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THE INTELLECTUAL CAPITAL MANAGEMENT MECHANISM AS A TOOL FOR MITIGATING RISKS IN CORPORATE LOGISTICS PROCESSES

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МЕХАНІЗМ УПРАВЛІННЯ ІНТЕЛЕКТУАЛЬНИМ КАПІТАЛОМ ЯК ІНСТРУМЕНТ
ДЛЯ ЗНИЖЕННЯ РИЗИКІВ У ЛОГІСТИЧНИХ ПРОЦЕСАХ
НА ПІДПРИЄМСТВАХ

This article examines issues related to the development of a mechanism for managing an enterprise's intellectual capital and its impact on reducing risks in logistics processes at enterprises. It is determined that an enterprise's intellectual capital, in terms of its components (human, structural, and consumer), plays a direct role in all areas of the enterprise's operations and influences their effectiveness. The paper examines Ukraine's position in the Global Innovation Index, compiled by the World Intellectual Property Organization, and concludes that in recent years the domestic economy has been losing ground across virtually all indicators. Overall, the decline amounts to 11 positions (from 49th place in 2021 to 60th place in 2024) in the ranking of 131 countries worldwide, indicating a deepening of problems in the innovative development of the domestic economy. The paper also presents a study of Ukraine's Global Competitiveness Index in 2024, in which the domestic economy ranked 47th among 191 countries worldwide. However, regarding the criteria "Management of Economic Processes" and "Intellectual Capital," Ukraine ranks 88th and 80th, respectively, in the rankings, indicating the presence of systemic problems specifically in these areas. Logistics processes are becoming increasingly important

in business operations today and encompass areas such as supplying enterprises with resources; managing warehouse operations; transporting resources and products; and so on. The main types of risks affecting the implementation of new technologies in logistics processes have been identified: organizational, financial, informational, transportation, and warehousing. Conclusions are drawn regarding the need to develop a mechanism for managing intellectual capital to reduce the level of risks in the enterprise's logistics processes. The main tasks and principles of this management mechanism have been identified. In accordance with the main functions of management (organization, planning, motivation, control), key tools for managing human capital, structural capital, and consumer capital have been proposed to reduce risks and ensure the implementation of modern innovative developments in logistics processes.

У статті розглядаються питання присвячені формуванню механізму управління інтелектуальним капіталом підприємства та його впливу на зниження ризиків в логістичних процесах на підприємствах. Визначено, що інтелектуальний капітал підприємства у розрізі його складових (людський, структурний та споживчий) приймає безпосередню участь в усіх напрямках діяльності підприємства та впливає на їх ефективність. У роботі досліджено місце економіки України у Глобальному інноваційному індексі, який проводить Всесвітня організація інтелектуальної власності та зроблено висновок, що протягом останніх років вітчизняна економіка втрачає свої позиції практично за усіма показниками. В цілому зниження становить 11 позицій (з 49 місця у 2021 р. до 60 місця у 2024 р.) у ранжуванні серед 131 країн світу, що свідчить про поглиблення проблем в інноваційному розвитку вітчизняної економіки. В роботі також наведено дослідження Глобального індексу конкурентоспроможності України у 2024 р., у рейтингу якого вітчизняна економіка посіла 47 місце серед 191 країн світу. Однак стосовно критеріїв "Управління економічними процесами" та "Інтелектуальний капітал" показники України займають відповідно 88 та 80 місце у рейтингах, що показує наявність системних проблем саме у цих напрямках. Логістичні процеси набувають сьогодні все більшого значення в діяльності підприємств та охоплюють напрями забезпечення підприємства ресурсами; забезпечення роботи складського господарства; транспортування ресурсів та продукції тощо. Визначено основні види ризиків, які впливають на впровадження нових технологій у логістичні процеси: організаційні, фінансові, інформаційні, транспортні, складські. Зроблено висновки про необхідність формування механізму управління інтелектуальним капіталом для зниження рівня ризиків у логістичних процесах підприємства. Визначено основні завдання та принципи даного механізму управління. Відповідно до основних функцій управління (організація, планування, мотивація, контроль) запропоновано основні інструменти управління людським капіталом, структурним та споживчим капіталом для зниження ризиків і забезпечення впровадження сучасних інноваційних розробок у логістичні процеси.

Key words: intellectual capital, human capital, structural capital, consumer capital, logistics processes, risks, management mechanisms.

