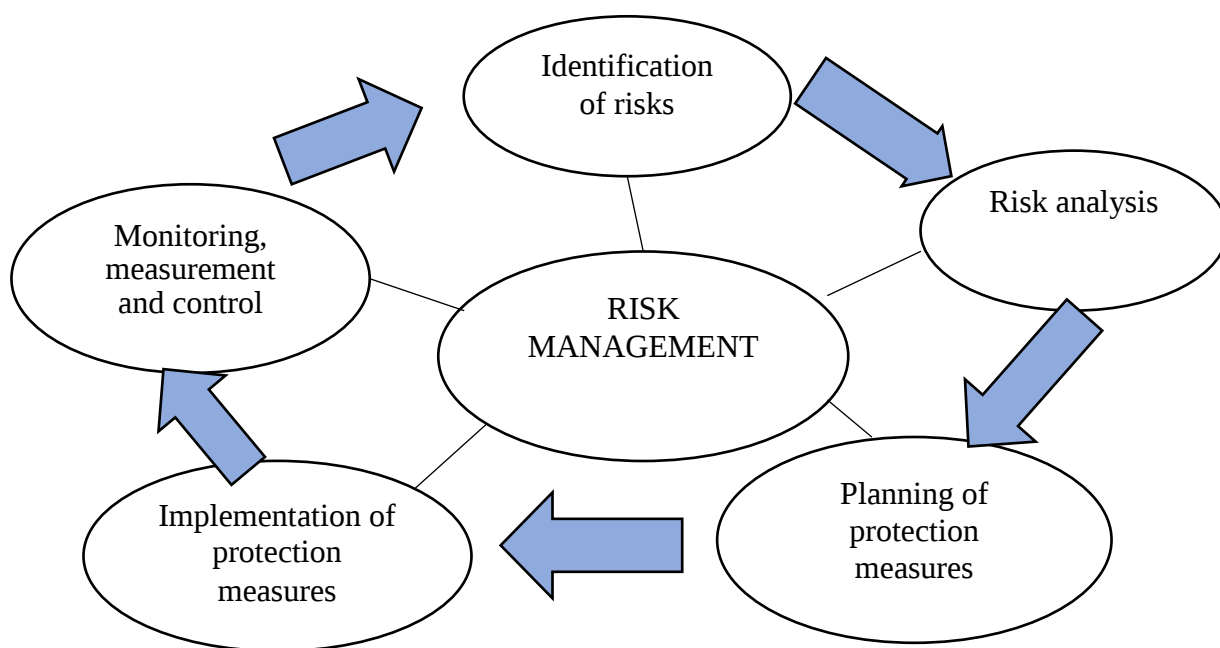
- the concept of risk is always associated with the future;
- it is intrinsically linked to the temporal gap between the potential occurrence of an event and its realization;
- risk directly influences the achievement of project goals, etc. [10].

Hence, the time interval is crucial in the formation of risk in general.

In our method of investment risk management, we consider the concepts of “investment activity risks” and “investment risks” to be identical, since the determining factor in the formation of the essence of these risks is the time gap between the moment of investment and the moment of their payback. Additionally, the consequences of the occurrence of undesirable events are identical. Therefore, we can assert that the concepts of “investment activity risks” and “investment risks” are essentially identical and can be used as synonyms.

According to Andrii Matviichuk, general risk management involves five sequential and interconnected stages / steps (Fig. 1). These are: Risk identification, Risk analysis, Planning protective measures, Implementation of protection measures, and Monitoring, measurement, and control [10].

In general, we concur with the proposed approach, but taking into account the essence of investment risk, we propose presenting investment risk management as a decision-making algorithm (flowchart) for selecting management methods (Fig. 2).



**Fig. 1. General scheme of risk management according to A. Matviichuk**

Source: [10]

At each stage of this algorithm, specific decisions are made, and corresponding steps are taken to optimize the company’s actions in terms of resource efficiency, minimizing losses, and/or maximizing performance. The investment risk management methods outlined in the

algorithm can be applied to all types of risks, regardless of the project phase: initial, investment, or final.

The initiation of an investment project represents a broader stage that encompasses addressing various issues, including project identification, preparation of project documentation, selection of funding sources, pre-investment planning, and more. This phase is not directly related to the investment risk management process. However, during the project formulation stage, specific conditions for its implementation are established, which subsequently lead to situations characterized by uncertainty and risks within the project.

The next stage is directly related to the risk management of a particular investment project and involves identifying the nature of the risk that may potentially threaten or be associated with a particular investment project. This includes examining the sources of risk, possible causes of its occurrence, and symptoms that may precede a negative situation.

The Risk Management Standard defines risk identification as “the process of identifying, realizing, and recording risks”. The aim of risk identification is to determine the potential occurrences or scenarios that may impact the attainment of the objectives of a system or organization [3]. Most of the methods suitable for this stage consist of diverse expert techniques.

The following step in the risk management process involves forecasting the occurrence of a specific negative situation and determining the potential consequences of unexpected events. As for forecasting methods, it is advisable to utilize those most suitable for the specific situation, ranging from extrapolation and trend adjustment to expert-based techniques. In our opinion, the most effective approach would be to apply a method of scenario building combined with expert methods.

