

Electronic scientific and practical journal
**INTELLECTUALIZATION OF LOGISTICS
AND SUPPLY CHAIN MANAGEMENT**

#28 (2024)
December '24



WWW.SMART-SCM.ORG

ISSN 2708-3195

DOI.ORG/10.46783/SMART-SCM/2024-28

ISSN 2708-3195



9 772708 319005

Electronic scientific and practical publication in economic sciences

Electronic scientifically and practical journal “Intellectualization of logistics and Supply Chain Management” included in the list of scientific publications of Ukraine in the field of economic sciences (category "B"): **Order of the Ministry of Education and Culture of Ukraine dated October 10, 2022 No. 894 (Appendix 2)**

Field of science: Economic.

Specialties: 051 – Economics; 073 – Management

ISSN 2708-3195

DOI: <https://doi.org/10.46783/smart-scm/2024-28>

The electronic magazine is included in the international scientometric databases:
Index Copernicus, Google Scholar

Released 6 times a year

№ 28 (2024)

December 2024

Founder: Viold Limited Liability Company

Editor in Chief: Hryhorak M. Yu. – Doctor of Economics, Ass. Professor.

Deputy editors-in-chief: Koulyk V. A. – PhD (Economics), Professor.
Marchuk V. Ye. – Doctor of Tech. Sci., Ass. Professor.

Technical editor: Harmash O. M. – PhD (Economics), Ass. Professor.

Executive Secretary: Davidenko V. V. – PhD (Economics), Ass. Professor.

Members of the Editorial Board:

SWIEKATOWSKI Ryszard – Doctor of Economics, Professor (Poland);

POSTAN M. Ya. – Doctor of Economics, Professor;

TRUSHKINA N. V. – PhD (Economics), Corresponding Member of the Academy;

KOLOSOK V. M. – Doctor of Economics, Professor;

ILCHENKO N. B. – Doctor of Economics, Ass. Professor;

SOLOMON D. I. – Doctor of Economics, Professor (Moldova);

ALKEMA V. H. – Doctor of Economics, Professor;

Henryk DŹWIGOŁ – PhD (Economics), Professor (Poland);

SUMETS O. M. – Doctor of Economics, Ass. Professor;

STRELCOVÁ Stanislava – PhD (Economics), Ass. Professor, (Slovakia);

RISTVEJ Jozef (Mr.) PhD (Economics), Professor, (Slovakia);

ZAMIAR Zenon – Doctor of Economics, Professor, (Poland);

SMERICHEVSKA S. V. – Doctor of Economics, Professor;

GRITSENKO S. I. – Doctor of Economics, Professor;

KARPENKO O. O. – Doctor of Economics, Professor;

PATKOVSKYI S. A. – Business practitioner.

The electronic scientific and practical journal is registered in international scientometric data bases, repositories and search engines. The main characteristic of the edition is the index of scientometric data bases, which reflects the importance and effectiveness of scientific publications using indicators such as quotation index, h-index and factor impact (the number of quotations within two years after publishing).

In 2020, the International Center for Periodicals (ISSN International Center, Paris) included the Electronic Scientific and Practical Edition "Intellectualization of logistics and Supply Chain Management" in the international register of periodicals and provided it with a numerical code of international identification: ISSN 2708-3195 (Online).

Recommended for dissemination on the Internet by the Academic Council of the Department of Logistics NAU (No. 7 of February 26, 2020). Released 6 times a year. Editions references are required. The view of the editorial board does not always coincide with that of the authors.

Electronic scientifically and practical journal "Intellectualization of logistics and Supply Chain Management" included in the list of scientific publications of Ukraine in the field of economic sciences (category "B"): **Order of the Ministry of Education and Culture of Ukraine dated October 10, 2022 No. 894 (Appendix 2)**

Field of science: Economic.

Specialties: 051 – Economics; 073 – Management

t.me/smart_scm
facebook.com/Smart.SCM.org
twitter.com/ScmSmart

DOI: <https://doi.org/10.46783/smart-scm/2024-28>

e-mail: support@smart-scm.org

тел.: (063) 593-30-41

<https://smart-scm.org>

Contents

INTRODUCTION	6
MARCHENKO V.S. Postgraduate Student, National Aviation University (Ukraine), BUGAYKO D.O. Doctor of Science (Economics), Professor, Academician of the Academy of Economic Sciences of Ukraine, Corresponding Member of the Transport Academy of Ukraine, Vice - Director of ES International Cooperation and Education Institute, Instructor of ICAO Institute, Professor of the Logistics Department, National Aviation University (Ukraine), PALYVODA O.M. Doctor of Science (Economics), Professor, Professor of the Management of Foreign Economic Activities of Enterprises, National Aviation University (Ukraine)	
<i>THE PROSPECTS OF HYDROGEN AS A FUEL OF THE FUTURE: THE IMPORTANCE OF DEVELOPING HYDROGEN TECHNOLOGIES IN UKRAINE AND THE WORLD</i>	7 – 18
GRYTSENKO S. I. Doctor of Economics, Professor, Professor of Logistics Department of National Aviation University, NELIPOVYCH L. O. Master student of Logistics Department of National Aviation University (Ukraine)	
<i>THE ROLE OF EXPORT-IMPORT ACTIVITY IN THE DEVELOPMENT OF THE NATIONAL ECONOMY: LOGISTICS ASCPECT</i>	19 – 25
DAVYDENKO V.V. PhD (Economics), Associate Professor, Associate Professor of Logistics Department National Aviation University (Ukraine), SUVOROVA I.M. PhD (Economics), Associate Professor, Associate Professor of Logistics Department National Aviation University (Ukraine)	
QUALITY SUPPORT OF AN INNOVATION-ORIENTED ENTERPRISE	26 – 35
KOBETS I. K. Bachelor's student of the Institute of Aerospace Technologies, National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute" (Ukraine), KULYK S. V. Bachelor's student of the Institute of Aerospace Technologies, National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute" (Ukraine), BOIARYNOVA K. O. Doctor of Economic Sciences, Professor, Professor of the Department of Economic Cybernetics, National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute" (Ukraine), ROCHSHYNA N. V. PhD in Economics, Associate Professor, Associate Professor of the Department of Economic Cybernetics, National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute" (Ukraine)	
ECONOMIC ANALYSIS OF AIRLINE PRICING: RETROSPECTIVE ANALYSIS AND CURRENT STATE	36 –46



HUBARIEVA I. O. Doctor of Sciences (Economics), Professor, Research Center for Industrial Problems of Development of NAS of Ukraine (Ukraine),
HARMASH O.M. PhD (Economics), Associate Professor, Associate Professor at the Logistics Department, National Aviation University (Ukraine),
TRUSHKINA N.V., Ph.D. (in Economics), Senior Researcher Research Center for Industrial Problems of Development of the NAS of Ukraine (Ukraine),
SHKRYGUN Yu. O., Postgraduate Student, Institute of Industrial Economics of NAS of Ukraine (Ukraine), **PATLACHUK T. V.**, Postgraduate Student, Research Center for Industrial Problems of Development of the NAS of Ukraine (Ukraine)

DIGITAL TRANSFORMATION OF ENTERPRISE' LOGISTICS ACTIVITIES:
BIBLIOMETRIC AND TREND ANALYSIS

47 –70

ZAHORODNIA A.S. PhD in Management, Associate professor of the Department of international relations and political consulting, Institute of law and public relations, Open International University of Human Development "Ukraine" (Ukraine), **Dr. Manish Sharma** PhD in Business Administration, Assistant Professor of the Department of Business Administration, Jaipur School of Business, JECRC University, Jaipur, Rajasthan (India)

INTERNATIONAL EXPERIENCE IN BUSINESS PROCESS MANAGEMENT: RELATIONS BETWEEN UKRAINE AND THE REPUBLIC OF INDIA

71 –77

DABIZHA V.V. PhD in Public administration, Associate Professor, Associate Professor of the Department of International Relations and Political Consulting, Open International University of Human Development «UKRAINE» (Ukraine),
DRYHA D. Yu. Postgraduate student of the Department of International Relations and Political Consulting, Open International University of Human Development «UKRAINE» (Ukraine), **PYSKUN D.V.** Postgraduate student of the Department of International Relations and Political Consulting, Open International University of Human Development «UKRAINE» (Ukraine)

THE INFLUENCE OF THE EXTERNAL AND INTERNAL ENVIRONMENT ON THE FORMATION OF STRATEGIC MANAGEMENT OF THE ENTERPRISE

78 –86

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 discuss 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.

HRYPHORAK Mariia
Chief Editor



UDC 620.97: 661.968: 339.97
JEL Classification: I18, J23, M12.
Received: 18 October 2024

DOI: <https://doi.org/10.46783/smart-scm/2024-28-1>

Marchenko V. S. Postgraduate Student, National Aviation University (Ukraine)

ORCID – 0009-0000-8959-8720

Researcher ID –

Scopus author id: –

E-Mail: vsmarch@ukr.net

Bugayko D. O. Doctor of Science (Economics), Professor, Academician of the Academy of Economic Sciences of Ukraine, Corresponding Member of the Transport Academy of Ukraine, Vice - Director of ES International Cooperation and Education Institute, Instructor of ICAO Institute, Professor of the Logistics Department, National Aviation University (Ukraine)

ORCID – 0000-0002-3240-2501

Researcher ID – ABF-5564-2021

Scopus author id: – 57216582348

E-Mail: bugaiko@nau.edu.ua

Palyvoda O.M. Doctor of Science (Economics), Professor, Professor of the Management of Foreign Economic Activities of Enterprises, National Aviation University (Ukraine)

ORCID – 0000-0001-9714-9765

Researcher ID – S-1138-2016

Scopus author id: – 36081316100

E-Mail:

THE PROSPECTS OF HYDROGEN AS A FUEL OF THE FUTURE: THE IMPORTANCE OF DEVELOPING HYDROGEN TECHNOLOGIES IN UKRAINE AND THE WORLD

Vladyslav Marchenko, Dmytro Bugayko, Olena Palyvoda. *«The prospects of hydrogen as a fuel of the future, the importance of developing hydrogen technologies in Ukraine and the world».* The article explains that environmental pollution, the depletion of natural resources and climate change are modern challenges that have a global scale. Their aggravation has led to horrible consequences that can now be seen in all countries of the world. Difficulties in the energy sphere and high dependence on traditional fossil fuels call into question environmental, economic and social safety. This stimulates humanity to look for new ideas, solutions and environmentally friendly alternatives. In our time, among such highly promising variants, hydrogen can be highlighted, which, due to its unique properties, can become the fuel of the future. In the article, the concept of hydrogen as a resource and fuel is explained, its unique characteristics and reserves are noted, its key types and ways to make them are indicated, the modern prospects of hydrogen technologies and their importance are considered. Examples of hydrogen usage in a big number of spheres were given, special attention was paid to successes in the transport and logistics in the process of managing supply chains. In this

paper, it was emphasised that hydrogen is highly promising for road, rail, air, water and even space transport, and examples of such modern initiatives were given. In a similar way, in this work, the main advantages that can be gained from the use of hydrogen were pointed out and the key contours of the development of this sphere in the coming years were described, both in our country and abroad. As a result, the reason why it is so important to continue to research and study this direction was highlighted.

Keywords: development, ecology, hydrogen, technologies, efficiency, prospects, fuel, transport, logistics, supply chain management (SCM)

Владислав Марченко, Дмитро Бугайко, Олена Паливода. «Перспективи водню, як палива майбутнього, важливість розвитку водневих технологій в Україні та світі». *Стаття пояснює, що забруднення навколишнього середовища, вичерпання природних ресурсів та зміна клімату є сучасними викликами, які мають глобальний масштаб. Їх загострення призвело до жахливих наслідків, які зараз можна побачити в усіх країнах світу. Складнощі в енергетичній сфері та висока залежність від традиційних, викопних видів палива ставить під сумнів екологічну, економічну та соціальну безпеку. Це стимулює людство шукати нові ідеї, рішення та екологічно чисті альтернативи. У наш час серед таких високоперспективних варіантів можна виділити водень, який завдяки своїм унікальним властивостям може стати паливом майбутнього. У статті пояснено концепт водню як ресурсу та палива, зазначено його унікальні характеристики та запаси, вказано його ключові типи та способи їх створення, розглянуто сучасні перспективи водневих технологій та їх важливість. Було наведено приклади застосування водню в великій кількості сфер, особлива увага була приділена успіхам в транспортній та логістичній галузі в процесі управління ланцюгами постачання. В цій роботі було підкреслено, що водень є високоперспективним для дорожнього, залізничного, повітряного, водного та навіть космічного транспорту, наведено приклади таких сучасних ініціатив. Аналогічним чином, в цій роботі було вказано на головні переваги, які можна отримати від використання водню та описано ключові контури розвитку даної сфери в найближчі роки, як в нашій країні, так і за кордоном. Як результат, було підкреслено причину, чому так важливо продовжувати досліджувати та вивчати цей напрямок.*

Ключові слова: розвиток, екологія, водень, технології, ефективність, перспективи, паливо, транспорт, логістика, управління ланцюгами постачання.

Introduction. In our time, humanity is facing a great number of challenges. Many of them have a global, existential scale and threaten not only people's lives but also the stability of ecosystems. They can include various environmental problems, starting with the pollution of ground, air and water, and ending with climate change, which appears in the form of extreme weather conditions and seriously affects the level of biodiversity around the world. It is impossible not to mention the current problems in the energy sector. These questions are particularly acute as the level of consumption of non-renewable natural resources such as natural gas, oil and coal is really high and even continues to grow. Scientists from around the

world are concerned with the rapid depletion of their reserves, as this poses significant threats to the safety of future generations and the environment in general.

It is very important for humanity to work now on finding new, modern and safe energy sources that will be able to replace the well-known traditional fuels. Special attention should be paid to variants that have a low impact on the environment and climate change. Intensive technological development in the sphere of alternative energy sources usage will allow decreasing our dependence on fossil fuels and protecting the environment.

One of the most modern and innovative solutions today is hydrogen. It is the resource

that many scientists consider to be the fuel of the future. Hydrogen has a truly giant undiscovered potential. Many scientists see it as the next evolutionary step in the development of the energy sector. Due to its special characteristics and properties, it has all chances to make an energy revolution. Nowadays, it is important to continue researching this question in the scientific community, to look for new, effective ways to develop it.

The purpose of the article is to explain the essence of hydrogen as a resource and fuel, to reveal its unique characteristics, types and global significance. This article will not only explain the possible ways of hydrogen usage in various industries, but also outline the key prospects for hydrogen technologies both in Ukraine and in the world.

Presentation of the main results. Today, humanity is facing many serious challenges that threaten life on the planet. The problems of environmental pollution, depletion of natural resources and climate change are among them. Currently, these

issues are so critical that turning a blind eye to them can lead to fatal consequences, not only for the modern society, but also for all future generations. Each such problem is very complex and requires a special approach and different, appropriate countermeasures.

It is impossible not to mention the significant household wastes, industrial and transport emissions. With each new year, they accumulate more and more in the ground, air and water. It is extremely important for humanity to prevent their pollution, as this negatively affects human health and the stability of entire ecosystems. An equally serious threat today is climate change. The importance of climate change, which is largely due to rising CO₂ emissions, has been recognized not only internationally but globally, by all countries committing themselves to sustainable development [1]. Its global impact and negative consequences can now be seen in all countries of the world, including Ukraine. An example of the extreme heat in Africa can be seen in Fig. 1.



Figure 1 – An example of the extreme heat in Africa

Source: https://www.un.org/sites/un2.un.org/files/unsg_call_to_action_on_extreme_heat_for_release.pdf

Large volumes of greenhouse gas emissions into the atmosphere significantly worsen the current situation. Greenhouse gases in our atmosphere act like the glass in a

greenhouse, letting light through but stopping heat from escaping [2]. Rising sea level and various extreme weather conditions, such as large-scale droughts and severe

floods, are examples of serious challenges that not only pose a big threat to product flows but also hamper agricultural activities in general.

The high dependence on non-renewable resources, such as natural gas, coal or oil, poses a significant challenge to humanity. The gradual depletion of the relevant reserves will lead to its deficit on the market in the future. This will not only have a negative impact on the availability of energy or changes in its cost, but will also painfully affect the economies of many countries, especially those that have not paid enough attention to this issue. Knowing what to expect helps us adapt and prepare for a more resilient future [3].

All of the above mentioned examples perfectly demonstrate why the goal of using other prospective resources, such as hydrogen, is so important in our time. The question of finding effective, environmentally friendly energy sources should remain a priority.

In our time, all possible questions connected with the energy sector are quite sensitive. And this is not surprising, as the level of well-being of the population directly depends on its stability, environmental friendliness and safety. Humanity was able to realise the scale of the existing problem, and therefore began to gradually focus on the active development of alternative energy sources and new technologies. Not so long ago, reaching significant success in the use of solar, wind, geothermal, hydropower or bioenergy seemed fantastic, but today it is our routine reality. Despite the fact that all the electricity generated has undoubtedly allowed humanity to reduce greenhouse gas emissions and partially reduce dependence on fossil fuels, it must be admitted that it has not yet been able to become a global panacea. This is primarily due to the slow pace

of implementation of these complex technologies, as well as the presence of a number of significant drawbacks that should not be forgotten.

