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INTRODUCTION

We are happy to invite you to get acquainted with the first issue of the new scientific and practical publication "Intellectualization of Logistics and Supply Chain Management".

We strongly believe that the launch of this magazine indicates the objective need to rethink a wide range of issues related to the development of theory and practice in logistics and supply chain management, awareness of the need to unite the scientific community and logistics practitioners, dissemination of modern knowledge and best practices for innovative development of the logistics services market.

The first issue of the magazine is published at a difficult time. The global coronavirus pandemic and the deep economic crisis have significantly worsened business activity in the world. Currently, global supply chains are collapsing, international trade is declining, and competition between global and regional logistics operators is intensifying. The most common thesis is that the world will never be the same again. Industry experts predict the emergence of new, more flexible and adaptive supply chain management strategies and approaches to logistics business process management. The trend towards collaborations, cooperation and unification of services is emerging, comprehensive proposals for clients are being developed. There is increasing talk about the need to build bimodal supply chains, which involves the development of different decision-making scenarios: the traditional approach - cost-effective efficiency, low risk, high predictability; a new approach "second mode" - rapid recognition of opportunities, adaptability, willingness to solve unexpected problems and look for new opportunities.

Radical transformations of the global and national markets for logistics services require appropriate scientific support. Logistics science has a special role to play in this process. Initiating the emergence of a new journal, we decided to focus on its coverage of problematic aspects of the formation and development of logistics systems at the micro, mezo and macro levels, supply chain management, digitization of logistics, methods and tools for optimizing processes in logistics and supply chains, sociopsychology relations and network interaction of enterprises using cloud technologies, artificial intelligence, e-learning, neural business process management systems, etc.

Therefore, we invite scientists, researchers and business representatives, as well as our colleagues from abroad, to cooperate and present the results of scientific research, to discus and debate on them, to work together to develop the scientific theory of logistics and promote mutual intellectual enrichment.

We hope that the new scientific publication will become a theoretical guide for young researchers and representatives of other fields.

HRYHORAK Mariia
Chief Editor

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INFLUENCE OF THE SUSTAINABLE DEVELOPMENT CONCEPT ON THE FORMATION OF ECO-FRIENDLY PACKAGING FIELD IN LOGISTICS

Vladyslav Marchenko. «Influence of the sustainable development concept on the formation of eco-friendly packaging field in logistics». *In this article, it was explained that nowadays, humanity faces a great number of complex challenges. Among them are such serious problems as the depletion of natural resources, the growth of volumes of waste, environmental pollution and climate change. The lack of attention to these important questions in the past has caused their complication and led to serious consequences for both humanity and the planet as a whole. One of the most critical problems of our time is the increase of the amount of waste. The use of non-ecological and inefficient packaging has led to a significant accumulation of its volumes. The challenge has become so global that humanity simply could no longer just stand by. Modern society saw the way for its solution in the implementation of sustainable development principles in this area. This can be best seen on the example of the logistics industry. In the article, the history of packaging development in logistics was explained, the importance and key advantages of eco-friendly packaging were considered, and the impact of environmental norms on various types of packaging was described. Similarly, in this work the impact of the concept of sustainable development on the formation of the field of eco-friendly packaging in logistics was explained, key circular practices in the field of packaging were presented, examples of the application of artificial intelligence in the field of packaging were described, the development of the field of eco-friendly packaging in Ukraine and the European Union was compared, and their development prospects were indicated. As a result of the work, a conclusion was made on why it is so important to continue to study, research and develop this direction.*

Keywords*:* development, ecology, sustainability, packaging, transportation, logistics, prospects, efficiency, management

Владислав Марченко. «Вплив концепції сталого розвитку на формування сфери екологічного пакування в логістиці». *В даній статті було пояснено, що в наш час, людство стикається з величезною кількістю комплексних викликів. Серед них є такі серйозні проблеми, як вичерпання природних ресурсів, зростання обсягів відходів, забруднення довкілля та зміна клімату. Недостатня увага до цих важливих питань в минулому, спричинила їх ускладнення та призвела до серйозних наслідків, як для людства, так і планети в цілому. Однією з найбільш критичних проблем нашого часу є збільшення кількості відходів. Використання неекологічного та неефективного*

пакування призвело до відчутного накопичення їх обсягів. Виклик став настільки глобальним, що людство просто більше не могло стояти осторонь. Сучасне суспільство побачило шлях до його вирішення в впровадженні принципів сталого розвитку в дану сферу. Найкраще це видно на прикладі саме логістичної галузі. У статті було пояснено історію розвитку пакування в логістиці, розглянуто важливість та ключові переваги екологічного пакування, описано влив екологічних норм на різні види пакування. Аналогічним чином, в цій роботі було пояснено вплив концепції сталого розвитку на формування сфери екологічного пакування в логістиці, представлено ключові циркулярні практики у сфері пакування, описано приклади застосування штучного інтелекту в сфері пакування, здійснено порівняння розвитку сфери екологічного пакування в Україні та Європейському Союзі, зазначено їх перспективи розвитку. Як результат роботи, було зроблено висновок чому так важливо продовжувати вивчати, досліджувати та розвивати цей напрямок

Ключові слова: розвиток, екологія, сталість, пакування, перевезення, логістика, перспективи, ефективність, управління.

Intraduction. In our time, modern society faces serious challenges. The depletion of natural resources, the growth of volumes of waste, environmental pollution and climate change are global problems in their scope. Today, the issues connected with them are on the agenda of the international community and require innovative ideas and thoughtful actions for their solution. One of the most critical problems of today is the increase in the amount of waste. The use of non-environmentally friendly and insufficient packaging has had a significant impact on the accumulation of waste, and ignoring this problem throughout history has only made it more complex. Humanity simply could no longer turn a blind eye to this question and therefore began to actively search for effective ways to resolve it. One of such most promising and modern options was the implementation of sustainable development principles in this area. The main emphasis in the work was placed on the logistics industry, as on its example it is possible to perfectly track the development of these processes. The field of sustainable packaging is extremely important. It is primarily aimed at reducing the amount of waste, minimizing environmental pollution and more efficient use of natural resources. Progress in the sector of eco-friendly packaging can have a positive impact on preserving our planet for future generations. Nowadays, social pressure on the environmental responsibility of companies is growing, and therefore the direction of eco-friendly packaging continues to gain popularity, as it is really able to positively influence on this question. The sphere of eco-friendly packaging has a really big undiscovered potential, and that is why it is so important for modern society to continue working on its study, analysis and development.

The purpose of the article is to explain the impact of the concept of sustainable development on the formation of the field of eco-friendly packaging in logistics, to indicate the main benefits that can be obtained from the use of eco-friendly packaging, to compare the development of the field of eco-friendly packaging in Ukraine and the European Union, and to describe the key prospects for the development of this field in the coming years

Presentation of the main results. Nowadays, environmental challenges pose a serious threat to both humanity and the harmony of ecosystems in general. The gradual growth of the population and global urbanization processes have led to an increase in the amount of waste and its accumulation. Every day they are dumped both in designated sites and in unauthorised areas of the natural environment and in the oceans, causing terrible harm to biodiversity and the well-coordinated functioning of ecosystems. The increase in the amount of waste negatively affects the flora and fauna of

our planet, and the factor of the long-term decomposition of many types of wastes makes this question much more serious, as the natural recovery of ecosystems can take not just years or decades, but hundreds of years. A modern example of a river polluted by waste at Freedom Island in Paranaque, the Philippines can be seen in Fig. 1.

Figure 1 – An example of river polluted by waste at Freedom Island in Paranaque, the Philippines.
Source: https://edition.cnn.com/2023/05/16/world/plastic-pollution-unep-climate-intl/index.html

Modern society is constantly looking for decisions that can both decrease the amount of waste and minimize the negative impact of human activity on the planet. It is not surprising that today the policy of applying the principles and practices of the sustainable development concept has gained such high popularity. The concept of sustainable development has become an effective response to the aggravation of the previously mentioned global challenges. It set a goal to find a balance between environmental preservation, economic development and social well-being. Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs [1].

This concept played an enormous role in the development of green logistics. Its main goal became the optimization of logistics processes in a way that minimizes their negative impact on the environment. The policy of sustainability in logistics has become a new, effective approach to preserving our planet. With each new year, an increasing number of citizens are becoming interested in it, exploring the possibilities of green technologies and researching the full potential of the circular economy.

Of course, one of the most modern and promising solutions that can reduce the level of environmental pollution is still the improvement of packaging. It is an integral part of the green logistics sphere. Packaging has many different roles [2]. It performs many

functions, starting with the storage of goods and their transportation and ending with marketing questions. But at the same time, despite all these moments, we cannot forget or turn a blind eye to the negative impact it can have on the environment.

The development of the eco-friendly packaging field has an extremely important, strategic value. Every day, millions of tons of different products are transported all around the world, and the correct selection of appropriate materials and packaging methods determines how serious the impact of humanity on the environment will be.

Today, the level of pollution of existing ecosystems directly depends on the usage of environmentally friendly or biodegradable, as well as reusable or recyclable ones, and that is why researches in this direction are more relevant than ever and should remain a priority.

To fully disclose the chosen topic, the historical development of packaging in logistics was analysed and its key events were highlighted in Table 1.

Table 1. Key events in the development of packaging in logistics

Period	Key events	Development in the field of packaging
Until the mid-19th century	The use of natural materials.	The use of barrels, wooden boxes, and fabric bags. The focus is on preserving products during transportation.
Mid-19th century – Early 20th century	Development of industrial packaging.	Creation of corrugated cardboard, growing popularity of its use. The application of different types of paper, metal and glass as packaging materials.
1920 – 1940	The impact of mass production on the improvement of packaging technologies.	The standardization of various packaging, its sizes and shapes, has allowed to significantly optimize logistics operations. No less important was the development of packaging machines and the acceleration of the pace of their implementation.
1950 – 1970	The use of plastics and disposable packaging.	The popularity of using various polymers for packaging is growing. Disposable packaging is becoming an important and widespread practice in logistics.
1980 – 1990	Growth of environmental awareness and development of recycling technologies.	The course towards the use of recycled materials in logistics and minimization of packaging waste has begun to gain popularity. Of particular importance was the creation and establishment of recycling systems for used packaging.
2000 – 2010	Popularization of the sustainable development concept and the use of innovative materials.	Development of green logistics and introduction of ecological decisions in logistics processes in order to achieve sustainable development goals. More and more popular becomes the policy of using biodegradable materials and reusable packaging.
2010 – Present	Development of digital technologies and eco-friendly packaging.	Application of modern artificial intelligence with the aim of improving packaging, optimizing its size and shape. Massive use of environmentally friendly materials for packaging, development of reusable packaging.

Source: Developed by Vladyslav Marchenko

This table demonstrates the key events in the historical development of packaging in logistics. It briefly describes the progressive solutions and tendencies that have occurred in packaging technologies, materials and methods over the past decades. It reflects gradual changes in production approaches and presents new practices for recycling and utilization of packaging materials. It can be seen that the original use of natural materials

has changed significantly with the advent of industrialization. And the 20th century became a truly breakthrough, as it was marked by the standardization of packaging units and the beginning of the widespread use of many different polymers. Although they have considerably increased the efficiency of products transportation, however, materials such as plastics have created new, serious challenges for the environment. After 1980, different ecological initiatives were launched to reduce the negative impact of packaging on the environment. At present, the concept of sustainable development and the use of digital technologies have a noticeable impact on the packaging sphere in logistics.

The policy of recycling packaging, its reducing and turning it into the most efficient constructor is also becoming more popular. Modern technological advances make it possible to create safe, sustainable and reliable packaging. The analysis showed that the packaging industry has repeatedly undergone periods of reforms that have led it from outdated, poorly thought-out packages to the present-day, truly innovative solutions. This difference has become a reflection of global efforts to protect the environment and achieve the most efficient use of natural resources.

To fully reveal the chosen topic of the work, an important task was to explain the benefits of sustainable packaging. Their key examples are presented in Table 2.

Table 2. The key advantages of eco-friendly packaging

Advantage	Description
Less extraction of natural resources	Eco-friendly packaging allows to reduce the extraction of new natural resources for the production of packaging.
Reduced carbon dioxide emissions	The use of lighter materials for packaging can significantly reduce the level of fuel consumption during transportation.
Biodegradability of materials	The use of modern, environmentally friendly, safely biodegradable materials allows to minimise the negative impact on the surroundings after disposal.
Recyclability and reusability of packaging	Sustainable packaging made from materials that can be recycled or reused can significantly reduce the amount of waste and the extraction of new natural resources.
Optimisation of packaging size	There are many ways to optimise the size of packaging which can reduce wasted space and improve efficiency of transportation.
Minimisation of the level of pollution	The use of ecological, biodegradable or recycled materials helps to decrease soil, air and water pollution.
Reduction of the use of disposable packaging	By using environmentally friendly, durable and reusable packaging, it is possible to reduce the volumes of disposable waste.
Use of renewable resources	Application of various materials made from renewable resources helps to limit the negative impact on the planet's flora and fauna.
Energy saving in the process of packaging production	Advanced methods of producing eco-friendly packaging help to save energy.

Source: Developed by Vladyslav Marchenko

Today, it is possible to clearly see that humanity has made significant progress in the field of packaging in recent decades. Prior to the emergence of modern ecological norms and standards, traditional packaging was not well thought out in terms of balancing ecological, economic and social aspects and usually had a rather high impact on the environment. In most cases, people used materials that were both unsuitable for recycling and required a huge amount of time for decomposition in nature. This undoubtedly led to their gradual accumulation and environmental pollution. The negative impact on existing ecosystems

became so dramatic that it was simply impossible to ignore it.

For a better understanding of the changes in ecological policy in packaging, a few illustrative examples can be mentioned to describe the approaches of the past and the present. Looking at the past, the first thing to mention is plastic. Despite the fact that it is a popular material, we should not forget that it is very difficult for recycling and is practically not biodegradable. The situation is similar with polystyrene foam. Although it has been widely used for packaging of fragile goods, it is impossible not to mention that this material can take more than 1000 years to naturally decompose. The situation is no better with a wide spectrum of metal packaging that has gained such great popularity. Despite their widespread use, it is impossible to neglect the fact that they require a large amount of energy to recycle, and their accumulation leads to serious environmental pollution.

But today, the approach to packaging is much more innovative and attentive to the aspects of sustainability. The main attention is paid to packaging efficiency, in the context of conserving resources and minimising the level of ecological pollution. First of all, materials that have a much lower environmental impact are selected. With each new passing year, more and more biodegradable materials are being used to create packaging. They are of enormous importance, as such packaging naturally and safely decomposes over a defined period of time, usually from several months to several years. Cardboard and paper have especially grown in popularity, as they are easily recyclable and can be used to make completely new packaging. Packaging made with biodegradable polymers is becoming more and more valued, as it does not leave any harmful residues, which is undoubtedly important for the environment protection. Renewable materials are also becoming increasingly popular in the packaging industry. They allow to noticeably reduce dependence on fossil resources, minimise waste and decrease the negative impact on the environment in general.

In order to fully explain the selected topic, the impact of ecological norms on different types of packaging was demonstrated in the form of Table 3.

Table 3. Impact of ecological norms on different types of packaging

Packaging	Material (Before)	Estimated time of decomposition in nature	Possibility of reuse, recycling or disposal	Material (Now)	Estimated time of decomposition in nature	Possibility of reuse, recycling or disposal
Film packaging	PVC, polyethylene	From 500 to 1000 years	Difficult to recycle, usually disposed of.	Biodegradable plastic (PLA/PHA)	From 1 to 3 years	Easy to recycle and compost.
Bags	Polyethylene bags	More than 500 years	Disposable, usually thrown away right after use.	Fabric bags	From 1 to 2 years	Disposable, can be reused.
Protective packaging	Polystyrene foam	From 500 to 1000 years	Difficult to recycle, usually disposed of.	Cardboard, paper	From 1 to 5 years	Easy to recycle, can be reused.
Beverage containers	Aluminium cans	From 200 to 500 years	Recyclable, but requires a lot of energy to process, often disposed of.	Bioplastic cans (PLA/PHA)	From 1 to 3 years	Easy to recycle and compost.

Source: Developed by Vladyslav Marchenko

This table demonstrates the considerable difference between traditional and more modern packaging. The packaging industry is undergoing a remarkable transformation, driven by the need for sustainability and consumer demand for eco-friendly solutions [3]. Over the past decades, there has been truly great progress in minimising the ecological impact of this sphere on the environment. These simple examples perfectly demonstrate the change in approach to this question. Materials that were used in the past and had a huge impact on the environment have been replaced by more modern and efficient analogues that can be reused, recycled and biodegraded. Moreover, in the case of the last one, this process no longer takes hundreds of years, as it used to, but short periods.

Today, humanity is confidently moving in the direction of more sustainable practices and eco-friendly solutions. This allows to significantly reduce the amount of waste, simplify the process of its safe disposal and minimise the level of environmental pollution in general. The rapid spread of the sustainable development concept has formed global tendencies in the field of eco-friendly packaging. These include modern policies on the use of safe materials, reuse of packaging, reduction of the size of packages, use of environmentally friendly inks, improved packaging construction, and the use of easily compostable materials.

In our time, one of the main trends is the use of safe materials that do not harm either human health or the environment. Outdated materials are gradually being replaced by more «green» alternatives that decompose naturally without harmful residues in a few months or years.

A no less important task is to reduce the volume of packaging. Avoiding excessive packaging allows to both decrease the amount of waste and reduce the need for regular extraction of such a high quantity of natural materials. The fight against over-packaging encourages a reduction in the size of packages, minimising their weight, making them more effective and suitable for transportation. A relevant example is the Apple company, which, after changing the content of the iPhone box, seriously reduced its size, as shown in Fig. 2.

Figure 2 – Comparison of iPhone 11 Pro Max and iPhone 12 Pro boxes size
Source: https://x.com/neilcybart/status/1318576553475932160/photo/1

Such a simple decision allowed the company not only to conserve natural resources and economise huge amounts of money on packaging, but also made the shipping of these products more efficient. The smaller size of the box has allowed us to significantly reduce the number of transportations, which has an undoubtedly positive effect on the preservation of the environment.

It is impossible not to mention the pricelessness of the innovative packaging design. New formats of packaging and its well-thought-out layouts allow to achieve the most efficient use of space. The market is setting the trend of packaging transformation into well-designed constructors, where each element has its own function. Such approaches increasing the efficiency of logistics and reducing the need in large volumes of supplies of materials needed for the production of relevant packaging. A modern example of the design of such cardboard boxes can be seen in Fig. 3.

Figure 3 – Example of a cardboard shipping boxes constructor
Source: https://www.amazon.de/-/en/HORLIMER-Shipping-Cardboard-Corrugated-Packaging/dp/B09DCPZNYQ?th=1

A special role is played by advanced packaging recycling technologies. Recycling helps protect the environment [4]. The concept of eco-friendly packaging focuses on the reuse of waste, its recycling and further transformation into new packaging. This policy helps to substantially lower the amount of waste and minimise the level of ecological pollution. An example of packaging waste collection for recycling is demonstrated in Fig. 4.

Figure 4 – An example of collecting cardboard for further recycling
Source: https://recyclinginside.com/recycle-cardboard/

The approach of using packaging materials that can be composted efficiently is of utmost importance. The use of this practice on a global level allows to safely and efficiently decompose such packaging in a natural way. This not only helps to preserve the environment, but also to get rid of waste without harming the flora and fauna of our planet.

In recent years, the direction of reusable packaging has been developing rapidly. Their key advantage is that they can be reused over and over again. Such packaging is more ecologically friendly, in the context that it reduces the demand for the regular production of a huge number of other, new packages.

It is also worth mentioning the modern practice of using materials extracted by local companies to create packaging. The use of local materials simplifies logistics, speeds up supply chains, reduces carbon dioxide emissions and decreases the need to import huge amounts of materials from other parts of the world.

It's hard not to point out the current tendency to use eco-friendly paints, inks and labels for packaging. This practice helps to visibly reduce the level of environmental pollution. Customers highly value market players that pay attention to these aspects and use innovative types of inks or biodegradable labels. A modern example of Eco-inks can be seen in Fig. 5.

Figure 5 – A modern example of Eco-inks
Source: https://www.mohawkconnects.com/article/mohawk-blog/what-are-eco-friendly-inks

Taking all of these examples into account, it can be emphasised that the global spread of the concept of sustainable development has indeed formed quite promising tendencies in eco-friendly packaging. Its introduction in this sphere has become an important step towards reducing the negative impact of humanity on the environment, preserving our planet and creating a more sustainable future in general.