Risk analysis, as a stage of risk management, can be performed using the following methods: qualitative, semi-quantitative (involving a combination of numerical scales for assessing consequences and probabilities, as well as their combination), and quantitative. In cases where the use of quantitative methods is too complex or excessively costly, they can be replaced with comparative semi-quantitative or qualitative risk ranking, as provided in the Risk Management Standard. It is important that the forecasting of the consequences of negative events addresses not only the direct impact of the event/phenomenon but also accounts for remote consequences that may arise in the future and can be considered caused by certain events, as well as secondary consequences, i.e., the impact on related systems [3].

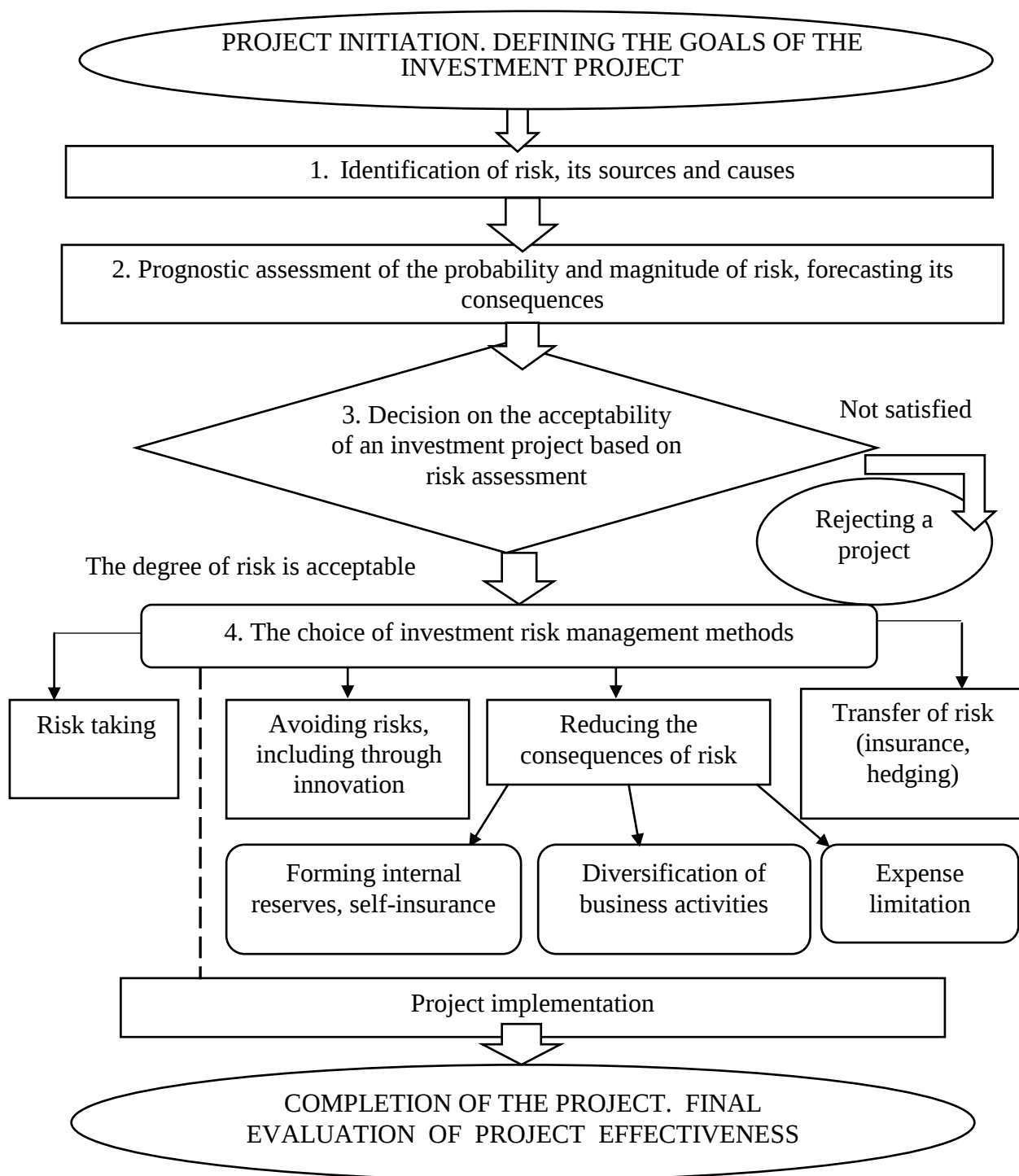
The next stage is depicted in the management algorithm as a decision-making block (Figure 2). At this stage, project managers and investors compare the results of the risk assessment with a benchmark – namely, the expected (planned) performance of a particular investment project or with the performance of similar projects implemented in the past or in global practice, or with industry averages. If investors deem the deviation of potential results from the ideal targets acceptable, the project risks can be assessed as manageable, and the project is approved for implementation. Investors will provide investment for the project and it will be financed. However, if investors and project managers conclude that the projected outcomes deviate too much from the desired results, it is highly likely that investors will refuse to finance such project, and a decision to implement it will not be made.

Even if the project is approved, it remains the responsibility of investors and/or project managers to select an appropriate method for managing investment risks. Broadly speaking, the extensive range of investment risk management methods can be categorized into four principal groups: risk avoidance, risk acceptance, risk transfer (to third parties for a fee, most commonly through insurance of risk), and risk mitigation by reducing the severity of potential consequences.