The need to find new, ecological energy solutions has prompted many scientists to continue their researches and turn their attention to hydrogen as a very promising resource. Today, hydrogen is seen as a highly prospective energy solution. With each new year, it is more and more often mentioned on the daily agenda as the «fuel of the future». Hydrogen has a wide range of unique properties and characteristics that, if properly managed, could make it a key to achieving sustainable energy in the future. That is why in this paper, the nature of hydrogen will be revealed, its high importance as a fuel will be explained, and the prospects for hydrogen technologies in general will be outlined.

Hydrogen is easily the most abundant element in the universe [4]. It does not have a smell or colour. Under standard conditions, it is a gas of diatomic molecules with the H_2 formula. It is worth noting that it is lighter than air, which is valued by various specialised spheres, especially aviation and space industries. Hydrogen has a number of features that make it extremely important for the energy sector. First of all, it should be noted that it is a flammable gas. It is so popular in the modern market because of its high energy efficiency and environmental friendliness. Unlike traditional fuels, its combustion does not produce harmful emissions, but rather the formation of ordinary water vapour. This is what makes it such an attractive environmental source of energy.

The classification of hydrogen is complex and is determined by the methods of its production. Each type has been assigned its own colour in the name, which is perfectly demonstrated in Fig. 2.

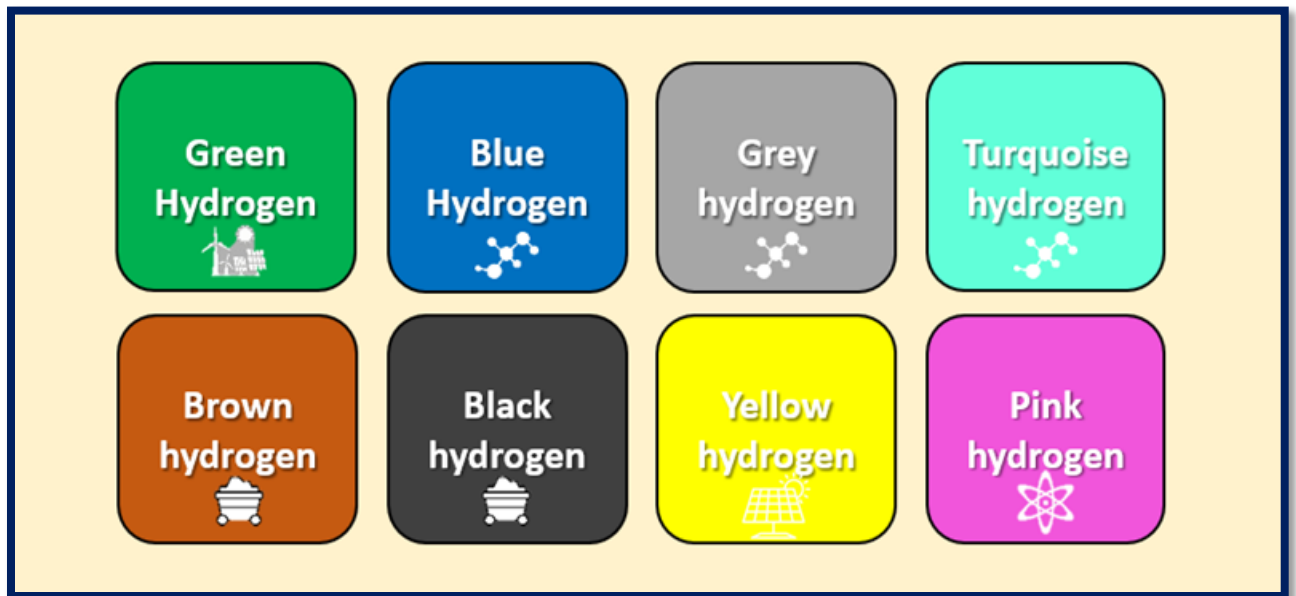


Figure 2 – Types of hydrogen
 Source: Developed by Vladyslav Marchenko

This decision allowed to better associate each type with its environmental impact and energy source. The key ones today are green, blue, grey, turquoise, brown, black, yellow and pink hydrogen. There are many ways to

obtain them. They differ in terms of economic efficiency and environmental friendliness. Types of hydrogen and ways to make them are shown in Table 1.

Table 1. Types of hydrogen and ways to make them

Type	How this type of hydrogen is made
Green hydrogen	is made by electrolysis powered by renewable energy sources.
Blue hydrogen	is made by steam methane reforming, with carbon capture and storage technology.
Grey hydrogen	is made by steam methane reforming from natural gas without carbon capture.
Turquoise hydrogen	is made by methane pyrolysis, that yields solid carbon instead of CO_2 .
Brown hydrogen	is made by gasifying coal, with «brown» typically referring to lignite coal
Black hydrogen	is made by gasifying coal, with «black» typically referring to bituminous coal.
Yellow hydrogen	is made by electrolysis powered by grid electricity from some mixed sources.
Pink hydrogen	is made by electrolysis with nuclear power as an energy source.

Source: Developed by Vladyslav Marchenko & Dmytro Bugayko

The above information clearly indicates that hydrogen is a truly unique energy resource that has the potential to become a modern, environmentally friendly alternative to traditional fuels. The presence of a great number of methods for its production is also a strong plus. Of course, modern scientists concerned with minimising the negative impact of humans on the environment are particularly interested in green hydrogen. Green hydrogen is an ecologically clean

solution, as its production through electrolysis uses renewable energy. When it is used, it is possible to safely split water without CO_2 emissions, which is undoubtedly very important. With the right approach, green hydrogen can noticeably simplify the global transition to clean energy. Experts believe that its popularity and competitiveness will increase strongly in the future following the development of renewable energy sources, as this will make the cost of green hydrogen

production more attractive. Reducing the level of greenhouse gas emissions into the atmosphere through the use of hydrogen technologies can be a countermeasure to climate change. Greenhouse gases from human activities are the most significant driver of observed climate change since the mid-20th century [5].

Regarding hydrogen reserves, it should be noted that, on the one hand, it is one of the most abundant elements in the world, but on the other hand, it can still be found in its natural form quite rarely. In practice, in most cases, we can see it in compounds. The process of truly large-scale, industrial use of hydrogen is complicated with this moment, as it is primarily necessary to achieve the separation of it from compounds using modern technologies. Hydrogen can be found in fossil fuels, various biomasses or water. The last variant is especially promising, as water is a common resource on our planet. This motivates scientists to look for new effective ways to produce it.

At present, hydrogen is used in a large number of spheres and industries. Its unique characteristics make it extremely valuable for the modern market. Ordinary people do not even realise how often in their lives they deal with products that have interacted with this resource. Hydrogen is widely used in manufacturing, and it plays a special role in the energy, chemical, medical, transport and logistics and SCM sectors.

For example, in the energy sector, hydrogen can be effectively used to generate electricity, which can power different types of equipment, enterprises, villages and even entire cities. Now, in quite difficult moments, when the demand for energy significantly exceeds the available proposal, it can act as a saviour, which will at least partially compensate this difference. No less essential

role today is played by hydrogen in the petrochemical industry. It is widely used in the production of ammonia, recycling of raw materials, oil refining, metal processing and the synthesis of various chemical compounds. And in the above mentioned medicine, hydrogen is used to synthesise a wide range of pharmaceutical substances and produce different medicines.

Separate mention should be made of the successes in the transport, logistics and SCM management, as in recent years hydrogen has found truly colossal perspectives for development in these spheres. Climate challenges have stimulated a growing interest in hydrogen as an efficient resource that can replace traditional fuels in the future, the combustion of which leads to significant carbon dioxide emissions. Today, these industries have made significant progress in the implementation of hydrogen technologies. Not so long ago, hydrogen transport was something futuristic, but now it is known all over the world. Every year, more and more innovative solutions and promising projects appear on the market. In our time, hydrogen transport is already capable of efficiently transporting people and loads over long distances without releasing greenhouse gases into the atmosphere, and some models have already managed to achieve the same high efficiency as traditional modes of transport, which is undoubtedly good. This motivates companies to think about strategies for their use and gradual purchase.

Particular attention is now focused on the development and popularisation of efficient hydrogen road transport and the creation of appropriate infrastructure for it. Modern examples of such transport include the Toyota Mirai or Hyundai Nexo, which can be seen in Fig. 3.



Figure 3 – Hyundai Nexo

Source: <https://www.hyundai.com/uk/en/models/nexo.html>

In a similar way, hydrogen is highly promising for rail, air, water and even space transport. There are a huge number of relevant developments, projects and initiatives.

A modern example of a hydrogen train is the Coradia iLint, which is shown in Fig. 4.



Figure 4 – Coradia iLint

Source: <https://en.reset.org/germany-launches-worlds-first-hydrogen-powered-train-heres-why-its-big-deal-09192018/>

One of the most famous hydrogen aircraft is HY4, which is demonstrated in Fig. 5.



Figure 5 – HY4 aircraft

Source: <https://www.airliquide.com/stories/hydrogen/world-premiere-air-liquide-contributes-first-piloted-electric-flight-powered-liquid-hydrogen>

And among hydrogen water transport, such an example is the MF Hydra ferry, which can be seen in Fig. 6.



Figure 6 – MF Hydra

Source: <https://www.schottel.de/en/portfolio/references/reference-detail/hydra>

Of course, such giant opportunities could not stay unnoticed by modern business, and that is why in our time, hydrogen technologies continue to be implemented step by step in the logistics and SCM sphere. It is worth remembering that their potential in logistics is not limited only by transportation. At present, hydrogen is already used to power logistics warehouses, stationary power plants and various types of machinery. Such a modern example is the existing practice of using hydrogen in ports to power container handlers and cranes.

There are many reasons why companies from all over the world are looking for ways to

use hydrogen technologies in logistics, and some of them have already been partially mentioned in this work. First of all, it is important to mention its high environmental friendliness, as its use can significantly reduce greenhouse gas emissions into the atmosphere. Now, when climate change is a huge problem, hydrogen acts as an effective countermeasure that can seriously decrease the ecological footprint.

No less important is the factor of high energy efficiency. Hydrogen as a fuel has good perspectives. Its unique characteristics make it a very productive and convenient resource for all types of transport. As fossil fuel

reserves continue to decline rapidly at the present time, hydrogen may become a resource that will gradually replace them in the future.

The factor of using different types of fuel is also highly relevant in today's market. It is valued by companies that do not want to rely on a single energy resource and wish to reduce their dependence on fossil fuels. Being prepared to manage different energy resources allows them to avoid risks and periods of instability in the energy market.

Today, the sphere of hydrogen technologies continues its active development. The first one to master these technological innovations will be able to gain serious competitive advantages. This includes financial benefits, attraction of investments, effective marketing, sustainable development, etc. All of the above listed examples are just the beginning of a gigantic list of reasons and that is why the involvement of hydrogen technologies in the logistics and SCM sector should become one of the top priorities for its development.

In order to fully disclose the chosen topic, it is important to describe the key contours of this area's development in the coming years. At present, they are quite promising, both in our country and abroad. Speaking about Ukraine, it is worth noting that we have a very good potential for its production. Experts are tending to the opinion that our country can get a key role in the European hydrogen

market. This can be clearly seen in the interaction between the European Union and our government. Western countries are ready to invest large amount of money in the development of hydrogen technologies and corresponding infrastructure in our country. In the context of the global transition to non-carbon technologies, this partnership is considered by them to be very mutually beneficial and promising.

Ukraine continues to work on approving an effective hydrogen strategy. In it, the active use of our resources for hydrogen production will be specified. Of course, the European Union is most interested in green hydrogen, and that is why active discussions are ongoing on the development of renewable energy in Ukraine. This primarily concerns the installation of solar panels and the construction of powerful wind farms. There are real plans to create Hydrogen Valleys in Zakarpattia and Odesa regions. A significant advantage of our country is its well-developed gas transmission system, which can be adapted to transport hydrogen and used for its further export.

In 2023, Ukraine signed an agreement to join the European Union's Single Market Programme. Memorandum of understanding between the European Union and Ukraine on a Strategic Partnership on Biomethane, Hydrogen and other Synthetic Gases was also signed at this meeting, what can be seen in Fig. 7.



Figure 7 – Memorandum of understanding between the European Union and Ukraine on a Strategic Partnership on Biomethane, Hydrogen and other Synthetic Gases

Source: https://x.com/Denys_Shmyhal/status/1621193538271678470/photo/1

It is extremely important for Ukraine not to miss the chance to realise its potential in this area. Experts forecast that this direction of development will not only allow us to strengthen our economy and improve our ties with the European Union, but also significantly reduce our carbon footprint and improve the ecology, which is a crucial goal in our time.

The transition to a zero-carbon economy is a global, truly complex task, and hydrogen plays an important role in it. A great number of countries have already achieved some success in this sphere and are forming promising plans for the future. In the case of the above-mentioned European Union, it has developed a well-thought-out development programme called «The European Green Deal», aimed for many years ahead. It includes not only significant investments in green hydrogen production projects, but also sets ambitious goals for the development of hydrogen infrastructure. Germany plays a particularly active role in this area and is

intensively working on the development of a strong hydrogen economy.

The United States also sees the serious potential of hydrogen. They not only make big investments in researching its possible capabilities, but also spend a lot of money on the development of hydrogen technologies.

This sector has not been unnoticed by Japan either. It has created a long-term plan to implement its own hydrogen strategy, which calls for expanding the role of hydrogen in the transport, logistics and energy sectors. Japan plans to significantly reduce greenhouse gas emissions through the development of hydrogen transport and refuelling stations.

As a global player, China also could not pass by such a promising direction. At present, it is seriously funding the development of hydrogen technologies and aims to become a global leader in hydrogen production. It is highly interested in the use of hydrogen in various fields, especially in manufacturing and transport.

All of these plans once again clearly demonstrate the interest of the global community in hydrogen as the «fuel of the future» and a resource that can be used in a huge number of industries. However, on the other hand, it has to be admitted that its current development remains limited by a number of obstacles. These include a lack of investments, poorly developed infrastructure, weak political will on the part of many leaders, and the initial high cost of the implementation. All of them can be and should be resolved in order to achieve the set objectives.

The potential of hydrogen technologies remains incredibly high. It is important to continue research and development in this area. To reach real success in this direction, it is necessary to reduce production costs and improve fuel technologies. The goals set are very ambitious and complex, and therefore it is crucial to establish international cooperation and collaboration. This will accelerate progress, create unified hydrogen standards, ensure the exchange of precious experience and new technological solutions. The article is a continuation of a series of publications by the authors on aspects of the development of "green" logistics and supply chain management [6-7].

Conclusions. The result of this article was the achievement of all earlier defined objectives. In this work, it has been clearly indicated that problems such as environmental pollution, depletion of natural resources and climate change are global challenges today. Their gradual aggravation has led to horrific consequences that can now be seen in all countries of the world. This has pushed humanity to look for new ideas, solutions and countermeasures that could improve the existing situation. Difficulties in the energy sector and high dependence on natural gas, coal or oil pose a serious threat to humanity. Their active and large-scale extraction is harmful to the environment, when their combustion is accompanied by significant greenhouse gas emissions into the atmosphere, which contributes to climate

change. That is why, in recent years, scientists have turned their attention to the use of hydrogen as a solution that can be an effective countermeasure to these challenges. Hydrogen, due to its unique characteristics, high energy efficiency and environmental friendliness, has the potential to become a key element in the transition to a no-carbon economy. The question of finding effective, ecologically safe energy sources should remain a priority, and that is why in this article it was explained in detail what hydrogen is, both in terms of a resource and a fuel, highlighted its reserves, importance, unique properties and characteristics, key types of hydrogen and ways to make them. We saw that hydrogen, as a resource and energy source, has a huge potential, especially for overcoming the above challenges. In this article, it was emphasised that in our time, hydrogen is used in a large number of spheres and industries. It is important not only for manufacturing, but also has a special role in the energy, chemical, medical, transport and logistics sectors. In this paper, detailed examples of successes in these areas were provided, and significant achievements in the transport, logistics and SCM sector were emphasised separately. In this work, it was explained that hydrogen is highly prospective for all types of transport, pointed out the key advantages that can be gained from its use and described the key contours of the development of this sphere in the coming years, both in our country and abroad. These development perspectives are very serious and optimistic. Today, our country has all the opportunities to become one of the main players in the hydrogen market. Ukraine has a giant potential for hydrogen production, transportation and export, which makes it attractive for international cooperation, especially with the European Union. The development of this sphere in Ukraine can result in the creation of a great number of new job places, technological progress and improvement of the ecological situation. Nowadays, our country can get significant investments, so it

is critically important for us not to miss our chance to take advantage of the demand for hydrogen technologies. In the article, specific examples were provided to show that European countries, the United States of America, Japan, and China see serious potential in hydrogen. All of them plan to continue to explore the perspectives of hydrogen technologies and actively develop appropriate infrastructure. The interest in hydrogen remains high at the global level. Thus, hydrogen is not just a «fuel of the

future», but a truly strategically important resource that can change our future, not only in Ukraine but also around the world. Summing up all the information above, hydrogen has an enormous importance in our time. The development of this direction will help not only reduce greenhouse gas emissions but also open up a great number of new opportunities. That is why it is so important to continue to research, analyse and study this sphere.