Also, in this article, it is simply impossible not to note the interconnection between the concept of sustainable development and the concept of circular economy. Nowadays, they are very closely related. They have a comprehensive goal - to achieve a balanced development of the economy, environment and society.

Today, a growing number of countries are beginning to actively work on establishing a circular economy, which is an effective instrument for achieving a wide range of global sustainable development goals. It uses highly efficient practices that create new production cycles where all possible materials and products are reused in economic turnover. This policy allows us to reduce our ecological footprint by minimising the amount of waste and reduces the need to extract such a large amount of natural resources.

Sustainable packaging is an integral part of the «circular economy» [5]. Thanks to it, it is now possible to achieve a considerable reduction in the negative impact on the environment and ensure more effective use of resources. The key circular packaging practices in the field of packaging and their main advantages are shown in Table 4.

Table 4. The key circular packaging practices in the field of packaging and their main advantages

Circular practices	The idea of the practice	Main advantages
Reuse of packaging	Returning packaging to the logistics cycle with the aim of reusing it in the future. As an example, it is possible to mention various plastic containers.	● Smaller expenses. ● Less need in new packaging. ● Lower amount of waste.
Return of packaging to the production process	Collecting and partial processing of used packaging with the aim of re-producing packaging materials. As an example, it is possible to mention the production of new boxes from waste cardboard.	● Lower greenhouse gas emissions. ● Minimisation of production costs. ● Development of innovations in the field of packaging.
Full recycling of packaging	Collecting and forwarding used packaging to factories with the aim of complete recycling and production of similar or absolutely new products.	● Less energy consumption. ● Lower demand for raw materials. ● Minimisation of waste.
Packaging in the form of a temporary service	A system where the manufacturer retains ownership of the packaging and the customer receives it only for the duration of the delivery, after which the packaging is returning back to the manufacturer.	● High responsibility of the manufacturer for packaging. ● Smaller need in new packaging. ● Lower carbon footprint. ● Less amount of waste.

Source: Developed by Vladyslav Marchenko

Taking into consideration the information provided in the table, it can be emphasised once again that packaging is an important element of the circular economy concept. The widespread adoption of its existing practices, as well as the use of new and perspective solutions, is a fundamental step towards achieving a more harmonious, modern, secure and sustainable economy in the nearest future.

It is also impossible to pass over the question of artificial intelligence in the packaging sphere. It has an enormous potential, and its capabilities are only growing every year. The gradual development of AI is one of the reasons for the rapid spread of the circular economy concept. It can make the packaging industry more innovative, productive and ecologically friendly. Nowadays, there is a huge list of options for using the powerful analytical functions of artificial intelligence. The key examples of ways to apply AI in the packaging sphere and the benefits it provides are included in Table 5.

Table 5. The key examples of ways to apply AI in the packaging sphere and the benefits it provides

№	Example of ways to apply AI	Explanation of use	Benefits
1	Innovative supply chain management	Artificial intelligence is able to collect, process and analyse a variety of data on packaging usage, packaging stocks and packaging waste. This information can then be used to improve the effectiveness of packaging usage in supply chains.	● Optimisation of logistics processes. ● Reduced resources consumption. ● Minimisation of excess packaging.
2	Improving packaging design	Artificial intelligence is able to select the most appropriate materials for packaging, determine the optimal packaging shape, its size, density	● Improving the efficiency of transportation.

		and strength. This direction allows to increase packaging efficiency and create the most compact and environmentally friendly design.	● Reducing the level of greenhouse gas emissions. ● Minimisation of the amount of waste.
3	Tracking the life cycle of packaging	The use of artificial intelligence allows to monitor packaging data in detail at all stages, starting from the moment of its production at the enterprise and up to the final disposal. Their analysis helps to improve the productivity of packaging, find ways to recycle and reuse it.	● Increase the effectiveness of operations. ● Recycling and reuse of packaging. ● Transparency of processes.
4	Automation of the packaging recycling process	Artificial intelligence can successfully recognise packaging, identify its types and sort all kinds of materials. This allows to automate the packaging recycling process, making it much faster and more effective.	● Less need in manpower. ● Higher speed of the packaging recycling process. ● Lower energy costs.
5	Determination of demand for packaging	Artificial intelligence can calculate the current demand for packaging. Similarly, it is able to predict future demand for packaging and future available supply, taking into account extracted resources and recycled material flows.	● The possibility to adapt to the needs. ● More efficient supply chains. ● Lower expenses on resources.

Source: Developed by Vladyslav Marchenko

Thus, it can be emphasised that artificial intelligence is of utmost importance in our time. It has tremendous prospects for both the development of the packaging industry and the establishment of a circular economy. The analysis has shown that there are a wide range of practices for its application in these questions. Already today, the use of AI in the field of packaging can provide companies and ordinary people with a huge number of opportunities and benefits. There is no doubt that it will continue to develop and become even more innovative and powerful.

At present, the sphere of sustainable packaging is facing serious challenges on its development path. Such challenges do not allow it to reach its full potential and slow down the implementation of sustainable development practices in packaging. The key challenges for the development of sustainable packaging are shown in Fig. 6.

Figure 6 – The key challenges for the development of sustainable packaging
Source: Developed by Vladyslav Marchenko

The above mentioned information perfectly demonstrates the complexity of the existing problems. All of them require effective solutions, and most importantly, a long period of time. At this stage of our society's development, none of these challenges can be solved instantly, and this will undoubtedly happen gradually. The current issues clearly demonstrate that further development of the eco-friendly packaging sector is only possible in case of finding reliable, well-thought-out approaches that can improve recycling technologies, reduce the financial expenses for the production of materials, create appropriate educational programmes and promote sustainable practices among both ordinary people and business representatives. It is also important to underline that eco-friendly packaging can only become a truly new standard if governments strongly support it, develop relevant packaging technologies and increase environmental awareness of citizens.

A comparison of the development of eco-friendly packaging in Ukraine and the European Union became the next element of this article. The progress of this direction in the EU and our country has a huge number of crucial differences, which have become the key to the rapid leadership of one of these parties. This is particularly evident when comparing their economic capabilities, existing technologies and regulatory frameworks. It will not be a big surprise to note at the very beginning that the European Union has a clear lead in the field of sustainable packaging. For many, many years, it has been paying special attention to the development of the circular economy concept and actively working to popularise the sphere of sustainable packaging, while our country, although it has had some success in this, is still just beginning its path of adaptation to these complex practices. A comparison of the development of the field of

ecological packaging in Ukraine and the EU can be seen in Table 6.

Table 6. A comparison of the development of the field of ecological packaging in Ukraine and the EU

Parameter	Ukraine	EU
Technologies	The development of eco-friendly packaging technologies has a very slow pace. Most promising projects are at the initial stages of implementation. There are initiatives in the country for packaging reuse, packaging waste recycling, and the implementation of biodegradable materials, but these are rare cases and not a widespread phenomenon.	The European Union is constantly investing significant financial resources in the development of innovations and new technologies that aim to reduce the ecological impact of packaging. EU countries support scientific researches in this area and finance different start-ups.
Level of environmental awareness and responsibility of citizens	The country has a low level of environmental awareness of citizens. The government does not pay enough attention to explaining the significance of eco-friendly packaging, which results in a lack of willingness to choose it. At the same time, the popularity of eco-friendly products among young people is gradually increasing, which is contributing to the growth of interest in eco-friendly packaging and the concept of sustainable development.	Citizens of EU countries have a fairly high level of environmental awareness. Most EU citizens are responsible when it comes to choosing the proper packaging. Eco-friendly packaging is in demand among citizens who want to minimize the impact of humanity on the surrounding. The government supports companies that implement ecological initiatives and pays more attention to these issues in education.
Regulatory framework	The relevant legal framework is still in the process of development. The government is actively adopting the experience of other countries. For example, in 2021, a law was approved to restrict the use of plastic bags in Ukraine. The country does not have a well-planned approach to the development of the eco-friendly packaging segment.	The European Union has an advanced regulatory framework. It has developed not only laws, directives and strategies for the development of a circular economy and the recycling of packaging, but also established clear obligations for member countries on reducing the amount of packaging.
Stimulation of companies	Stimulation is quite limited. The country supports such environmental projects, initiatives, and waste recycling programs, but this is not a widespread practice. In a similar way, their financial support is also currently inadequate. Many companies just close their eyes to environmental issues.	Stimulation is very active. The EU is constantly working on the transition to sustainable packaging. A balanced system of benefits and strict obligations has been developed. It provides companies with new technologies, supports them with subsidies and tax benefits, but sets clear requirements to reduce their environmental footprint.
Overall level of implementation and future development prospects	The country is still at the initial stage of the development of eco-friendly packaging sphere. Ukraine is actively studying existing practices and plans to implement European approaches step by step. The country has significant prospects for improvement, but due to a large number of barriers, progress in this area is currently slow.	The EU has a good level of development in the field of eco-friendly packaging. This applies to both established policies and environmental practices. The EU has a great potential for development in this direction. Experts predict the further spread of eco-friendly packaging policy and the establishment of a circular economy.

Source: Developed by Vladyslav Marchenko

This table clearly demonstrates the significant difference between the development of this sphere in Ukraine and the EU. The EU have already made significant achievements and gained considerable success, while our country is still actively developing this area, studying international experience and trying to adapt existing practices. At present, the creation of a strong regulatory framework and the implementation of reforms remain a top priority for Ukraine. Conducting public awareness campaigns and changing approaches to this issue in the education system can also play an important role in accelerating the development of sustainable packaging sphere.

Thus, it can be emphasized that the sustainable development concept has a great impact on the field of eco-friendly packaging and aims to balance its environmental, economic and social aspects. The article is a logical continuation of the author's scientific research in the direction of developing environmental aspects of logistics.

Conclusions. The conducted research and analyses in this article have allowed to achieve all the previously set goals. In this work, it has been clearly emphasized that problems such as environmental pollution, climate change and depletion of natural resources are complex challenges that are global in scope. The lack of attention to them in the past has led to terrifying consequences that are now pushing humanity to look for innovative ideas that can improve the current situation. Nowadays, one of the most serious problems is still the increase in the amount of waste. The implementation of the principles of the concept of sustainable development in the field of packaging has become one of the most innovative solutions to this problem. The concept of sustainable development is a powerful basis for the evolution of packaging in the direction of ecological friendliness. Eco-friendly packaging in logistics is a crucial element necessary to achieve sustainable business. The development of eco-friendly packaging can bring many benefits, starting with environmental protection, financial cost savings or reduced need in such large volumes of materials, and ending with optimization of energy consumption and improvement of the company's reputation in the market. After analyzing the impact of environmental regulations on various types of packaging and the history of packaging in general, it is possible to see how sustainability practices are indeed making changes in the packaging industry step by step. A comparison of the development of eco-friendly packaging in Ukraine and the EU has shown that although our country has implemented many positive solutions in recent years, we still have a lot of work to do. Despite all the mentioned problems and challenges that Ukraine is facing today, the development of the eco-friendly packaging sector is still on the rise in our country. Summarizing all the information above, the sphere of eco-friendly packaging has great prospects for further development, and that is why it is so important to continue to study this direction.

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STRATEGIC GUIDELINES FOR INNOVATIVE DEVELOPMENT OF ENTERPRISES IN THE CONTEXT OF A DYNAMIC ECONOMIC ENVIRONMENT

Ivan Marchenko. "Strategic guidelines of innovative development of enterprises in the conditions of dynamic economic environment". *The article is devoted to the substantiation of strategic guidelines for the innovative development of enterprises in the context of the dynamic economic environment. The relevance of the research topic is explained by the need to formulate strategic guidelines for the innovative development of enterprises that would meet the challenges of a dynamic economic environment, ensure the synergy of innovative potential and strategic goals, and also contribute to increasing their sustainability and adaptability. It is substantiated that innovation activity is a key factor in ensuring the adaptability, competitiveness and long-term growth of enterprises in the context of growing economic uncertainty and security challenges. The current state of innovation development in Ukraine is considered, taking into account the positions in the Global Innovation Index. The dynamics of expenditures on innovations of industrial enterprises is analyzed, which indicates their significant decline in recent years under the influence of external factors. The key internal and external barriers that hinder innovation development are identified. It is outlined that overcoming the systemic barriers to the innovative development of enterprises creates the basis for the formation of an effective strategic trajectory of their growth, based on the development of intellectual potential, technological renewal and digital transformation. A number of strategic guidelines for the innovative development of enterprises are proposed, including: digital transformation, improvement of organizational and managerial mechanisms, intensification of partnerships, development of innovative infrastructure and formation of innovative culture. It is substantiated that the innovative development of enterprises acts as a catalyst for structural changes in the national economy, stimulates the development of knowledge-intensive industries, influences the formation of innovative infrastructure, promotes employment and activates domestic demand for intellectual products. It is emphasized that innovation-oriented enterprises play a key role in shaping a modern economic model capable of ensuring long-term growth and integration of Ukraine into the global innovation space.*

Keywords*:* innovative development, enterprise, economic environment, strategic guidelines, innovative potential, innovative development of enterprises

Іван Марченко. «Стратегічні орієнтири інноваційного розвитку підприємств в умовах динамічності економічного середовища». *Стаття присвячена обґрунтуванню стратегічних орієнтирів інноваційного розвитку підприємств в умовах динамічності економічного середовища.*

Актуальність теми дослідження пояснюється необхідністю формування стратегічних орієнтирів інноваційного розвитку підприємств, які б відповідали викликам динамічного економічного середовища, забезпечували синергію інноваційного потенціалу та стратегічних цілей, а також сприяли підвищенню їхньої стійкості та адаптивності. Обґрунтовано, що інноваційна активність є ключовим фактором забезпечення адаптивності, конкурентоспроможності та довгострокового зростання підприємств в умовах зростання економічної невизначеності та безпекових викликів. Розглянуто сучасний стан інноваційного розвитку в Україні з урахуванням позицій у Глобальному інноваційному індексі. Проаналізовано динаміку витрат на інновації промислових підприємств, що вказує на їхнє значне зниження протягом останніх років під впливом зовнішніх факторів. Визначено ключові внутрішні та зовнішні бар'єри, які стримують інноваційний розвиток. Окреслено, що подолання системних бар'єрів інноваційного розвитку підприємств створює підґрунтя для формування ефективної стратегічної траєкторії їхнього зростання, що ґрунтуватиметься на розвитку інтелектуального потенціалу, технологічному оновленні та цифровій трансформації. Запропоновано ряд стратегічних орієнтирів інноваційного розвитку підприємств, серед яких: цифрова трансформація, удосконалення організаційно-управлінських механізмів, активізація партнерських зв'язків, розвиток інноваційної інфраструктури та формування інноваційної культури. Обґрунтовано, що інноваційний розвиток підприємств виступає каталізатором структурних зрушень у національній економіці, стимулює розвиток наукоємних галузей, впливає на формування інноваційної інфраструктури, сприяє підвищенню зайнятості та активізує внутрішній попит на інтелектуальні продукти. Підкреслено, що підприємства, орієнтовані на інновації, відіграють ключову роль у формуванні сучасної економічної моделі, здатної забезпечити довгострокове зростання та інтеграцію України до глобального інноваційного простору.

Ключові слова: інноваційний розвиток, підприємство, економічне середовище, стратегічні орієнтири, інноваційний потенціал, інноваційний розвиток підприємств.

Intraduction. In the current conditions of functioning of enterprises, the issue of ensuring their innovative development is becoming increasingly relevant, which is a key factor in maintaining competitiveness and sustainability in an unstable and dynamic economic environment. In the context of increasing global competition, technological transformation, intensification of digital processes, destructive influence of military and political factors, and macroeconomic uncertainty, there is a need to conceptualize new strategic guidelines for the innovative development of enterprises. Despite the growing awareness of the importance of innovation, many enterprises face difficulties in formulating clear strategic guidelines for innovative development. The lack of a systematic approach to strategic planning of innovation activities, insufficient investment in innovation, and limited human resources hinder the innovative development of enterprises. Based on the above, the issues of forming strategic guidelines that would meet the challenges of a dynamic economic environment, ensure the synergy of innovation potential and strategic goals of enterprises, and contribute to their sustainability and adaptability are becoming more relevant.

Analysis of recent research and publications. The problems of innovative development of enterprises are reflected in the works of such scientists as Voloshchuk Y. O. [1], Grechan A. P. [2], Emelianov O. Y. [3], Nyzhnyk O. V. [6], Cherkasova T. I. [10], and others. However, given the economic and security challenges, there is a need for further research on this issue, which will not only identify existing external barriers and internal constraints to the innovation activity of enterprises, but also outline strategic guidelines for further development.

The article is aimed at studying the peculiarities of innovative development of enterprises in the context of adaptation to the

challenges of the modern economic environment.

Summary of the main research material. In today's dynamic economic environment characterized by high turbulence, digital transformation and global challenges, innovation is becoming a determining factor in ensuring the competitiveness of enterprises. Innovative development is no longer an additional option, but is becoming a strategic necessity for enterprises seeking to adapt to new market realities, ensure sustainable growth and integrate into global production and information processes. In this context, the ability of enterprises to formulate and implement long-term innovation strategies focused on the use of modern technologies, digitalization of business processes, and human capital development is important.

Every year, the World Intellectual Property Organization (WIPO) comprehensively assesses the innovation potential of more than 130 countries. The value of the Global Innovation Index (GII) is significant, as in the context of rapid transformations in the global economic environment, a country's ability to form an effective system of innovative development is becoming a key factor in its competitiveness. According to the data for 2024, Ukraine ranked 60th, which, despite a decline of several positions, confirms its status as a country with innovative development (Fig. 1). Given these conditions, it is extremely important to rethink the strategic guidelines for the innovative development of enterprises as key actors in the national economy. It is the business sector that plays a leading role in transforming scientific and technological achievements into real products, services and technologies that can ensure economic development even in the face of military challenges and economic instability.

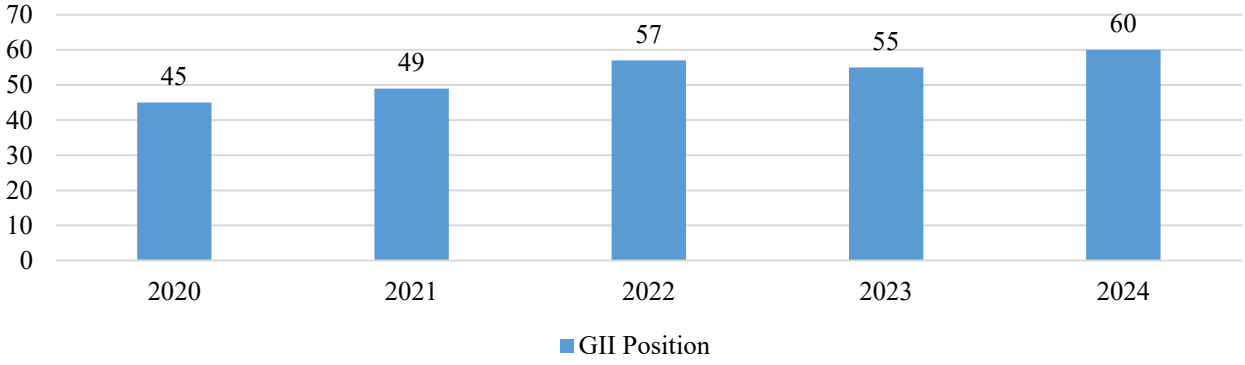

Figure 1 – Changes in Ukraine's ranking positions according to the Global Innovation Index
Source: compiled by the author according to [11; 13].

Today, the level of innovation activity of most Ukrainian enterprises remains insufficient, which leads to the lack of dynamic innovation development or its minimal manifestations and, in turn, negatively affects their competitiveness. The dynamics of expenditures on innovations of Ukrainian industrial enterprises is characterized by a downward trend (Fig. 2) [7]. A particularly significant decline was observed in 2022-2023, which was a direct consequence of a full-scale war, economic instability, disruption of supply chains, and revision of business priorities. In this context, we agree with O. Y. Yemelianov and O. T. Danilovych that innovation activity needs to be rethought and intensified, since in conditions of economic instability, increased security risks and reduced investment, innovation can become a driver of recovery and a source of increasing the sustainability of enterprises [3, p. 478]. Therefore, the

intensification of innovation activity becomes not just desirable, but a necessary condition for ensuring the competitiveness of enterprises in the face of constant challenges.