It should be noted that such a grouping is somewhat arbitrary, as in practice a specific combination of individual methods is employed.

In general terms, risk avoidance means avoiding any risky situations and avoiding dangerous actions, however, entrepreneurial activity in a broad sense involves risk taking, the

ability of an entrepreneur to take risks, make decisions and act in conditions of uncertainty, and take responsibility for his or her actions. Consequently, in practical applications, investors and entrepreneurs often refrain from transactions perceived to be associated with an elevated level of risk. This can be achieved through various strategies, including the collection of information regarding potential hazards, the limitation of investments in specific domains, and other risk management techniques. The integration of these diverse approaches reflects a multifaceted approach to risk management.



**Fig. 2. Flowchart of Risk Management in Investment Activity**

Source: authors' development

The acceptance or retention of risk inherent to an investment project necessitates a series of determinations pertaining to potential risk scenarios. These include the establishment of internal profitability reserves, the assumption of managerial and entrepreneurial accountability for project outcomes, and so forth.

The most comprehensive category of methods entails the mitigation of the consequences of risk. Such methods include self-insurance, cost and resource limitation, risk distribution (including diversification), and hedging (especially in the realms of financial investments).

During the implementation of the project, these and other methods may be applied at the discretion of the management team.

The conclusion of an investment project necessitates a comprehensive evaluation of its effectiveness, an assessment of the return on investment, and an analysis of the efficacy of the measures implemented to mitigate the impact of adverse circumstances that may have arisen during the project's lifespan.

One of the functions of risk is its innovativeness or creativity, which is expressed in the utilisation of innovative methods for the measurement and forecasting of risk, as well as the development of novel strategies for its reduction and avoidance. The creative function of risk is performed by stimulating the creation of new knowledge and encouraging the pursuit of unconventional solutions to the challenges faced by the entrepreneur.

The functioning of Ukraine's railway transport already requires investments in the maintenance and operational activities, as well as the development and restoration of fixed assets: both rolling stock and infrastructure complexes. JSC 'Ukrzaliznytsia' continues to restore infrastructure using its own funds, which has been damaged due to attacks by the Russian Federation. Moreover, as one of the largest electricity distribution operators, the company invests in the protection of substations and critical energy infrastructure facilities [14].

The Russian-Ukrainian war has created unprecedented challenges for the Ukrainian railways. In order to ensure the efficient functioning of the railway as a vital transport artery during the war, it is necessary to ensure the capacity of the railways in certain areas, and especially at border crossings points, particularly with Poland and Moldova, as this will allow increasing freight traffic, boosting exports of Ukrainian products through Moldovan ports and increasing transit volumes via land railway crossings with other countries. For example, Ukraine had to restore an alternative railway route to connect Odesa and the Danube ports, which had not been operational since 1999. The issues of modernisation and electrification of checkpoints and railway crossings on the borders with Poland, Slovakia, Hungary, and Romania remain relevant, and terminals are being built near border crossing stations [15, 16]. Before the war, the electrification of non-electrified sections had begun, the expediency of which was explained by fuel savings and reduction of harmful emissions into the atmosphere, which was in line with sustainable development goals. However, today, because of destroying energy infrastructure by Russian troops, railway electrification has been suspended.

Despite the war affecting the railway sector, the implementation of a number of investment projects related to infrastructure modernisation and rolling stock renewal remains relevant, such as:

- construction, repair, and rehabilitation of the railway network (helps improve transport accessibility in regions, increase cargo turnover, and passenger traffic);
- reconstruction and renewal of tracks, bridges, tunnels, and other engineering structures (improves traffic safety, increases train speed, and line capacity);
- electrification of lines (switching to electric traction reduces fuel costs, reduces emissions, and improves transportation efficiency);
- introduction of modern train control systems to improve safety, reduce staff costs, and optimise the use of infrastructure;

- the renewal of rolling stock, including the purchase of new freight cars, is expected to increase their carrying capacity, improve reliability, and reduce repair costs. The renewal of locomotives is expected to increase railway capacity and transportation, improve speeds, guarantee the reliability of supply, and so on. Furthermore, it has been demonstrated that the implementation of such systems has the additional benefit of reducing fuel consumption.

The investment projects that incorporate the implementation of cutting-edge digital technologies and artificial intelligence into railway operations have the potential to facilitate innovative growth and competitive advantages.

The implementation of automated control systems, GPS navigation, accounting, and control systems has the potential to enhance the efficiency of the railway, reduce costs, and improve the quality of services provided.

The Internet of Things (IoT) enables the monitoring of the status of rolling stock, which can facilitate more efficient maintenance and management of railway infrastructure.

The application of artificial intelligence for route optimisation, demand forecasting, passenger service, and resource management enables the reduction of costs, enhances service quality, and increases the efficiency of the railway [17].