References

1. Ovdiienko, O., Hryhorak, M., Marchuk, V., & Bugayko, D. (2021). An assessment of the aviation industry's impact on air pollution from its emissions: worldwide and the Ukraine. *Environmental & Socio-economic Studies*, 9(2), 1-10.
2. NSW Government. Causes of climate change. [Electronic resource]. – URL: <https://www.climatechange.environment.nsw.gov.au/why-adapt/causes-climate-change>
3. IPCC. Climate change in data. [Electronic resource]. – URL: <https://www.ipcc.ch/report/ar6/wg1/resources/climate-change-in-data/>
4. The Royal Society of Chemistry. Periodic Table [Electronic resource]. – URL: <https://www.rsc.org/periodic-table/element/1/hydrogen>
5. U.S. Environmental Protection Agency. Climate Change Indicators: Greenhouse Gases [Electronic resource]. – URL: <https://www.epa.gov/climate-indicators/greenhouse-gases>
6. Marchenko V.S., Bugayko D.O. (2024). "Possible ways of the sustainable development concept realisation by logistics companies, the necessity of using «green» technologies for decarbonisation of their business activity". *Intellectualization of logistics and Supply Chain Management*. [Online], vol.23, pp.17-36.
7. Marchenko V.S., Bugayko D.O. (2024). "Increasing the level of environmental friendliness of companies through decarbonisation". *Intellectualization of logistics and Supply Chain Management*. [Online], vol.24, pp.24-32.

UDC 332.1

DOI: <https://doi.org/10.46783/smart-scm/2024-28-2>

JEL Classification: C51, F63, L92, O33, R58.

Received: 15 November 2024

Grytsenko S. I. Doctor of Economics, Professor, Professor of Logistics Department of National Aviation University (Ukraine)

ORCID – 0000-0002-3322-3986

Researcher ID – N-4298-2018

Scopus author id: – 57783729900

E-Mail: sergiy.grytsenko@gmail.com

Nelipovych L. O. Master student of Logistics Department of National Aviation University (Ukraine)

ORCID –

Researcher ID –

Scopus author id: –

E-Mail: 6287158@stud.nau.edu.ua

THE ROLE OF EXPORT-IMPORT ACTIVITY IN THE DEVELOPMENT OF THE NATIONAL ECONOMY: LOGISTICS ASPECT

Sergiy Grytsenko, Liliia Nelipovych. «*The role of export-import activity in the development of the national economy: logistics aspect*». The article 'The role of export-import activity in the development of the national economy: logistics aspect' by is devoted to foreign economic operations that affect the economy of the state. The focus of this article is the role of logistics in the structure of exports and imports. The study examines the organisation and management of export and import operations that contribute to economic growth. This is achieved by optimising the allocation of resources and increasing trade efficiency, with an important role in promoting international competitiveness.

The object of study is logistics systems that facilitate international trade. Logistics operations include transport, warehousing, customs procedures and supply chain management. Particular attention is paid to the relationship between logistics infrastructure and the strategic goals of national export and import activities, which emphasises their interdependence in trade.

A systematic approach to assessing cooperation between logistics elements and their role in the export-import system has made it possible to determine the efficiency of foreign economic activity in the country's economy.

The survey results demonstrate the level of development and strategically managed logistics systems that significantly increase the efficiency of export and import activities. They reduce transaction costs and minimise delays in the supply chain. The study identifies risks and threats in the implementation of foreign economic activity. It also examined critical logistics factors, such as the expansion of the range of transport, digitalisation and the use of modern technologies, which enhance the benefits of export and import operations for the national economy.

The study found that the logistics sector is not just a service component of trade, but a strategic driver and engine of economic development. The integration of innovative technologies and infrastructure modernisation

are proposed as necessary measures to maintain competitive advantages in global markets. In addition, the study emphasises the importance of political support and international cooperation in harmonising logistics standards and practices to unlock the full potential of export and import activities.

The article reveals logistics as a segment of economic growth, emphasising its key role in transforming export and import activities into a powerful factor of national development.

Keywords: export; import; national economy; logistics; supply chain; transportation; trade; economic development; digitalisation; international cooperation

Сергій Гриценко, Лілія Неліпович. «Роль експортно-імпоротної діяльності у розвитку національної економіки: логістичний аспект». Стаття на тему «Роль експортно-імпоротної діяльності у розвитку національної економіки: логістичний аспект» присвячена зовнішньоекономічним операціям, які впливають на економіку держави. Акцентним елементом у цій статті є роль логістики у структурі експорту та імпорту. У дослідженні розглядається організація та управління експортно-імпортними операціями, які сприяють економічному зростанню. Це відбувається завдяки оптимізації розподілу ресурсів та підвищенню ефективності торгівлі, важливе місце посідає сприяння міжнародній конкурентоспроможності.

Об'єктом дослідження є логістичні системи, які сприяють міжнародній торгівлі. Логістичні операції включають в себе транспортування, складування, митні процедури та управління ланцюгами поставок. Особлива увага приділяється взаємозв'язку між логістичною інфраструктурою та стратегічними цілями національної експортно-імпоротної діяльності, що підкреслює їх взаємозалежність у торгівлі.

Системний підхід для оцінки кооперації між елементами логістики та їх роль у експортно-імпортній системі дав змогу визначити ефективність зовнішньоекономічної діяльності економіки країни.

Результати дослідження демонструють рівень розвитку стратегічно керованих логістичних систем, які значно підвищують ефективність експортно-імпоротної діяльності. Вони знижують транзакційні витрати та мінімізують затримки в ланцюгу постачання. У дослідженні визначено ризики та загрози при реалізації зовнішньоекономічної діяльності. Було розглянуто критичні логістичні фактори, такі як, розширення спектру перевезень, діджиталізація та застосування сучасних технологій, які посилюють переваги експортно-імпортних операцій для національної економіки.

У результаті дослідження було виявлено, що логістичний сектор є не просто сервісною складовою торгівлі, а стратегічним драйвером та рушієм економічного розвитку. Інтеграція інноваційних технологій та модернізація інфраструктури пропонуються як необхідні заходи для збереження конкурентних переваг на світових ринках. Крім того, в дослідженні підкреслюється важливість політичної підтримки та міжнародного співробітництва в гармонізації логістичних стандартів і практик для розкриття повного потенціалу експортно-імпоротної діяльності.

Стаття розкриває логістику як сегмент економічного зростання, підкреслюючи її ключову роль у трансформації експортно-імпоротної діяльності на потужний чинник національного розвитку.

Ключові слова: експорт; імпорт; національна економіка; логістика; ланцюг постачання; транспортування; торгівля; економічний розвиток; цифровізація; міжнародне співробітництво.

Introduction. Economic relations under the influence of globalization face a number of new challenges and opportunities. Export and import operations are key elements in the

development of a country's economy. They expand markets for sales and cooperation, attract investments, and increase the competitiveness of countries in the world. The

exchange of technologies, including experience, contributes to the improvement of economic performance and international cooperation.

For foreign economic activity to function successfully, it is necessary to increase the efficiency of logistics processes, namely their timeliness and uninterrupted operation. Optimization of routes and deliveries makes it possible to reduce costs and increase benefits.

The relevance of the topic is driven by the growth of trade and the integration of the national economy into supply chains. Improving export and import operations is a strategic task to ensure economic stability. Digital technologies and innovations are opening up new prospects for development in the logistics sector.

The study of the impact of export and import activities on the country's economy is presented in many sources that serve as the basis for this study. They are based on the analysis of international trade, increasing the country's competitiveness and efficiency. In a global context, foreign economic activity is a crucial factor that determines a country's place in the international arena. The issue of the relationship between logistics infrastructure and economic potential in the context of specific national economies remains relevant for research.

The need for an integrated approach to the topic of national economies is due to the analysis of economic and logistics aspects. In this study, logistics is a factor in the success of foreign economic activity, which determines and suggests ways to optimize processes to improve the efficiency of international trade.

Research aims and objectives. The purpose of the study is to determine the role of export-import activities in the development of the national economy through the prism of logistics. The development of recommendations for optimizing logistics processes to improve the efficiency of international trade and ensure economic growth is also part of the goal of the study.

To implement the study of this issue, the following tasks were performed:

- The export-import activity as an element of economic development was analyzed;
- The main factors affecting the efficiency of foreign economic activity were identified;
- The relationship between logistics and the national economy was investigated;
- The economic indicators and potential of Ukraine are analyzed;
- The recommendations for improving logistics activities in national exports and imports are developed.

Results in material. Foreign economic activity of an enterprise (FEA) is a key indicator of the national economy. It determines the level of development of the state and its place among other countries. Export and import activities play an important role in the integration of the economy in a competitive market. Modern business conditions are impossible without logistics.

Export-import operations are undoubtedly one of the largest sources of finance. Foreign economic activity plays an important role in national development, especially in the field of logistics. It opens up new opportunities for improving and establishing economic stability. Despite its leading role, foreign economic activity must comply with regulations and international and national laws.

According to the Law of Ukraine "On Foreign Economic Activity", foreign economic activity is the activity of economic entities of Ukraine and foreign economic entities based on the relationship between them, which takes place both in Ukraine and abroad [1].

When studying the interdependence of foreign economic activity and logistics, it is advisable to distinguish between the key concepts of import and export.

Imports are defined as the importation of goods from abroad for future consumption. In the broadest sense, imports are the process of importing goods, services, technologies or capital from other countries for the purpose

of their sale, consumption or use in the domestic market [2].

Imports have a direct impact on the national economy, as labor employment and the trade balance depend on the volume of its production. The import of goods or services or technology into the country allows to satisfy the demand of the population for the product in short supply. Imports often bring in modern innovations and can accelerate the development of enterprises.

Exports are the process of exporting goods, services, or capital from one country to another for sale on foreign markets. Through this operation, you can get financial replenishment, increase revenues, take a place in the market and expand your sales area [4].

The advantage of this operation is that it creates new jobs and stimulates production. Exporting is an opportunity for a country to become an expert in creating a particular product or service in which it has significant advantages.

It should be noted that exports and imports drive the growth of a country's economic potential. Export and import operations provide access to goods, technologies, and raw materials. The wider the sales of products, the larger the zone of influence. Thanks to healthy competition, manufacturers advance far in technology and can create new innovative products.

Export and import activities help to create international ties and establish contacts. It opens up access to many opportunities and defines a country among others. Since foreign economic activity is based on the interaction of partners of different levels, it should be governed by state and international regulations [5].

The existence of national legal regulations and their alignment with trade standards determine the country's export and import activities. The more the legal framework governing foreign trade is aligned with international standards, the less national restrictions affect the formation of strategic

decisions in the field of exports and imports [6].

Foreign economic activity includes international trade, the movement of financial and material resources, the introduction of new technologies, and the implementation of joint projects. Labor movement and migration are also elements of foreign economic activity [9].

The development of export and import activities enables a balanced foreign trade balance, thereby creating macroeconomic stability. Exports support the inflow of foreign currency, which can then be used for financing, foreign investment, or debt repayment.

To effectively tap into the potential of exports and imports, favorable conditions are essential, including legislation, developed infrastructure, and government support for enterprises when entering international markets.

Export and import activities, despite their great opportunities, carry certain risks, such as dependence on external conditions, currency fluctuations, trade barriers and political instability. As a result, the national economy is subject to rapidly changing conditions, including competition, changes in demand in foreign markets and regulatory restrictions.

Factors influencing the development of foreign economic activity can be divided into external and internal. External factors are caused by the political situation, customs regulation, and legislation in general. These elements determine the stability and sustainability of economic development and affect profitability.

The technological process determines the innovativeness and novelty of export and import activities, and therefore is the component that develops the process.

Internal factors include the level of infrastructure development and the quality and competitiveness of products. These elements are crucial because they assess the market demand. A well-developed supply chain is a favorable indicator for doing business, and meeting the requirements of

consumption helps to increase economic performance.

The diversity of natural resources, climatic conditions, location of countries, scientific and technological progress, and social development has led to the emergence of the international division of labor. That is why the establishment of foreign economic relations is necessary to maintain trade and political relations between countries.

The international division of labor is a social indicator of the division of labor between countries and their specializations. The basis of the ILD is the production of goods or their components to obtain the final product for national consumption [7].

The national economy and logistics are directly related to each other, as logistics ensures the constant movement of goods or services and affects economic performance. This connection can be maintained in various aspects, for example, in providing jobs. Logistics supports working capital by providing jobs in transportation and warehousing services, while economists analyze the results achieved.

The other side could be infrastructure that is expanded and updated every year, thereby stimulating other industries to innovate. It can also include attracting investments that help create jobs and maintain economic performance.

Foreign economic activity primarily encourages the national economy to expand its sales market, which implies an increase in the share of logistics. For the country, this means ensuring reliable highways and logistics facilities that will be responsible for the uninterrupted and systematic supply. Substandard logistics delays transportation and weakens economic relations [12].

The development of international trade is one of the indicators of cooperation between logistics and the economy. Integration into global markets facilitates the export and import of products or services, thereby increasing productivity and output.

In order to achieve an increase in economic potential, foreign trade must fulfill

certain tasks. For this purpose, it is necessary to cooperate closely with foreign partners and look for foreign markets for the sale of products or services. The development of scientific and technological progress has a major impact on the economy and its establishment. The introduction of innovations into activities is a key factor in the introduction of export-import operations today.

The expansion of export-import relations is stimulated by the development of infrastructure, as it is one of the most important aspects for fast transportation, including in the international arena. This, of course, means not only the renovation of roads and ports, but also the modernization of digital automated systems that manage logistics activities [10].

It should be noted that foreign economic activity ensures the development of human resources by providing jobs. The specifics of this area require highly qualified employees with a sufficient number of professional and personal qualities. Therefore, the improvement of a person in the private and work aspect can be formed under the influence of modern requirements.

As a result, export-import operations have a multifaceted impact on logistics. They stimulate modernization, optimization and creation of new development opportunities.

Logistics is a fundamental component for achieving the objectives of foreign economic activity, as it ensures not only the physical movement of goods but also optimizes processes. Well-established supply chains minimize costs and contribute to economic stability. An efficiently organized logistics infrastructure allows countries to be competitive in the global economy.

Under the influence of Russia's full-scale invasion of Ukraine and the desire to weaken export and import activities with the aggressor country, the country is strengthening cooperation with foreign countries to gain a foothold in the European market. Despite this economic direction, due to the war, changes in the map, and

difficulties with supply chains, export and import operations are experiencing negative indicators [8].

The economic potential of a country is determined by its economic endowment, domestic resources, and activities in the global economic system. Trade turnover is considered to be a certain number of products that move within the framework of international export and import operations. The foreign trade balance is the ratio of the price of exports and imports over a certain period of time, usually a year [11].

In 2020-2023, Ukraine faced significant changes in export and import flows, which is reflected in significant fluctuations in the trade balance and the impact on GDP.

Starting in 2022, due to the war and other economic factors, exports declined while imports increased significantly, leading to a sharp increase in the trade deficit and -16.8% of GDP. In 2023, exports recovered slightly, but imports grew even more, resulting in -20.9% of GDP.

An important point is the increase in exports in 2023 compared to 2022. At the same time, according to official data, Ukraine's GDP grew to 3.7% in the first half of 2024, with imports of goods amounting to \$33.2 billion and exports of \$19.5 billion.

Economic development depends on the structure of merchandise exports. Under the influence of various socio-political factors, this data can change significantly and have a significant effect on the foreign trade balance.

To increase the country's competitiveness, it is necessary to improve and optimize logistics activities in exports and imports. To do this, a number of measures should be taken to increase the efficiency of cooperation between logistics and the economy.

First of all, it would be useful to integrate national and international routes and transits, which would speed up the transportation process. Modernization of roads, railways, and in the future airports will lead to shorter travel times and lower costs.

The introduction of digital technologies would ensure a smooth and automated process, while using less human capital. The use of artificial intelligence can be used to create automatically customized alerts, i.e., sending out messages. Blockchain technologies can be the technology that will enable transparent transactions with high security.

Since logistics is an element of the national economy, it is necessary to create information and advisory centers to help exporters and importers plan logistics processes. Government subsidies also play an important role, especially for small and medium-sized enterprises.

The development of green logistics has become increasingly popular in recent years and is taking a leading position in the transportation industry. The use of environmentally friendly vehicles helps to reduce CO2 emissions. In addition, customs clearance of such vehicles is free of charge, which helps to reduce costs.

The importance of exports and imports in logistics operations lies in the transportation of products, resources, and other services in the foreign and domestic markets for further use. Logistics forms the interaction of national and international economies in this chain, acting as an intermediary and regulating foreign economic relations [3].

Conclusions. Exports and imports are the main elements of the state economy. Their activities depend on the development of logistics chains, regulatory documents, and technology integration. To increase the country's competitiveness, it is important to optimize and update logistics routes and to use digital technologies.

The factor of internal and external stimuli remains important, so it is necessary to follow current trends. The introduction of "green logistics" and support for small and medium-sized enterprises through government subsidies will contribute to sustainable economic development.

The constant movement and promotion of export and import operations ensures

economic stability, investment attraction, and the integration of the national economy into international markets. To expand its foreign economic activity, Ukraine should focus on improving its logistics sector.

Thus, export-import activities in conjunction with logistics remain an important tool for economic growth, facilitating the country's integration into the global economic system and ensuring its sustainable development.