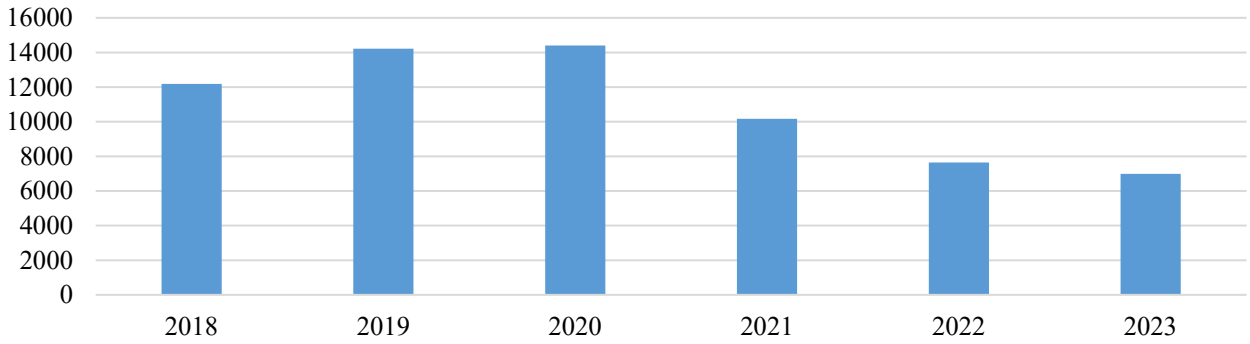

Figure 2 – Dynamics of expenditures on innovations by industrial enterprises in 2018-2023, UAH million

Source: compiled by the author based on [7].

To ensure a sustainable result, it is necessary to overcome a number of barriers that hinder this process. Many of these constraints are of an internal nature, as their sources are concentrated in the internal environment of enterprises - in the management system, human resources, organizational culture, financial capabilities and level of readiness for change. In this context, T. I. Cherkasova and O. M. Talakh [10] identify three main areas by which barriers and challenges to the innovative development of enterprises can be classified:

1. Financial and organizational.

Implementation of innovative solutions requires significant investments, which is becoming a significant challenge for enterprises. Limited access to funding sources, high cost of raising capital, and imperfect internal organizational structure complicate the implementation of innovative strategies. In addition, insufficient flexibility of management processes and lack of effective mechanisms for coordinating innovation activities increase the vulnerability of enterprises to changes in the external environment.

2. Lack of qualified personnel and knowledge.

Successful implementation of innovative initiatives is impossible without the participation of highly qualified specialists capable of working with the latest technologies. However, the shortage of such personnel in the labor market and the low level of innovation culture at enterprises limit development opportunities. Often, staff do not have the necessary knowledge and competencies, which requires additional investment in professional development, advanced training and education.

3. Risks and uncertainties associated with innovation activities.

Innovative activity is accompanied by an increased level of risk due to the difficulty of predicting the final results. Uncertainty of market reaction, possible technological failures, changes in consumer preferences or in the regulatory environment create additional barriers. In order to minimize the negative consequences, enterprises should implement effective risk management systems, conduct a comprehensive assessment of innovative projects and develop appropriate strategic development scenarios [10].

Thus, effective overcoming of these barriers requires the implementation of measures aimed at strengthening the institutional, human and financial capacity of enterprises, as well as at developing flexible

mechanisms for responding to external challenges.

Overcoming the systemic barriers to innovative development of enterprises creates the basis for an effective strategic trajectory of their growth. In a dynamic economic environment, it is extremely important to reorient from short-term response to challenges to long-term strategic planning based on the development of intellectual potential, technological upgrades, and digital transformation. In this context, we agree with Y.O. Voloshchuk that the definition of strategic guidelines for the innovative development of enterprises should be based on the level of formation of their intellectual and innovative potential, which is the basis for the realization of qualitatively new opportunities in such areas as

- comprehensive technical and technological modernization of the production base of enterprises;
- implementation of automation, robotization and digital business process management tools;
- Integration of advanced technologies, including nano-, bio-, cognitive, information and communication technologies, into production systems;
- searching for alternative sources of raw materials and implementing resource-efficient technologies;
- active digitalization of key functions of enterprises;
- updating technical means of production;
- introducing creative management practices and educational approaches focused on human capital development, institutional flexibility, and modern models of labor organization;
- expanding the scope of economic activity through diversification of activities;
- strategic focus on consumer needs, development and promotion of innovative products with high added value [1, p. 67].

These areas are not only a response to current challenges, but also appropriate tools for shaping the competitive advantages of enterprises in the medium and long term.

Based on the above, the innovative development of enterprises should be based on proactive adaptation, openness to change, and integration of new knowledge and technologies. Accordingly, given the dynamism of the economic environment, a number of strategic guidelines can be formed (Fig. 3). In particular, an important component should be a focus on creating high value-added products that can compete not only on the basis of price but also on the basis of uniqueness, functionality, and creative solutions. Businesses should also ensure the development of internal mechanisms for managing innovation activities, in particular through strategic planning tools, economic analysis, innovation project management, and the introduction of modern information systems and motivational technologies. In the context of economic instability, it is also extremely important to form partnerships with research institutions, participate in international technical assistance programs, and establish effective connections that will expand innovative horizons. Such an approach will not only minimize the risks associated with the instability of the external environment, but also turn these challenges into opportunities for strategic renewal and growth.

In the process of determining ways to implement strategic vectors of innovative development of enterprises, along with a comprehensive assessment of its resource and innovation potential, detection of deviations and identification of strengths, the diagnosis of hidden competitive potential is of particular importance. This approach is important because it opens up opportunities for a significant increase in the level of competitiveness of enterprises by optimizing internal management processes and using available resources without the need to attract additional external investments, which allows to effectively direct efforts to

implement innovative solutions in priority areas of development [6, p. 95]

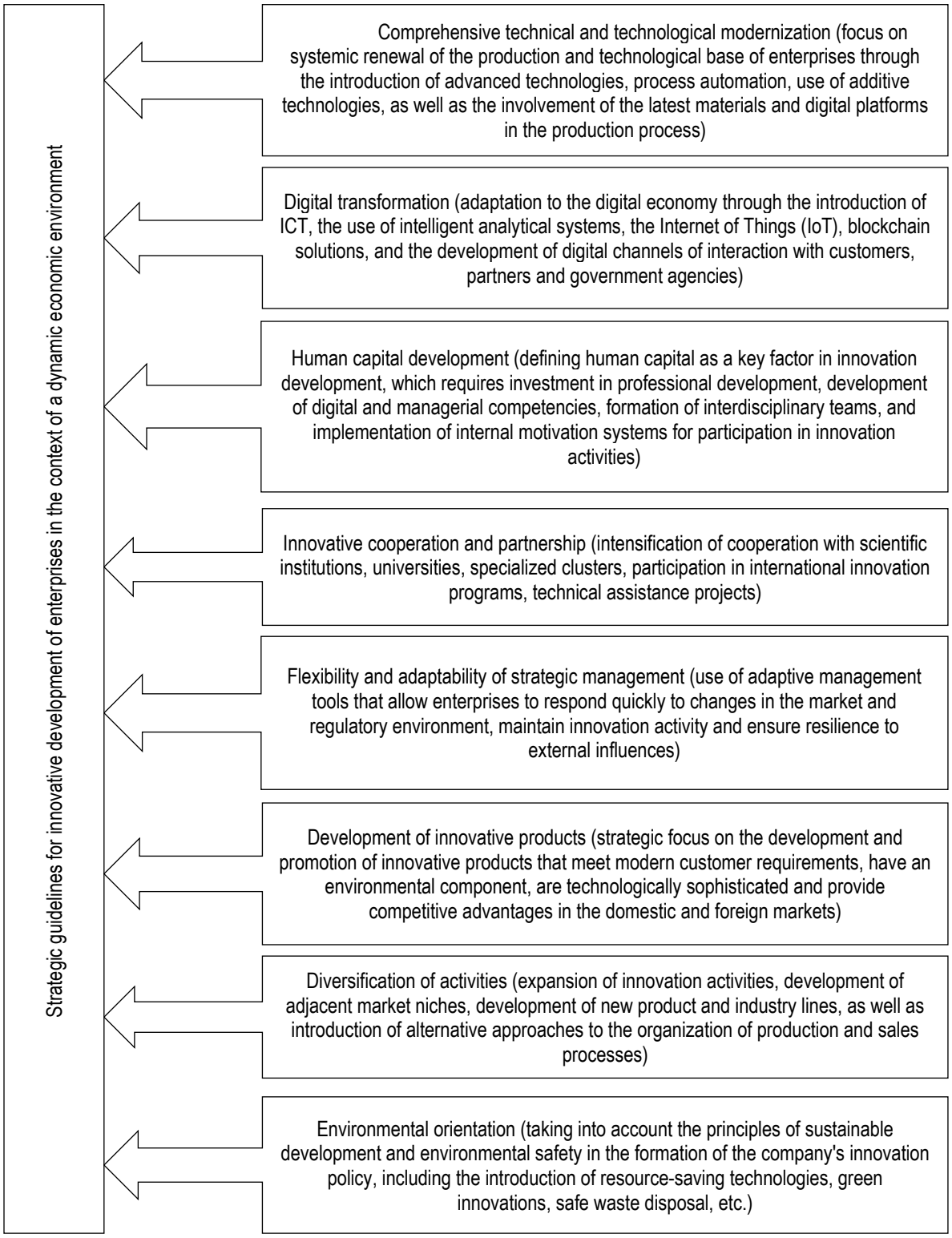

Figure 3 – Strategic guidelines for innovative development of enterprises in a dynamic economic environment

Source: developed by the author according to [4; 5; 8; 9; 12].

In this context, the issue of implementing a set of effective management tools that can ensure the effectiveness of transformational changes at enterprises becomes particularly relevant. It is the instrumental content of innovation activities that determines the ability of an enterprise to respond promptly to external challenges, minimize risks and increase its competitiveness.

One of the key tools is strategic planning, which allows for the formation of long-term guidelines for innovative development, setting goals, predicting risks, and developing algorithms for neutralizing them. An important factor is also the effective management of innovation projects, which involves the application of modern approaches to the organization, implementation, and control of innovation processes, which helps to increase their effectiveness and alignment with the strategic priorities of the enterprise.

Financial and economic analysis of innovation activities plays a significant role in management decision-making, including assessing the feasibility of innovations, calculating the return on investment and economic efficiency of projects, taking into account risks. At the same time, the creation of an effective organizational structure will ensure coordinated interaction between the company's departments within the framework of the innovation strategy and will help to strengthen internal communication and integrate innovations into the corporate culture.

Equally important is the introduction of modern digital technologies and management information systems that automate key management processes, increase the speed of information processing, optimize communications, and respond quickly to changes. Particular attention should be paid to the formation of an effective system of staff motivation, which should encourage employees to actively participate in innovation through a combination of tangible and intangible incentives, creating favorable working conditions and opportunities for professional development [2, p. 150-151].

In general, the integration of these tools into the strategic management system of an enterprise will not only ensure the stability of innovative development, but also form a flexible adaptive model of enterprise functioning that can effectively respond to dynamic changes in the environment.

Thus, the innovative development of enterprises is one of the key prerequisites for the modernization of the national economy, increasing its competitiveness and ensuring sustainable economic growth. In a dynamic transformational environment, increasing global competition and growing security challenges, the ability of enterprises to generate and implement innovations is becoming a critical factor in their adaptability, sustainability and economic viability. Innovative activity allows not only to increase productivity and technological level of production, but also to form qualitatively new approaches to management, organization of business processes, and interaction with the market environment. At the same time, the innovative development of enterprises acts as a catalyst for structural changes in the national economy, stimulates the development of knowledge-intensive industries, influences the formation of innovative infrastructure, promotes employment in the high-tech sector and activates domestic demand for intellectual products. Thus, innovation-oriented enterprises play a key role in shaping a modern economic model capable of ensuring long-term economic security and Ukraine's integration into the global innovation space.

Conclusions. In a dynamic economic environment characterized by a high level of uncertainty, instability, technological change, and constant transformation, innovations are becoming a source of new opportunities for growth and modernization. For Ukraine, innovation transformation is particularly relevant given the need to restore the economy, increase its resilience to external challenges, and achieve strategic goals of

sustainable development. Since enterprises play a key role in ensuring sustainable economic development of the state, implementing its strategic priorities, strengthening competitiveness and building innovative potential, it is important to rethink the strategic guidelines for their innovative development. The analysis of the current situation shows that most Ukrainian enterprises demonstrate a low level of innovation activity, which is a consequence of both external destabilizing factors (full-scale war, economic crisis, and reduced investment) and internal barriers (weak strategic management system, limited financial and human resources, insufficient integration of the latest technologies and management practices). Therefore, innovative development should be viewed as a multidimensional process that encompasses not only technical or technological changes, but also social, managerial, institutional, and other transformations. It should be based on a strategic vision, adaptability, openness to change, and active implementation of new technological and managerial solutions that will not only allow to survive in the face of uncertainty but also to create competitive advantages in the long term.

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CHALLENGES OF INNOVATIVE DEVELOPMENT OF RIVER TRANSPORT IN THE EU AND UKRAINE

Svitlana Smerichevska, Danylo Bugayko, Dmytro Bugayko. "Challenges of innovative development of river transport in the EU and Ukraine". *The development of the logistics capabilities of Ukrainian river transport enterprises is the main factor ensuring their competitiveness and long-term success. The post-war reconstruction of the national economy of Ukraine will require systematic logistics support, which should be based not only on transportation by classic modes of transport, but will also require the search for new cost-effective transportation. The proposal is to revive Ukrainian river transport by developing the river transportation component on the basis of existing logistics companies. Analysis of global and European domestic transportation confirms the relevance of this direction in Europe and the world, which is of particular importance, taking into account the Euro-Atlantic integration processes of Ukraine.*

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Keywords: river transport, multimodal transportation, innovation, digitalization, strategy

Світлана Смерічевська, Данило Бугайко, Дмитро Бугайко. «Виклики інноваційного розвитку річкового транспорту ЄС та України». *Розвиток логістичних можливостей підприємств річкового транспорту України є головним чинником, що забезпечує їх конкурентоспроможність та довгостроковий успіх. Повоєнна відбудова національної економіки України буде вимагати системного логістичного забезпечення, яке повинне базуватись не тільки на перевезеннях класичними видами транспорту, але й вимагатиме пошуку новітніх економічно ефективних перевезень. Пропозицією є відродження річкового транспорту України, шляхом розвитку складової річкових перевезень на базі існуючих логістичних компаній. Аналіз світових та європейських внутрішніх перевезень,підтверджує актуальність цього напрямку у Європі та світі, що має особливе значення, враховуючи Євроатлантичні інтеграційні процеси України.*

Ключові слова: річковий транспорт, мультимодальні перевезення, інновації, цифровізація, стратегія.

Intraduction. Analysis of world and European inland transportation confirms the relevance of the development of inland waterway transport in Europe and the world. It is also possible to argue that the development of river transport is of particular importance in view of the Euro-Atlantic integration processes of Ukraine and the need for sustainable development of multimodal transportation in the post-war period.

An unresolved part of the problem is the need for research to reach the level of a strategic vision of managing the sustainable development of river transport in Ukraine in the post-war period. Given the above, it is considered relevant to apply a systemic approach in determining ways to improve river transport. This creates conditions for obtaining a positive synergistic effect for sustainable development, both for river transport in particular and for the national economy as a whole.

The purpose of the study. The purpose of the study is to improve the logistical potential of river transport in the national water transport system based on strategic approaches to the sustainable development of EU river transport and the implementation of modern innovative solutions.

The main tasks are:

• Development of innovative logistics products and development of new segments of the multimodal transportation market. The task is to include the river transport segment in the post-war multimodal subsystem of the transport system of Ukraine.

• Interaction with different types of transport in the multimodal supply chain.

• Development of a mechanism for the integration of different types of transport in a single supply chain, taking into account the synergistic effect with the determination of the contribution of river transport.

• Analysis of the main innovative approaches to the sustainable development of river transport.

The object of the study is the strategic management of river transport in the context of sustainable development of the national economy.

The subject of the study is the scientific and theoretical foundations and scientific and methodological provisions that ensure the strategic management of river transport in the context of sustainable development of the national economy.

The main proposal for strategic development is a proposal to form its own river fleet of logistics enterprises, which will allow them to become the flagships of inland water transport in Ukraine.

At the present stage, logistics companies should focus not on the pre-war restoration and reconstruction of the industry, but on

planning the future, using approaches to demand generation and sales stimulation, which will allow Ukraine to integrate into the EU inland waterway transport system and take a worthy place among the inland waterway logistics countries of Europe. At the same time, it is proposed to adjust the strategy of river transport logistics companies in accordance with the main global and regional strategies for the development of inland waterway transport.

Results of the research.

Experience in developing logistics solutions in river transport in the EU. European countries, having developed river transport, can radically differ in the level of intensity of its use. Realizing two important advantages of river transport, such as economy and environmental friendliness, many researchers focus only on individual aspects related to the formation of demand and supply of river transport services, less often - from the standpoint of a systemic approach, considering river transport as a subsystem of the country's logistics system. This initiates the need to analyze the experience of forming river transport systems based on their coordinated functioning with other modes of transport in the process of implementing the logistics concept for the development of port regions [1].

Freight transport by inland waterways, EU, 2013-2023. Unfortunately, the activity of river transport in the European Union has a tendency to decrease (Fig. 1).

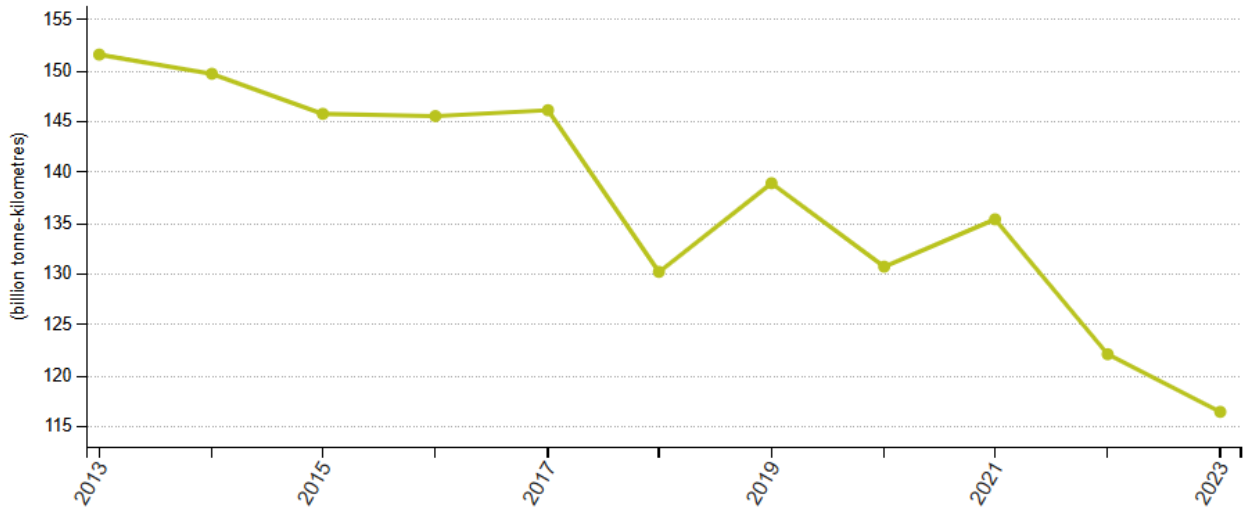

Figure – 2. Inland waterway freight transport, EU, 2013-2023.
Source: [2].

Inland waterway transport activity was volatile over the period 2013-2023. Measured in tonne-kilometres, activity decreased every year over the period 2014-2016. A slight increase was observed in 2017 (+0.5%), followed by a sharp drop in 2018 (-10.9%) and an immediate recovery in 2019 (+6.6%). A decline was observed in 2020 (-5.9%), while a new recovery was recorded in 2021 with an increase of 3.6% compared to 2020. A sharp decrease of 9.8% was recorded in 2022. In 2023, freight transport by inland waterways decreased by 4.6% (or 6 million tonne-kilometres), reaching its lowest point since data for the EU began to be available (i.e. 2005). A similar trend can be observed in 2023 in tonnes, with a decrease of 4.0% (or 20 million tonnes).

Freight transport by inland waterways, EU, 2013-2023 (billion tonne-kilometres) is shown in Figure 3 [2].