Overall, the attractiveness of JSC 'Ukrainian Railways' as an investment object is limited by several factors: first, Ukrzaliznytsia is a state-owned company (100% of its shares are owned by the Cabinet of Ministers of Ukraine); second, investors are deterred by the war, uncertainty, and corruption. Ongoing shelling and the risk of further attacks make investments in railway infrastructure highly risky. The opportunities for state financing of investment projects are, of course, constrained. The sources of financing for investment projects, as before the war, largely remain loans from international financial institutions such as the European Bank for Reconstruction and Development, the World Bank, and others. Another means of raising funds is the issuance of bonds: Ukrzaliznytsia is the issuer of Eurobonds listed on the Irish Stock Exchange. Currently, there is information about the restructuring of Eurobonds amounting to \$895 million and the postponement of coupon payments due in 2023-2024 until January 2025. The deferral and restructuring of Eurobond payments will allow Ukrzaliznytsia to reduce the liquidity burden on the company and contribute to the stable operation of continuous rail transportation of goods and passengers during the wartime period [18].

The prospect of attracting direct investment from foreign companies interested in developing rail transport in Ukraine, as well as the potential for public-private partnerships involving private capital in the financing and management of railway assets, remains promising.

Given the above, it is also important to determine the extent to which JSC "Ukrainian Railways" is capable of independently financing the necessary investment projects. Since the ability to independently finance innovative and investment development is largely determined by the solvency and performance of the economic entity, we will examine the financial state of Ukrainian Railways in terms of the compliance of existing indicators with recommended values and the assessment of established trends (Table 1).

**Table 1. Dynamics of key indicators of the financial position of JSC Ukrzaliznytsia**

| Financial position indicators                                         | As at the end of the financial year |      |      |      |
|-----------------------------------------------------------------------|-------------------------------------|------|------|------|
|                                                                       | 2020                                | 2021 | 2022 | 2023 |
| 1                                                                     | 2                                   | 3    | 4    | 5    |
| 1. Non-current assets, the percentage share in the value of property. | 96,9                                | 94,9 | 92,8 | 88,5 |

Table 1 continued

| 1                                                                   | 2         | 3         | 4         | 5         |
|---------------------------------------------------------------------|-----------|-----------|-----------|-----------|
| Of which:                                                           |           |           |           |           |
| – Property, plant and equipment                                     | 68,8      | 68,5      | 65,5      | 78,7      |
| – Intangible assets                                                 | 17,8      | 19,5      | 18,3      | 0,14      |
| – Capital investments in progress                                   | 2,8       | 3,1       | 3,2       | 4,2       |
| – Financial investments, including long-term investments            | 0,4       | 0,5       | 0,38      | 0,32      |
| 2. Net working capital, million UAH                                 | -17 178,7 | -10141,6  | +3 975,1  | +13 114,5 |
| 3. Indicators of financial stability and independence:              |           |           |           |           |
| – autonomy ratio                                                    | 0,776     | 0,769     | 0,762     | 0,708     |
| – share of long-term liabilities in the total sources of funds, %.  | 11,1      | 14,2      | 18,3      | 22,4      |
| – share of short-term liabilities in the total sources of funds, %. | 11,3      | 9,0       | 5,5       | 6,7       |
| 4. Solvency indicators:                                             |           |           |           |           |
| – absolute liquidity ratio                                          | 0,081     | 0,098     | 0,097     | 0,778     |
| – coverage ratio                                                    | 0,407     | 0,563     | 1,290     | 1,715     |
| 5. Income and profitability:                                        | -11 772,3 | 427,7     | -9 642,8  | 5 044,1   |
| – net income, UAH million;                                          | -10,98    | +3,42     | +10,68    | +5,81     |
| – operating profitability (loss), %;                                | -4,48     | +0,17     | -3,94     | +1,93     |
| – return on assets (loss), %;                                       |           |           |           |           |
| ▪ return (loss) on shareholders' equity                             | -5,72     | +0,21     | -5,15     | +2,63     |
| 6. Average annual value of assets, million UAH                      | 262 824,9 | 258 267,6 | 254 471,2 | 260 964,9 |
| 7. Average annual value of equity, million UAH                      | 205 735,5 | 199 483,2 | 194 797,8 | 191 782,4 |

Source of data: [19]

The study of the dynamics of the value and structure of the company's assets allows for the following conclusions: there is a gradual but steady decrease in the share of non-current assets within the asset structure, accompanied by a corresponding increase in the proportion of current assets. As a result, the company's ability to utilize mortgage loans secured by non-current assets and real estate is diminishing.

At the same time, the share of fixed assets increased sharply in 2023 – by almost 10 % compared to the 2020 level. From the perspective of asset structure, these are positive changes. However, there was a significant decrease in the share of intangible assets in the total value of the company's assets, which is associated with the revaluation of intangible assets in 2023.

As observed, capital investments in progress account for approximately 3-4 % of Ukrzaliznytsia's assets, while long-term financial investments represent less than half a percent. There have been no significant changes in the value of these assets.

A company's Net working capital reflects its property position. This indicator is defined as the difference between the company's current assets and its short-term borrowings at the end of each financial year. According to Table 1, this indicator had a negative value in 2020-2021,

reflecting that Ukrzaliznytsia's current business activities during these years were financed by current liabilities, which is a sign of financial instability. In 2022-2023, the indicator turned positive and has been gradually increasing, which is evaluated positively as it demonstrates independence from external financing for operational activities.

The indicators of financial stability and independence reflect the extent to which the company relies on borrowed and external sources of financing.

Based on the calculation of analytical indicators and comparing their values with recommended norms, the following conclusion can be made: JSC "Ukrzaliznytsia" demonstrates a high degree of independence from external financing sources during the analyzed years.