References

1. About foreign economic activity: Law of Ukraine dated 03.09.2024 - №959-XII URL: <http://zakon4.rada.gov.ua/laws/show/959-12>. (accessed on September 10, 2024).
2. Elizarov, Y.F. Economics of organizations: a textbook for universities / Y.F. Elizarov. Publishing house "Exam", 2014. 496 p.
3. Garneriwalla A. Three paths to advantage with digital supply chains A.Garniewalla The Boston Consulting Group. 2016. P. 4.
4. Grebelnyk O.P. Fundamentals of foreign economic activity: Textbook / O.P. Grebelnyk. Kyiv: TsUL, 2008. 432 c.
5. Katsma, V.I. The essence and role of logistics management in the enterprise management system / V.I. Katsma // Economic analysis. 2016. Vol. 23, No2. C. 60-65. URL: http://nbuv.gov.ua/UJRN/ecan_2016_23%282%29__10
6. Krasilich I.O. Development of export-import activity of machine-building enterprises: PhD in Economics, specialty 08.00.04. Lviv, 2017. 227p.
7. Logistics. Global logistics and supply chain management: methodological recommendations for the implementation of qualification work / compiled by Smerichevska SV, Hrytsenko SI, Molchanova KM, Semeryagina MM K.: NAU, 2024. 48 p.
8. Luchnikova T.P., Tarnovska I.V., Vorobyov E.V. Adaptation of transport enterprises of Ukraine to the conditions of martial law. Business Inform. 2023. No1. C. 116-122. <https://doi.org/10.32983/2222-4459-2023-1-116-122>
9. Mishchenko D.A., Mishchenko L.O. Theoretical foundations of the mechanism of state regulation of foreign economic activity in Ukraine. Public administration: improvement and development. 2021. No. 2. URL: <http://www.dy.nayka.com.ua/?op=1&z=1965>
10. Polyanska AS, Martynets VB, Kaban OV Optimization of the supply chain at the enterprise in the conditions of crisis, Ivano-Frankivsk 2022, 114-117. URL: <http://lib.pnu.edu.ua:8080/bitstream/123456789/12635/1/6083-Article%20Text-17004-1-10-20220629.pdf>
11. Radzievska S.O. Global economy: lecture notes for students of economic specialties of all forms of education / S.O. Radzievska. K.: SIK GROUP UKRAINE, 2015. 344 p.
12. Tkachova O. Efficiency of public administration: concepts and approaches to evaluation / O. Tkachova // Bulletin of the National Academy of Public Administration. 2015. P. 30-37.

UDC 338.45

DOI: <https://doi.org/10.46783/smart-scm/2024-28-3>

JEL Classification: M11, O14, O21.

Received: 20 November 2024

Davydenko V.V. PhD (Economics), Associate Professor, Associate Professor of Logistics Department National Aviation University (Ukraine)

ORCID – 0000-0002-8419-4636

Researcher ID –

Scopus author id: –

E-Mail: viold@ukr.net

Suvorova I.M. PhD (Economics), Associate Professor, Associate Professor of Logistics Department National Aviation University (Ukraine)

ORCID – 0009-0009-3271-6242

Researcher ID –

Scopus author id: –

E-Mail: irina_suvorova@ukr.net

QUALITY SUPPORT OF AN INNOVATION-ORIENTED ENTERPRISE

Volodimir Davydenko, Irina Suvorova. «*Quality support of an innovation-oriented enterprise*».

The article is devoted to the quality support of innovation-oriented enterprises. The article describes theoretical and practical aspects of the development of innovation-oriented enterprises. The classical approaches to the management of innovation-oriented enterprises are highlighted. The methods of managing innovation-oriented enterprises are analyzed. Extended explanations of the methods of managing innovation-oriented enterprises are provided. The main reasons that lead to resource losses are considered. An analysis of the basic tools and methods that can be used in the implementation of quality management of innovation-oriented enterprises is carried out. The possibilities of obtaining benefits from the introduction of new and advanced quality assurance technologies that work to increase competitiveness are considered. The tools based on the innovative type of development of industrial enterprises are considered. The main areas of improvement in the management system of innovation-oriented enterprises are identified. Critical aspects in the management system of innovation-oriented enterprises have been identified. The possibilities of using modern methods of management of innovation-oriented enterprises are analyzed. The classical models of management of innovation-oriented enterprises are specified. The main advantages of using the methods of management of innovation-oriented enterprises are proposed. Recommendations for further research in the field of management of innovation-oriented enterprises have been provided.

Keywords: innovative development, innovation-oriented enterprises, quality, quality assurance, reengineering, quality management methods

Володимир Давиденко, Ірина Суворова. «*Підтримка якості інноваційно-орієнтованого підприємства*». Стаття присвячена якійсь підтримці інноваційно-орієнтованим підприємствам. У статті викладені теоретичні і практичні аспекти напрямки розвитку інноваційно-орієнтованих підприємств. Висвітлено класичні підходи до управління інноваційно-орієнтованими

підприємствами. Проаналізовані методи управління інноваційно-орієнтованими підприємствами. Надані розширені пояснення щодо методів управління інноваційно-орієнтованими підприємствами. Розглянуто основні причини, які призводять до виникнення ресурсних втрат. Проведено аналіз базових інструментів та методів, які можуть бути застосовані при запровадженні якісного управління інноваційно-орієнтованими підприємствами. Розглянуто можливості отримання переваг від запровадження нових та прогресивних технологій забезпечення якості, що працюють на підвищення конкурентоспроможності. Розглядається інструменти, які базуються на інноваційному типі розвитку промислових підприємств. Визначаються основні напрямки вдосконалення в системі управління інноваційно-орієнтованими підприємствами. Були визначені критичні аспекти в системі управління інноваційно-орієнтованими підприємствами. Проаналізовано можливості використання сучасних методів управління інноваційно-орієнтованими підприємствами. Зазначені класичні моделі управління інноваційно-орієнтованими підприємствами. Запропоновані основні переваги від застосування методів управління інноваційно-орієнтованими підприємствами. Надано рекомендації подальших досліджень в області управління інноваційно-орієнтованими підприємствами.

Ключові слова: інноваційний розвиток, інноваційно-орієнтовані підприємства, якість, забезпечення якості, реінжиніринг, методи управління якістю.

Introduction. In today's conditions of accelerating scientific and technological progress and the desire of countries to increase their influence on the global distribution of market niches, the study of quality assurance opportunities in innovation-oriented enterprises is of particular relevance and importance.

The innovation potential of an enterprise is a set of various resources necessary and sufficient to carry out the required scale of innovation activity with the specified criteria of its effectiveness. For this purpose, qualitatively heterogeneous elements of the innovation potential should be organized as independent subsystems and adapted to the structure of a more complex enterprise system.

The direction of innovative development of an enterprise is a certain path or movement based on the introduction and implementation of innovations that lead to an improvement in the quantitative and qualitative characteristics of the enterprise, ensure the strengthening of its market position and create conditions for progressive development [3].

It is extremely important to realize the importance of the transition to a qualitative innovation breakthrough by an enterprise.

Insufficient attention to stimulating the innovation activity of industrial enterprises has led to Ukraine's sharpest lagging behind the global level of development of advanced countries, including low welfare of the population.

A special and distinctive feature of innovation-oriented enterprises is the extreme dynamism of their external environment. The processes taking place in the external environment of innovation-oriented enterprises are not only non-deterministic, but the factors determining the dynamism and variability of the external environment of enterprises are also increasing.

Analysis of recent research and publications. G. Azgaldov, G. Bagiev, B. Berman, B. Burkinsky, M. Gerasymchuk, A. Glichev, P. Zavyalov, J. Petrovich, E. Reichman, and others have had a significant impact on the modern theory and practice of quality assurance. The activities of innovation-oriented enterprises have been studied by foreign and Ukrainian scholars: J. Bailey, I. Blank, V. Geets, V. Hryneva, V. P., S. Ilyashenko, G. Kozachenko, Fedulova, O. Yastremska and others.

Identification of previously unresolved parts of the overall problem. Modern

quality management theories are based on the idea of satisfying the needs and expectations of a particular consumer. In fact, the concept of "quality" refers not only to the product, but also to quality assurance in general. The quality object is understood as [4]:

- an activity or process;
- product, which in turn can be tangible or intangible, or a combination of both;
- organization, system or individual;
- any combination of them.

A qualitative approach to the management of innovation-oriented enterprises involves the study of current actions to achieve the desired goals in the future.

The main external and internal factors that hinder the development of innovation potential include [3]

- uncertain state policy in the field of innovation development;
- lack of financial assistance to innovation-oriented enterprises;
- high wear and tear of technological equipment, lack of a modern production base for development;
- lack of specialists in the field of innovation implementation capable of managing innovation activities at the level of quality assurance;
- lack of an effective organizational and management mechanism for the development of innovation activities, no methodology for managing innovation potential;
- inconsistency of the business model of the enterprise with the chosen innovation strategy;

- lack of a model of cooperation with other enterprises engaged in innovation and research centers;

- the existence of the "phenomenon of resistance to innovation" on the part of both the management of enterprises and functional executives;

- lack of coherence between the innovation strategy and the culture that supports innovation.

Summary of the main research material. Quality assurance is carried out using the main modern methods and tools, in particular, the following:

- Business Process Reengineering (BPR);
- TIPS - the theory of inventive problem solving;
- Innovation and technology policy of the enterprise;
- Just in time method;
- Balanced Scorecard (BSC);
- ABC/ABM methodology.

Reengineering is a fundamental rethinking and radical redesign of business processes to achieve significant improvements in such key performance indicators for modern business as costs, quality, customer service and efficiency [1].

Business process reengineering (BPR) is necessary to achieve strategic goals and bring the organizational structure in line with the organization's development strategy. Business processes are the standards of operations on which the correction of the organizational and functional model is based, and policies and procedures for personnel activities are prescribed (Fig. 1).

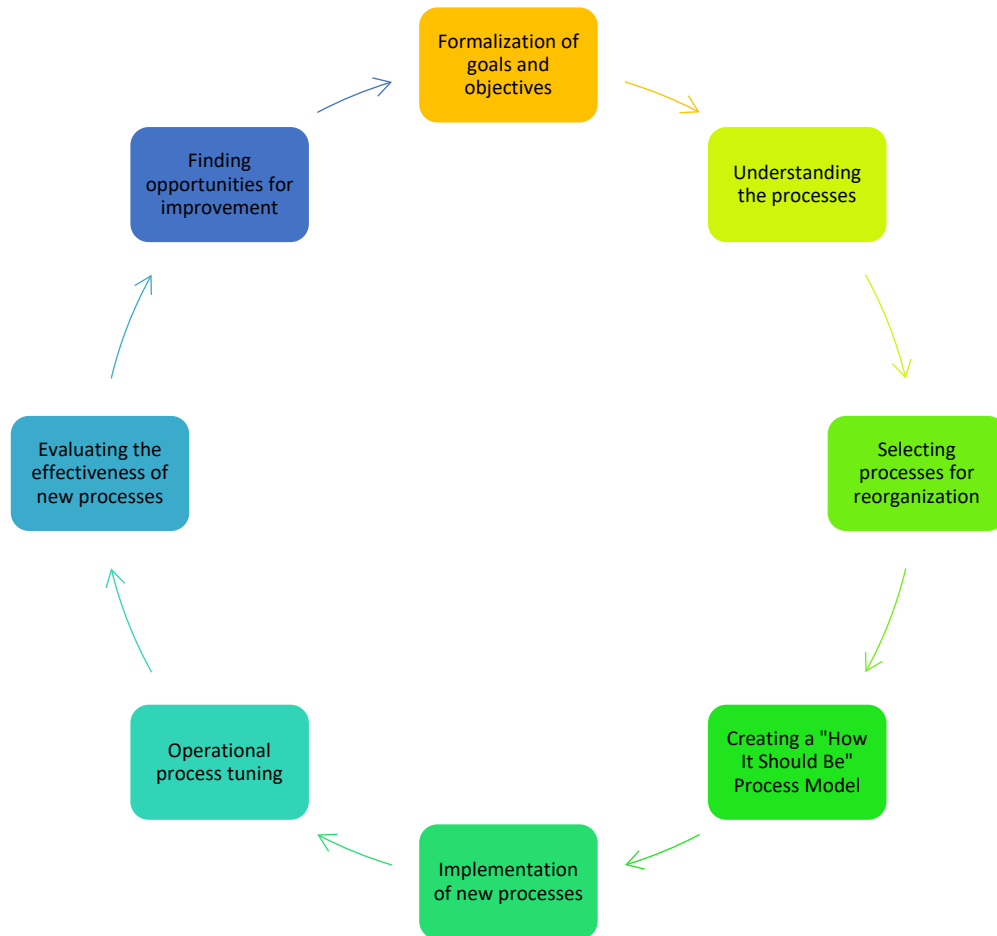


Figure 1. Business process reengineering

The object of change in reengineering is business processes. This is the main difference between reengineering and restructuring, for example, where the object of change is the organizational structure. Reengineering technologies are based on the fact that business processes are primary, and the company's organizational structure is secondary and is only a means of executing processes. Therefore, improving the company's operations should start with improving business processes, not the organizational structure. After reengineering, the company's work should be process-oriented, and the company's management model should use a process approach, which should be reflected in the organization's organizational structure.

In BPR, new goals and methods have been brought to the forefront, which are

dictated by the situation of increased competition: reducing the time spent on performing functions, reducing the number of staff and other costs of performing functions, working with clients and partners anywhere in the world, working with the client in the 24*365 mode, increasing staff mobility, fully meeting client needs, and introducing new technologies [1].

To ensure the effective operation of BPR, TIPS is sometimes used in conjunction with it. The Theory of Inventive Problem Solving (TIPS) is designed to solve inventive problems and form inventive thinking. Inventive thinking is a systemic thinking that identifies and resolves contradictions that lie in the depths of a complex problem (inventive problem) (Fig. 2).

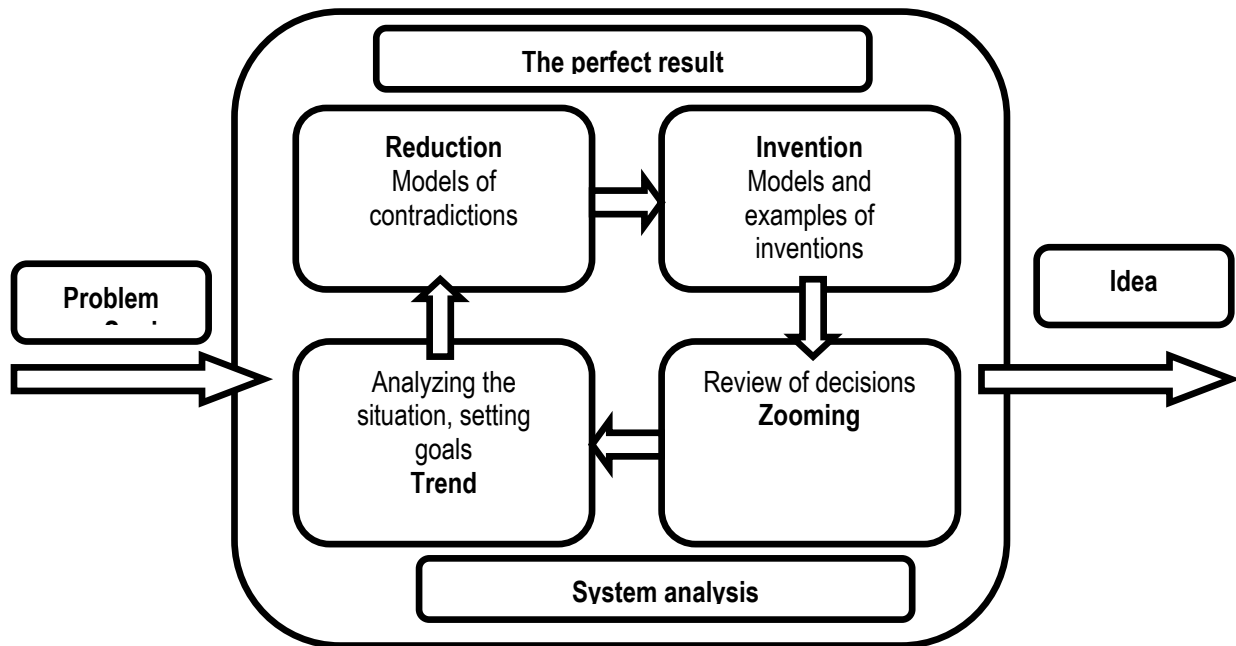


Figure 2 – The theory of inventive problem solving

TIPS allows not only to solve complex inventive problems, but also to predict the development of systems (including technical ones) and develop creative thinking [6]:

- Stage. At the first stage, the problem is diagnosed, the causes of the problem are investigated, and the goal and direction of the problem are outlined.

- Reduction. A model of the problem is built, its adaptation to a simpler format, in the form of a standard or radical contradiction.

- Invention. Creativity and professional knowledge are involved. Standard models of transformation of the initial situation are used in order to eliminate contradictions and obtain an "ideal" result.