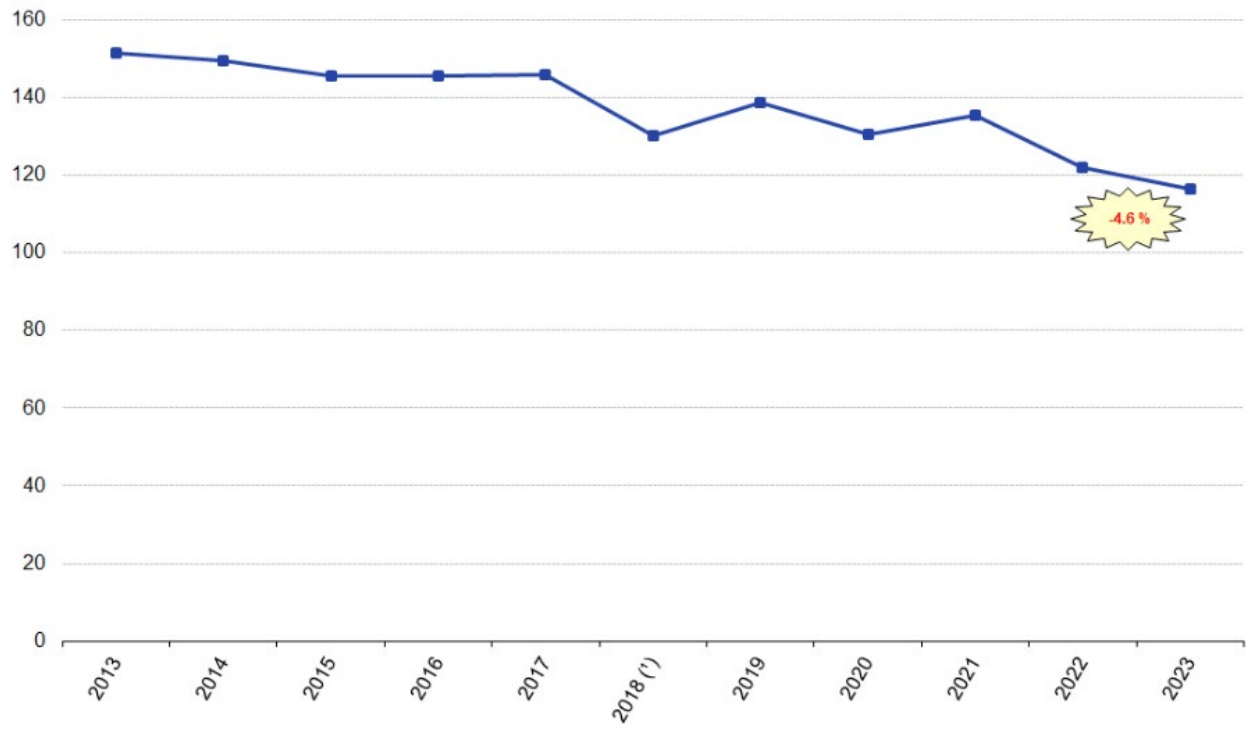

Figure 3 – Inland waterway freight transport, EU, 2013-2023 (billion tonne-kilometres)
Source: [2].

Freight transport by inland waterways, 2013, 2022 and 2023 (million tons) is shown in Fig. 4.

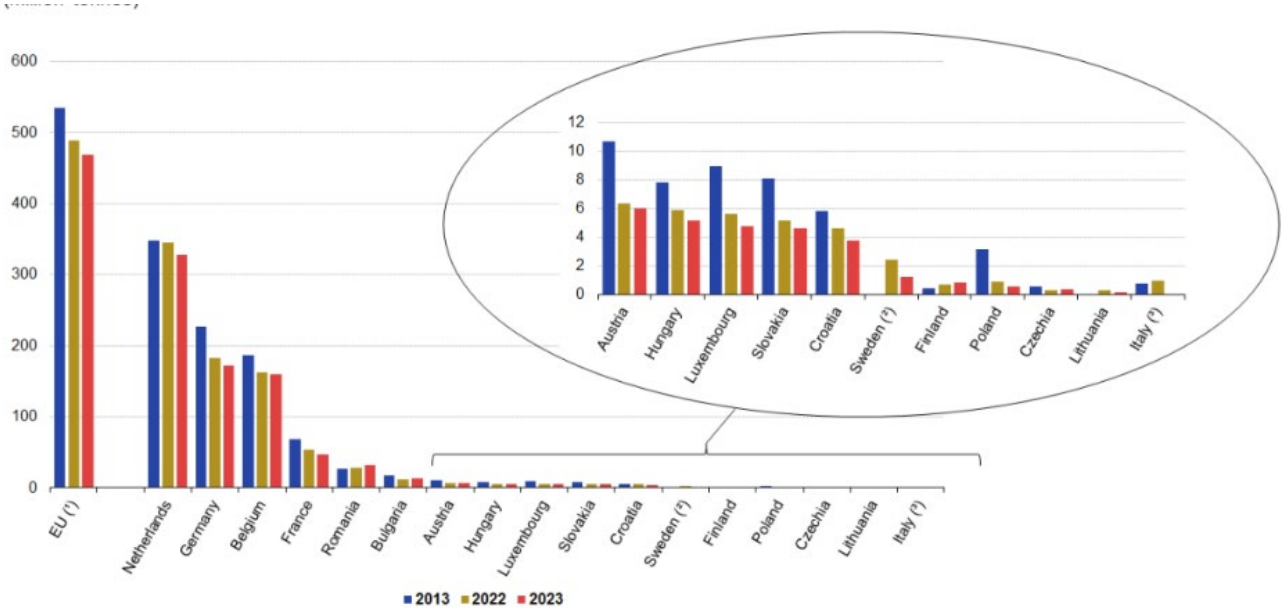

Figure 4 – Inland waterway freight transport, 2013, 2022 and 2023 (million tonnes).
Source: [2].

When looking at freight transport in tonnes, the picture is quite similar to that for tonne-kilometres, with some notable differences (Figure 4). All countries experienced a decrease in 2022 compared to 2021, with the exception of the Czech

Republic (+19.3%), Finland (+14.5%), Romania (+12.2%) and Bulgaria (+7.0%). However, the significant percentage changes for the Czech Republic and Finland should be viewed in light of the low starting values. It should be noted that while the Czech Republic experienced a significant increase in freight transport measured in tonnes, it experienced a decrease in freight transport measured in tonne-kilometres (-10.9%). The largest relative declines were recorded in Sweden and Lithuania, with -48.6% and -46.4% respectively. However, these significant percentage changes should be seen in light of the low starting values, with absolute values decreasing from 2.5 million tonnes to 1.3 million tonnes in Sweden and from 303 thousand tonnes to 162 thousand tonnes in Lithuania. Other countries with significant declines were Poland (-36.1%), Croatia (-18.6%), Luxembourg (-16.0%), Hungary (-12.2%), France (-11.0%) and Slovakia (-9.8%). It should be noted that while Lithuania experienced a significant decrease in freight transport measured in tonnes, it experienced an increase in freight transport measured in tonne-kilometres (+24.6%).

Inland waterway transport activity was volatile over the period 2013-2023. Measured in tonne-kilometres, activity declined every year during the period 2014-2016. A slight increase was observed in 2017 (+0.5%), followed by a sharp drop in 2018 (-10.9%) and an immediate recovery in 2019 (+6.6%) (Figure 1.5). A decline was observed in 2020 (-5.9%), while a new recovery was recorded in 2021 with an increase of 3.6% compared to 2020. A sharp decrease of 9.8% was recorded in 2022. In 2023, freight transport by inland waterways fell by 4.6% (or 6 million tonne-kilometres), reaching its lowest point since data for the EU began to be available (i.e. 2005). A similar trend can be observed in 2023 in tons with a decrease of 4.0% (or 20 million tons) [3].

Currently, "Metal ores and other mining products" and "coke and petroleum products" are the two main categories of goods transported [4].

'Metal ores and other mining and quarrying products; peat; uranium and thorium' (NST2007, section '03') was the main category of goods transported by inland waterways in the EU in 2023, both in terms of tonne-kilometres and tonnes. This category of goods accounted for almost a quarter (23.7%) of the total tonnes transported for all goods and over a quarter (27.9%) of the total tonnes transported. However, in 2023, a decrease in the transport performance of 'metal ores and other mining and quarrying products' in tonne-kilometres was recorded compared to 2022 (-2.1%). There was also a drop in tonnes transported (-2.6%). When analysing this category of goods from the perspective of different modes of transport, national transport showed the largest decrease in tonne-kilometres (-9.1%), followed by transit transport (-5.8%). International transport, on the other hand, registered a growth of 3.1%. Analyzing the volume of transported tons in 2023, national transport decreased by 4.7%, while international transport increased by 0.3% compared to 2022. [4]. Transport indicators of inland waterway transport on the national territory of each European country - comparison between 2022 and 2023 (in million tkm) are shown in Fig. 5 [5].

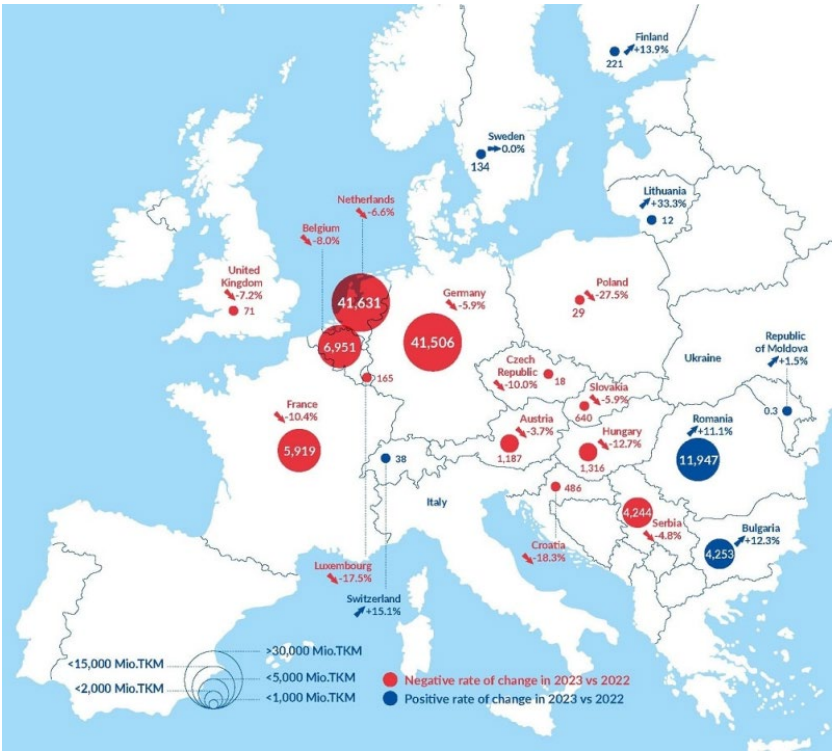

Figure 5 – Inland waterway transport indicators on the national territory of each European country – comparison between 2022 and 2023 (in million tkm)

Source: [5].

Inland waterway transport indicators in European countries in 2023 (in billion tkm) are shown in Fig. 6 [5].

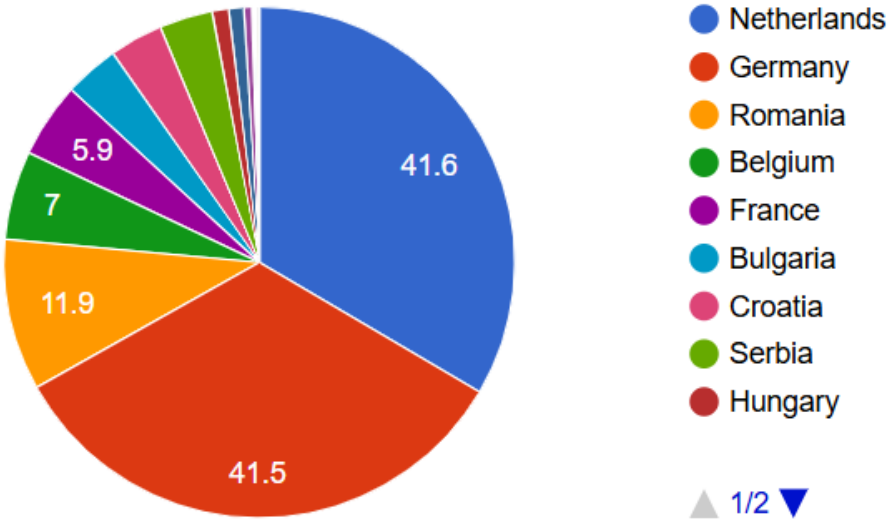

Figure 6 – Inland waterway transport performance in European countries in 2023 (in billion tkm)

Source [5].

Annual inland waterway transport performance in the EU-27 (in billion tkm) is shown in Figure 7[5].

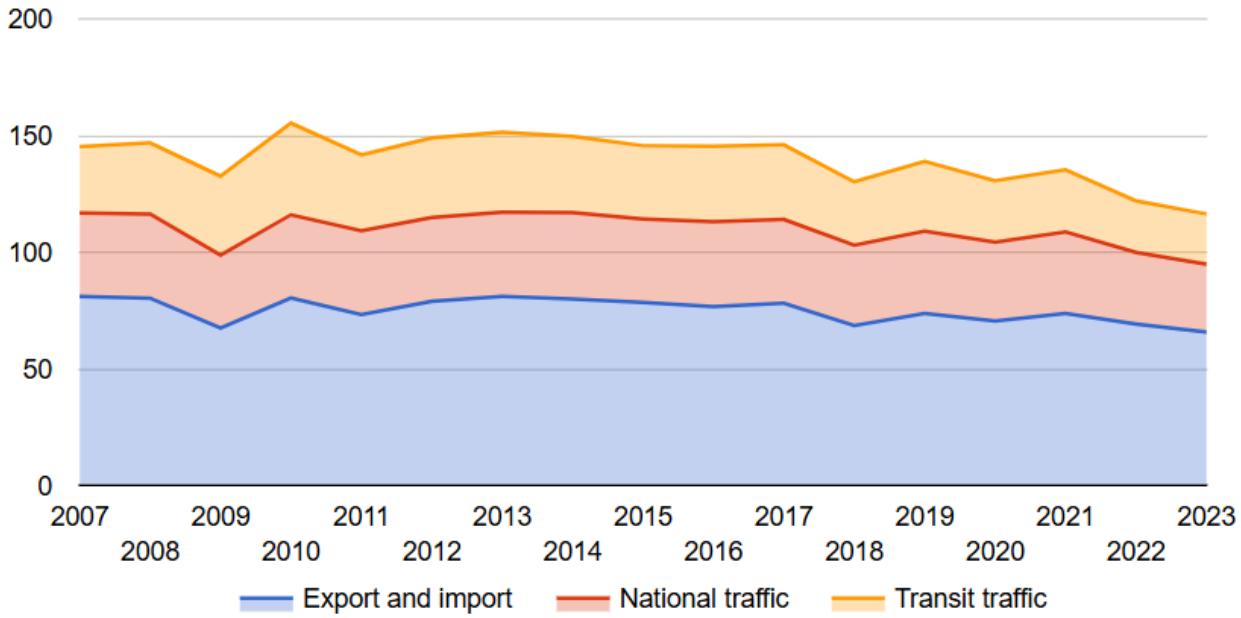

Figure 7 – Annual inland waterway transport figures in the EU-27 (in billion tkm)
Source [5].

Features of the functioning of river transport in the logistics system of Ukraine. Ukraine has a huge potential for increasing the volume of freight transportation by inland waterways. Compared to other modes of transport, which are limited by a deficit in capacity, inland waterways has an undoubted advantage - the possibility of a significant increase in freight transportation volumes [6].

Inland waterways are a type of transport that includes vessels and business entities that carry out and provide transportation mainly by river waterways of cargo, passengers, luggage and mail, provide other services using inland waterways, provide navigation on river waterways, maintain infrastructure facilities of inland waterways, and provide navigation and hydrographic support for navigation.

Inland waterways of Ukraine include rivers defined by the European Agreement on the Most Important Inland Waterways of International Importance, in particular, the Danube, Dnieper, Dniester, etc. [6].

At the time of the full-scale invasion of river transport in Ukraine, the following problems were inherent:

- lack of an improved regulatory and legal base for river transport;
- outdated port infrastructure;
- lack of specialized terminals;
- lack of a modern fleet;
- insufficient funding for the infrastructure of the Navy, etc. [6].

Martial law and bombing were added to the above problems, which significantly complicated navigation on Ukrainian rivers.

Let us conduct a study of the potential of river transport in Ukraine based on the concept of sustainable development. Ukraine, which is the largest country in Europe by territory, has significant potential for river transport. Taking into account the significant distances of potential river transport and the structure of freight transport in domestic and export-import logistics processes, which are dominated by raw material flows of dry and liquid cargo, large-sized goods, etc., river transport should occupy a significant share in

total freight transport and in the structure of GDP. However, the river freight transport industry has been stagnating over the past 20 years despite its objective advantages in terms of low costs, reliability and environmental friendliness. River transport in Europe consumes 1.5 times and 3.5 times less energy, respectively, than rail and road transport. On the other hand, the lack of consideration of external negative effects in costs in Ukraine makes this transport uncompetitive compared to rail or road transport, despite the fact that in Europe there are reverse relations [1].

There are three major navigable rivers in Ukraine: the Danube, the Dnieper, and the Southern Bug. All of them have access to the Black Sea, and the Danube and the Dnieper are among the five largest rivers in Europe. However, despite the existing potential for the development of transport connections using river transport in Ukraine, only 0.5% of goods are transported by it before full-scale invasion. Among the EU countries, this figure reaches 16.3% in Bulgaria, 12.3% in Germany. In general, in the EU countries this figure is 6.7% [7].

Thus, Ukraine potentially has the resource to increase river freight transportation by more than 12 times. The total length of navigable rivers in Ukraine is 4,400 km. The traditional waterways in use are the Dnieper - 1,205 thousand. km and its straits (Desna – 520 km and Pripyat – 60 km), as well as the Danube – 160 km, the Bug – 155 km and other so-called small rivers [7].

The technical condition of the river fleet is constantly deteriorating. The number of technically and morally obsolete vessels is 81.9%. The largest share of old vessels is cargo-passenger vessels – 97.1%. As a result, over the past 5 years, taking into account the global financial crisis, the total volume of cargo transportation has decreased by 3.5 times [7].

The length of inland waterways in Ukraine is the smallest among the analyzed countries – 2129.4 km compared to 3572 km (RP) and 7600 km (FRG), despite the largest area of its territory – 603.6 thousand km2 compared to 312.7 thousand km2 and 357.1 thousand km2 in the RP and FRG, respectively. The density of river waterways in FRG is 21.28 km/1000 km2 and significantly exceeds the similar indicator in the RP (11.42 km/1000 km2) and 3.52 km/1000 km2 in Ukraine. The GDP of Germany significantly exceeds the GDP of the Republic of Poland or the GDP of Ukraine (3865 billion USD compared to 509.955 billion USD and 112.154 billion USD, respectively). Germany is the leader in the intensity of foreign economic exchanges (exports – 1279 billion EUR; imports – 1035 billion EUR), in which river transport occupies an active place. The volume of cargo transportation by this transport in Germany is 221.349 million tons compared to 3.821 million tons in the Republic of Poland and 3.642 million tons in Ukraine. Taking into account the average distance of cargo transportation (Germany – 296.3 km, the Republic of Poland – 24.8 km (domestic transportation), Ukraine – 391 km), the cargo turnover of river transport in Germany was 54.347 billion t·km; in the Republic of Poland – 0.105 billion t·km, in Ukraine – 1.465 billion t·km, which indicates the strategic role of river transport in Germany. Thus, taking into account the low density of river roads in Ukraine (extensive factor), the short average distance of cargo transportation and the meager ratio of GDP to a unit of roads (intensive factors) compared to similar indicators in Germany, we note a low level of use of the potential of river transport in natural, temporal and spatial dimensions. At the same time, due to short transportation distances, which leads to a significant increase in the share of fixed costs (loading and unloading operations) per unit of distance, river transport becomes uncompetitive from a cost perspective. Separate factors have a source of formation from both the supply and demand sides.

The prospects for the formation of demand for river transport services are quite optimistic for three reasons:

a) the history of the development of river transport during the Soviet Union, the weight and volumes of transportation were at least an order of magnitude higher then;

b) the density of river roads and the scale of freight transportation of bulk cargo, in particular through seaports, are comparable to the prerequisites of river transportation in Germany;

c) the presence of significant transit potential due to the geographical location of the territory of Ukraine.

The prospects for river transport in Ukraine, in the near future, may be quite optimistic due to the acquisition of complementary relations between it and sea transport. In fact, sea transport may be one of the drivers of the development of river transport, given the positive dynamics of the former. In 2018, cargo turnover in 13 seaports of Ukraine reached 135 million tons, having processed 11,654 vessels. The ports of "Pivdennyi" handled the most cargo – 42.7 million tons, Mykolaiv – 29.2 million tons, Odesa – 21.7 million tons and Chornomorsk – 21.5 million tons. These ports are dominated by cargo (80%) of agricultural products, ores, metal products and container transportation. In 2018, the first place was taken by agricultural products (52 million tons of grain and other agricultural products), ores (28 million tons) and metal products (18 million tons). Container transportation takes fourth place and amounts to only 846 thousand TEN. Then the volume of cargo exports amounted to 100 million tons, imports – about 25 million tons and transit – only a little more than 10 million tons. It should be noted that a significant share of cargo is generated by territories close to the Dnieper River [1].

