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*H. Demchenko,*

*Candidate of Economic Sciences, Lecturer, Associated Professor of the Department of Management, Logistics and Innovations,  
Simon Kuznets Kharkiv National University of Economics*

*O. Iastremska*

*Candidate of Economic Sciences, Associated Professor, Professor of the Department of Management, Business and Administration,  
Simon Kuznets Kharkiv National University of Economics*

**Intellectual Property and Technology Transfer in the Enterprise Risk Management System under Wartime Conditions**

*Г. В. Демченко,*

*к. е. н., викладач, доцент кафедри менеджменту, логістики та інновацій,  
Харківський національний економічний університет імені С. Кузнеця*

*ORCID ID: <https://orcid.org/0000-0001-8550-8011>*

*О.О. Ястремська*

*к. е. н., доцент, професор кафедри менеджменту, бізнесу і адміністрування,  
Харківський національний економічний університет імені С. Кузнеця*

*ORCID ID: <https://orcid.org/0000-0003-1865-0282>*

**Інтелектуальна власність і трансфер технологій у системі управління ризиками підприємства в умовах воєнного стану**

*The article examines the role of intellectual property and technology transfer*

*within the enterprise risk management system under wartime conditions. It is argued that the implementation of innovative technologies, software solutions, and technical developments is associated not only with economic benefits but also with the emergence of additional sources of uncertainty. These uncertainties are primarily related to the legal status of intellectual property objects, the conditions of their use, the level of legal protection, and the potential loss of control over intangible assets.*

*Particular attention is devoted to technology transfer processes, which ensure access to advanced technological solutions while simultaneously generating specific risks. Such risks arise from the transfer of rights, contractual limitations on the use of technologies, dependence on external providers of innovations, and uncertainty regarding the expected economic outcomes of implementation. Under wartime conditions, these risks are intensified due to the instability of the external environment, disruption of economic ties, and the need for rapid decision-making.*

*The study substantiates that intellectual property should be considered not only as a legal category but also as an economic and managerial instrument that can be effectively integrated into the enterprise risk management system. A conceptual approach to such integration is proposed, based on the incorporation of intellectual property management tools into all key stages of the risk management process, including risk identification, assessment, development of risk mitigation measures, and monitoring of risk levels and the effectiveness of implemented actions.*

*It is demonstrated that the systematic use of intellectual property protection mechanisms, licensing strategies, and structured technology transfer processes contributes to reducing legal, technological, and operational risks, improving the quality of managerial decision-making, and strengthening enterprise resilience to external shocks. The practical significance of the study lies in the possibility of applying the proposed approach to enhance enterprise risk management systems in conditions of instability and in the context of post-war economic recovery.*

*У статті досліджено роль інтелектуальної власності та трансферу технологій у системі управління ризиками підприємства в умовах воєнного стану. Обґрунтовано, що впровадження інноваційних технологій, програмних рішень і технічних розробок супроводжується не лише економічними перевагами, але й формуванням додаткових джерел невизначеності, пов'язаних із правовим статусом об'єктів інтелектуальної власності, умовами їх використання, рівнем захищеності та ризиком втрати контролю над нематеріальними активами.*

*Особливу увагу приділено процесам трансферу технологій, які забезпечують доступ підприємств до сучасних технічних рішень, але водночас формують специфічні ризики, зумовлені передачею прав, обмеженнями використання технологій, залежністю від зовнішніх постачальників інновацій та невизначеністю економічного ефекту від їх впровадження. Встановлено, що в умовах воєнного стану зазначені ризики посилюються під впливом нестабільності зовнішнього середовища та необхідності оперативного прийняття управлінських рішень.*

*Доведено доцільність розгляду інтелектуальної власності не лише як об'єкта правового захисту, але і як економічного інструменту управління ризиками. Запропоновано концептуальний підхід до інтеграції інтелектуальної власності та трансферу технологій у процес управління ризиками підприємства, який передбачає їх включення у всі ключові етапи – ідентифікацію, оцінку, розроблення заходів щодо мінімізації ризиків та моніторинг рівня ризиків і ефективності впроваджених заходів.*