- Zooming. Consideration of a new idea on a new scale and in a diverse systemic environment

TIPS functions [5]:

- solving creative and inventive tasks of any complexity and direction without going through the options;

- solving scientific and research problems;

- identification and elimination of the causes of defects and emergencies;

- maximizing the efficient use of resources and equipment to solve problems;

- forecasting the development of technical systems, their objective assessment and obtaining promising solutions;

- systematization of knowledge in any field of activity, which allows for more efficient use and development on a fundamentally new basis;

- development of creative imagination and thinking, qualities of a creative personality and creative teams.

Another quality assurance tool is the company's innovation and technology policy. The company's innovation and technology policy is mainly aimed at achieving strategic goals in the field of ensuring the competitiveness of its products, technologies, production and other facilities. Without an innovation and technology policy, an enterprise would not be able to survive in the current environment, when the competitiveness of the enterprise and its products are the most important factors of its activities and economic sustainability (Fig. 3).

At all levels of enterprise management, the main goal is to achieve sustainable development of its economy, which is characterized by an increase in key statistical indicators and final indicators in certain amounts and in the optimal ratio between them.

The sustainable state of an enterprise is its state in which the enterprise is able to maintain profit at a given level. A given level

of profit should ensure the constant development of the enterprise over time.



Figure 3 – Innovation and technical policy of the enterprise

Economic sustainability can be defined as ensuring that an enterprise is able to conduct profitable production and innovation activities by improving the efficiency of production resources and enterprise management, a stable financial position by improving the asset structure, as well as stable development of the enterprise's capacity and social development of the team through self-financing. It is the ability of an enterprise to withstand the threat of bankruptcy. The economic sustainability of an enterprise is determined by the level of its economic potential, which depends on the implementation of a number of strategic conditions.

Sustainable development of an enterprise is directly related to the sustainability of individual elements of the system of socio-economic development of an enterprise, which largely depends on the innovation and technical policy of the enterprise. It is the innovation and technical policy of an enterprise that determines the reaction of the enterprise management

system to changes in the external environment in order to prevent the collapse of the managed system and the parameters of its functioning going beyond certain limits. At the same time, an enterprise is a dynamic system capable of changing under the influence of the external environment. The economic sustainability of an enterprise depends on its internal capabilities to effectively use all the resources at its disposal. A properly developed innovation and technical policy of the enterprise determines the main resources of the enterprise, and therefore its economic sustainability.

The innovation and technical policy of an enterprise is a system of strategic measures carried out by the management of the enterprise in the field of product quality improvement, resource saving, organizational and technical development of production as components of the management system [3].

Innovation and technical policy is a part of the overall strategy, which provides for a clearer planning of actions and steps to be

taken to implement this strategy at the level of production processes [3].

The stages of development and implementation of the innovation and technology policy of the enterprise include [3]

- conducting marketing research to determine the level of competitiveness of manufactured goods and developing strategic measures to achieve the competitiveness of goods in the future;

- development of the company's strategy, which includes the ideology of innovation and technology policy;

- conducting research and development work to create competitive goods;

- organizational and technological preparation for the production of new goods;

- production and sale of new goods of the enterprise.

Resource saving is considered an important factor in innovation and technology policy. Resource saving methods include technological processes, organizational and economic methods of saving resource consumption. Resource saving methods are implemented through organizational and technical measures.

Resource saving strategies at the enterprise can be the following [3]: simplification of the structure, principle of operation of the product; interspecies and intraspecies unification of the components of the product; improvement of the manufacturability of the product design; organizational and technical development of production, etc.

Just-in-time is a concept of management of manufacturing enterprises. "Just-in-time" (JIT) is a production philosophy aimed at continuous improvement and based on the systematic elimination of all unnecessary things, i.e., everything that leads to an increase in the cost of products without increasing their consumer value [4]. In a narrow sense, it is the supply of the necessary materials to the right place at the right time, which implies a high degree of synchronization of production operations.

To achieve the main goal within the ideology of cost reduction, three auxiliary goals must be achieved [4]:

1. Volume management. Production volume planning - both monthly and daily - must be flexible to respond to fluctuations in demand.

2. Quality management. A system must be in place to guarantee defect-free products at every stage of production. To ensure product quality, the JIT system involves the implementation of a total quality control system or TQM.

3. Respect for employees. It is impossible to achieve high productivity (as well as cost reduction) if the company does not effectively develop the talents and skills of employees, does not encourage their enthusiasm and does not respect them.

JIT is a philosophy of effective management, the main principles of which include the following [4]:

- any unnecessary actions that increase the cost of production but do not increase its consumer value should be eliminated;

- "Just-in-time" is not a fixed result, but a continuous process that never stops, and involves certain steps and boundaries;

- Inventories are unnecessary, their reduction increases the efficiency of the enterprise;

- the main factors that determine product development and production are customer preferences. This is the trend of continuously bringing the properties of the final product closer to the needs of consumers;

- flexibility of production, which includes a quick response to customer requests, as well as changes in qualitative and quantitative parameters, is extremely important for maintaining high quality and reasonable prices for products;

- principles of mutual respect and support should prevail both within the organization and in relations with suppliers and customers;

- an employee who is well versed in his or her role is the best resource for ensuring

the process of continuous improvement. In other words, not only the hands of employees should be used, but also their brains.

Thus, JIT is not only a way to minimize inventory, but also a system of product quality management and employee management, which also improves coordination and increases the efficiency of the enterprise.

In order to be able to constantly adapt to changing market conditions better than their competitors, to outperform them in terms of quality, speed and flexibility of service provision, product range or price, company executives need to receive prompt information about the company's activities to make timely management decisions. The conceptual and technological link between the strategy and the organizational solutions used is of great importance.

The Balanced Scorecard (BSC) ensures the integration of financial and non-financial indicators, taking into account the cause-and-effect relationships between the resulting indicators and the factors under which they are formed. This allows for detailed monitoring of the company's activities in a strategic focus, increasing the efficiency and effectiveness of management decisions, controlling the most important financial and non-financial performance indicators, that are targeted for the company and the degree of achievement of which determines the company's movement in accordance with a given strategy.

The Balanced Scorecard translates the mission and overall strategy of an organization into a system of interrelated goals and indicators, since, according to the developers of the system, management is essentially the translation of strategy into measurable goals.

When applying the balanced scorecard, the strategy is usually broken down into four aspects [5]:

- financial aspect;
- aspect of customer relations;
- the aspect of organizing internal business processes;
- training and development aspect.

A balanced scorecard allows you to control the company's activities, signals emerging problems, combines strategic and operational management, and reflects the main financial and non-financial performance indicators of the company. Performance indicators are necessary to measure the degree of achievement of strategic goals based on the company's strategy, as well as to calculate the efficiency of personnel, the effectiveness of business processes, etc.

The difference between the balanced scorecard and other management systems is as follows [5]:

- it manages not only financial indicators, but also non-financial ones;
- it is a system of management by means of indicators, not a system of measuring indicators;
- manages the company by combining all processes together;
- it is a management system not only for the company's managers, but also for all employees.

It is believed that more advanced business processes provide the most significant and easily sustained benefits than products. It is much more difficult for competitors to copy them than product ideas. The use of ABC, an operationally oriented alternative to traditional financial approaches, allows us to emphasize the close connection between the organization of processes and financial results of the business. This highlights possible ways to improve the organization's financial performance through improved operations. In addition, it allows you to respond flexibly to a variety of orders - to satisfy them quickly and at an affordable price.

The result of applying the ABC methodology is an accurate determination of the profitability of a product, service or organizational unit, which allows you to make the right decisions in the future. The total cost of each function is the sum of individual cost elements; functions can form a hierarchical structure and be grouped into functional centers. Together, these objects and the

relationships between them form the ABC / ABM model. The total cost of each function is transferred to value objects using functional

factors. A functional factor is a measure of the use of a given function by a cost object (Fig. 4).

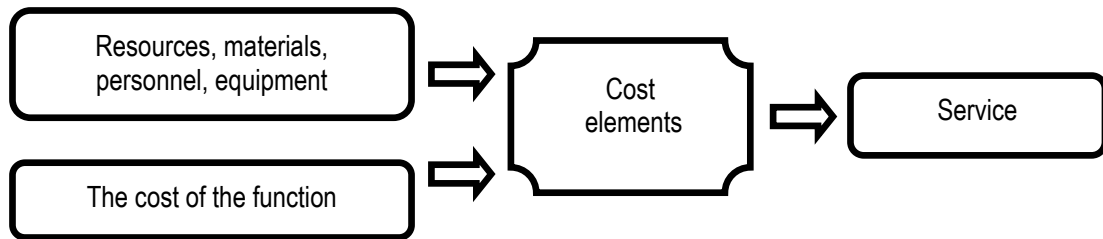


Figure 4 – Model ABC/ABM

The result of applying the ABC methodology is an accurate determination of the profitability of a product, service or organizational unit, which allows you to make the right decisions in the future. The total cost of each function is the sum of individual cost elements; functions can form a hierarchical structure and be grouped into functional centers. Together, these objects and the relationships between them form the ABC / ABM model. The total cost of each function is transferred to value objects using functional

factors. A functional factor is a measure of the use of a given function by a cost object.

A prominent place among these methods is occupied by statistical methods in the quality management system. As a rule, they are widely used in the process of quality control in production. However, in modern conditions, the scope of their use has significantly expanded to the areas of planning, design, marketing, logistics, etc.

Table 1 – Statistical methods in the quality management system

Areas of work	Characteristics	Methods
Functional and cost analysis	Calculation of the real value of an object (product, service, technology, organization) based on the analysis of its functions at different stages of the life cycle; identification of cost centers; analysis of cost factors and performance indicators of business processes.	VA, ABB, ABC, ABM, ARP
Functional and structural modeling	Description of business processes in the form of a system of interconnected functions, definition of performance indicators.	SADT, IDEF0, DFD
Information modeling	Description of the system in terms of objects; description of the information structure of objects; identification of relationships between objects.	IDEF1X, ERD
Analysis of business organization	Determining the mission, hierarchy of goals, business principles; analyzing processes from the perspective of quality management; evaluating the effectiveness of business processes; specifying requirements for an information support system.	BPR, TQM, STD, CPI, BPI, Benchmarking
Simulation modeling	Modeling the behavior of an enterprise (enterprise model) in different conditions; analysis of critical operating modes; analysis of dynamic characteristics of business processes; analysis of resource allocation.	CPN, STD, IDEF3

Conclusions. It is worth noting that the presented list of modern methods and tools of quality management is not exhaustive and

can be supplemented and expanded in the process of analyzing the experience of modern innovation-oriented enterprises.

Quality improvement as one of the tasks in the enterprise quality system is a continuous management activity of the enterprise aimed at improving the technical level of products, the quality of their manufacture, improvement of production elements and the enterprise quality system itself. In a competitive market, an enterprise is interested in obtaining results that are better than the initially established standards. Ensuring the optimal functioning of the

company's quality system is the basis of its competitiveness.

In order to meet the ever-changing needs of customers and respond to the actions of competitors who also want to meet them, competing organizations must solve a new problem. They must constantly collect information about changes in customer needs, strategies and tactics of competing firms, as well as changes in their resources, technological capabilities and capacities.

References

1. Competitiveness of the enterprise: assessment of the level and directions of increase: [monograph / edited by O.G. Yankovyi] - Odesa: Atlant, 2013. 470 p.
2. Innovative development of the economy: model, management system, state policy / Y.M. Bazhal, L.I. Fedulova, V.P. Aleksandrova and others; ed. by L.I. Fedulova, NAS of Ukraine; Institute of Economic Forecasting - Kyiv: Osnova, 2005.
3. Mykytyuk P.P., Krysko Z.L., Ovsyanyuk-Berdadina O.F., Skochylyas S.M. Innovative development of the enterprise. Ternopil: Printer Inform, 2015. 224 p.
4. Jeffrey K. Liker. Toyota Philosophy. 14 principles of a well-coordinated team. <https://www.maxzosim.com/filosofia-toyota-14-printsipiv-roboti-zlaghodzhienoyi-komandi-dzhiefri-k-laikier/>.
5. Managerial diagnostics: a course of lectures for full-time and part-time students / Compiled by: S.O. Zaika - Kharkiv: DBTU [b.v.], 2023 - 270 p.

UDC 338.57

DOI: <https://doi.org/10.46783/smart-scm/2024-28-4>

JEL Classification: G12, G17, H80.

Received: 04 December 2024

Kobets I. K. Bachelor's student of the Institute of Aerospace Technologies, National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute" (Ukraine)

ORCID – 0009-0003-4261-7949

Researcher ID –

Scopus author id: –

E-Mail: gold.ferarris@gmail.com

Kulyk S. V. Bachelor's student of the Institute of Aerospace Technologies, National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute" (Ukraine)

ORCID – 0009-0007-3045-2103

Researcher ID –

Scopus author id: –

E-Mail: sofy080604@gmail.com

Boiarynova K. O. Doctor of Economic Sciences, Professor, Professor of the Department of Economic Cybernetics, National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute" (Ukraine)

ORCID – 0000-0001-5879-2213

Researcher ID –

Scopus author id: –

E-Mail: boyarinovaea@ukr.net

Rochshyna N. V. PhD in Economics, Associate Professor, Associate Professor of the Department of Economic Cybernetics, National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute" (Ukraine)

ORCID – 0000-0003-2035-8846

Researcher ID –

Scopus author id: –

E-Mail: 2203883@ukr.net

ECONOMIC ANALYSIS OF AIRLINE PRICING: RETROSPECTIVE ANALYSIS AND CURRENT STATE

Illia Kobets, Sofiia Kulyk, Kateryna Boiarynova, Nadiia Rochshyna. «*Economic analysis of airline pricing: retrospective analysis and current state*». The article provides an in-depth analysis of airline ticket pricing, tracing its historical evolution and exploring current trends. The article provides a detailed description of the structure and components of airline ticket pricing, as well as the impact of factors on this process. The research examines the development of airline pricing from the early 20th century, when aviation was a luxury reserved for the wealthy, to its current state as a competitive and affordable industry. Key historical milestones

are discussed, including the introduction of computerised reservation systems in the 1960s, the US Airline Deregulation Act of 1978, and the emergence of low-cost airlines in the 1980s and 1990s. These developments have led to fundamental shifts in the pricing of airline tickets, which made it possible to transform the aviation landscape by reducing fares and expanding access to air travel. At the same time, the article discusses economic and technological factors that influence airfare changes, such as deregulation, fuel costs, global crises and consumer demand. The article analyses dynamic pricing strategies supported by sophisticated modern airline pricing algorithms, which allow carriers to adjust fares in real time in line with market conditions. The study also highlights important events that have influenced pricing trends, such as the 2008 financial crisis and the COVID-19 pandemic, showing how airlines have quickly adapted to economic shocks by adjusting their pricing structures. In addition, the study delves into the speed and frequency of price fluctuations, highlighting airlines' responses to real-time data and global changes. The implications of these price dynamics are assessed, identifying their impact on industry profitability, passenger accessibility and other economic consequences. Airlines benefit from revenue optimisation through dynamic pricing, while passengers face challenges in navigating variable fares. Thus, the results of the study, namely the economic analysis of airline pricing, provide an opportunity to identify the complex interaction of factors that shape airline prices. The results highlight how technological advances, competitive pressures and changes in consumer behaviour continue to redefine the airline market, offering valuable insights into the factors driving the evolution of airline affordability.

Keywords: airline ticket prices, dynamic pricing, airline deregulation, demand fluctuations, fuel costs, technological advancements, pricing algorithms, airline competition

Ілля Кобець, Софія Кулик, Катерина Бояринова, Надія Рощина. «Економічна аналітика ціноутворення авіаперевезень: ретроспективний аналіз та сучасний стан». Представлена стаття містить глибокий аналіз формування цін на авіаквитки, простежуючи їхню історичну еволюцію та досліджуючи сучасні тенденції. У статті розглянуто детальний опис структури та складових ціноутворення на авіаквитки, вплив чинників на означений процес. Дослідження вивчає розвиток ціноутворення на авіаквитки з початку 20-го століття, коли авіація була розкішшю, зарезервованою для заможних людей, до її нинішнього стану як конкурентоспроможної та доступної галузі. Обговорюються ключові історичні віхи, включаючи впровадження комп'ютеризованих систем бронювання у 1960-х роках, Закон США про дерегуляцію авіакомпаній від 1978 року та появу лоукостерів у 1980-х і 1990-х роках. Наведені події визначили кардинальні зрушення процесу формування цін на авіаквитки, що надало можливість трансформувати авіаційний ландшафт за рахунок зниження тарифів і розширення доступу до авіаперевезень. Поряд з цим, у статті розглядаються економічні та технологічні фактори, що впливають на зміну цін на авіаквитки, такі як дерегуляція, вартість палива, глобальні кризи та споживчий попит. Аналізуються стратегії динамічного ціноутворення, які підтримуються складними алгоритмами сучасного ціноутворення в авіакомпаніях, що дозволяє перевізникам коригувати тарифи в режимі реального часу відповідно до ринкових умов. У дослідженні також висвітлюються важливі події, що вплинули на цінові тенденції, такі як фінансова криза 2008 року та пандемія COVID-19, показуючи, як авіакомпанії швидко адаптувалися до економічних потрясінь шляхом коригування структури ціноутворення. Крім того, дослідження заглиблюється у швидкість та частоту цінових коливань, підкреслюючи реакцію авіакомпаній на дані в режимі реального часу та глобальні зміни. Оцінюються наслідки такої цінової динаміки, виявляючи її вплив на прибутковість галузі, доступність для пасажирів та інші економічні наслідки. Авіакомпанії отримують вигоду від оптимізації доходів завдяки динамічному ціноутворенню, тоді як пасажирів стикаються з проблемами, намагаючись зорієнтуватися у змінних тарифах. Отже, представлені результати дослідження, а саме проведена економічна аналітика ціноутворення авіаперевезень, надають можливість визначити складну взаємодію

факторів, що формують ціни на авіаквитки. Результати підкреслюють, як технологічний прогрес, конкурентний тиск і зміни в поведінці споживачів продовжують переосмислювати ринок авіаперевезень, пропонуючи цінну інформацію про чинники, що визначають еволюцію доступності авіаперевезень.