Introducing digital technologies and innovations into EU river transport logistics. The digitalisation of inland waterway transport (IWT) and, consequently, the digital transformation of business processes for all stakeholders, is an essential part of measures to ensure the sustainable development of the transport and logistics system in order to ensure safe, efficient and environmentally friendly navigation.

An important prerequisite for this is digital transformation, which consists in ensuring the availability of digitised information about waterways. Digitalisation can improve the safety of IWT operations by monitoring vessels in a "digital twin" of the waterway in real time, allowing shippers and authorities to identify unsafe practices and take appropriate preventive measures.

Finally, digitalisation can also help to improve the efficiency of IWT operations. Digital solutions can enable the tracking of vessels and cargo, allowing for route optimisation and reduced waiting times. This can reduce the amount of time, energy and resources used in transporting goods, leading to lower emissions and supporting climate change measures. Through digitalisation, inland navigation can be seamlessly integrated into multimodal transport chains.

Figure 7 shows the main IWT digitalisation measures proposed by the sector in the EU Masterplan Digitalisation of Inland Waterways (DIWA) [8].

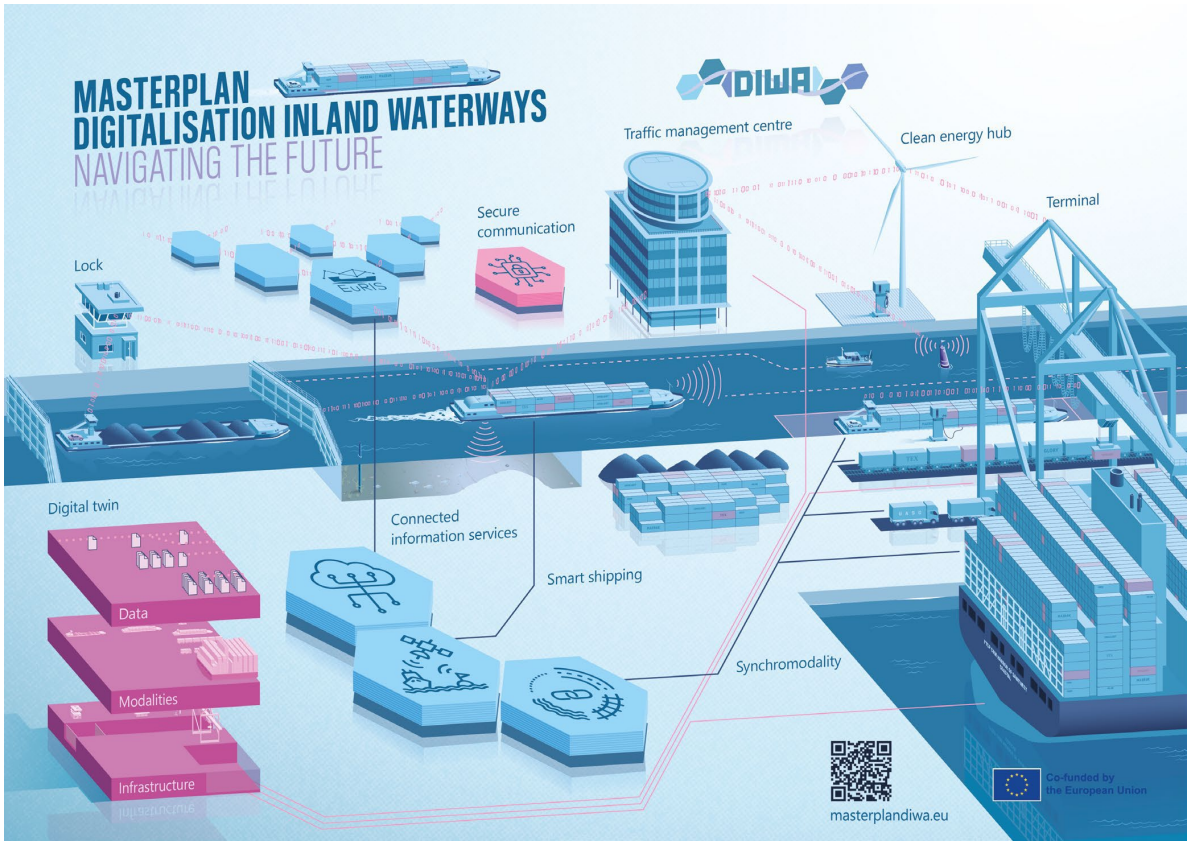

Figure 7 – Key digitalisation measures for IWT
Source: [8].

The DIWA Masterplan roadmap aims to achieve the overall digital transformation objectives set out in European strategies.

These objectives include:

- "safe and efficient navigation",
- "digital by default",
- "synchronous transport",
- as well as "reliable supply chains",
- creating a sustainable, environmentally friendly IWT sector,
- combating climate change
- adapting to the shortage of skilled workers [8].

These objectives outline the strategic horizons for the development of European IWT for the period up to 2032 and are supported by three main areas of practical measures:

- Synchronous modal shift,
- Connected information services,
- Smart delivery [8].

These measures are supported by requirements for standardization processes, cybersecurity, technology, data quality, legal and regulatory components. The success of digitalization and digital transformation also depends on stakeholder engagement and social acceptance.

Digitalization is rapidly transforming the global economy and society. Digitalization is an important source of innovation and new business development. Digitalization has the potential to transform IWT into a smart, efficient, sustainable, safe and multimodally integrated mode of transport.

In transport and logistics, the use of digital technologies is important for optimizing business processes between shippers and logistics market participants, as well as for exploring the possibility of semi-autonomous use of vehicles. The EU is actively improving the regulatory framework for the digitalization of transport and supporting new developments in this innovative direction. This is an important aspect of the future competitiveness of both the EU as a whole and all its member countries. Therefore, in view of European integration

trends, it is also very important for Ukraine to develop the state regulatory framework in this area, integrating it as much as possible with EU requirements.

True sustainability and efficiency can only be achieved if the entire supply chain is involved in digitalization processes. IWT, as part of a larger multimodal chain, requires seamless cooperation with other modes of transport and logistics companies [8].

Digitalization will contribute to:

1) optimized route planning in real-time conditions and using forecasts of expected water levels, weather conditions and traffic density to reduce fuel costs and negative environmental impact;

2) optimized traffic management and infrastructure operation with reduced waiting times and real-time tracking of cargo shipments;

3) increased traffic safety through a higher level of automation, supporting technologies such as modules for situational awareness (exchange of intentions, incident, warning) and improved communication protocols for ship-to-ship and ship-to-shore communications;

4) higher levels of automation to address common shortages of qualified personnel;

5) integration and interconnection with other modes of transport at multimodal hubs as a prerequisite for synchronous transport operations to support the sustainable development of the transport and logistics industry;

6) reducing the administrative burden by sharing digital data with the consent of the owner and reducing bureaucratic reporting;

7) developing new services for stakeholders based on existing and accessible data [8].

One of the main EU initiatives is to use the core network of multimodal corridors across Europe. The challenge for IWT includes establishing and adopting the institutional and regulatory framework for inland navigation in Europe. This is necessary for the development of a pan-European network of inland waterways and waterways of international importance with sustainable infrastructure as an integrated part of multimodal networks and markets. Ukrainian river transport logistics companies can also be involved in the development of such transport.

Digitalization is considered a favourable factor for the modernization of IWT by using core multimodal networks. Thus, it stimulates the improvement of the efficiency, reliability, safety and sustainability of the IWT system. As a result, waterways will be more attractive to new users and the use of waterways can be intensified.

Another challenge is the greening of river transport. According to the EU Green Deal, transport in Europe is expected to become carbon neutral by 2050. In addition, IWT must adapt to the effects of climate change. Already, low and high water periods are becoming longer and more frequent. In addition to these challenges, there are several major challenges that will be crucial for the role and position of IWT in the coming years [8].

European Commission strategies that lay the foundations for the digitalization of IWT.

Digital Inland Waterway Area DINA. The DINA study set out the first strategy for the development of a digital inland waterway area and digital multimodal hubs. The first roadmap for the digitalisation of IWT was developed, presenting short-term and long-term measures to stimulate the use of digital IWT technologies [9].

EU Digital Single Market Strategy. The strategy aims to create a single digital market for goods and services across the EU. The strategy also includes the development of the necessary infrastructure. Due to existing barriers, consumers limit access to goods and services, from which businesses cannot fully benefit from digitalisation, and governments and citizens cannot fully benefit from this digital transformation. The Digital Single Market aims to open up new opportunities, eliminate key differences between the online

and offline worlds, breaking down barriers to cross-border online activity [10].

European Green Deal. The main objective of the EU Green Deal is for the European Union to become carbon neutral by 2050. The Green Deal promotes sustainable transport, in particular the development of zero-emission vehicles and alternative fuels. Digitalisation is seen as an important catalyst for this process. Digital platforms help to promote the concept of sustainable mobility and the use of intelligent transport, and allow for systematic optimisation of energy efficiency. The Green Deal strategy envisages the development of smart mobility, with freight transport becoming paperless by 2030 and automated mobility being deployed on a large scale. In addition, the Green Deal aims to increase the modal market segment of IWT and short sea shipping by 25% by 2030. It is expected that a multimodal trans-European transport network for sustainable and smart transport will be fully operational by 2050 [11].

European (Open) Data Strategy. The EU (Open) Data Strategy aims to promote data sharing in the European Union through measures to support the development of relevant infrastructure, such as data sharing platforms. Open public data is an integral part of the EU data strategy. The Directive on Open Data and Re-use of Public Sector promotes the sharing of high-value data [12].

EU Mobility Data Spaces. The EU Mobility Data Space (MDS) is an initiative of the European Commission that aims to ensure the safe and interoperable sharing of mobility data across transport modes [13].

EU Mobility Data Space (MDS). The EU Mobility Data Space (MDS) is an initiative of the European Commission that aims to ensure the safe and interoperable sharing of mobility data across transport modes. The EU Mobility Strategy paves the way for a fundamental transformation of transport, including the concepts of green, smart transport, and affordable mobility. The EU Mobility Strategy focuses on several key areas of action in the domains of sustainable, smart and sustainable mobility and transport. The EU Mobility Strategy aims to enhance sustainability by providing sustainable alternatives and setting the right incentives. The EU Mobility Strategy aims to establish a concept of smart mobility, taking full advantage of smart digital solutions and intelligent transport systems, as well as the use of Connected, Cooperative and Automated Mobility (CCAM). The concept of smart mobility also includes the development of paperless transport, multimodal journey planning, the construction of a common European mobile data space and the use of AI ecosystems. The EU Smart Mobility Strategy identifies the need to increase sustainability in transport [14].

NAIADES III – PLATINA 3. The NAIADES III Action Plan focuses on transforming the EU transport systems towards zero emissions and developing multimodal transport. These goals are planned to be achieved by digitalising freight transport and logistics, developing inland waterway transport infrastructure for better navigability, including inland ports as multimodal hubs and suppliers of alternative fuels. The PLATINA3 project acts as a policy platform for the implementation of the future of inland navigation. The Action Programme has the main objective of providing a knowledge base for the implementation of the EU Green Deal and the NAIADES III programme. The platform is considered a catalyst for awareness, stakeholder engagement and the use of results from related European projects and initiatives [15].

The article is a logical continuation of a series of publications by the authors dedicated to the sustainable development of multimodal transport and logistics [16 - 18].

Conclusions. The development of the logistics capabilities of Ukrainian river transport enterprises is the main factor ensuring their competitiveness and long-term success. Strategic approaches that can be used are participation in the post-war reconstruction of the Ukrainian economy. The post-war reconstruction of the national economy of Ukraine will require systematic

logistics support, which should be based not only on transportation by classic modes of transport, but will also require the search for new cost-effective transportation. The proposal of the publication is the revival of Ukrainian river transport by developing the river transportation component on the basis of existing logistics companies. The analysis of global and European domestic transportation confirms the relevance of this direction in Europe and the world, which is of particular importance, taking into account the Euro-Atlantic integration processes of Ukraine.

The main proposal for strategic development is the proposal to form its own river fleet, which will allow logistics companies to become the flagships of inland waterway transportation in Ukraine, which have undeniable potential. At the same time, it is proposed to adjust the strategy of logistics companies in river transport in accordance with the main global and regional strategies for the development of inland waterway transport. In fact, the task is not to rebuild the pre-war system of river transport in Ukraine, but to build a fundamentally new, innovative system of river transport. This system will be based on the basis of modern innovative solutions and on systemic integration with the provisions of European concepts of a sustainable EU transport system in general and sustainable development of inland waterway transport, as its integral component, in particular.

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MODELING SUSTAINABLE SUPPLY CHAINS FOR UKRAINE'S EXPORT-ORIENTED INDUSTRIES

Sergiy Grytsenko, Illia Hallini. "Modeling sustainable supply chains for ukraine's export-oriented industries". *The article highlights the need to implement sustainable supply chains as a strategic direction for the development of Ukraine's export potential. It provides a detailed analysis of modern methodological approaches to designing logistics systems that ensure resilience, adaptability, and long-term viability in unstable geopolitical and economic conditions. Particular attention is paid to integrating ESG (Environmental, Social, and Governance) principles into supply chain architecture. The study focuses on agricultural and food sectors as core export-driven industries, recognizing their vulnerability and pivotal role in national economic security. Through a combination of scenario modeling, digital transformation frameworks, and benchmarking best practices from the EU and OECD countries, the article proposes a roadmap for the transformation of Ukraine's logistics systems. The scientific novelty lies in the development of a hybrid model that combines data-driven logistics and regional sustainability metrics, enabling targeted investment and policy planning. The article aims to initiate a broader discussion on the strategic restructuring of Ukraine's export logistics and to serve as a foundation for future empirical studies and pilot implementations.*

Keywords: sustainability, supply chains, export, logistics modeling, agricultural logistics, digitalization, infrastructure, risks, transformation, competitiveness

Сергій Гриценко, Ілья Галліні. «Моделювання сталих ланцюгів постачання для експортоорієнтованих галузей україни». *У статті підкреслюється необхідність впровадження стійких ланцюгів постачання як стратегічного напрямку розвитку експортного потенціалу*

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України. Наводиться детальний аналіз сучасних методологічних підходів до проєктування логістичних систем, що забезпечують стійкість, адаптивність та довгострокову життєздатність в умовах нестабільної геополітичної та економічної ситуації. Особлива увага приділяється інтеграції принципів ESG (екологічних, соціальних та управлінських) в архітектуру ланцюгів постачання. Дослідження зосереджується на сільськогосподарському та харчовому секторах як основних галузях, орієнтованих на експорт, визнаючи їх вразливість та ключову роль у національній економічній безпеці. Завдяки поєднанню моделювання сценаріїв, концепцій цифрової трансформації та порівняльного аналізу найкращих практик країн ЄС та ОЕСР, стаття пропонує дорожню карту для трансформації логістичних систем України. Наукова новизна полягає у розробці гібридної моделі, яка поєднує логістику на основі даних та регіональні показники стійкості, що дозволяє здійснювати цільові інвестиції та планувати політику. Стаття має на меті ініціювати ширшу дискусію щодо стратегічної реструктуризації експортної логістики України та слугувати основою для майбутніх емпіричних досліджень та пілотних впроваджень.

Ключові слова: сталість; ланцюги постачання, експорт, логістичне моделювання, аграрна логістика, цифровізація, інфраструктура, ризики, трансформація, конкурентоспроможність.

Intraduction. Current geopolitical and economic conditions pose new challenges for Ukraine, particularly in the field of international trade. The most thorough theoretical and methodological foundations of Ukraine's export-import potential have been studied in works [1, 2]. Article [3] is devoted to the study of theoretical and applied aspects of improving the efficiency of foreign economic activity management of enterprises in modern geopolitical conditions. Works [4, 5] are devoted to the organization of supply chains for export and import goods and costs under import and export contracts. The works [6, 7] are devoted to the study of innovative and technological support for the sustainable development of Ukraine's economy in the context of transport and logistics clusters. The works [8-10] are devoted to the modeling of logistics processes, the value system of the eco-supply chain, and the strategizing of enterprises' activities. Successful integration into the global market requires the modernization of logistics infrastructure and the development of sustainable supply chains. Given the high share of agricultural exports, there is a need to rethink approaches to the planning, functioning, and management of export-oriented logistics systems.

The purpose and objectives of the study. The purpose of the study is to comprehensively justify the feasibility of using innovative methods for modeling sustainable supply chains in export-oriented sectors of Ukraine's economy, taking into account current challenges, digital transformation, and sustainable development requirements. Particular attention is paid to the formation of an integrated logistics strategy that ensures the improvement of the efficiency of the national logistics infrastructure, environmental responsibility, and social orientation.

The main objectives of the study include:

– analyzing the current state of export and logistics chains in Ukraine and identifying their weaknesses; studying global experience in designing sustainable supply chains with a focus on the agro-industrial sector and the food industry;

– developing a conceptual model of a sustainable supply chain focused on sustainability, digital integration, and flexibility;

– selecting and justifying a methodological basis for quantitative modeling of chains using scenario analysis tools, KPIs, and geoanalytics; identifying critical success factors for implementing a sustainable chain model in the real conditions of Ukraine;

– Formulation of practical recommendations for state regulation and

the private sector on the construction of logistics hubs, taking into account international ESG standards and the prospects for European integration.

Main material and results. The work uses a systematic approach to modeling, which involves assessing three components: economic efficiency, environmental feasibility, and social impact. The SCOR, Triple Bottom Line, and Data-Driven Logistics models were studied. The analysis showed that traditional logistics networks in Ukraine are vulnerable to risks and have low flexibility. The use of digital platforms, smart contracts, and IoT solutions is proposed to optimize the interaction of chain participants. Within the framework of scenario modeling, potential transport and logistics hubs (Odesa, Lviv, Dnipro) and areas for investment in transport and IT infrastructure have been identified.

In the current global economy, the sustainable development of logistics systems is a key requirement for the functioning of export-oriented sectors. Modeling sustainable supply chains involves a harmonious combination of economic feasibility, environmental safety [11, p. 26], and social responsibility. The Triple Bottom Line (TBL) concept plays a central role in the formation of such models, as it focuses on three components: "profit – planet – people" [12, p. 45].

Global experience shows that countries with a high level of logistics digitization achieve higher efficiency in supply chain management. In particular, the Netherlands, Germany, and South Korea are actively implementing Big Data, IoT, and blockchain technologies in logistics processes. This reduces costs, increases delivery accuracy, and ensures transparency at all stages of goods movement [13].

The Ukrainian logistics infrastructure is undergoing structural transformation. Data from the State Statistics Service of Ukraine indicate uneven development of logistics routes and critical dependence on road transport [14]. A significant part of export flows (especially agricultural products) passes through the seaports in the south of the country, which makes the chains vulnerable to geopolitical risks.

Figure 1 shows the structure of Ukraine's main export destinations in 2023, where the dominance of agricultural products is clearly evident. This highlights the need to improve agrologistics solutions and introduce innovative transport models.

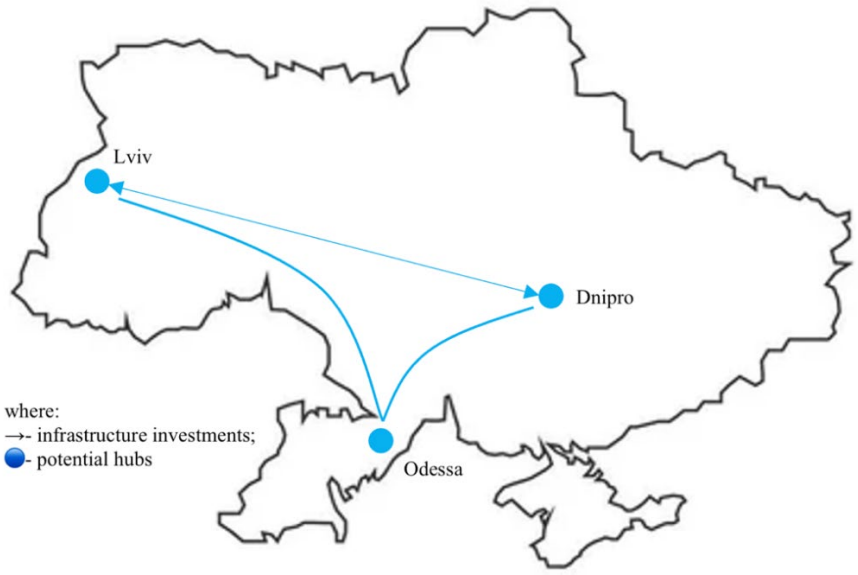

Figure 1 – Logistics hubs and investment areas in Ukraine

The proposed model of a sustainable supply chain (Fig. 2) is based on three subsystems: digital, environmental, and organizational. The digital subsystem covers the use of IoT, automated accounting systems, and smart contracts [15, p. 102]. The environmental component includes the implementation of ISO 14001 standards [16] and carbon footprint calculation. The organizational part involves the construction of flexible logistics networks with a multi-channel supply system.