*Практичне значення отриманих результатів полягає у можливості застосування запропонованого підходу для підвищення ефективності системи управління ризиками підприємства, зниження рівня невизначеності та забезпечення стійкості його функціонування в умовах нестабільного середовища та післявоєнного відновлення економіки.*

**Keywords:** *intellectual property; technology transfer; risk management; innovation activity; enterprise risks; intangible assets; licensing; wartime conditions; risk management system; enterprise resilience*

**Ключові слова:** *інтелектуальна власність; трансфер технологій; управління ризиками; інноваційна діяльність; ризики підприємства; нематеріальні активи; ліцензування; воєнний стан; ризик-менеджмент; стійкість підприємства.*

**General statement of the problem and its connection with important scientific or practical tasks.** The integration of intellectual property into the economic activities of enterprises under modern conditions acquires not only economic but also risk-oriented significance. In practice, the use of innovative technologies, software solutions, technical developments, and other results of intellectual activity is associated not only with potential benefits but also with the emergence of new sources of uncertainty related to the legal status of such assets, the conditions of their use, the level of protection, and the possibility of losing control over them.

Under wartime conditions, these risks become significantly more acute. Disruptions in market stability, changes in logistics routes, forced relocation of enterprises, and limited access to resources and technologies necessitate the rapid implementation of innovative solutions, which often occurs without adequate legal and organizational preparation. As a result, the likelihood of using unprotected or improperly formalized intellectual property increases, leading to risks of legal disputes, loss of competitive advantages, and a decline in the efficiency of enterprise operations.

Particular importance is attributed to technology transfer processes, which provide enterprises with access to new technical solutions while simultaneously generating additional risks. These risks are associated with the conditions of rights transfer, limitations on the use of technologies, dependence on innovation suppliers,

and uncertainty regarding the economic outcomes of their implementation. The absence of a systematic approach to the management of intellectual property and technology transfer results in enterprises failing to fully consider the associated risks, which is especially critical in an unstable environment.

Thus, there is a need to reconsider the role of intellectual property not only as an object of legal protection but also as a risk management tool integrated into the enterprise decision-making system. This determines the relevance of studying the interrelation between intellectual property, technology transfer, and risk management processes under wartime conditions.

*Analysis of recent studies and publications.* The issue of using intellectual property in the economic activities of enterprises has traditionally been examined within the framework of research on innovation development, competitiveness, and economic security. At the same time, contemporary scholarly approaches demonstrate a gradual shift in emphasis from the legal interpretation of intellectual property to its consideration as a strategic resource capable of influencing the level of risk in enterprise activities.

In the works of domestic scholars, intellectual property is primarily studied as a factor in the formation of an innovative economy and a source of added value. In particular, V.M. Heiets [1] and L.I. Fedulova [2] substantiate its key role in ensuring technological development and improving the efficiency of enterprise economic activity. At the same time, recent studies on the management of innovation risks emphasize the need to take into account risks associated with the use of the results of intellectual activity, which confirms the importance of integrating relevant instruments into enterprise management systems [3]. However, the main focus remains on the creation and commercialization of intellectual property objects, while their functioning within the enterprise risk management system remains insufficiently explored.

The studies of O.Ye. Kuzmin [4] and S.V. Onyshko [5] focus on the relationship between intellectual property and enterprise economic security, emphasizing that an appropriate level of legal protection of innovative solutions reduces the likelihood of losing competitive advantages and contributes to the stabilization of business activities. At the same time, the risks associated with technology transfer processes and the use of intellectual property in unstable environments are considered only fragmentarily in these works.