Ключові слова: ціни на авіаквитки, динамічне ціноутворення, дерегуляція авіаперевезень, коливання попиту, вартість палива, технологічний прогрес, алгоритми ціноутворення, конкуренція авіакомпаній.

Introduction. The articles collectively explore the evolution of air travel from its inception to the modern day, focusing on how factors like technological advancements, inflation, and market competition have shaped the industry. "The Evolution of the Commercial Flying Experience" by the Smithsonian Institution traces the transformation of passenger experiences since 1914. "Here At The Smithsonian: The History of Aviation" by Kira M. Sobers exploring aviating history overall. It archives delve into aviation milestones, including ticketing practices like those of Pan American World Airways. Economic aspects are highlighted through tools like the CPI Inflation Calculator, showing historical currency adjustments, and data from Our World in Data, which quantifies the declining cost of transport since the 1930s. The IEA chart documents air passenger traffic trends from 1980 to 2020, revealing growth patterns and disruptions. Pricing insights include average fare data from Bureau of Transportation Statistics, inflation-adjusted ticket prices from the US Inflation Calculator, and a MoneyWise analysis of a 50% price drop over 40 years. The works represent a mix of institutional authors, independent data analysts, and generalist contributors, offering a comprehensive view of aviation's economic, social, and technical history.

Formulation of the Objectives of the Article (Statement of the Task). The article aims to unravel the complex mechanisms behind airline ticket pricing by exploring its historical evolution and identifying modern factors that influence price fluctuations. It seeks to provide insights into the interplay between technological advancements, economic pressures, and consumer behavior,

demonstrating how these forces continue to redefine affordability and accessibility in the aviation industry.

Summary of the main research material. The history of airline tickets dates back to the early 20th century when commercial aviation began. Initially, air travel was a luxury reserved for the wealthy, and booking a ticket was a manual process, usually done through travel agents. Airlines issued paper tickets, and the process involved direct interaction with agents who would manually confirm flight details and ticket availability. As aviation developed, more airlines began offering scheduled flights, and the need for more efficient ticketing grew [9].

In the 1960s, with the advent of computerized systems, the industry began to transition toward more modern methods of booking. The introduction of Computer Reservation Systems (CRS) in the late 1960s allowed airlines to manage seat reservations and pricing with more efficiency. This was a significant leap forward, as it made it easier for airlines to adjust prices based on demand and operational costs, setting the stage for more dynamic pricing. With the advent of technology, airlines could now keep track of seat availability in real-time, which led to more precise fare structures. These systems eventually led to the creation of Global Distribution Systems (GDS), which connected airlines to travel agencies worldwide, standardizing the process of ticketing [9; 10].

The next major shift came with the deregulation of airlines in the late 1970s. The Airline Deregulation Act of 1978 in the United States led to increased competition among airlines, which had a dramatic effect on ticket pricing. Prior to deregulation, the government-controlled airfares, but with

deregulation, airlines were free to set their own prices. This resulted in a decrease in ticket prices and the introduction of discount carriers, which made air travel accessible to a wider audience. This era also saw the rise of "yield management" systems, which allowed airlines to set different prices for the same flight based on factors like seat availability, time before departure, and the number of passengers already booked. Prices fluctuated more often, and passengers could find cheaper tickets by booking in advance or flying at off-peak times.

The 1990s and 2000s saw further changes with the rise of the internet and online booking systems. Websites like Expedia and Orbitz allowed passengers to book tickets directly from airlines or through third-party services, eliminating the need for travel agents. This shift was particularly impactful for consumers, as it gave them access to a wider range of options and allowed them to track price changes in real-time. As a result, airlines adapted to new consumer behavior by further refining their pricing strategies and introducing more sophisticated algorithms to adjust ticket prices instantly based on demand and market conditions. This development also paved the way for the widespread use of electronic tickets (e-tickets), which were introduced in the late 1990s and became standard by the 2000s. E-tickets simplified the booking process, reduced costs for airlines, and made the experience more convenient for passengers [10].

As technology advanced, so did the speed of price changes. Airlines began using complex algorithms that could adjust ticket prices multiple times a day based on a variety of factors, including seat availability, time of booking, and customer preferences. This led to a dramatic increase in price variability. Tickets could cost significantly different amounts depending on when they were purchased or even who was buying them. The rapid fluctuation in ticket prices created both opportunities and challenges for travelers. While it became easier to find cheaper fares, it

also meant that passengers needed to remain vigilant and flexible in their travel plans to secure the best deals.

The consequences of these price changes were significant. For airlines, dynamic pricing allowed them to maximize revenue and fill more seats, but it also meant that they had to manage customer expectations carefully. Price fluctuations often led to frustration, especially for passengers who felt they were paying too much compared to others who booked earlier or found last-minute deals. However, for consumers, the benefits were clear. The competitive environment, combined with more affordable pricing, made air travel more accessible. It also created an environment where customers could take advantage of sales or last-minute deals if they were willing to adapt their schedules [9; 10].

Today, the world of airline ticketing continues to evolve, with new technologies and pricing strategies shaping the industry. While prices have fallen significantly from the high costs of the past, the future of ticket pricing will likely continue to be influenced by advances in technology, competition, and changing consumer behavior. The industry is now at a point where online platforms and sophisticated algorithms allow for real-time price adjustments, making it easier for consumers to access flights at a wide range of prices. However, as the complexity of pricing systems increases, so does the need for passengers to stay informed and flexible in their travel choices [10].

In the 1920s and 1930s, commercial air travel was a luxury reserved for the wealthy elite. Flights were characterized by their high costs, with a ticket from London to Paris priced at around £15–20, equivalent to several thousand dollars (£1 120 to be exact) today when adjusted for inflation. Passengers traveled aboard noisy, unpressurized planes like the Ford Tri-Motor, enduring rudimentary comfort and limited services. Despite these drawbacks, the novelty and exclusivity of flying appealed to adventurous travelers, setting the foundation for the global aviation

industry. This era marked the beginning of passenger air travel as a symbol of status and progress. [1; 2]

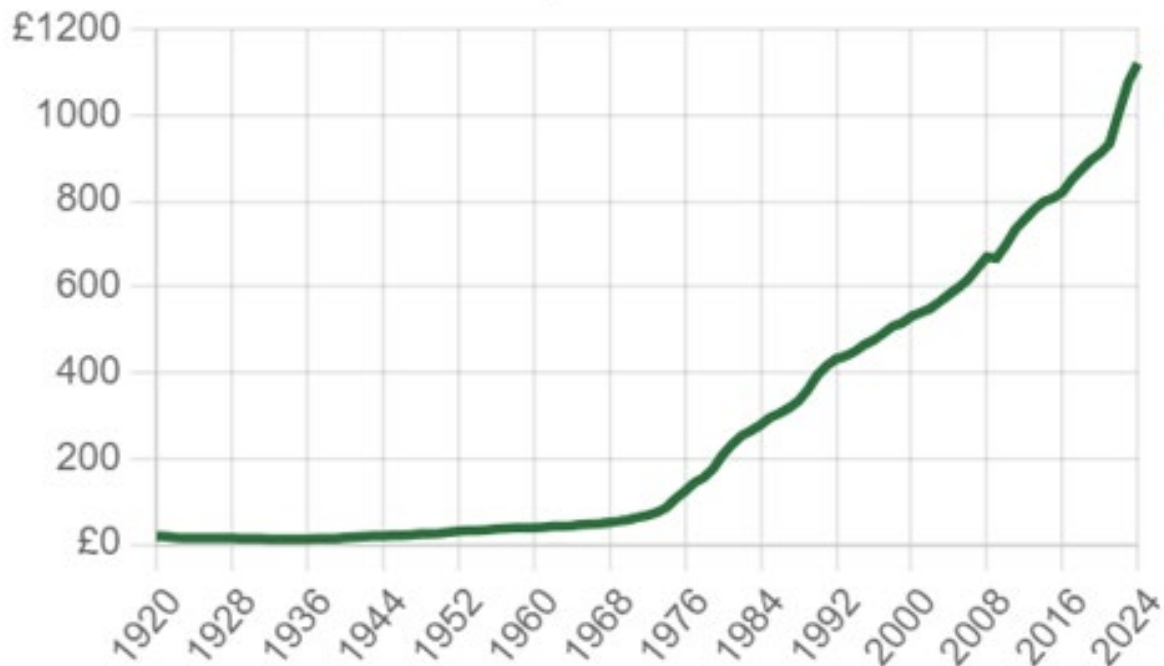


Figure 1 – £20 adjusted for inflation from 1920 to present days. In 2024 it equals to £1 120.
Source: compiled based on [2].

During the post-war period, the London-to-Paris route remained one of Europe's most popular air connections, benefiting from advancements in aviation technology and an increase in demand for international travel. In the 1950s, the introduction of more efficient propeller planes like the Douglas DC-3 and later the jet-engine aircraft dramatically reduced flight times to about an hour. Ticket prices, however, were still high due to

regulated fare systems. A one-way ticket could cost around £25–30, a significant amount equivalent to nearly £800–1,000 today. Airlines such as British European Airways (BEA) and Air France competed to attract travelers with improved services, including on-board meals and higher comfort, signaling the beginning of air travel's golden age [1; 2]

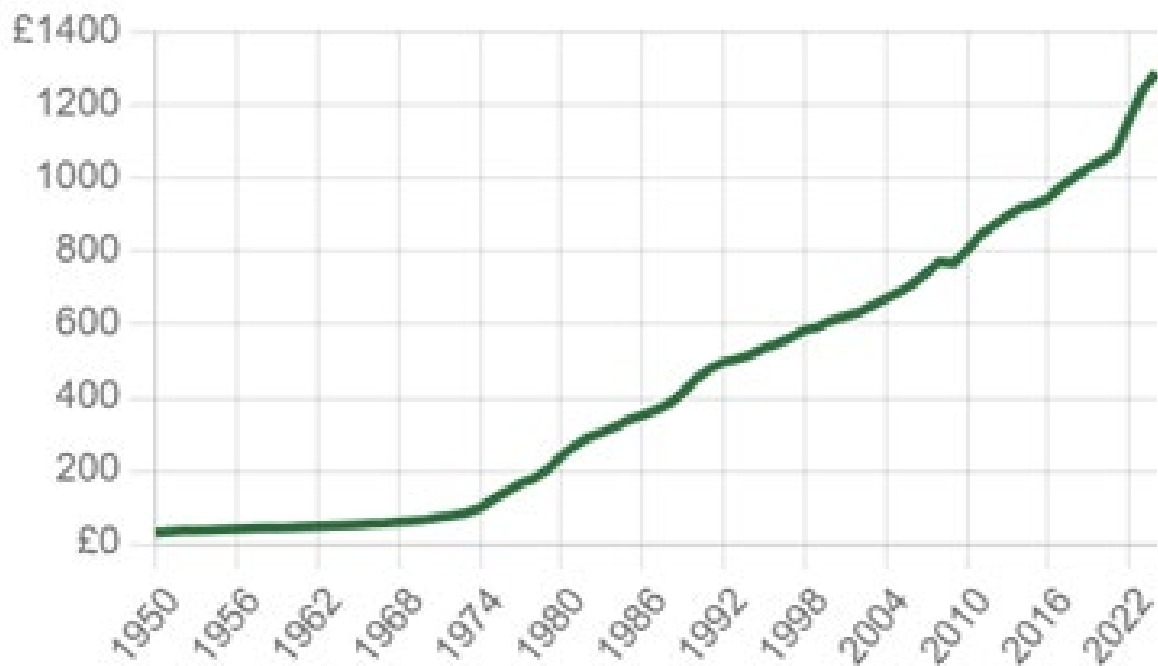


Figure 2 – £30 adjusted for inflation from 1950 to present days. In 2024 it equals to £1 288.
Source: compiled based on [2].

The 1980s and 1990s saw a dramatic transformation in air travel with the rise of deregulation and budget airlines, making previously expensive routes like London to Paris much more affordable. In Europe, deregulation policies allowed new competitors like Ryanair and EasyJet to challenge legacy carriers, driving prices down. Flights between London and Paris, once a luxury, became accessible to a broader

audience, with tickets often dropping below £50 for one-way trips by the late 1990s. Airlines adopted a no-frills approach, cutting extras like in-flight meals and introducing dynamic pricing models to maximize occupancy. This era marked the democratization of air travel, forever changing how people viewed short-haul flights [1; 2].

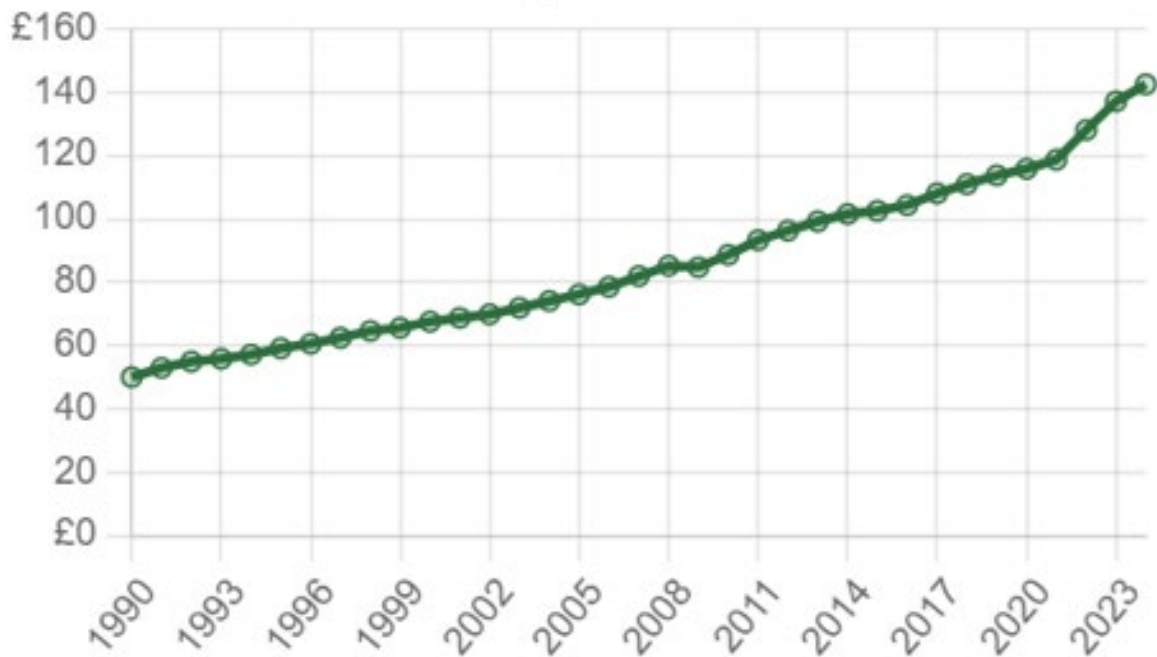


Figure 3 – £50 adjusted for inflation from 1990 to present days. In 2024 it equals to £142.

Source: compiled based on [2].

In the 2000s and beyond, the London-to-Paris route became emblematic of the modern air travel experience, defined by affordable prices, dynamic fare systems, and fierce competition. With budget airlines like EasyJet and Ryanair dominating the market, tickets often started as low as £10 for one-way trips during sales, though prices could fluctuate based on demand, seasonality, and booking time. The emergence of online booking platforms revolutionized

accessibility, enabling passengers to compare prices and find deals with ease. Environmental concerns also began shaping the industry, with airlines introducing carbon offset programs and governments debating taxes on short-haul flights to encourage greener alternatives like high-speed rail. Despite these changes, the route remained one of Europe's busiest, showcasing the evolution of aviation into a global, mass-market service [1; 2].