The autonomy ratio, which reflects the share of equity in total funding sources, remained within the range of 71-77% during the analyzed period. This structure of liabilities enables Ukrzaliznytsia to attract borrowed funds without significant credit risk for lenders. The table also shows a notable increase in the share of long-term liabilities in total funding, coupled with a significant reduction in current liabilities. This borrowing structure is typical for companies investing in strategic development and is generally viewed positively.

It is also important to consider the findings of P. Stetsiuk, who emphasizes that differentiating sources of investment financing can potentially affect the financial stability of the enterprise [4]. This risk arises when the majority of financing is derived from borrowed and loaned funds, which can lead to imbalances in the capital structure.

Two key solvency indicators were calculated to assess the company's ability to meet its current liabilities, including those with the shortest maturity. The absolute liquidity ratio, which reflects the ability to cover current liabilities with the most liquid assets, has a normative range of 0.2-0.35. A company is considered short-term solvent if it can repay 20-35% of its current liabilities using cash and cash equivalents. According to the data, between 2020 and 2022, Ukrzaliznytsia lacked sufficient liquid assets to meet its current liabilities. However, in 2023, the company demonstrated a significant improvement in absolute liquidity, which may be a result of a number of factors.

The coverage ratio is the most comprehensive measure of liquidity, indicating a company's ability to repay current debts using all current assets. The normative value of this indicator is 2-2.5, signifying that the value of current assets should be at least twice the value of current liabilities. Maintaining this ratio minimizes the risk of borrowers failing to repay short-term loans within a year. As shown in the table, Ukrzaliznytsia's solvency exhibited improvement only during the 2022-2023 period, with values approaching the regulatory thresholds.

An analysis of profitability indicators reveals the absence of consistent trends in the company's financial performance. In 2020, the company reported substantial losses, likely attributable to the economic downturn and transportation volume reduced during the period of COVID-19 restrictions.

Regarding the structure of funding sources, attention should be drawn to a significant trend: the reduction in the value of equity. The reasons for this are clear: equity decreases due to the accumulation of past years' losses.

A review of the financial results and the financial condition of JSC "Ukrainian Railways" shows that the company's capacity for self-investment emerged only in 2023. This marked the first time in many years that Ukrzaliznytsia achieved a favourable financial outcome from its economic activities, recording a positive result of just over UAH 5 billion. The factors that had a positive impact on the financial results of UZ were follows:

- an increase in revenue from passenger transportation by UAH 1.42 billion, due to an 11 % increase in passenger turnover;
- savings of UAH 4.81 billion on the item 'Materials' and reduction of the cost of repairs due to the use of old materials;

- additionally, the hryvnia exchange rate proved more stable than initially anticipated, resulting in exchange rate differences of +UAH 4.53 billion;
- the restoration of the utility of assets in the de-occupied territories, amounted to UAH 1.88 billion [14].

In accordance with the directive from the Cabinet of Ministers of Ukraine, the net profit of Ukrzaliznytsia was distributed. The following amounts were allocated for specific purposes:

- UAH 1.51 billion was allocated to pay dividends to the state budget;
- UAH 2.52 billion was allocated to finance capital investments approved in the consolidated financial plan for 2024, reconstruction of critical railway infrastructure and rolling stock renovation;
- more than UAH 1 billion was allocated to finance the transportation of concrete and reinforced concrete structures for the construction of military engineering and fortifications [20].

This indicates that, despite positive changes, the company's own funds will evidently be insufficient to ensure the prospective development of Ukrzaliznytsia. Moreover, the presence of substantial accumulated losses further deteriorates the company's financial position.

At the same time, it should be acknowledged that the operation of Ukrainian enterprises is characterized by a unique trait – resilience. Despite the extremely difficult business environment, Ukrzaliznytsia managed not only to continue operating during the war but also to achieve profitability.

**Conclusions and suggestions.** Following the end of the war, a significant increase in investment in the Ukrainian railway sector is expected. To ensure sustained investor interest in the railway as an investment asset, comprehensive reforms will be necessary across several key areas, including the railway sector itself, the broader economy, social relations, and societal attitudes. Reforms aimed at improving the transparency and efficiency of Ukrzaliznytsia's management will play a crucial role in attracting additional investors. International financial institutions may also provide loans and guarantees to support Ukrzaliznytsia's investment projects.

The restoration and development of railway infrastructure represent a strategically important task for Ukraine. Attracting both domestic and foreign investments will aid in repairing damaged infrastructure, modernizing the railway system, and enhancing its competitiveness. However, successful implementation of these investment projects will require overcoming a range of challenges, including those related to the war, corruption, and geopolitical risks.