A separate line of research is related to the study of technology transfer as a mechanism for the dissemination of innovations. Thus, T.K. Kvasha and T.V. Pysarenko define technology transfer as a key instrument for integrating scientific developments into business practice, while emphasizing the existence of significant barriers associated with the imperfection of the institutional environment and the insufficient development of innovation support infrastructure [6, pp. 58–63]. In the context of risk, this implies an increased likelihood of inefficient technology implementation, violations of intellectual property rights, and potential loss of investments.

A significant contribution to understanding the role of intellectual property in the modern economy has been made by foreign researchers. In particular, D. Teece emphasizes that effective management of intellectual capital forms the basis for the development of dynamic capabilities of an enterprise and its ability to adapt to changes in the external environment [7]. In the studies of H. Chesbrough, attention is drawn to the importance of open innovation models, which involve active exchange of knowledge and technologies among economic actors, thereby expanding development opportunities while simultaneously increasing risks related to the control over the use of intellectual property [8].

Recent analytical reports of international organizations also confirm the growing role of intellectual property in ensuring the resilience of economic systems. In particular, according to the World Intellectual Property Organization, enterprises that

actively apply intellectual property protection mechanisms demonstrate higher efficiency of innovation activity and better adaptability to crisis conditions [9]. Similar conclusions are presented in OECD reports, which emphasize that the integration of intellectual property management tools into strategic enterprise management contributes to reducing uncertainty and increasing investment attractiveness [10].

Recent studies also indicate the growing importance of intellectual property in ensuring enterprise resilience under conditions of instability. The academic literature emphasizes that effective management of intangible assets enhances the adaptability of enterprises to changes in the external environment, contributes to reducing strategic risks, and improves the quality of managerial decision-making [9]. At the same time, the development of digital technologies and open innovation models increases the need to improve intellectual property protection mechanisms, which becomes particularly relevant under wartime conditions.

Some studies are devoted to analyzing the impact of intellectual property on the formation of enterprise innovative potential. These works emphasize that properly formalized intellectual property rights contribute to increasing innovation activity, facilitate investment attraction, and create conditions for long-term enterprise development. At the same time, insufficient intellectual property management may lead to the loss of part of the potential economic effect from the implementation of innovations.

In the context of risk management, it is also important to consider the influence of the external environment on the processes of intellectual property use and technology transfer. In particular, economic instability, changes in the regulatory environment, and limited access to resources increase the level of risks associated with the implementation of innovative solutions, which necessitates the formation of a comprehensive approach to intellectual property management based on the combination of legal, economic, and organizational instruments.

Under modern conditions, particular relevance is attached to considering intellectual property as a risk management tool in the context of digitalization and the growing role of intangible assets. The literature emphasizes that effective intellectual property management ensures not only the protection of intellectual outputs but also the formation of a stable basis for strategic decision-making. This determines the need to shift from fragmented use of intellectual property instruments to their systematic integration into the risk management process.

At the same time, the analysis of scientific publications indicates that the issue of the integrated combination of intellectual property, technology transfer, and enterprise risk management under wartime conditions remains insufficiently explored. In most studies, these categories are considered separately, without taking into account their interrelation and their role in ensuring enterprise resilience.

***Formulation of the objectives of the article (task statement).*** The purpose of the article is to substantiate the role of intellectual property as an instrument for minimizing innovation risks of an enterprise and to develop approaches to integrating intellectual property management into the corporate risk management system in order to enhance the efficiency of innovation activity and ensure enterprise competitiveness.

To achieve this objective, the following tasks are defined:

to examine the essence and specific features of enterprise risks under wartime conditions;

to analyze the role of intellectual property in reducing uncertainty and risk levels;

to identify the specifics of technology transfer as a tool for implementing innovations and as a source of potential risks;

to justify the necessity of integrating intellectual property management into the enterprise risk management system;

to develop a conceptual approach to the use of intellectual property and technology transfer in ensuring enterprise resilience.