Ключові слова: інтелектуальний капітал, людський капітал, структурний капітал, споживчий капітал, логістичні процеси, ризики, механізм управління.

A GENERAL FORMULATION OF THE PROBLEM AND ITS CONNECTION TO IMPORTANT SCIENTIFIC OR PRACTICAL CHALLENGES

The activities of a modern enterprise encompass various aspects related to the need to ensure the supply of material, technical, fuel, and energy resources; the

organization of preparatory and production-technological processes; the management of auxiliary units and warehousing; and the implementation of product promotion processes in sales markets, etc. The role of enterprises' intellectual capital in solving complex problems is growing, as these challenges intensify against the backdrop of deepening crises in the global economy.

Complex and diverse tasks require the refinement of approaches to managing these processes.

The use of intellectual capital (human capital, structural capital, and consumer capital) can be focused on various aspects of a company's operations, particularly on logistics processes as a key tool for mitigating risks and enhancing competitiveness. The logistics sector of domestic enterprises is currently under the influence of a number of negative factors: military operations on the territory of Ukraine are leading to the disruption of supply chains and the destruction of transport, warehouses, raw materials, and products. The mechanism for managing intellectual capital and its structural elements requires further study in the context of risk mitigation in logistics support processes at enterprises.

ANALYSIS OF RECENT STUDIES AND PUBLICATIONS

Many scholars and practitioners have devoted their research to examining the nature, significance, and management of a company's intellectual capital. For example, A.P. Gordiychuk, in his work, examined the economic nature of intellectual capital, the characteristics of its formation, and its management. He identified the significance and impact of each structural element of intellectual capital (human, structural, and relational) on enterprise management strategy [1]. In her study, M.A. Derzhevetska focused on the formation of an intellectual capital management system using the example of machine-building enterprises and examined the principles of forming such a system and the characteristics of management tasks in accordance with the structural elements of intellectual capital [2].

Scholars such as I.S. Klymenko, O.M. Taranukha, and O.V. Zhuravel have studied intellectual capital and the intellectual property market in the current conditions of the information economy; they examined the main approaches in the scientific literature regarding the identification of structural elements of intellectual capital and methods for its evaluation [3]. In the scientific work by O.P. Korniienko, the peculiarities of investing intellectual capital in the innovative development of an enterprise are examined, and the importance of facilitating the processes of transforming an enterprise's intellectual potential into intellectual capital is emphasized [4]. N.V. Zakharchenko, S.A. Horbachenko, R.V. Hrinchenko, I.A. Topalova, and A.A. Fialkovska identified the main principles for forming an organizational and economic mechanism for developing the creative potential of enterprises in regions [5].

Logistics processes and risks in this field are also the subject of research by many scholars. Researchers V. Vakulenko, Y. Lyu, and S. Lyu identified the main directions for developing a risk management system for logistics systems under martial law in Ukraine; they highlighted the importance of applying adaptive management tools to develop a risk management system using the digitalization of logistics processes and modern software [6]. T. Pavliuk, Y. Polusmyak, and R. Zenkina, in their work, emphasized the need to develop a logistics system based on innovative solutions to ensure flexible adaptation to market changes and consumer demands and

to increase the speed, accuracy, and transparency of logistics processes [6].

The existence of a significant number of studies on the issues of intellectual capital formation and risk mitigation in logistics processes attests to the importance and relevance of this topic and the presence of unresolved issues. In our view, questions regarding the development of a mechanism for managing intellectual capital to ensure risk reduction in logistics processes require further clarification.

STATEMENT OF THE ARTICLE'S OBJECTIVES (RESEARCH QUESTION)

The aim of this study is to identify the key components of the intellectual capital management mechanism for mitigating risks in logistics processes at enterprises.

PRESENTATION OF THE MAIN RESEARCH MATERIAL

Intellectual capital is an important component of modern enterprises' resources and a key factor in increasing their competitiveness and market value. However, building intellectual capital is a complex task for most domestic enterprises due to a number of reasons:

- limited sources and amounts of funding;
- low level of knowledge and qualifications among enterprise employees;
- insufficient information support;
- problems with the legal protection of innovative developments;
- underdeveloped technology transfer channels;
- the absence of a system of long-term relationships with consumers;
- problems with the organization of management of the enterprise's activities and structural units [8, pp. 345—346].

Based on the results of an analysis of a range of criteria and indicators related to innovation and overall economic development, the World Intellectual Property Organization (WIPO) annually ranks countries worldwide in the Global Innovation Index (covering more than 130 countries). Ukraine's performance in this ranking is presented in Table 1.