## REFERENCES

1. Sheremetynska O., Kovalchuk A. (2018) Otsinka krainovoho ryzyku v krainakh Skhidnoi Yevropy [Assessment of country risk in the countries of Eastern Europe]. Black Sea economic studies journal. 2018. Issue 36. P. 164-169. [in Ukrainian].
2. Law of Ukraine "On Critical Infrastructure". VVR, 2023, No. 5, Art. 13. Available at: <https://zakon.rada.gov.ua/laws/show/1882-20#Text> (Accessed 27<sup>th</sup> of August, 2024). [in Ukrainian].
3. Risk management. Methods of general risk assessment. National standard of Ukraine. The publication is official. Available at: [https://zakon.isu.net.ua/sites/default/files/normdocs/iso\\_31010.pdf](https://zakon.isu.net.ua/sites/default/files/normdocs/iso_31010.pdf) (Accessed 21<sup>st</sup> of August, 2024). [in Ukrainian].
4. Stetsiuk P. (2017) Upravlinnia ryzykamy finansuvannia innovatsiino-investytsiinoi diialnosti pidpriemstv. [Risk management of financing innovation and investment activities of enterprises]. Economy. Management. Business. Available at: <https://journals.dut.edu.ua/index.php/emb/article/view/1590/1520>. (Accessed 21<sup>st</sup> of August, 2024). [in Ukrainian].
5. Voronina V., Nechitailo Yu. (2022) Investytsii: faktory ta ryzyky. [Investments: factors and risks]. Change management and innovation: scientific and practical journal, No. 4, pp. 5-8. DOI: <https://doi.org/10.32782/CMI/2022-4-1> (Accessed 21<sup>st</sup> of August, 2024). [in Ukrainian].
6. Nykyforov, A. (2015) Ryzyky innovatsiino-investytsiinoi diialnosti ta yikh rol u rozvytku ekonomiky.

[Risks of innovation and investment activity and their role in the development of the economy]. Current Economic Problems, No. 8 (170), 2015. P. 45-52. Available at: <https://ir.kneu.edu.ua/server/api/core/bitstreams/861794ec-11e7-474b-b1fd-88607c7d659e/content> (Accessed 25 of August, 2024). [in Ukrainian].

7. Kret, I., Petrushka, T. (2018) Investytsiinyi ryzyk ta yoho vplyv na napriamy investytsiinoi diialnosti pidpriemstva. [Investment risk and its impact on the company's investment activities]. Black Sea Economic Studies, 2018, Vol. 28-1. Available at: <https://griml.com/8TJy8> (Accessed 21<sup>st</sup> of August, 2024). [in Ukrainian].

8. Shepylenko V. (2022) Investytsiinyi ryzyky v diialnosti pidpriemstv. [Investment risks in the activities of enterprises]. Bulletin of the Sumy National Agrarian University. Series Economics and Management, issue 2 (82), 2022. P. 24-29. [in Ukrainian].

9. Tarasenko A., Boichuk T., Dankov A. (2023) Upravlinnia ryzykamy v konteksti zabezpechennia finansovo-ekonomichnoi bezpeky transportnykh i promyslovykh kompanii. [Risk management in the context of ensuring the financial and economic security of transport and industrial companies]. Polissya Scientific Bulletin, (2(27), 2023, P. 143–160. URL: [https://doi.org/10.25140/2410-9576-2023-2\(27\)-143-160](https://doi.org/10.25140/2410-9576-2023-2(27)-143-160) (Accessed August 23, 2024). [in Ukrainian].

10. Matviichuk, A. Upravlinnia ryzykamy [Risk management]: a course of lectures. Available at: <https://www.slideshare.net/slideshow/pmclub-march/60342826#6> (Accessed August 23, 2024). [in Ukrainian].

11. Nakaliuzhna, A. (2023) Suchasni ryzyky u zaliznychnomu sektori svitovoi ekonomiky. [Modern risks in the railway sector of the world economy]. WARN 2023. P. 609-612. Available at: [https://files.duit.edu.ua/uploads/Сайт/3\\_НАУКА/conferences/international-scientific-and-practical-conferences/hybrid-threats-23-11-2023.pdf](https://files.duit.edu.ua/uploads/Сайт/3_НАУКА/conferences/international-scientific-and-practical-conferences/hybrid-threats-23-11-2023.pdf) (Accessed August 23, 2024). [in Ukrainian].

12. Pylypenko, O. (2014) [Features of risk management of the duration of investment projects in the railway transport of Ukraine]. Collection of scientific works of SETUT, series Economics and Management. 2014. Issue 30. P. 116-126. [in Ukrainian].

13. Top 10 Military Technology Trends & Innovations for 2025. Available at: <https://www.startus-insights.com/innovators-guide/top-10-military-technology-trends-2022/> (Accessed August 23, 2024). [in English].

14. UZ torik otrymala 5 miliardiv prybutku, polovynu – perekazala derzhavi. [UZ received 5 billion in profit last year, half of which was transferred to the state]. Economic truth. Electronic edition. April 9, 2024. Available at: <https://www.epravda.com.ua/news/2024/04/9/712203/> (Accessed 27<sup>th</sup> of August, 2024). [in Ukrainian].

15. Ukraina i Moldova vidnovyly alternatyvnyi zaliznychnyi marshrut mizh Odesoiu ta Dunaiskymy portamy [Ukraine and Moldova have restored an alternative railway route between Odesa and the Danube ports]. Suspilne news agency: News. Available at: <https://suspilne.media/273737-ukraina-i-moldova-vidnovili-alternativnij-zaliznicnij-marsrut-mizh-odesou-ta-dunajskimi-portami/> (Accessed 27<sup>th</sup> of August, 2024). [in Ukrainian].