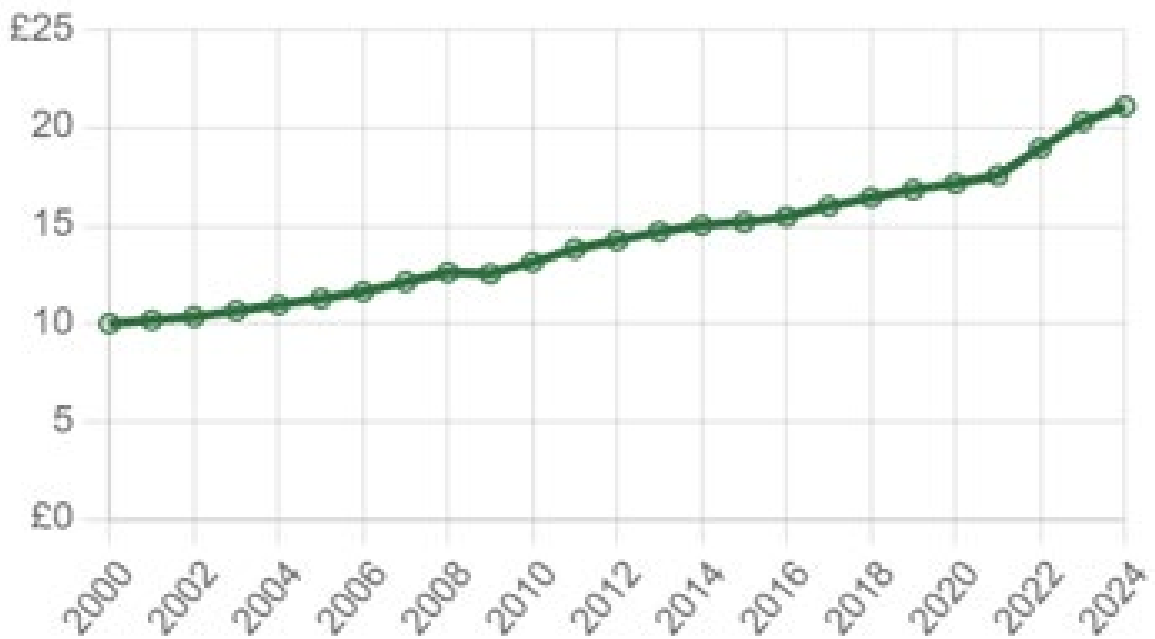


Figure 4 – £10 adjusted for inflation from 2000 to present days. In 2024 it equals to £21.
Source: compiled based on [2].

Overall flight fares from 1930s to present days have fallen. Compared to 1930, in 2005

the price for the ticket for more than 90% cheaper [5].

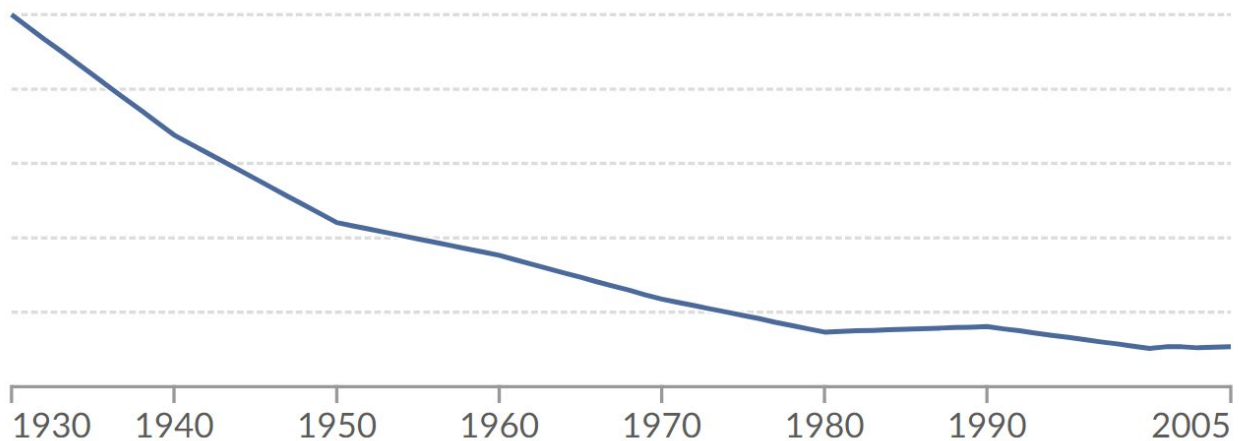


Figure 5 – Passenger air transport cost from 1930s to 2005.
Source: compiled based on [5].

Inspecting the graph of the World air passenger traffic evolution from 1980s. Exactly from this date the government made a law that opens for airlines ability to charge any price for their services. Before it, the flight costs were regulated.

As we can see, most of the crises and wars didn't affect on flights and the number of

passengers. Some amounts of flights decreased during Gold War, Asian financial crisis and 9/11 tragedy. But because the other world could continue to flight without any restrictions, the numbers were the same. Only during Covid-19, when it shook the world and the countries closed borders, the amounts of flights and passengers rapidly fallen down [6].

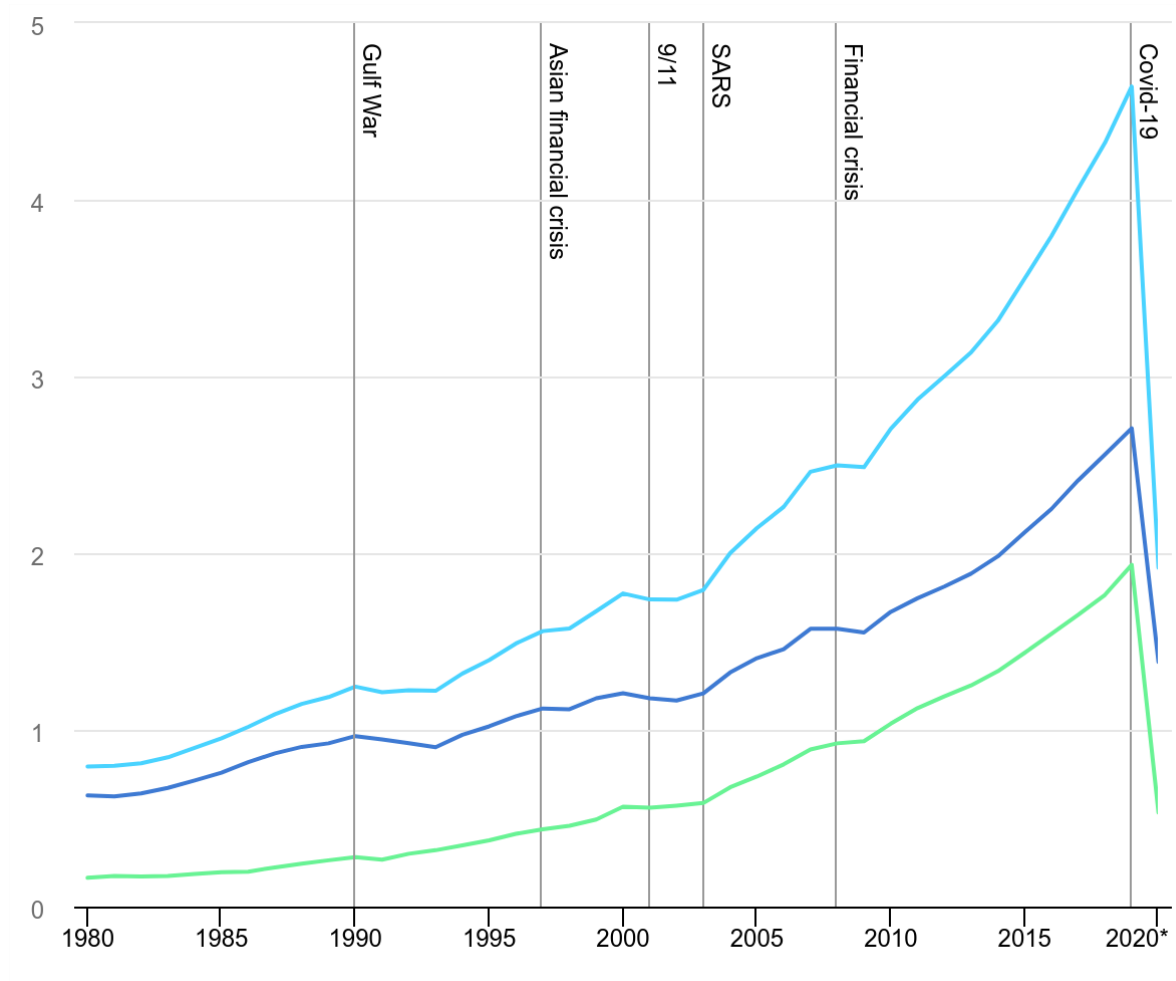


Figure 6 – World air passenger traffic evolution. Light blue line – total, blue line – domestic, green line – international.

Source: compiled based on [6].

Next is the graph of change in airline ticket prices. We can see some rapid changes in prices in 1978, 2009 and 2019. [7; 8]

1978. Airline Deregulation Act of 1978 (U.S.). The U.S. deregulated its airline industry, allowing airlines to set their own routes and fares. This led to initial pricing instability as carriers adjusted to competitive pressures, with some dramatic price drops to attract customers. However, fuel costs surged due to the 1979 oil crisis, triggered by reduced oil supplies following the Iranian Revolution, pushing up ticket prices.

The global economic downturn of the early 1980s reduced consumer demand for air travel, forcing some airlines to lower prices, but inflationary pressures and higher operational costs kept volatility high.

The 2008-2009 global financial crisis drastically reduced disposable income, leading to reduced demand for travel. Airlines responded by slashing fares to attract passengers, resulting in a sharp drop in average ticket prices. Simultaneously, some airlines introduced ancillary fees (e.g., baggage fees) to recover lost revenue without increasing base fares.

Pandemic Impact: The COVID-19 pandemic devastated the aviation industry, with travel restrictions and reduced demand causing ticket prices to plummet. Airlines faced severe losses and had to implement price cuts to attract hesitant travelers.

As the industry rebounded, high post-pandemic demand for leisure and business travel led to fare increases, exacerbated by inflation and rising fuel costs. Additionally,

supply chain disruptions and labor shortages increased operating expenses, further driving up prices. [7; 8]

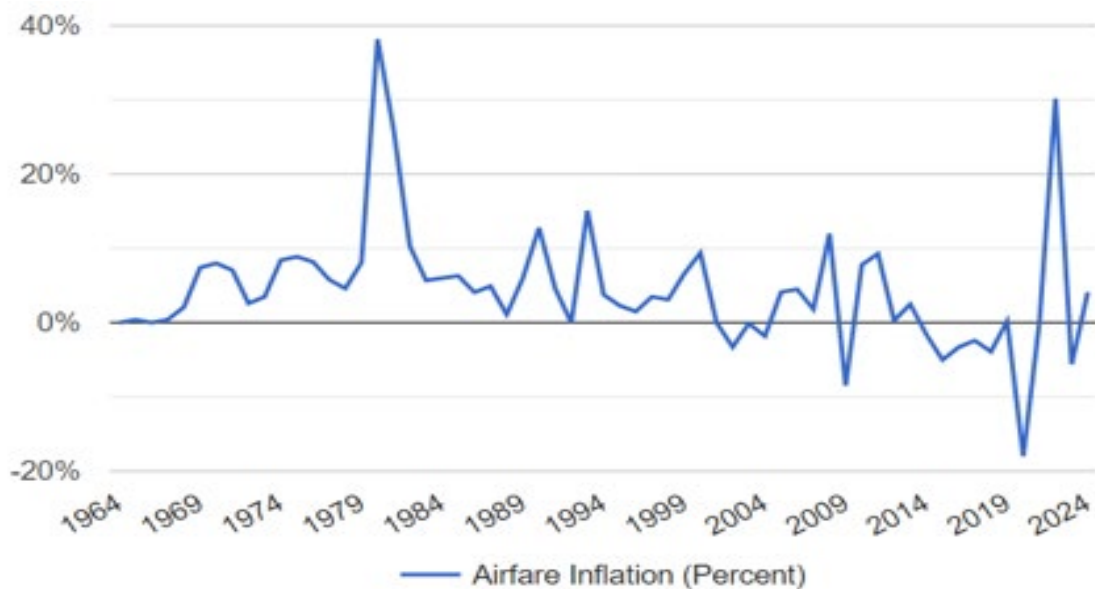


Figure 7 – Change in airline ticket prices. The rapid price changes in 1978, 2009 and 2019. Data from 1964 to 2024. Source: compiled based on [8].

Conclusions. The evolution of airline ticket pricing reflects broader shifts in global economic, technological, and social landscapes. Historically, the early days of aviation positioned air travel as an exclusive luxury, with tickets costing the equivalent of thousands of modern-day pounds. Through significant milestones—such as the introduction of computerized reservation systems in the 1960s, deregulation in the 1970s, and the rise of budget airlines and online booking platforms—prices steadily became more affordable, democratizing air travel for the masses. For example, a London-to-Paris flight that once cost the equivalent of £1,120 in 1930 could be found for as little as £10 (equivalent to £21 in 2024) by the 2000s.

Analyzing key historical data reveals that airline pricing trends have been influenced by a mix of economic crises, technological advancements, and geopolitical events. The Airline Deregulation Act of 1978 in the United States marked a major turning point, enabling

airlines to set their own fares and adopt dynamic pricing strategies. Later, global events such as the 2008 financial crisis and the COVID-19 pandemic triggered rapid price adjustments, demonstrating the industry's sensitivity to external factors.

Price charts highlight periods of dramatic shifts. In 1978, deregulation and the subsequent oil crisis caused pricing turbulence. The 2009 financial crisis led to significant fare reductions, while the pandemic in 2019 forced airlines to lower prices to survive declining demand. However, recovery brought price hikes driven by inflation and operational cost increases, showing how the industry balances affordability with profitability.

The overall trend points to a 90% decrease in real airfares since the 1930s, illustrating how competition, technology, and market forces have made flying accessible. Nonetheless, this affordability is tempered by modern challenges like fluctuating fuel prices,

labor shortages, and environmental concerns. Looking ahead, airlines must navigate these dynamics while addressing the growing demand for sustainable travel options.

This comprehensive analysis underscores the transformative power of innovation and market forces in shaping one of the most dynamic industries in the modern world.

References

1. Smithsonian Institution. The evolution of the commercial flying experience, 1914-today. URL: <https://airandspace.si.edu/explore/stories/evolution-commercial-flying-experience>
2. In2013Dollars. (n.d.). CPI inflation calculator. Retrieved from <https://www.in2013dollars.com/uk/inflation/1920?amount=20>
3. Smithsonian Institution Archives. Here at the Smithsonian: The history of aviation. URL: <https://siarchives.si.edu/blog/here-smithsonian-history-aviation>
4. Smithsonian Institution National Air and Space Museum. Here at the Smithsonian: The history of aviation. URL: <https://airandspace.si.edu/collection-archive/pan-american-world-airways-tickets/sova-nasm-2010-0011>
5. Our World in Data. The decline of transport and communication costs relative to 1930. Retrieved from <https://ourworldindata.org/grapher/real-transport-and-communication-costs?facet=metric>
6. International Energy Agency. World air passenger traffic evolution, 1980-2020. Retrieved from <https://www.iea.org/data-and-statistics/charts/world-air-passenger-traffic-evolution-1980-2020>
7. Bureau of Transportation Statistics. Average domestic airline itinerary fares. Retrieved from <https://www.transtats.bts.gov/AverageFare/>
8. US Inflation Calculator. Airfare inflation: Airline ticket prices (1964-2024). Retrieved from <https://www.usinflationcalculator.com/inflation/airfare-inflation/>
9. Wikipedia. Airline ticket. Retrieved from https://en.wikipedia.org/wiki/Airline_ticket
10. MoneyWise. How the price of airline tickets fell by 50% in 40 years. Retrieved from <https://moneywise.com/life/travel/airline-prices-fell-50-and-nobody-noticed>

UDC 658.7:658.8:004.4:004.6:004.7:004.8:005.4:005.93
JEL Classification: L86, M31.

DOI: <https://doi.org/10.46783/smart-scm/2024-28-5>

Received: 10 December 2024

Hubarieva I. O. Doctor of Sciences (Economics), Professor, Research Center for Industrial Problems of Development of NAS of Ukraine (Ukraine)

ORCID – 0000-0002-9002-5564

Researcher ID –

Scopus author id: – 57190439486

E-Mail: gubarievairyna@gmail.com

Harmash O.M. PhD (Economics), Associate Professor, Associate Professor at the Logistics Department, National Aviation University (Ukraine)

ORCID – 0000-0003-4324-4411

Researcher ID – I-4542-2018

Scopus author id: – 57218381499

E-Mail: kim_ol@ukr.net

Trushkina N.V., Ph.D. (in Economics), Senior Researcher Research Center for Industrial Problems of Development of the NAS of Ukraine (Ukraine)

ORCID – 0000-0002-6741-7738

Researcher ID – C-1441-2018

Scopus author id: – 57210808778

E-Mail: nata_tru@ukr.net

Shkrygun Yu. O., Postgraduate Student, Institute of Industrial Economics of NAS of Ukraine (Ukraine)

ORCID – 0000-0002-7623-8213

Researcher ID –

Scopus author id: –

E-Mail: yuliyashkrigun@gmail.com

Patlachuk T. V., Postgraduate Student, Research Center for Industrial Problems of Development of the NAS of Ukraine (Ukraine)

ORCID – 0009-0007-4093-6697

Researcher ID –

Scopus author id: –

E-Mail: tpatlachuk@ukr.net

DIGITAL TRANSFORMATION OF ENTERPRISE' LOGISTICS ACTIVITIES: BIBLIOMETRIC AND TREND ANALYSIS

Hubarieva Iryna, Harmash Oleh, Trushkina Nataliia, Shkrygun Yuliya, Patlachuk Tamila. «**Digital transformation of enterprise' logistics activities: bibliometric and trend analysis**». In the modern conditions of the digital economy and many force majeure events, both economic and social, the issues of providing production with the necessary material and information resources and their effective use; improving operational and strategic management of warehouses, product stocks, differentiated transport flows, sales activities and customer experience are of particular relevance. In order to ensure effective operations, enterprises must organize their activities in such a way as to achieve risk mitigation, minimize losses and costs associated with the organization of logistics processes, production, transportation, logistics services and sales, as well as maximize profitability from sales. First of all, the above tasks can be achieved by increasing the efficiency of managing the logistics activities of enterprises, taking into account the analysis of its components, their interconnection and the presence of an accelerated and uneven process of digitalization.