Analyzing the data in Table 1, we can conclude that Ukraine's rankings vary from year to year across specific groups of criteria. In 2024, Ukraine's ranking declined both overall and across criteria such as "Intellectual Capital," "Infrastructure," "Creative Outputs," and "Institutions."

Table 1. Ukraine's ranking in the Global Innovation Index

Components of the ranking	2021	2022	2023	2024
Overall ranking, including the following components:	49	57	55	60
- Market sophistication;	88	102	104	85
- Business sophistication;	53	48	48	45
- Human capital and research;	44	49	47	54
- Infrastructure;	94	82	77	82
- Creative outputs;	48	63	37	68
- Institutions;	91	97	100	107
- Knowledge and technology outputs	33	36	45	34

Source: Compiled based on [9—12].

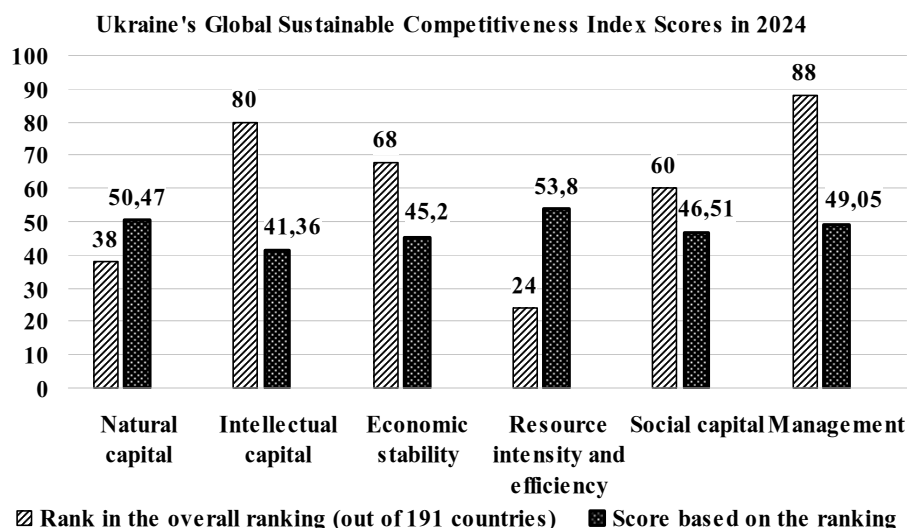


Fig. 1. Indicators of Ukraine's Global Sustainable Competitiveness Index in 2024

Source: Compiled based on [13].

Figure 1 shows the results of the Global Competitiveness Index for Ukraine in 2024 by specific groups of criteria and its ranking among 191 countries (47th place overall).

An analysis of the data in Fig. 1 indicates the presence of negative trends in economic development, particularly with regard to the utilization of intellectual capital, which directly and indirectly influences the course of all processes at enterprises, including logistics processes, which are generally aimed at attracting material, technical, raw material, energy, and other types of resources into the enterprise's operations and supplying finished products and semi-finished goods to consumers.

Innovative technologies are an important direction for the development of logistics processes at enterprises; however, their implementation may be hindered by a number of risks, including:

- organizational risks arising from improper organization of logistics routes, inconsistencies in the timing and volumes of orders for various resources, and disruptions in supply chains;
- financial risks caused by insufficient funding volumes and sources;
- information risks arising from limited information sources and the ability to obtain reliable information;
- transportation risks arising from technical issues with vehicles and changes to traditional transportation routes;
- warehousing risks that may result from the lack of properly equipped facilities for storing raw materials, supplies, finished goods, etc.

These risks can be mitigated through the use of modern scientific and technological advancements. Experts identify the following promising innovative technologies in the logistics sector:

1. The Internet of Things (IoT), aimed at ensuring supply chain transparency for businesses by using sensors to track shipping, transportation, and delivery processes in real time. The use of technologies that improve warehouse management (inventory levels and storage conditions) is also anticipated.

2. Cloud computing, aimed at optimizing analytical processes and refining data sets.

3. Artificial intelligence and machine learning will help develop various supply chain options, taking into account the advantages of specific resource suppliers, modes of transport, transport routes, and costs associated with logistics processes, etc.

4. Computer vision. This technology is designed to read barcodes more accurately, even from damaged or deformed labels, which, compared to traditional laser scanners, offers greater capabilities for identifying goods.