16. Bondar, V., Kopylov, Mykola. Chy dostatno Ukraini zaliznychnykh perekhodiv z krainamy Yevropy [Are there enough railway crossings with European countries for Ukraine?]. Rail.Insider. 06/27/2023. Available at: <https://www.railinsider.com.ua/chy-dostatno-ukrayini-zaliznychnyh-perekhodiv-z-krayinamy-yevropy/> (Accessed 27<sup>th</sup> of August, 2024). [in Ukrainian].

17. Ukrzaliznytsia. Wikipedia. Available at: <http://surl.li/oaylap> (Accessed 27<sup>th</sup> of August, 2024). [in Ukrainian].

18. Ukrzaliznytsia uzghodyla restrukturyzatsiiu yevrooblihotsii na sumu \$895 mln. [Ukrzaliznytsia agreed on the restructuring of Eurobonds in the amount of \$895 million]. Press center. News from 12/23/2022. (Accessed 27<sup>th</sup> of August, 2024). [in Ukrainian].

19. The Ukrainian Railways Joint Stock Company. Financial statements for 2020-2023. Available at: [https://clarity-project.info/edr/40075815/finances?current\\_year=2023](https://clarity-project.info/edr/40075815/finances?current_year=2023) (Accessed 21st August, 2024) [in Ukrainian].

20. Uriad rozpodilyv 5 miliardiv prybutku «Ukrzaliznytsi». [The government distributed 5 billion of Ukrzaliznytsia's profit]. Economic truth, May 5, 2024. Available at: <https://www.epravda.com.ua/news/2024/05/3/713251/> (Accessed 27<sup>th</sup> of August, 2024). [in Ukrainian].

## ЛІТЕРАТУРА

1. Шереметинська О.В., Ковальчук А.В. Оцінка країнового ризику в країнах Східної Європи. Причорноморські економічні студії. 2018. Випуск 36. С. 164-169.

2. Закон України «Про критичну інфраструктуру». ВВР, 2023, №5, ст. 13. URL: <https://zakon.rada.gov.ua/laws/show/1882-20#Text> (дата звернення 27.08.2024).

3. Керування ризиком. Методи загального оцінювання ризику. Національний стандарт України. Видання офіційне. URL: [https://zakon.isu.net.ua/sites/default/files/normdocs/iso\\_31010.pdf](https://zakon.isu.net.ua/sites/default/files/normdocs/iso_31010.pdf) (дата звернення 21.08.2024).
4. Стецюк П.А. Управління ризиками фінансування інноваційно-інвестиційної діяльності підприємств. Економіка. Менеджмент. Бізнес. 2017. URL: <https://journals.dut.edu.ua/index.php/emb/article/view/1590/1520>. (дата звернення 21.08.2024).
5. Вороніна В.Л., Нечитайло Ю.А. Інвестиції: фактори та ризики. *Управління змінами та інновації: науково-практичний журнал*, № 4, 2022. С. 5-8. DOI: <https://doi.org/10.32782/CMI/2022-4-1> (дата звернення 21.08.2024).
6. Никифоров А.Є. Ризики інноваційно-інвестиційної діяльності та їх роль у розвитку економіки. *Актуальні проблеми економіки*, № 8 (170), 2015. С. 45-52. URL: <https://ir.kneu.edu.ua/server/api/core/bitstreams/861794ec-11e7-474b-b1fd-88607c7d659e/content> (дата звернення 25.08.2024).
7. Крет І.З., Петрушка Т.О. Інвестиційний ризик та його вплив на напрями інвестиційної діяльності підприємства. *Причорноморські економічні студії*. 2018. Вип. 28-1. URL: <https://griml.com/8TJy8> (дата звернення 23.08.2024).
8. Шепиленко В.Ю. Інвестиційні ризики в діяльності підприємств. *Вісник Сумського національного аграрного університету. Серія «Економіка і менеджмент»*, випуск 2 (82), 2022. С. 24-29.
9. Тарасенко А., Бойчук Т., Даньков А. Управління ризиками в контексті забезпечення фінансово-економічної безпеки транспортних і промислових компаній. *Науковий вісник Полісся*, (2(27), 2023, С. 143–160. URL: [https://doi.org/10.25140/2410-9576-2023-2\(27\)-143-160](https://doi.org/10.25140/2410-9576-2023-2(27)-143-160) (дата звернення 23.08.2024).
10. Матвійчук А.В. Управління ризиками: курс лекцій. Електронний ресурс. URL: <https://www.slideshare.net/slideshow/pmclub-march/60342826#6> (дата звернення 23.08.2024).
11. Накалюжна А. Сучасні ризики у залізничному секторі світової економіки. *WARN 2023*, с. 609-612. URL: [https://files.duit.edu.ua/uploads/Сайт/3\\_НАУКА/conferences/international-scientific-and-practical-conferences/hybrid-threats-23-11-2023.pdf](https://files.duit.edu.ua/uploads/Сайт/3_НАУКА/conferences/international-scientific-and-practical-conferences/hybrid-threats-23-11-2023.pdf) (дата звернення 23.08.2024).
12. Пилипенко О.В. Особливості управління ризиками тривалості інвестиційних проектів на залізничному транспорті України. *Збірник наукових праць ДЕТУТ, серія «Економіка і управління»*. 2014. Вип. 30. С. 116-126.
13. Top 10 Military Technology Trends & Innovations for 2025. URL: <https://www.startus-insights.com/innovators-guide/top-10-military-technology-trends-2022/> (дата звернення 23.08.2024).
14. УЗ торік отримала 5 мільярдів прибутку, половину – переказала державі. Економічна правда. Електронне видання. 9 квітня 2024 р. URL: <https://www.epravda.com.ua/news/2024/04/9/712203/> (дата звернення 27.08.2024).
15. Україна і Молдова відновили альтернативний залізничний маршрут між Одесою та Дунайськими портами. *Суспільне: Новини*. URL: <https://susplne.media/273737-ukraina-i-moldova-vidnovili-alternativnij-zaliznicnij-marsrut-miz-odesou-ta-dunajskimi-portami/> (дата звернення 27.08.2024).
16. Бондар В., Копилов М. Чи достатньо Україні залізничних переходів з країнами Європи. *Rail.Insider*. 27.06.2023. URL: <https://www.railinsider.com.ua/chy-dostatno-ukrayini-zaliznychnyh-perehodiv-z-krayinamy-evroпу/> (дата звернення 27.08.2024).
17. *Укрзалізниця*. Вікіпедія. URL: <http://surl.li/oaylap> (дата звернення 27.08.2024).
18. *Укрзалізниця* узгодила реструктуризацію єврооблігацій на суму \$895 млн. Прес-центр. Новини від 23.12.2022. URL: [https://uz.gov.ua/press\\_center/up\\_to\\_date\\_topic/page-2/589869/](https://uz.gov.ua/press_center/up_to_date_topic/page-2/589869/) (дата звернення 27.08.2024).
19. Акціонерне товариство «Українська залізниця». Фінансова звітність за 2020-2023 роки. URL: [https://clarity-project.info/edr/40075815/finances?current\\_year=2023](https://clarity-project.info/edr/40075815/finances?current_year=2023) (дата звернення 21.08.2024).
20. Уряд розподілив 5 мільярдів прибутку «Укрзалізниці». Економічна правда, 05 травня 2024 р. URL: <https://www.epravda.com.ua/news/2024/05/3/713251/> (дата звернення 27.08.2024).