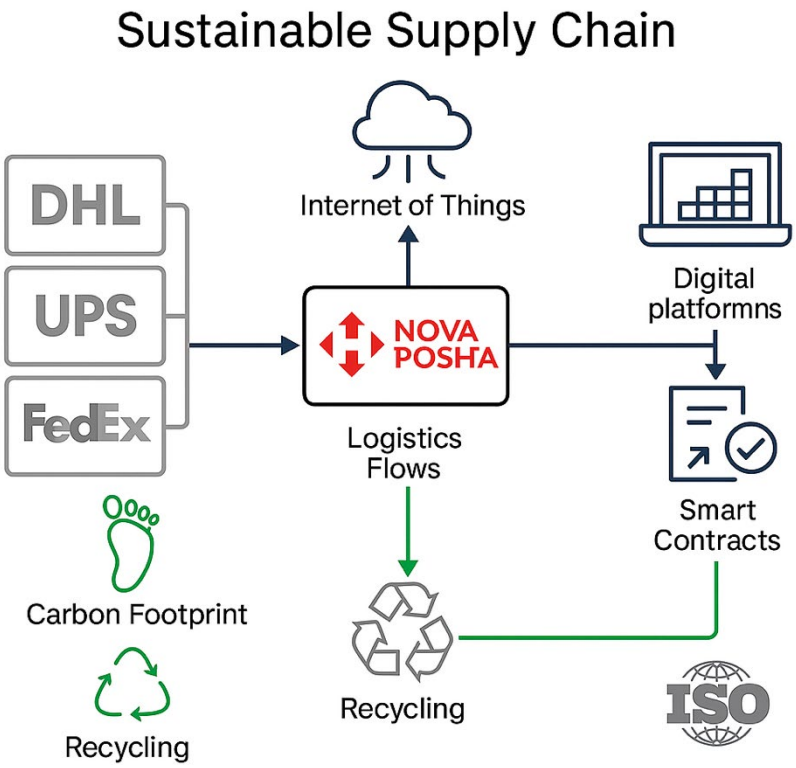

Figure 2 – Model of a sustainable supply chain

Scenario modeling and geoanalytics of logistics hubs. The study included scenario modeling of the development of Ukraine's logistics infrastructure until 2030. Three scenarios were identified: pessimistic (status quo), baseline (integration into the European logistics space), and optimistic (leadership in digital agrologistics in Eastern Europe).

Geoanalytical analysis showed the feasibility of forming transport and logistics hubs in the cities of Odesa, Lviv, and Dnipro, due to their transport accessibility, the presence of cargo redistribution nodes, and proximity to export markets.

Practical recommendations for the public and private sectors. The implementation of a sustainable supply chain model requires the active participation of both public and private institutions. On the part of the state, it is advisable to introduce programs to stimulate investment in logistics infrastructure, digitization of customs procedures, and harmonization with European ESG standards [17]. Particular attention should be paid to creating a legislative framework for the use of smart contracts in foreign economic activity.

The practical implementation of the sustainable supply chain model in Ukraine's export-oriented industries requires coordinated action on the part of the state, business, and the scientific and educational community. A comprehensive cross-sectoral approach focused on the integration of digital solutions, infrastructure upgrades, and

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adherence to the principles of environmental responsibility is a key factor for success. First and foremost, efforts should be focused on creating a national digital logistics platform that will bring together participants in logistics chains based on modern information technologies. Such a system should ensure transparent interaction between customs authorities, transport operators, exporters, and certification bodies using blockchain, open APIs, and geanalytics tools. This will automate key processes, reduce administrative burdens, and improve control over the movement of goods.

In order to objectively review the existing issues and improve the efficiency of logistics systems focused on foreign markets, it is advisable to propose a project model that provides for the practical implementation of a hybrid concept of a sustainable supply chain adapted to the current conditions of the agro-industrial sector in Ukraine. The project part is based on the use of geoanalytics, KPI analysis, scenario planning, and matrix assessment of sustainability components in logistics systems. As part of the project solution, a tabular structure has been developed for assessing key parameters that form the basis for decision-making in the field of supply chain modernization. Table 1 shows a comparative description of the main challenges and corresponding project solutions adapted to the Ukrainian economic and logistical context.

Table 1 – Analytical matrix of problems and integrated solutions in the context of modeling sustainable supply chains

Identified problem	Area of impact	Proposed solution	Expected effect
High dependence on road transport	Transport logistics	Development of multimodal transport with a focus on rail and water infrastructure	Reduced costs and CO_2 emissions
Fragmentation of the digital infrastructure of logistics operators	Digital logistics	Creation of a national platform for the exchange of logistics data based on open APIs and blockchain technologies	Unification of accounting and reduction of transaction costs
Lack of ESG standards in agricultural logistics practice	Environmental and social sphere	Adaptation of international standards ISO 14001 and GRI to national legislation	Increasing the investment attractiveness of the industry
Low level of logistics education and staff training	Educational and professional sphere	Introduction of interdisciplinary programs and clusters in higher education institutions specializing in logistics	Increasing the competence and innovative potential of employees
Limited access to financing for sustainable logistics initiatives	Financial and economic sphere	Development of green lending mechanisms and subsidies for innovative projects	Activation of the implementation of energy-efficient solutions in logistics

The implementation of these decisions must be supported by the introduction of an effectiveness monitoring system using key performance indicators that allow for the assessment of implementation dynamics and the adjustment of management strategies in real time. It is advisable to use indicators that cover both economic and environmental and social parameters. The metrics presented in Table 2 allow for a balanced approach to

assessing the effectiveness of a sustainable supply chain.

Table 2 –Proposed KPI for assessing the effectiveness of implementing a sustainable supply chain model

Indicator	Unit of Measurement	Target Value for 2030	Data Collection Method
Share of multimodal transportation	%	35–40	Reports from transport operators
Level of logistics process digitalization	%	over 70	Integrated digital logistics IT dashboards
Average carbon footprint	t CO_2/ton-kilometer	-30% compared to 2020 level	ISO 14064, verification systems
Number of environmentally certified warehouses	units	at least 250	Data from the national enterprise register
Share of personnel with relevant training coverage	%	over 80	Surveys, internal company reports

One of the priority areas is the development of multimodal logistics corridors that will ensure the efficient use of rail, road, sea, and river transport. Particular attention should be paid to the modernization of water transport, in particular the restoration of navigation on the Dnieper River, which could significantly reduce transportation costs and greenhouse gas emissions. It is also advisable to stimulate the development of logistics hubs in cities with high transit potential. Achieving environmental goals in logistics is impossible without the use of green financing mechanisms. It is necessary to activate the banking sector in the direction of introducing targeted credit programs for enterprises that invest in the decarbonization of logistics processes, the transition to electric transport, warehouse automation, and the use of renewable energy sources. The introduction of special preferential lending conditions should encourage small and medium-sized businesses to implement eco-strategies.

An important element of the nationwide logistics transformation is Ukraine's active participation in international technical assistance and digital integration programs. Participation in initiatives of the European Union, the World Bank, the EBRD, and other organizations will provide access to advanced technologies, management practices, and financial resources. Such cooperation will contribute to the harmonization of Ukrainian logistics standards with European ESG requirements. Science and education play a special role in shaping the innovative potential of logistics. It is advisable to create interdisciplinary educational and scientific clusters based on specialized universities and research centers [18, 19]. Education, science, and innovation are the drivers of economic modernization in any country and, in general, the drivers of infrastructure development in the context of the fourth industrial revolution. Their task will be to develop applied solutions in the field of digital logistics, scenario modeling, sustainable management, and the formation of a new generation of logistics managers capable of working in a high-tech environment. Prospects for further research in this area cover a number of topical issues, in particular the study of the regional specifics of logistics systems in Ukraine. It is necessary to

model territorially adapted sustainable development strategies, taking into account transport accessibility, existing infrastructure, and the specifics of the export potential of regions. This will avoid uniform solutions and ensure targeted support from the state.

The impact of intelligent technologies on logistics efficiency requires in-depth analysis. The use of artificial intelligence, neural networks, and machine learning opens up new opportunities in demand forecasting, automatic route planning, and real-time adaptation to changes in the external environment. Further research should also focus on the development of ESG metrics that take into account Ukrainian realities and comply with international standards. This will enable businesses to report effectively on their activities and attract investment from global sustainable funds. Practical testing of the hybrid sustainable supply chain model is possible through the implementation of pilot projects in cooperation with logistics operators and export-oriented companies in the agro-industrial complex. The results of such projects can serve as a basis for the formation of a regulatory framework, scaling of decisions, and transformation of Ukraine's logistics policy.

The private sector should invest in the modernization of warehouses, the implementation of ERP systems, and staff training in sustainable logistics management [20, p. 77]. It is necessary to create corporate eco-strategies and ensure reporting in accordance with the principles of sustainable development.

Conclusions. Based on the research conducted, it has been established that modeling sustainable supply chains is not only relevant but also a critically necessary prerequisite for increasing Ukraine's export capacity in conditions of global turbulence. Given the structure of Ukrainian exports, in which more than 40% is accounted for by agricultural and food products, the modernization of logistics systems based on the principles of sustainable development should become a strategic priority both at the level of state policy and in company management. Research has shown that traditional logistics networks, which are mainly focused on road transport, demonstrate low flexibility and high dependence on external threats, in particular geopolitical risks and the vulnerability of port infrastructure. According to the State Statistics Service of Ukraine, about 63% of export shipments in 2023 were carried out by road transport, which creates an additional burden on the carbon balance and reduces the efficiency of supply chains in the long term.

The proposed hybrid model of a sustainable supply chain encompasses three subsystems: digital, environmental, and organizational. The digital component is based on the implementation of IoT technologies, smart contracts, and integrated ERP systems, which will enable more than 70% digital coverage of logistics operations by 2030. The environmental vector of the model involves the introduction of ISO 14001 certification, carbon footprint measurement (with the aim of reducing it by 30%), and the development of green financing for logistics initiatives. The organizational structure of the model is focused on building multimodal routes and creating a new generation of transport and logistics hubs in regional centers – Lviv, Odesa, and Dnipro.

Scenario modeling envisages three possible scenarios for the development of Ukraine's logistics system until 2030, among which the scenario of digital leadership in the Eastern European agrologistics market is considered the most effective. It is expected that, under the conditions of implementation of a comprehensive strategy for sustainable logistics development, the share of multimodal transport will increase from the current 18% to over 40%, the number of certified warehouses will increase to at least 250 units, and more than 80% of logistics personnel will be involved in specialized training. Thus, the sustainable supply chain model is not only theoretically sound but also fully suitable for phased practical

implementation. It ensures the integration of digital technologies, compliance with ESG standards, regional adaptability, and institutional and financial stability. Its implementation will make it possible to form a logistics system capable of responding to crisis challenges, maintaining the continuity of exports, optimizing costs, and at the same time contributing to the fulfillment of Ukraine's international commitments in the field of sustainable development.

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THE ROLE OF MARKETING STRATEGIES IN THE USE OF ORGANIC FERTILIZERS IN FARMING ENTERPRISES OF UKRAINE

Viktoriia Lazebnyk. "The role of marketing strategies in the use of organic fertilizers in farming enterprises of Ukraine". *The article investigates the role of marketing strategies in the process of introducing and utilizing organic fertilizers within farming enterprises in Ukraine. The relevance of this issue is driven by the growing global and domestic demand for environmentally friendly and safe agricultural products, which in turn necessitates the development of new, more adaptive approaches to sales management, consumer engagement, and brand positioning in the agricultural sector. The transition to organic production not only requires technological and agronomic readiness but also a rethinking of communication tools and marketing infrastructure. The study highlights the importance of tailoring marketing instruments to the structural and operational characteristics of agricultural enterprises, taking into account farm size (small, medium, large), level of digital maturity, market orientation (local or export), and consumer expectations regarding ecological sustainability and transparency.*

The research methodology is based on a combination of scientific literature review, statistical data analysis, and empirical case studies. The article presents the experiences of five Ukrainian farming enterprises from different regions that have successfully implemented organic fertilizers alongside various marketing strategies. Special attention is given to the application of digital marketing tools, including social media campaigns (Instagram, TikTok), video marketing on platforms like YouTube, email newsletters, CRM systems, loyalty programs, participation in international trade fairs, and organic certification (e.g., Organic Standard, GlobalG.A.P.). The effectiveness of these instruments is evaluated using ROI (return on investment) calculations, which demonstrate that the economic success of marketing activities is primarily determined by the strategic relevance of the selected tools rather than the size of the marketing budget.

The findings reveal that medium-sized farming enterprises (20–100 hectares) are the most active and successful segment in adopting organic fertilizers and modern marketing strategies. These enterprises combine a sufficient level of financial independence, openness to innovation, and a strong desire to integrate into national and international markets. They show high efficiency in using digital tools to enhance product visibility, attract target audiences, and expand distribution channels. Based on the analysis, the article proposes an original author's classification of marketing support approaches, structured according to farm size and digital integration level. This framework offers practical value for policymakers, consultants, and agricultural producers aiming to enhance competitiveness in the organic segment.

The study concludes that the implementation of strategically sound marketing strategies significantly increases the effectiveness of promoting organic fertilizers, improves brand reputation, stimulates consumer demand, and contributes to the sustainable development of Ukraine's agricultural sector. The presented results can serve as a basis for forming evidence-based support programs, targeted consulting services, and further research into the marketing mechanisms for organic agriculture.

***Keywords**:* organic fertilizers, farming enterprises, marketing, marketing strategies, sales, ROI, agricultural sector, ecological products

Вікторія Лазебник. «Роль маркетингових стратегій у використанні органічних добрив фермерськими господарствами України».. *У статті досліджено роль маркетингових стратегій у процесі впровадження та використання органічних добрив у фермерських господарствах України. Актуальність теми зумовлена зростаючим попитом на екологічно безпечну сільськогосподарську продукцію, що, у свою чергу, вимагає нових підходів до управління збутом, комунікації з цільовими споживачами, формування довіри до бренду та підвищення обізнаності про переваги органічного землеробства. Підвищення ефективності просування органічних добрив стає можливим лише за умови адаптації маркетингових інструментів до специфіки аграрного ринку, зокрема з урахуванням масштабів господарської діяльності (дрібні, середні, великі фермерські підприємства), ступеня цифрової інтегрованості та орієнтації на локальні чи експортні ринки.*

У ході дослідження систематизовано наукові підходи до агромаркетингу, здійснено сегментацію фермерських господарств за площею земельного банку та рівнем використання цифрових технологій. Особливу увагу приділено цифровим інструментам просування: соціальним мережам (Instagram, TikTok), відеомаркетингу, email-розсилкам, CRM-системам, платформам електронної комерції, а також участі у виставках і сертифікації продукції. На основі розрахунків рентабельності маркетингових витрат (ROI) показано, що стратегічна доцільність використаних інструментів має вирішальне значення для економічної ефективності господарств. Найвищі результати показали фермери, які поєднують помірні витрати з широким охопленням цільової аудиторії через сучасні канали комунікації.

Доведено, що найактивніше органічні добрива впроваджуються саме в середніх фермерських господарствах, які мають достатній рівень ресурсного потенціалу, прагнуть до виходу на експортні ринки та відкриті до впровадження інноваційних маркетингових рішень. У статті запропоновано авторську класифікацію маркетингових підходів залежно від розміру господарства та рівня його цифрової інтегрованості, що може слугувати основою для розробки цільових стратегій просування органічної продукції на аграрному ринку України.

Ключові слова: органічні добрива, фермерські господарства, маркетинг, маркетингові стратегії, збут, ROI, аграрний сектор, екологічна продукція.

Intraduction. Modern farming enterprises in Ukraine are increasingly oriented towards the principles of sustainable development, environmental responsibility, and healthy nutrition. In this context, the use of organic fertilizers plays a significant role, as it contributes to preserving soil fertility and producing safe agricultural products. However, without proper marketing support, the promotion of organic fertilizers remains limited. It is marketing strategies that enable effective communication between producers, suppliers, and end consumers.

Analysis of recent research and publications. The issue of marketing support in Ukraine's agro-industrial complex, particularly regarding the promotion of organic fertilizers, has been the subject of growing academic attention, reflecting the

relevance of this topic amid the transformation of the agricultural market.

In her work, N. V. Bielikova [1] emphasizes the need to implement innovative directions in agricultural marketing, highlighting the transition from traditional sales models to comprehensive systems based on market integration, consumer expectations, and modern communication technologies. The author argues that marketing efficiency in the agricultural sector improves when strategic management tools focused on sustainable development and ecological responsibility are applied. D. K. Semenda and O. V. Semenda [2] focus on the introduction of digital marketing in agro-industrial enterprises, pointing to enhanced communication with target audiences, cost optimization, and increased competitiveness through the use of social media, digital analytics, and mobile applications. O. Petrenko [3] explores the organizational and economic approach to integrating digital technologies into the marketing strategies of agricultural enterprises. The author proves that digital transformation enables not only the automation of promotional processes but also deep consumer segmentation, leading to more precise communication and better market adaptation.

The research conducted by S. V. Kovalchuk and Ye. M. Zaburmekha [4] provides valuable insights into consumer behavior in the organic product market and the effectiveness of digital technologies in marketing research. The authors highlight the importance of building brand trust for organic goods through personalized communication channels, video marketing, and e-commerce platforms.

Among foreign researchers, P. Kotler is worth mentioning. In his work Marketing 5.0 [5], he outlines the concept of technology-driven marketing, based on values, data, and artificial intelligence, which is directly relevant to the promotion of organic products through innovative platforms. J. H. Hanf [6] explores vertical coordination in agribusiness and the potential for integrating marketing strategies at all levels of the agri-food value chain.

Despite growing interest in the topic, most scientific works still pay insufficient attention to the marketing support of organic fertilizers as a distinct category of agricultural products. Practical recommendations for a differentiated approach to fertilizer promotion – depending on the size of the farm, its level of digital integration, and the specificity of the target audience – remain underdeveloped. Moreover, there is a noticeable lack of research assessing the effectiveness of marketing strategies in the agricultural sector based on ROI indicators.

The formulation of the goals of the article. In the context of the transformation of Ukraine's agricultural sector – driven by global challenges, shifting consumer preferences, and increasing demands for ecological safety of products – the development of organic farming is gaining particular importance. A key component of this process is the effective use of organic fertilizers, which contribute to sustainable soil resource management and improved product quality.

Despite the agronomic benefits of organic fertilizers, their implementation in the practices of farming enterprises remains limited. This is primarily due to the low level of awareness regarding the advantages of organic production, as well as the lack of clearly formulated and effectively implemented marketing strategies. At the same time, the available opportunities related to digitalization, the expansion of export potential, and support from government programs create favorable conditions for activating the organic fertilizer market through the use of innovative marketing tools.

Therefore, there is a need for in-depth scientific research into the role of marketing strategies in the promotion of organic fertilizers in farming enterprises. The purpose of this study is to identify the most effective marketing approaches for stimulating demand for organic fertilizers in Ukraine,

which will enhance the economic resilience of farming enterprises and contribute to the overall development of the organic market.

Presentation of the main results. The analysis of the effectiveness of marketing strategy implementation in the process of introducing organic fertilizers requires a comprehensive approach that considers the structural characteristics of farming enterprises, their market potential, level of innovation capacity, and access to modern communication channels. Given the heterogeneity of Ukraine's agricultural sector in terms of production scale, it is appropriate to examine the influence of marketing tools through the lens of farm size, digital maturity, and market positioning strategy [7].

Analytical framework and farm segmentation. In this context, empirical analysis of specific farms practicing organic agriculture, applying marketing approaches, and demonstrating varying levels of economic efficiency becomes particularly relevant. Such an analytical basis makes it possible to identify patterns between the choice of marketing strategy and its performance, as well as to assess the justification of marketing investments from the perspective of return on investment (ROI). The following study focuses on the classification of farms according to key parameters, analysis of the promotional tools used, and quantitative evaluation of their impact on the sales of organic products.