5. Robotic process automation is aimed at improving warehouse operations and reducing the amount of manual labor.

6. Digital twins. This technology involves creating a digital copy of a physical object or process, enabling the exploration of various warehouse layout options, testing of transport routes, and more.

7. Blockchain, designed for the exchange of confidential data between suppliers and carriers to support logistics processes.

8. Data standardization and advanced analytics. The application of these technologies is aimed at achieving supply chain visibility, improving market demand forecasting, optimizing "last-mile" delivery, and more.

9. Warehouse automation, aimed at reducing data processing times in warehouse operations, enabling the use of modern analytical software, and optimizing inventory levels

10. "Last-mile" delivery system, focused on determining the feasibility of engaging third-party logistics and transportation systems to optimize routes and reduce costs [14].

Given the complexity of implementing such projects within enterprises, we believe that a necessary and appropriate course of action is to mobilize human, structural, and consumer capital as a significant tool for ensuring the implementation of innovative logistics technologies and reducing risks in logistics processes.

Table 2. Functions and Tools for Managing Intellectual Capital in Logistics Processes

Control functions	Human Capital: Tools for Implementing the Function	Structural capital: tools for fulfilling the function	Consumer capital: tools for fulfilling its function
Organization	Organizing training and professional development for staff. Applying heuristic methods to solve problems in the logistics sector. Training in lean logistics and 5S methods.	Improving the management structure of logistics processes based on a process-oriented approach. Implementing cybersecurity systems to protect customer (and partner) databases.	Implementation of CRM software. Sharing information (knowledge) with resource providers. Application of agile software development methods in interactions with suppliers and customers.
Planning	Application of economic and mathematical planning methods. Creation of databases for comprehensive analysis of the market for resources and products. Use of machine learning algorithms to implement demand planning tools (SAP IBP, Blue Yonder).	Planning the automation and digitization of logistics processes to reduce errors and disruptions (human error). Implementation of modern information systems (WMS, TMS). Implementation of data collection terminals to minimize errors in warehouse operations.	Efforts to attract new customers through online platforms and social media.
Motivation	Incentive programs for conducting workshops on staff training and knowledge transfer. Ensuring transparency in career advancement pathways upon the acquisition of new competencies.	Bonuses for error-free warehouse operations. Bonuses for drivers for safe and timely delivery of cargo.	Bonuses for improving loyalty programs and providing effective personalized customer service; for enhancing the quality of after-sales service.
Control	Monitoring of staff core competencies related to logistics processes.	Implementation of TMS (Transportation Management Systems) with GPS tracking for continuous real-time route monitoring.	The use of blockchain technology and electronic document management to monitor logistics processes.

Джерело: сформовано на основі [1; 6; 7; 14].

Therefore, the processes of establishing an effective intellectual capital management mechanism to stimulate innovation in a company's logistics processes are of great importance.

In our view, a management mechanism is a comprehensive system consisting of elements such as: objectives, principles, functions, and management tools.

We believe that the main tasks of intellectual capital management in the logistics sector include: improving the efficiency of supply chains by enhancing staff qualifications; utilizing modern inventory management software and CRM systems for interacting with the company's customers; and employing artificial intelligence, among others.

The main principles of intellectual capital management in logistics include: scientific rigor; purposefulness; systematic approach; comprehensiveness; efficiency; continuity; and flexibility.

CONCLUSIONS AND PROSPECTS FOR FURTHER RESEARCH IN THIS AREA

Intellectual capital is of vital importance to the operations of modern enterprises and influences all aspects of their functioning, including the flow and efficiency of logistics processes. The study analyzes Ukraine's ranking in the Global Innovation Index

(conducted by the World Intellectual Property Organization) over recent years and concludes that between 2021 and 2024, the domestic economic system's position declined across nearly all criteria groups. The indicators of Ukraine's Global Competitiveness Index in 2024 are examined, revealing that Ukraine ranks lower in the "Intellectual Capital" development criterion compared to other criteria groups. Conclusions are drawn regarding the need to establish an effective intellectual capital management mechanism to mitigate risks in the enterprise's logistics processes. In accordance with the core management functions (organization, planning, motivation, and control), intellectual capital management tools in the logistics sector are identified in terms of their constituent elements.

Prospects for further research will focus on studying modern approaches to the development of elements of enterprises' intellectual capital, taking into account the risks associated with martial law in Ukraine.

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