**Олена Пилипенко, канд. екон. наук, доцент**

**(доцент кафедри економіки, маркетингу та бізнес-адміністрування, Державний університет інфраструктури та технологій)**

**Олена Цвірко, доктор екон. наук, професор**

**(професор кафедри економіки, маркетингу та бізнес-адміністрування, Державний університет інфраструктури та технологій)**

## **УПРАВЛІННЯ РИЗИКАМИ ІНВЕСТИЦІЙНОЇ ДІЯЛЬНОСТІ В КОНТЕКСТІ ЗАБЕЗПЕЧЕННЯ ІННОВАЦІЙНОГО РОЗВИТКУ ЗАЛІЗНИЧНОГО ТРАНСПОРТУ**

*У статті обґрунтовано доцільність реалізації інноваційно-інвестиційних проєктів в умовах військових дій в Україні, виконання яких сприяє забезпеченню функціонуванню об'єктів критичної інфраструктури та зростанню обороноздатності країни. Звідси випливає необхідність забезпечити ефективне управління ризиками інвестиційної діяльності. Оскільки залізничний транспорт виконує важливу роль у транспортному забезпеченні країни, інвестиції у його відновлення та розвиток є критично важливими.*

*Встановлена тотожність понять «інвестиційні ризики» та «ризики інвестиційної діяльності». Проаналізовано джерела формування інвестиційного ризику та встановлено, що ризики інвестиційної діяльності пов'язані в першу чергу з існуванням розриву у часі між моментом вкладання коштів (інвестування) та часом отримання доходів і настання окупності проєкту. Часовий розрив (лаг) зумовлює невизначеність умов провадження бізнесу і реалізації проєктів, що й породжує ризик відхилень фактичних результатів від прогнозованих показників.*

*В статті запропоновано алгоритм управління ризиками інвестиційної діяльності на базі класичного підходу управління ризиками з урахуванням специфіки джерел формування інвестиційного ризику як такого. В статті подано характеристику основних інструментів управління інвестиційними ризиками та особливостям їх застосування. Надано характеристику найбільш перспективним і нагальним інвестиційним проєктам, реалізація яких є особливо актуальною для забезпечення функціонування залізничного транспорту в умовах війни.*

*Визначено перспективні можливості фінансування інвестиційних проєктів за показниками фінансового стану АТ «Українська залізниця» на основі фінансової звітності за 2020 – 2023 рр. та проаналізовано показники, що характеризують фінансовий стан компанії в динаміці. Встановлено, що, незважаючи на позитивні тенденції, що намітилися у фінансових показниках в останні два роки, фінансових можливостей компанії недостатньо для здійснення самофінансування. Для підвищення привабливості Укрзалізниці як об'єкта інвестування необхідна реалізація комплексу заходів, зокрема реформування діяльності. Разом з тим, перевагою Укрзалізниці як об'єкта інвестування є стресостійкість та здатність до ефективного функціонування в умовах підвищених ризиків.*

**Ключові слова:** *інвестиційна діяльність, інновації, інвестиційні проєкти, інвестиційні ризики, управління ризиками, Укрзалізниця, фінансування, показники фінансового стану, війна.*

*Стаття прийнята до друку 05 грудня 2024 року*