Farming enterprises in Ukraine can be conditionally divided into three main segments depending on the cultivated area: small farms (up to 20 hectares), medium-sized farms (from 20 to 100 hectares), and large agricultural enterprises (more than 100 hectares). This classification allows for a better understanding of the operational specifics of each category and helps identify the most effective approaches to implementing innovative technologies, particularly organic farming [8; 9].

Characteristics of marketing behavior by farm type. Small farms are generally limited in financial and technical resources, which reduces their ability to scale the use of organic fertilizers. However, they often show high flexibility, a willingness to experiment, and the ability to maintain direct contact with the end consumer, which creates potential for the development of localized organic production. Nonetheless, their marketing potential is significantly constrained by a lack of knowledge, limited access to modern communication channels, and underdeveloped market infrastructure.

Medium-sized farms (20–100 hectares) have proven to be the most active in adopting organic fertilizers. This segment combines sufficient financial independence with institutional flexibility and a desire for integration into national and international markets. These farms are most often certified according to organic production standards (e.g., Organic Standard, GlobalG.A.P.), participate in cooperative sales, agricultural exhibitions, educational programs, and actively apply marketing strategies to promote their products. Many of them are export-oriented, which encourages higher product quality and transparency of business processes, including marketing [8].

Large enterprises (>100 hectares), despite their significant production capacity, are less likely to transition to organic farming due to the complexity of transforming traditional agricultural models, the need for significant infrastructure modernization, the risk of income loss during the transition period, and the complexity of their management structures. Their marketing campaigns are typically formalized, focused on the B2B segment and wholesale buyers, which limits flexible interaction with end consumers [8-9].

Thus, medium-sized farming enterprises represent the most promising segment for the development of the organic fertilizer market in Ukraine, as they combine sufficient economic stability, institutional adaptability, and readiness to implement modern marketing approaches.

Case analysis of marketing strategy implementation. Table 1 presents examples

of the successful implementation of marketing strategies in farming enterprises from various regions of Ukraine that specialize in organic farming. Each farm demonstrates a unique approach to promoting its products – from traditional SEO and participation in trade fairs to cutting-edge communication channels such as TikTok and video content [10-11].

Table 1 –Examples of the application of marketing strategies in farming enterprises of Ukraine

Farm Name	Region	Marketing Strategy	Implementation Outcome
"Organic Land" Farm	Kyiv region	SEO promotion, participation in international exhibitions (Biofach)	Increased HoReCa orders and export growth by 25%
"Zelenyi Klyn" Farm	Cherkasy region	Direct marketing via email campaigns, collaboration with bloggers	Improved brand recognition, sales growth by 30%
"Dobrodiy" Farm	Zhytomyr region	Own online store, customer loyalty program	Increase in repeat purchases, reduced customer acquisition costs
"BioGreenFarm" Farm	Ternopil region	Product certification (Organic Standard), agro-excursions	Built brand trust, increased demand among family-oriented customers
"Rosa" Farm	Sumy region	Video marketing on YouTube, advertising on Instagram and TikTok	Influx of younger target audience, online sales growth by 35%

Source: compiled by the author based on data from the State Statistics Service of Ukraine, Form 50-agriculture, and own empirical research.

A general trend is the active digitalization of communication and a focus on building long-term relationships with consumers. The strategic use of such tools as certification, loyalty programs, and branded content contributes not only to the increase in sales volumes but also to the improvement of farm profitability. This confirms the significant role of marketing strategies in shaping sustainable demand for organic fertilizers in Ukraine.

Figure 1 illustrates the percentage increase in efficiency across five farming enterprises in Ukraine following the implementation of various marketing strategies. The highest growth is observed in the "Rosa" farm (35%), which actively utilizes video marketing and social media to attract a younger audience. It is followed by "Zelenyi Klyn" (30%), where a strategy based on direct mailings and collaboration with bloggers proved to be effective.

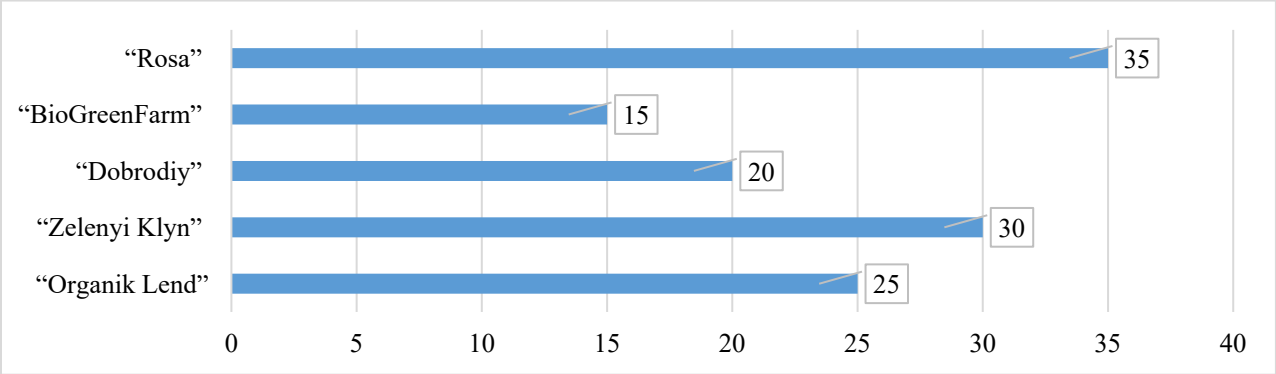

Figure 1 – Efficiency Growth of Farming Enterprises After the Implementation of Marketing Strategies, %.

Source: compiled by the author based on data from the State Statistics Service of Ukraine and own empirical research.

The lowest growth (15%) is shown by "BioGreenFarm", although the enterprise focuses on certification and agrotourism – indicating the long-term effect of such strategies. Overall, the figure confirms the importance of a marketing-oriented approach in improving economic outcomes in the field of organic farming.

Figure 2 presents a comparison between efficiency growth (%) and marketing expenditures (thousand UAH) across five Ukrainian farming enterprises using organic fertilizers. For example, "Rosa" farm demonstrates the highest efficiency increase (35%) with relatively moderate expenses (45,000 UAH), indicating the effectiveness of digital communication channels. Meanwhile, "Zelenyi Klyn" achieved a 30% increase with 40,000 UAH in expenses – a good example of the optimal use of partnership and influencer-based strategies. "Organik Lend" invested the most (50,000 UAH) and recorded a 25% increase, which may suggest the long-term nature of effects from participation in international events. "BioGreenFarm", despite having the lowest expenses (25,000 UAH), also shows the smallest result (15%), demonstrating a slow but steady impact from agrotourism and product certification.

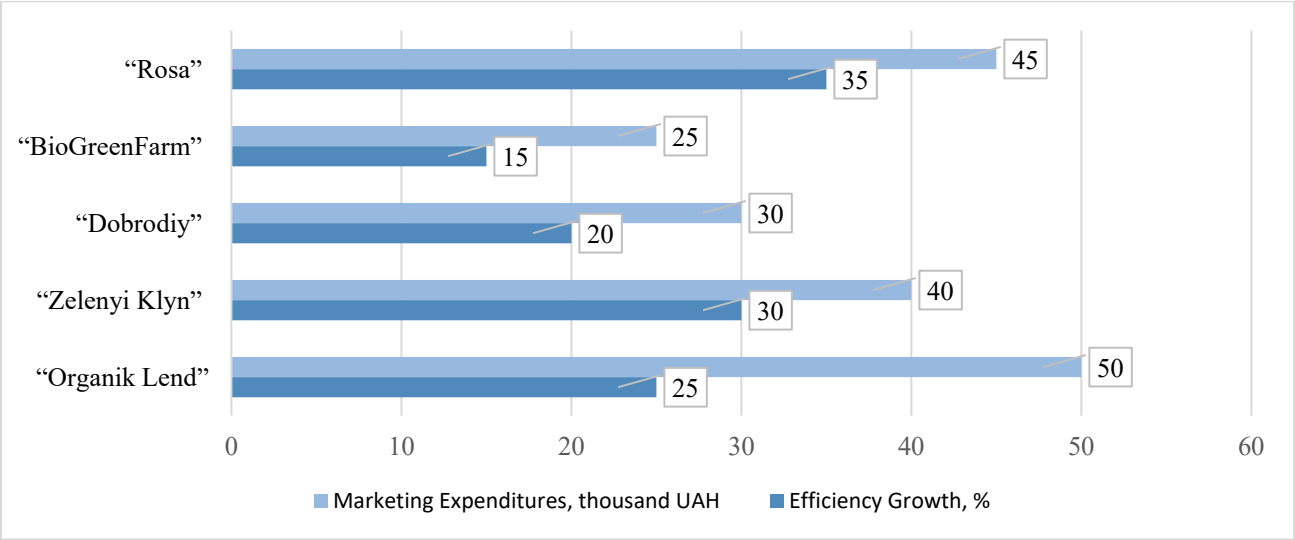

Figure 2. Comparison of Efficiency Growth and Marketing Expenditures in Farming Enterprises, %.
Source: compiled by the author based on data from the State Statistics Service of Ukraine and own empirical research.

The presented data indicate that higher expenditures do not always guarantee a proportionally greater effect – what matters most is the selection of strategically appropriate marketing tools.

Figure 3 illustrates how effectively each farming enterprise utilizes its marketing investments. "Rosa" farm demonstrates the highest return on investment (ROI) at 77.8%, confirming the efficiency of social media and video marketing when applied with moderate costs.

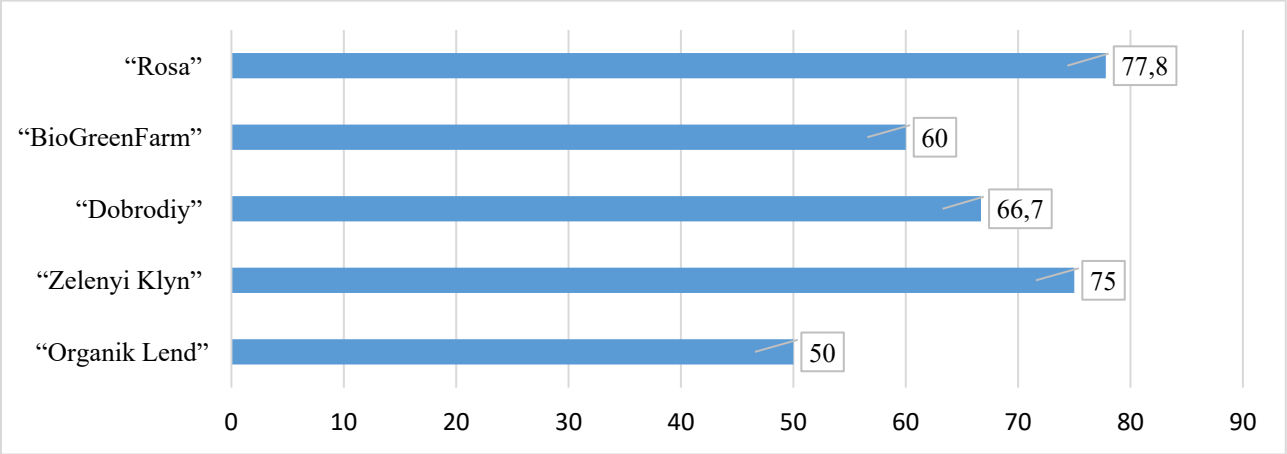

Figure 3. Return on Investment (ROI) of Marketing Expenditures in Farming Enterprises, %.
Source: compiled by the author based on data from the State Statistics Service of Ukraine and own empirical research.

"Dobrodiy" also achieved a high ROI of 66.7% thanks to its own online store and loyalty program. "Zelenyi Klyn" achieved a 75% ROI by effectively using email campaigns and collaboration with bloggers. The lowest ROI was recorded by "Organik Lend" at 50%, indicating the need to optimize spending on participation in trade exhibitions. Despite the lowest overall growth, "BioGreenFarm" shows a 60% ROI, which is a positive sign for long-term, sustainable strategies. Thus, based on the presented data, we can conclude that properly selected marketing tools can ensure high economic efficiency even with limited budgets.

The study of the role of marketing strategies in the use of organic fertilizers by farming enterprises in Ukraine has revealed a number of important patterns. The analysis of the practical experience of five farms from different regions of Ukraine demonstrated that the targeted use of marketing tools – particularly digital technologies, direct communication, and loyalty programs – positively affects the overall performance of these enterprises. The greatest results were observed in farms that focus on modern distribution channels (online stores, social media, crowdfunding platforms) and actively work on increasing brand recognition [12].

The calculation of return on marketing investment (ROI) showed that the level of economic efficiency is determined not by the amount of money invested, but by the strategic relevance of the selected tools. The highest ROI was recorded in farms that combined low marketing expenditures with wide audience reach – for example, through video marketing or email campaigns.

Classification of marketing approaches according to farm size and level of digital integration. The table 2 presents the author's classification of marketing approaches for promoting organic fertilizers, based on two key criteria: farm size (small, medium, large) and level of digital integration (low, medium, high). Depending on the combination of these parameters, the table outlines the most relevant and effective marketing tools and strategies for each category of agricultural enterprise.

Small farms with low digital integration typically rely on traditional communication methods such as local fairs, word-of-mouth, and print media. Those with higher digital capacity implement online stores, social media, and video marketing to reach broader audiences.

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Table 2 –Classification of marketing approaches based on farm size and level of digital integration

Farm Type	Level of Digital Integration	Typical Marketing Approaches	Implementation Features
Small farms (up to 20 ha)	**Low**	Traditional marketing: fairs, word-of-mouth, local newspapers	Minimal budget, focus on local buyers
	Medium	SMM via Facebook, cooperation with local bloggers, Viber groups, Google Business	Simple digital tools, outreach to nearby communities
	High	Own online store, video marketing, crowdfunding campaigns	Targeting younger audiences, market expansion beyond local area
Medium farms (20–100 ha)	**Low**	Direct marketing via email, printed brochures, participation in local events	Entry-level digital transition, limited reach
	Medium	Comprehensive SMM strategy, online consulting, CRM systems, product certification	Brand development, customer base building, analytics
	High	E-commerce platforms, targeted advertising, consumer behavior analytics, content marketing	Export orientation, automated marketing systems
Large farms (over 100 ha)	**Low**	B2B communication, participation in industry exhibitions, print advertising	Focus on wholesalers and corporate partners
	Medium	E-commerce platforms, SEO optimization, email marketing	Partial automation, efficiency optimization
	High	ERP and CRM integration, big data analytics, multimedia branding, e-commerce	Full marketing automation, expansion into international markets

Source: compiled by the author

Medium-sized farms, especially with medium to high digital integration, demonstrate the most flexibility and effectiveness in applying modern tools like CRM systems, e-commerce platforms, targeted campaigns, and certification to build trust and expand market reach.

Large enterprises tend to focus on B2B marketing and standardized campaigns, with those at higher digital levels utilizing advanced systems such as ERP, big data analytics, and multimedia branding to operate at scale, often targeting international markets.

This classification provides a strategic framework for adapting marketing approaches to the specific operational and technological characteristics of farms, thereby enhancing the effectiveness of promotional efforts for organic fertilizers and supporting the sustainable development of the agricultural sector.

Conclusions. The conducted study confirms that marketing strategies play a decisive role in stimulating demand for organic fertilizers among Ukrainian farming enterprises. In the context of the agricultural sector's transition towards sustainable and environmentally responsible practices, effective marketing ensures not only product visibility but also long-term economic resilience for producers.

The analysis of five Ukrainian farms revealed that the targeted use of modern marketing tools – such as digital platforms, social media, online stores, influencer collaborations, and loyalty programs – significantly improves market performance.

The study found that the effectiveness of marketing strategies is primarily determined by the strategic relevance of tools used rather than the size of the marketing budget. Farms that implemented relatively low-cost but targeted approaches (e.g., email campaigns, video marketing) achieved high ROI and increased sales.

The developed classification of marketing approaches based on farm size and level of digital integration offers a practical framework for selecting optimal marketing tools depending on the characteristics of each enterprise. It was shown that medium-sized farms with medium to high digital maturity are the most effective in adopting innovative marketing strategies, particularly those focused on brand building, export potential, and direct consumer engagement.

Overall, the findings support the conclusion that well-planned, digitally oriented marketing strategies are critical for enhancing the competitiveness of the organic fertilizer sector in Ukraine. These strategies not only facilitate market expansion but also contribute to the broader goals of environmental sustainability, food safety, and alignment with global organic farming trends.

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BUILDING STRONG PARTNERSHIPS THROUGH STRATEGIC COMMUNICATIONS AND CONFLICT MEDIATION

Ganna Gurina, Serhii Podrieza, Valentyna Novak. "Building strong partnerships through strategic communications and conflict mediation". *This article deeply explores the critical role of strategic communications and conflict mediation in the context of post-war recovery in Ukraine. It emphasizes that the formation of strong and stable partnerships is a key factor for the country's successful economic and social revival. We examine the specific challenges of the post-war period, such as increased distrust, uncertainty, and emotional tension, which can hinder effective cooperation. The paper substantiates how transparent and adaptive communications help restore trust, foster a shared vision, and establish effective two-way dialogue among all stakeholders. Particular attention is given to the importance of rebuilding the reputation of businesses affected by the war. A significant part of the research is devoted to conflict mediation as an indispensable tool for preserving partnership relations and expeditiously resolving disputes. We analyze how mediation, unlike traditional legal methods, facilitates the search for mutually beneficial solutions and prevents*

conflict escalation. The pivotal role of professional mediators as neutral facilitators, capable of guiding dialogue by focusing on parties' underlying interests, is highlighted. Their skills in transforming confrontation into constructive interaction are explored. The article also integrates international experience in negotiation and mediation, underscoring the universality of principled negotiation tenets and the importance of institutionalizing mediation practices. Finally, we propose an algorithm for building strong partnerships that combines communication and mediation strategies, which is fundamental for Ukraine's sustainable development and economic revival in the current environment. This comprehensive approach is critically important for creating a resilient business ecosystem and effectively implementing recovery projects.

***Keywords**:* Post-war recovery, business communications, strategic communications, conflict mediation, partnership, trust building, dispute resolution, Ukraine, economic revival, synergy, economic revival.

Ганна Гуріна, Сергій Подрєза, Валентина Новак. «Побудова міцних партнерств через стратегічні комунікації та медіацію конфліктів».. *Ця стаття глибоко досліджує критичну роль стратегічних комунікацій та медіації конфліктів у контексті повоєнного відновлення України. Вона підкреслює, що формування міцних і стабільних партнерств є ключовим фактором для успішного економічного та соціального відродження країни. Ми розглядаємо специфічні виклики повоєнного періоду, такі як зростання недовіри, невизначеність та емоційне напруження, що можуть перешкоджати ефективній співпраці. У роботі обґрунтовується, як прозорі та адаптивні комунікації допомагають відновити довіру, сформувати спільне бачення та налагодити ефективний двосторонній діалог між усіма зацікавленими сторонами. Особлива увага приділяється значенню відновлення репутації підприємств, що постраждали від війни. Значна частина дослідження присвячена медіації конфліктів як незамінному інструменту для збереження партнерських відносин та оперативного вирішення спорів. Ми аналізуємо, як медіація, на відміну від традиційних юридичних методів, сприяє пошуку взаємовигідних рішень та запобігає ескалації конфліктів. Висвітлюється ключова роль професійних медіаторів як нейтральних посередників, здатних фасилітувати діалог, фокусуючись на глибинних інтересах сторін. Досліджуються їхні навички у перетворенні конфронтації на конструктивну взаємодію. Стаття також інтегрує зарубіжний досвід у сфері переговорів та медіації, підкреслюючи універсальність принципів принципових переговорів та важливості медіаційних практик. Зрештою, ми пропонуємо алгоритм побудови міцних партнерств, який поєднує стратегії комунікації та медіації, що є фундаментальним для сталого розвитку та економічного відродження України в умовах сьогодення. Цей комплексний підхід є критично важливим для створення стійкої бізнес-екосистеми та ефективної реалізації проєктів відновлення.*

Ключові слова: Повоєнне відновлення, бізнес-комунікації, стратегічні комунікації, медіація конфліктів, партнерство, побудова довіри, вирішення спорів, економічне відродження, синергія, економічне відродження.

Intraduction. The full-scale invasion of Ukraine has not only caused devastating economic damage but has also fundamentally altered the landscape of business and social interaction. In the context of post-war recovery, it becomes critically important for enterprises, organizations, and even entire economic sectors, such as the aviation industry, to not only survive but also to form and maintain strong, effective partnerships. These partnerships are the foundation for attracting investments, rebuilding infrastructure, integrating into international markets, and ensuring sustainable development. However, the process of building such relationships in a

post-conflict society faces unprecedented challenges, including increased uncertainty, a deficit of trust, emotional tension, and potential conflicts related to resource redistribution, changing rules, and overcoming trauma. In this context, strategic communications and conflict mediation emerge not merely as desirable, but as absolutely essential tools for management and development.