*Summary of the main research material.* Intellectual property under modern economic conditions is no longer considered solely as a legal category that ensures the protection of the results of intellectual activity; rather, it is increasingly viewed as a complex economic resource capable of influencing the effectiveness of enterprise management. This is particularly significant under wartime conditions, when enterprises operate in an environment characterized by heightened uncertainty, limited access to resources, and the need for rapid adaptation to changing circumstances. In such conditions, intellectual property serves not only as a source of competitive advantage but also as a tool for mitigating risks associated with the use of innovative technologies and the organization of business activities.

The economic essence of intellectual property lies in its ability to generate added value through the use of intangible assets that can be reproduced, transferred, or scaled without substantial material costs. At the same time, the proper legal formalization of intellectual property rights ensures control over their use and creates the necessary conditions for minimizing the risks of technology loss or unauthorized exploitation. As noted in the works of V.M. Heiets [1] and L.I. Fedulova [2], intellectual property is a key factor in shaping an innovation-driven model of economic development, and its effective utilization determines the level of enterprise competitiveness.

Within the framework of risk management, intellectual property performs several interrelated functions:

it ensures legal certainty in the use of technologies, thereby reducing the risks of legal disputes and financial losses;

it forms the basis for the valuation of intangible assets, which is essential for informed investment decision-making;

it contributes to the structuring of innovation processes, which allows for the reduction of operational risks associated with the implementation of new technologies.

Under modern conditions, intellectual property also acts as an instrument for the formation of long-term competitive advantages of an enterprise, as it enables the creation of unique technological solutions and limits competitors' access to key innovations. In this context, effective management of intellectual property objects contributes not only to risk reduction but also to enhancing the investment attractiveness of an enterprise, which is particularly important under conditions of limited access to financial resources.

At the same time, the use of intellectual property is accompanied by specific risks that are often underestimated by enterprises. These include the risk of uncertainty regarding the legal status of an intellectual property object, the risk of infringement of third-party rights, the risk of loss of control over technologies due to ineffective licensing arrangements, and the risk of failing to achieve the expected economic outcomes from innovation activities. Research by O.Ye. Kuzmin indicates that the absence of a systematic approach to intellectual property management leads to a decrease in the level of enterprise economic security and increases its vulnerability to external influences [4].

It should be noted that risks associated with intellectual property are complex in nature and may arise at different stages of the innovation process – from technology development to its commercialization. This necessitates the formation of a systematic approach to their identification and assessment, which involves taking into account both internal and external factors. Particular attention should be paid to risks related to intellectual property rights infringement in the context of economic digitalization, where the rapid dissemination of information significantly complicates the control over the use of innovations.

In this context, technology transfer plays a particularly important role as a mechanism for implementing innovations in economic activity. It provides enterprises with access to new technical solutions, thereby improving the efficiency of production processes, optimizing resource utilization, and expanding market opportunities.

However, it also generates additional risks associated with the terms of rights transfer, dependence on technology suppliers, and the complexity of integrating new solutions into existing business processes.

As emphasized by T.K. Kvasha and T.V. Pysarenko, technology transfer in Ukraine is often accompanied by institutional constraints that reduce the effectiveness of innovation utilization and increase the risks associated with its implementation [5, p. 58 – 63]. Wartime conditions further complicate these processes, as enterprises are forced to make decisions under conditions of limited information and time constraints, which increases the likelihood of errors.

Moreover, the effectiveness of technology transfer largely depends on the degree of alignment of interests among the participants in this process, including technology developers, recipient enterprises, and the institutional infrastructure. Insufficient coordination among these actors may lead to additional risks associated with implementation delays, cost overruns, or the mismatch of technological solutions with the needs of the enterprise.

Foreign studies also confirm the importance of integrating intellectual property into enterprise management systems. In particular, D. Teece highlights that effective management of intellectual capital forms the basis for the development of dynamic capabilities that enable enterprises to adapt to changes in the external environment [10]. In turn, H. Chesbrough demonstrates that open innovation models, which involve active exchange of technologies, require particular attention to intellectual property protection issues, as these determine the level of risk in interactions between economic actors [12].