Literature and Research Review. Fisher, R., Ury, W. L., & Patton, B. "Getting to Yes: Negotiating Agreement Without Giving In" (2011). This classic work presents the concept of "principled negotiation," which is a cornerstone of modern mediation and effective communication. The authors propose moving away from positional bargaining to focus on the parties' interests. They identify four key principles: separating the people from the problem (being soft on the people, hard on the problem), focusing on interests rather than positions, generating various options for mutual gain, and insisting on objective criteria. Klimczak, K. "The Role of Communication in Building Business Relationships" (2017). K. Klimczak's article highlights the fundamental role of communication as the basis for building and maintaining stable business relationships. The author examines how various aspects of communication – such as openness, trust, mutual understanding, empathy, and prompt feedback – contribute to strengthening partnerships. Bercovitch, J. "Mediation in International Conflict: An Overview of Theory, a Review of Practice" (2012). This work by J. Bercovitch, though focused on international conflicts, provides a deep theoretical understanding of mediation and its practical applications. The author analyzes different models of mediation, factors influencing its success (e.g., the level of trust between parties, the nature of the conflict, the mediator's qualifications), and the mediator's role as a neutral facilitator. Susskind, L., & Cruikshank, J. "Breaking the Impasse: Consensual Approaches to Resolving Public Disputes" (1987). In this work, the authors explore a consensual approach to resolving complex public disputes, which is highly relevant for understanding business mediation. They advocate for including all stakeholders in the decision-making process and using facilitation to achieve mutually beneficial agreements.

While the internal challenges of Ukraine's post-war recovery are unique, global experience in business communications and conflict resolution offers invaluable lessons and methodological approaches that can be effectively adapted to Ukrainian realities. Foreign studies, particularly the works of D. Saunders, B. Barry, R. Fisher, W. Ury, and B. Patton, as well as J. Bercovitch, emphasize the universality of negotiation principles, focusing on interests rather than positions, and the importance of neutral mediation. These approaches, refined over decades in global business practice and international relations, demonstrate that even in the most complex situations, consensus can be achieved and mutually beneficial relationships preserved.

Purpose and Objectives. Strategic communications are the cornerstone of any successful partnership, and in the context of post-war recovery, their role is amplified manifold. This is not merely about information exchange but about the deliberate shaping of perceptions, building trust, and creating a shared vision for the future. In the post-war period, communications must be as transparent, honest, and future-oriented as possible to dispel uncertainty and restore faith in stability. This requires developing differentiated communication strategies for various target audiences – be they international investors seeking guarantees of security and profitability; local communities needing a clear understanding of recovery plans; or government agencies coordinating efforts. Of particular importance is the restoration of the reputation and image of enterprises, especially aviation ones, which may have suffered significant losses or been

associated with negative wartime events. Effective communications allow not only for informing about plans and achievements but also for rebuilding an emotional connection with partners and stakeholders, demonstrating a commitment to social responsibility and sustainable development. The communication process must be two-way, involving active listening and feedback, which fosters mutual understanding and prevents misunderstandings that can easily arise in negotiation situations.

Parallel to strategic communications, conflict mediation plays a crucial role in maintaining the viability and strength of partnerships during recovery. The post-war environment will inevitably generate new types of conflicts – from disputes over the redistribution of scarce resources, the restoration of damaged property and infrastructure, to issues related to legislative changes and the reintegration of various population groups. Traditional dispute resolution methods, such as litigation, are in this context excessively lengthy, costly, and often destructive to business relationships, which is unacceptable during a period when speed and consolidation of efforts are a priority.

Results, Analysis, and Discussion. Mediation, as a facilitated dialogue with a neutral third party, allows for preserving and strengthening partnership ties by focusing on finding mutually beneficial, consensual solutions. It creates a space for open discussion of problems, helps parties overcome psychological barriers and emotional tension, and facilitates the formation of "new" rules of cooperation that account for changed realities. The principles of confidentiality and voluntariness in mediation make it an attractive tool for businesses aiming to preserve their reputation and avoid public confrontation. Thus, mediation becomes not only a tool for resolving existing disputes but also a mechanism for conflict prevention, contributing to the formation of flexible and adaptive partnerships capable of quickly responding to the challenges and opportunities of the post-war period.

The relationship between strategic communications and mediation in post-war recovery is synergistic. Effective communications reduce the likelihood of conflicts, and should they arise, they simplify the mediation process by creating a basis for dialogue. At the same time, successful mediation restores communication channels that may have been damaged by conflict and strengthens trust, paving the way for further productive cooperation. In the context of Ukrainian post-war recovery, where every resource and every partner is invaluable, investments in developing competencies in strategic communications and conflict mediation are critically important for building resilient and strong partnerships that will become the driving force behind the revival of the economy and society.

Recognizing the critical role of strategic communications and mediation in the post-war period requires not only theoretical understanding but also clear steps for their practical implementation. First and foremost, Ukrainian enterprises, especially in strategically important sectors like aviation, need to invest in developing internal and external communication departments. This means not only technical equipment but also enhancing staff qualifications in crisis communications, building a positive image, and effectively interacting with international partners and donors. The development of clear communication plans, including anti-crisis scenarios and mechanisms for rapid response to disinformation, is mandatory. It is also crucial to establish constant dialogue with local communities, as their support and trust are the key to the successful implementation of any recovery projects. This can include regular meetings, public progress reports, and the creation of feedback channels. In parallel, the institutionalization of mediation as a standard dispute resolution tool is critically important. This involves not only popularizing mediation services but also training qualified mediators who understand

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the specifics of business processes and the sensitive aspects of the post-war environment. Enterprises should consider implementing internal mediation mechanisms to resolve conflicts between employees or departments, which, in turn, will enhance their ability to interact effectively with external partners. For international partnerships, specific mediation protocols can be developed, allowing for prompt responses to potential disagreements without resorting to lengthy and costly legal procedures. Such an approach not only minimizes the risks of disruption to recovery projects but also demonstrates a readiness for constructive dialogue and compromise, which is extremely appealing to external investors.

The expected results of such an integrated strategy are significant. Firstly, it will accelerate post-war recovery processes by increasing the efficiency of interaction among all participants. Strong partnerships, based on trust and the ability to overcome conflicts, will become a catalyst for attracting necessary financial, human, and technological resources. Secondly, it will strengthen Ukraine's reputation as a reliable and predictable partner in the international arena, facilitating its integration into the global economy. Thirdly, it will create a more resilient and adaptive business ecosystem, capable of functioning effectively even in conditions of increased turbulence. Ultimately, the successful implementation of these approaches will contribute not only to economic revival but also to overall social cohesion, as effective dialogue and peaceful dispute resolution are the guarantors of stability and prosperity for the entire society.

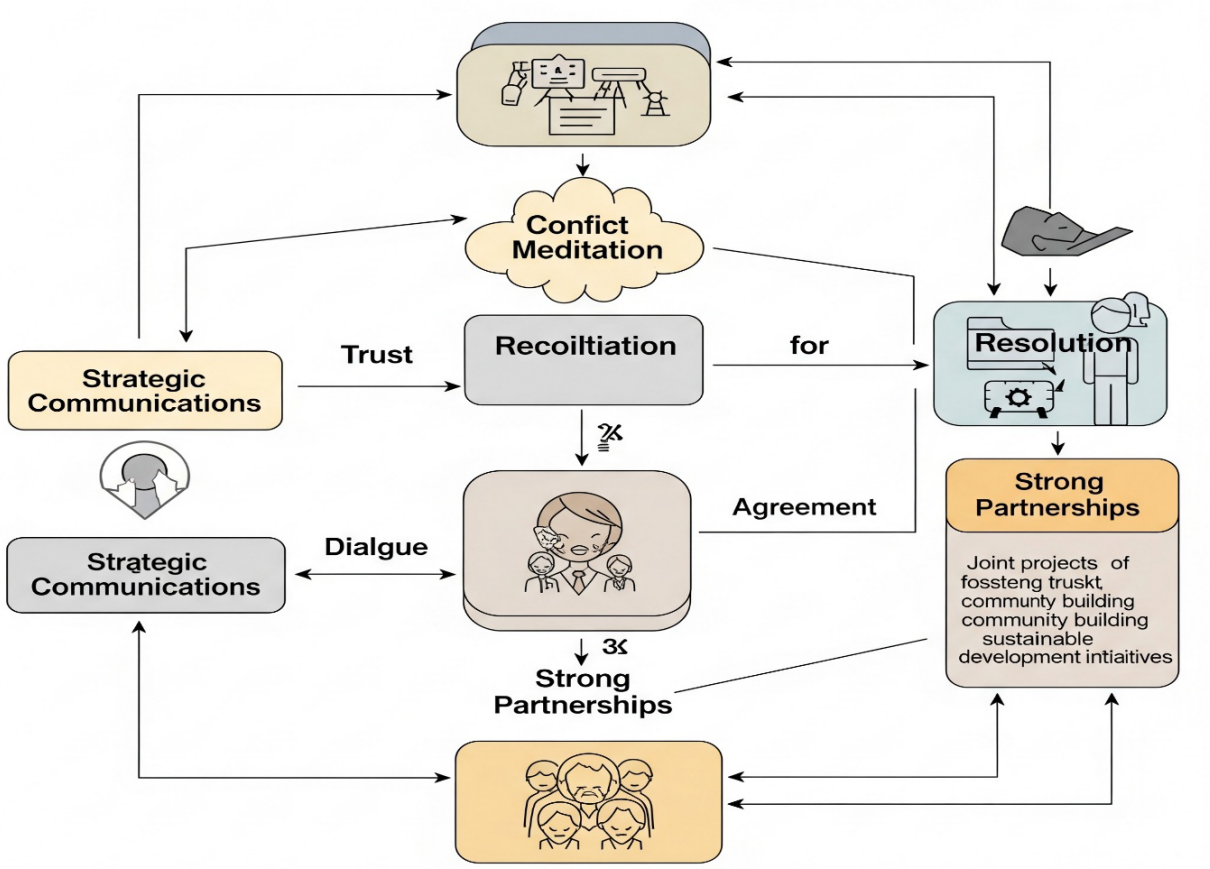

Figure 1 – Diagram of Strategic Communications and Conflict Mediation.
Developed by the authors based on [1, 7, 9]

This diagram illustrates a step-by-step process where strategic communications and conflict mediation interact to form strong partnerships. Key elements such as trust, dialogue, and resolution underscore their crucial role in achieving long-term peace.

In the context of Ukraine's complex post-war recovery challenges, professional mediators emerge not merely as negotiation facilitators but as true architects of dialogue and trust. Their role extends beyond classic dispute resolution, acquiring strategic significance for consolidating society and the economy. A mediator in the post-war period is not just a specialist in negotiation techniques; they are, first and foremost, an independent and impartial third party capable of creating a safe space for open communication even between parties with deep disagreements or traumatic experiences. This is especially important when emotions and mutual claims can hinder the rational search for solutions, as often happens after large-scale conflicts.

It is precisely the mediator's neutrality that allows parties to move away from positional disputes and focus on their underlying interests and needs. Mediators possess skills in active listening, empathy, and reframing, which enables them to rephrase accusations into constructive requests, and hostility into a search for mutually beneficial alternatives. They help conflict participants articulate their positions, understand the other side's perspectives, and jointly generate solutions acceptable to all. In the post-war business environment, where disputes may arise regarding the restoration of property rights, the distribution of compensation, terms of new contracts, or the reintegration of employees, the mediator becomes the "bridge" that helps avoid paralyzing litigation and preserve business ties.

Moreover, the mediator's role is not limited to incidental conflict resolution. An important aspect is their ability to facilitate preventive mediation and build a mediation culture within enterprises and among partners. This means teaching parties skills in constructive communication, identifying potential conflicts at early stages, and utilizing internal mechanisms for their resolution. For aviation enterprises, with their complex structure and numerous international contacts, such a culture is critical for maintaining operational continuity and rapid recovery. Mediators can also play a significant role in facilitating strategic sessions and negotiations for forming new partnerships, where they will ensure balanced discussion, clear formulation of agreements, and minimization of future risks. Thus, investments in developing a body of qualified mediators and their integration into the system of business relations will be an important step towards creating a stable and prosperous economic environment in Ukraine.

During Ukraine's post-war recovery, as society and the economy face unprecedented challenges, the establishment of strong and adaptive partnerships is not merely desirable but a vital condition for sustainable revival. The experience of both domestic and leading international scholars clearly demonstrates that the architects of these robust connections are strategic communications and conflict mediation, which, in their synergy, form an unbreakable foundation for trust, cooperation, and development.

In the post-war context, where increased uncertainty, resource scarcity, and emotional tension can easily lead to conflicts, transparent, purposeful, and empathetic communications become the primary tool for reputation rebuilding, stakeholder informing, and shaping a shared vision for the future. This requires enterprises, including the aviation industry, to invest in two-way dialogue that ensures feedback and adaptability to changing realities.

Simultaneously, the institutionalization of mediation, guided by qualified and impartial mediators, is critically important for the prompt and constructive resolution of inevitable disputes. Mediators, by focusing on interests rather than positions and facilitating the co-creation of mutually beneficial

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solutions, help parties preserve business relationships, avoid lengthy litigation, and transform conflict into an opportunity for further cooperation.

Thus, the comprehensive implementation of strategic communications and mediation practices is not just a tactical step for resolving current issues, but a strategic investment in forming a resilient and flexible business ecosystem in Ukraine, capable of successfully overcoming challenges and building a prosperous future.

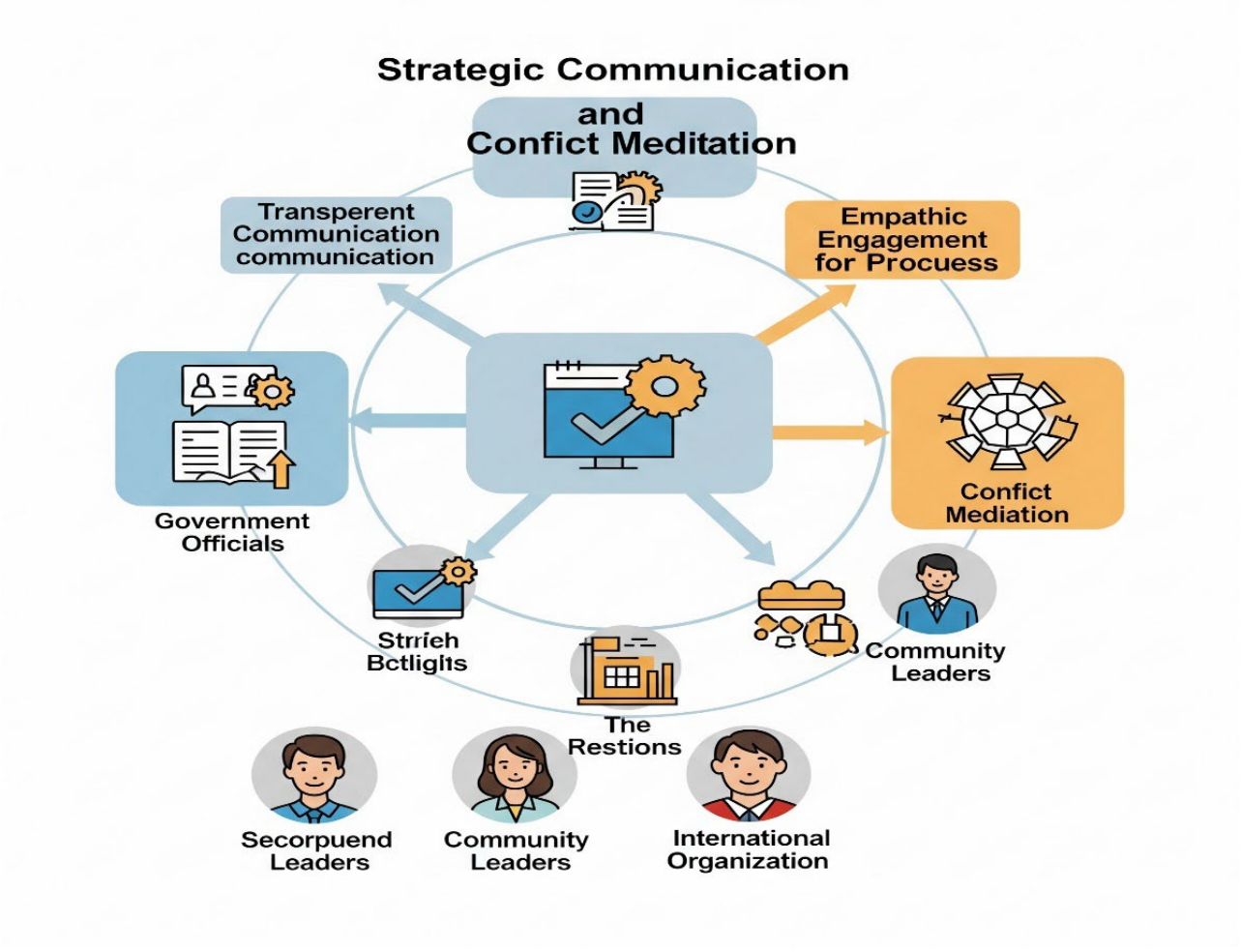

Fig. 2. Synergy Between Strategic Communication and Conflict Mediation in Building Resilient Partnerships for Post-War Reconstruction.
Developed by the authors based on [2, 5, 6]

This diagram illustrates the synergy between strategic communication and conflict mediation in building resilient partnerships for post-war reconstruction. It highlights how transparent communication, empathy, and consensus contribute to successful cooperation.

For Ukraine, this means the necessity of not blindly copying, but intelligently borrowing and adapting the best global practices. For example, the concept of "value creation" through negotiation, as opposed to "value distribution," is critically important for attracting international investments and forming long-term partnerships in reconstruction projects. Instead of each party focusing solely on their benefits, a joint dialogue should aim to maximize overall benefit for all participants. This requires Ukrainian managers and negotiators to develop skills in integrative negotiations, the ability to see the bigger picture, and to find creative solutions that meet the interests of all stakeholders.

At the same time, foreign mediation experience emphasizes the importance of formalizing and institutionalizing this process. In many developed countries, mediation is a recognized and often mandatory stage of resolving business disputes before resorting to court. The establishment of professional mediation chambers, certification programs for mediators, and extensive educational activities within the business community can significantly increase the effectiveness of conflict resolution in Ukraine. Special attention should be paid to mediation in conflicts with an international element, where cultural differences and the absence of a common legal framework can complicate dialogue. Here, J. Bercovitch's experience in international mediation is particularly relevant, showing how a neutral intermediary can help overcome these barriers.

Thus, lessons from foreign experience confirm that strategic communications and mediation are not just tools, but a philosophy of relationship management that allows for transforming conflict situations into opportunities for cooperation. Adapting these approaches, while considering the specifics of the post-war context, will ensure Ukraine not only a faster recovery but also the formation of a more stable, flexible, and trusted business culture capable of thriving in the new world order.

Conclusions. Ukraine's post-war recovery isn't just about rebuilding what's destroyed; it's a fundamental transformation of society and the economy that demands new approaches to interaction and cooperation. As this article demonstrates, at the heart of this process lies the establishment of strong, resilient partnerships, which serve as the driving force for attracting resources, implementing projects, and ensuring sustainable development. The key architects of these partnerships in the extremely complex post-war context are strategic communications and conflict mediation. Strategic communications, grounded in transparency, empathy, and two-way dialogue, are more than just information exchange; they are a deliberate process of restoring trust, forming a shared vision, and overcoming uncertainty. They enable enterprises, particularly in the aviation industry, to effectively engage with various stakeholders – from international investors to local communities – and rebuild their reputation.

In parallel, conflict mediation is an indispensable tool for managing the inevitable disagreements and disputes that arise during a period of massive change. It allows for conflicts to be resolved quickly, confidentially, and with a focus on preserving business relationships, which is critically important for the continuity of recovery processes. The role of a qualified mediator as a neutral facilitator is central to transforming confrontation into constructive dialogue and finding mutually beneficial solutions. The integration of domestic and foreign experience confirms that the synergy of these two approaches creates a powerful mechanism for forming adaptive and flexible partnerships capable of overcoming challenges and leveraging post-war opportunities. The proposed algorithm serves as a practical guide for implementing these principles, ensuring a systemic approach to relationship management.

Thus, investments in developing strategic communication competencies and institutionalizing mediation practices are not merely expenses, but a strategic investment in Ukraine's future. They lay the foundation for a stable and prosperous business ecosystem that will contribute not only to economic revival but also to overall social cohesion and stability in the post-war period.

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