The generalization of scientific approaches makes it possible to conclude that intellectual property and technology transfer should be considered as integrated elements of the enterprise risk management system. Their effective use requires not only proper legal formalization but also their incorporation into strategic

management, which ensures the alignment of innovation activities with enterprise objectives and contributes to reducing the level of uncertainty.

In this regard, it is advisable to propose a conceptual approach to the integration of intellectual property into the enterprise risk management system. This approach is based on combining the key stages of the risk management process – risk identification, assessment, development of risk mitigation measures, and monitoring of risk levels and the effectiveness of implemented actions – with appropriate intellectual property management tools and technology transfer processes (Table 1).

**Table 1. Integration of intellectual property and technology transfer into the enterprise risk management process**

<b>Stage of the risk management process</b>	<b>Characteristics of the stage</b>	<b>Risks related to intellectual property and technology transfer</b>	<b>Intellectual property and technology transfer management tools</b>
Risk identification	Identification of potential sources of risk in enterprise activities	Infringement of intellectual property rights; use of unprotected technologies; risk of loss of know-how; dependence on technology suppliers	Intellectual property audit; analysis of the legal status of technologies; verification of licensing agreements
Risk assessment	Determination of the probability of risk occurrence and the scale of potential losses	Underestimation of intellectual property value; failure to consider indirect losses; risk of inefficient use of technologies	Patent protection; licensing; conclusion of technology transfer agreements; legal protection
Development of risk mitigation measures	Formation of managerial decisions aimed at reducing or avoiding risks	Improper legal formalization; ineffective licensing agreements; risk of technology imitation	Patent protection; licensing; conclusion of technology transfer agreements; legal protection
Monitoring of risks and effectiveness of mitigation measures	Continuous monitoring of changes in risk levels and effectiveness of implemented measures	Violation of intellectual property usage conditions; loss of control over technologies; decrease in efficiency of use	Control over compliance with licensing conditions; audit of intellectual property use; digital monitoring systems

*Source: developed by the author based on [1–5; 7; 12].*

As shown in Table 1, intellectual property and technology transfer are integrated into all stages of the enterprise risk management process, which ensures a comprehensive approach to managing uncertainty and enhances the efficiency of using innovative resources.

The proposed approach differs from existing ones in that it the integration of intellectual property management tools into all stages of the risk management process, allowing for the consideration of the specific features of intangible asset utilization under wartime conditions.

***Conclusions and prospects for further research in this area.*** The results of the study indicate that under wartime conditions intellectual property and technology transfer acquire a new functional role in enterprise activities, transforming from instruments of innovation development into important components of the risk management system. The use of intellectual property makes it possible to reduce legal, technological, and operational risks by ensuring clarity in the use of innovative solutions, establishing control over intangible assets, and enhancing the validity of managerial decision-making. At the same time, technology transfer, while serving as a mechanism for implementing innovations, generates specific risks related to the terms of rights transfer, the efficiency of technology utilization, and dependence on external sources of innovation. In this regard, the necessity of considering technology transfer not only as a development tool but also as an object of risk management within the overall enterprise management system is substantiated.

The proposed conceptual approach to the integration of intellectual property and technology transfer into the enterprise risk management process their incorporation into all key stages, including risk identification, assessment, development of risk mitigation measures, and monitoring of risk levels and the effectiveness of implemented actions. The implementation of this approach ensures a comprehensive character of risk management, reduces the level of uncertainty, and enhances enterprise resilience to external influences.

Prospects for further research in this area are associated with the development of methodological approaches to the quantitative assessment of risks related to intellectual property, the improvement of technology transfer management mechanisms under conditions of an unstable environment, and the formation of tools for evaluating the effectiveness of integrating intellectual property into enterprise management systems, particularly in the context of post-war economic recovery.

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Simon Kuznets Kharkiv National University of Economics