In view of the above, this study is devoted to the analysis of the relationship between digital transformation and the processes of logistics activities of companies using bibliometric and trend approaches. The aim of the article is to identify the main areas of scientific research, assess the dynamics of publication activity, and identify key trends and gaps in this field of knowledge. As part of the study, a bibliometric analysis of the database of scientific publications was conducted to identify the most cited works and authors, as well as a trend analysis to identify changes in the topics of research. The results of the study will allow us to obtain a holistic picture of the current state and prospects for the development of research on the digital transformation of logistics activities of enterprises of various industries, which can contribute to the formation of more effective sales and marketing policy and the concept of logistics management.

It has been established that it is advisable to develop and implement management solutions in the following key areas: management of procurement and supplies of material resources (calculation of the optimal volume of the delivery batch of material resources, optimization of the enterprise's procurement strategy, improvement of the procurement process management using the multi-criteria evaluation method of choosing the optimal supplier of material resources); management of transport flows (implementation of information systems for managing cargo flows, application of automated document processing in the process of registering cargo transportation, development of proposals for optimizing transport loading, use of Internet technology for automating transport processes); management of customer experience (analysis of product shipment volumes, forecasting product shipment volumes to consumers, development of proposals for improving the level of logistics service, formation of a system of contractual relationships with consumers, improvement of a customer-oriented approach to servicing various categories of consumers in the context of the concept of relationship marketing); sales management (substantiation of the feasibility of applying a network approach to organizing sales activities of enterprises; improvement of the mechanism for implementing public-private partnerships in managing sales activities of enterprises based on the organizational and legal form of a syndicate, a methodological approach to choosing the optimal sales channel for finished products; identification of priority areas for the development of e-commerce as an effective tool for promoting products on the market).

It has been proven that the priority area of research in the future should be the development of a strategy for the digital transformation of the customer relationship management system using digital marketing tools and artificial intelligence.

Keywords: logistics activities, logistics management, strategic management, digital transformation, digitalization, digital logistics, smart logistics, digital technologies, information and communication

systems, artificial intelligence, e-commerce, digital marketing, customer relationship management, bibliometric analysis, trend analysis

Губарева Ірина, Гармаш Олег, Трушкіна Наталія, Шкригун Юлія, Патlachук Таміла. **«Цифрова трансформація логістичної діяльності підприємств: бібліометричний і трендовий аналіз».** В сучасних умовах цифрової економіки та багатьох форс-мажорних подій, як економічного, так і соціального характеру, питання забезпечення виробництва необхідними матеріальними та інформаційними ресурсами та їх ефективного використання, удосконалення оперативного та стратегічного управління складами, товарними запасами, диференційованими транспортними потоками, збутовою діяльністю та клієнтським досвідом є особливо актуальними. Для забезпечення ефективної роботи підприємства мають організувати свою діяльність таким чином, щоб знизити ризики, мінімізувати втрати та витрати, пов'язані з організацією логістичних процесів, виробництвом, транспортуванням, логістичними послугами і збутом, а також максимізувати прибутковість від продажів. Перш за все, зазначені завдання можуть бути досягнуті шляхом підвищення ефективності управління логістичною діяльністю підприємств, враховуючи аналіз її компонентів, їх взаємозв'язок та наявність прискореного і нерівномірного процесу цифровізації.

З огляду на вищезазначене, це дослідження присвячене аналізу взаємозв'язку між цифровою трансформацією та процесами логістичної діяльності компаній із використанням бібліометричних та трендових підходів. Метою статті є визначення основних напрямів наукових досліджень, оцінка динаміки публікаційної активності, а також виявлення ключових трендів і прогалів у цій галузі знань. У межах дослідження було проведено бібліометричний аналіз бази даних наукових публікацій для визначення найбільш цитованих робіт та авторів, а також трендовий аналіз для виявлення змін у тематиці досліджень. Результати дослідження дозволять отримати цілісну картину поточного стану та перспектив розвитку досліджень цифрової трансформації логістичної діяльності підприємств різних галузей, що може сприяти формуванню більш ефективної збутової та маркетингової політики і концепції управління логістикою.

Встановлено, що доцільно розробляти та впроваджувати управлінські рішення у таких ключових напрямках: управління закупівлями та постачанням матеріальних ресурсів (розрахунок оптимального обсягу партії постачання матеріальних ресурсів, оптимізація стратегії закупівель підприємства, удосконалення управління процесом закупівель із використанням багатокритеріального методу оцінки вибору оптимального постачальника матеріальних ресурсів); управління транспортними потоками (впровадження інформаційних систем управління вантажопотоками, застосування автоматизованої обробки документів у процесі реєстрації вантажоперевезень, розробка пропозицій щодо оптимізації завантаження транспорту, використання інтернет-технологій для автоматизації транспортних процесів); управління клієнтським досвідом (аналіз обсягів відвантаження продукції, прогнозування обсягів відвантаження продукції споживачам, розробка пропозицій щодо підвищення рівня логістичного сервісу, формування системи договірних відносин із споживачами, удосконалення клієнтоорієнтованого підходу до обслуговування різних категорій споживачів у контексті концепції маркетингу відносин); управління збутом (обґрунтування доцільності застосування мережевого підходу до організації збутової діяльності підприємств; удосконалення механізму реалізації державно-приватного партнерства в управлінні збутовою діяльністю підприємств на основі організаційно-правової форми синдикату, методичний підхід до вибору оптимального каналу збуту готової продукції; визначення пріоритетних напрямів розвитку електронної комерції як ефективного інструменту просування продукції на ринку).

Доведено, що пріоритетним напрямом досліджень у майбутньому має стати розробка стратегії цифрової трансформації системи управління взаємовідносинами з клієнтами із використанням інструментів цифрового маркетингу та штучного інтелекту..

Ключові слова: логістична діяльність, управління логістикою, стратегічне управління, цифрова трансформація, цифровізація, цифрова логістика, розумна логістика, цифрові технології, інформаційно-комунікаційні системи, штучний інтелект, електронна комерція, цифровий маркетинг, управління взаємовідносинами з клієнтами, бібліометричний аналіз, трендовий аналіз.

Introduction. In today's conditions of rapid digitalization of many areas of life, in particular business activities, the aspect of logistics management as an integrated process is gaining special attention. The digital economy is characterized by digital transformation processes. D. Terrar, an analyst at the consulting company Agile Elephant [1], notes that digital transformation is the process of an organization's transition to new ways of thinking and working based on the use of social, mobile and other digital technologies. This transformation includes changes in thinking, leadership styles, a system for encouraging innovation and the adoption of new business models to improve the work of the organization's employees, its customers, suppliers and partners. This is confirmed by Statista 2022 data, which indicate that 80% of respondents in the world consider business digitalization a priority for the organization's technological breakthrough.

It is worth emphasizing that the processes of digitalization and the organization of logistics activities are interdependent. Currently, the processes of accelerated digitalization, on the one hand, are a factor of changes in the economic and social spheres of life, and, on the other hand, are a component of these changes as a reflection of the general needs of society, which are rapidly changing. That is, digitalization is a reflection of technological, economic and social progress. At the same time, the process of digitalization has a dual nature, consisting in a combination of the characteristics of a factor and a component. At a certain stage of human development, digitalization reflects existing changes and, through this process, provokes and

determines a new round of further changes. It can be noted that in logistics activities, these processes are present to a significant extent and have long-term prospects. This is due to the fact that the digitalization of logistics activities and the spread of the consequences of this process affects the participants in the logistics market and forms further changes in the behaviour and expectations of consumers. Thus, according to Statista, revenues from the use of software for managing relationships with consumers worldwide increased by 90% in 2015-2020, or from 24 to 45.7 billion dollars. It is predicted that the value of this indicator will grow annually and will amount to 49.6 billion dollars in 2025. According to Transport Intelligence, Statista, the volume of the global e-commerce market will grow in 2026 compared to 2020 by 2.1 times, or from 368.1 to 770.8 billion euros. The average share of digital interactions with customers in the world was 58% in 2020, while in 2017 it was 20%. The level of widespread implementation of artificial intelligence for managing supply chains, according to 600 respondents surveyed worldwide was 34% in 2022.

From the point of view of most experts, the digitalization of logistics business processes will contribute to the optimization of flows, improvement of service quality, and increase of efficiency indicators and flexibility of logistics service. For example, preparation of paper documentation and delay of delivery associated with its registration constitute 10-15% of transportation costs. When implementing digital logistics on the basis of legally recognized electronic document flow, these costs and delivery times can be reduced by 20-40% [2].

Therefore, logistics processes are a significant component of operational and long-term activities of enterprises. Taking into account the digitalization of the economy, it is advisable to consider logistics processes as components of the concept of "Logistics 4.0" [3]. The close interdependence and integrated nature of logistics activities of enterprises determines the relevance of studying the relationship of this concept with digital transformation and related categories.

Literature and researches review.

Analysis of the scientific literature indicates the diversity of approaches of scientists to the definition of the concepts of "logistics" and "logistics management". Scientists use different concepts, namely: "logistics management", "strategic logistics management", "enterprise' logistics management", "supply chain management", "marketing and logistics management", etc. There are many interpretations of these terms, which are based on various scientific concepts and provisions.

Based on the theoretical generalization of existing definitions of the concept of "logistics", they are conditionally systematized into the following groups: theory (management concept, science or scientific direction, management methodology); activity (type of activity, management tool, form of market relations of participants); management activity (management process, management function, process management); flow management system (theory and practice of managing the movement of a set of flows, integrated material flow management system, flow process management system) [4].

In recent years, as the analysis shows, the concept of digital logistics has been introduced into scientific circulation. As a rule, this term is considered from the standpoint of digital service; digital-type systems; transition from the era of automation to the era of digitalization; logistics models as a "single window"; logistics, where all systems are

integrated and function only in virtual space [5].

It should be noted that when interpreting logistics activities, the vast majority of researchers emphasize such aspects as the direction of activity; a set of actions for the practical implementation of processes; the goal and objectives of implementing policy in the field of transport and logistics; a single integrated process management function, etc.

Logistics management, as a rule, is understood as a tool on the basis of which it is possible to reduce costs for logistics, inventory management, and transportation of products to consumers; synthesis of management functions (planning, organization, regulation, coordination and control) of flow processes; management of material and information flows; management of integrated business processes (from logistics to sales of finished products to consumers); integration of management theory and logistics.

Some authors use the term "logistics management", which includes management of: consumer requests, market participants' offers and establishing the relationship between them; information flows; procurement and supply processes; production activities; inventories and warehousing; financial and sales activities; service; pricing; other components of production activities and relationships with the end consumer.

Therefore, based on the generalization of existing conceptual provisions and the results of previous own research [6-11], it is proposed to consider the logistics activities of enterprises in the context of digital transformations as a set of processes (supply and purchase of material resources, contractual work with suppliers, production of products, their storage in logistics centres, waste recycling on the basis of a circular economy and reverse logistics, logistics service for consumers, transportation and sales of products), the organization of which

is carried out using digital technologies and information systems.

A significant number of scientific works are devoted to conceptual principles and scientific and methodological approaches to managing digital transformations of logistics activities of enterprises. As the analysis of scientific sources on logistics shows, leading scientists pay special attention to the study of:

various aspects of the impact of digitalization on logistics activities [12-16];

the relationship between digital, intelligent and smart logistics [17-20], digital strategy and logistics activities [21-24], smart contract and logistics activities [25-33], etc.

Despite the wide range of scientific research on the chosen topic, the multifaceted nature and debatability of individual issues require further development. And especially the solution of this problem is becoming more relevant in the era of digital transformations and the intensification of automation and digitalization processes.

Aim and objectives. The outlined problem determined the purpose of this article, which is to identify the main areas of

scientific research, assess the dynamics of publication activity, as well as identify key trends and gaps in this field of knowledge.

The theoretical and methodological basis of the study is the provisions of institutional theory, digital economy, concepts of strategic, logistical and marketing management, enterprise development, management, and customer relationship management. The following general scientific methods were used in the research process: analysis and synthesis, expert survey, bibliometric analysis, trend analysis, comparison and classification, structural and logical generalization.

Results, analysis and discussion. Based on bibliometric analysis, it was found that various issues of digital transformation of logistics activities of business entities of various industries are included in the scope of long-term scientific interests of most leading foreign scientists. By the title of articles, abstracts and keywords "digital transformation" and "logistics" in the international scientometric database Scopus, 980 documents were found in 1985-2024 (Fig. 1).

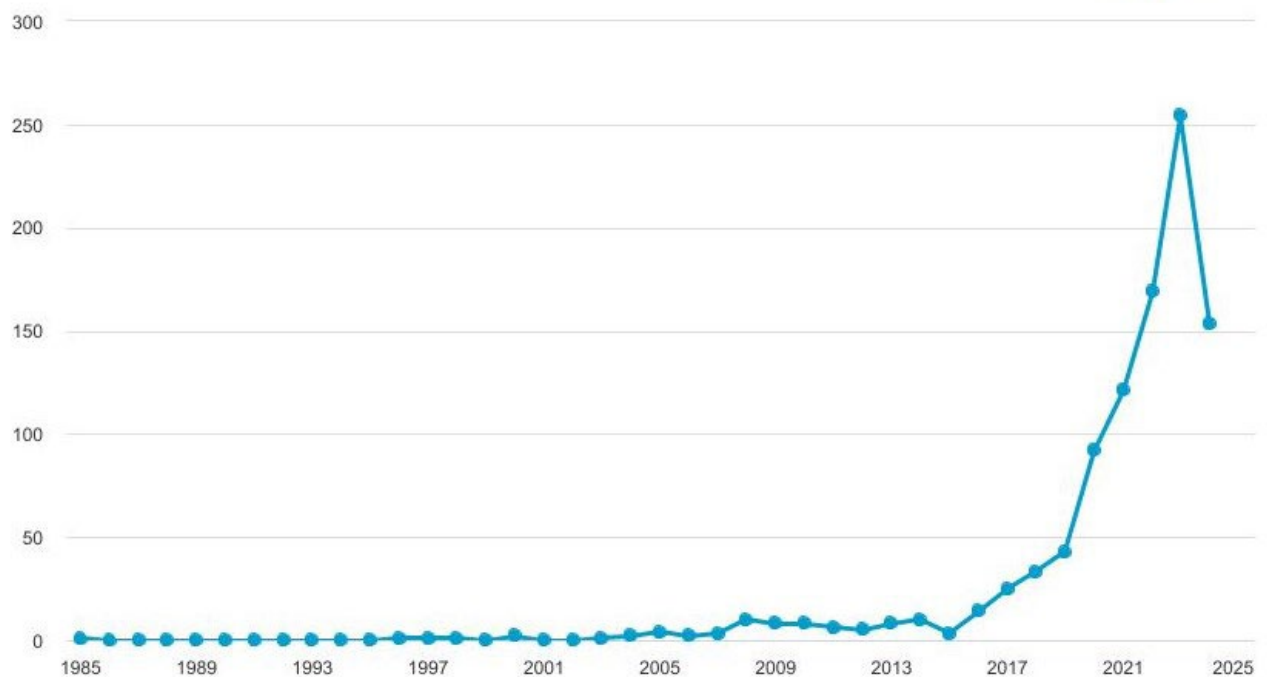


Figure 1 – Dynamics of the number of scientific publications in the Scopus database dedicated to the digital transformation of logistics activities

Source: built on the basis of data from the Scopus scientometric database.

As can be seen from Fig. 1, these issues have become particularly relevant since 2017. During 2017-2024, the number of scientific papers increased from 25 to 153, or 6.1 times. During this period, the average growth rate was 29.5%. The following keywords are mostly used in publications: digital transformation (304 documents), Industry 4.0 (105), logistics (96), supply chain management (77), supply chains (75), digitalization (59), artificial intelligence (58), Internet of Things (53), digital technologies (52), digital storage (49), machine learning (45), managerial decision-making (44), blockchain (43), big data (39 documents), etc.

The first publication on the selected topic appeared in the international scientometric database Scopus in 1985. The author J. Kirkaldy [34] considered the problem of digital modelling of systems, justifying the relevance of the contribution to the theory of evolution and the study of artificial intelligence. It should be emphasized that until 2008 there was a low level of publication activity. Thus, in 1996, 1997, 1998, 2000, 2003, 2004, 2006, only one or two works on the

selected topic were published. And since 2008, researchers have begun to pay more attention to the processes of digitalization in the organization of logistics activities of companies. The international scientometric database Scopus has included works by such scientists as A. Dialo et al. [35]; L. Heilig et al. [36]; J. Holmström, J. Partanen [37]; K. Holzhauser, P. Schalla [38]; Z. Jin, L. Yanping [39]; Ch. Meier [40]; A. Nath et al. [41]; S. Papagiannidis et al. [42]; M. Ph. Rößler, M. Haschemi [43]; H. Zeeb [44]. These publications focus on establishing electronic supply chains as an ecosystem that combines the business ecosystem and the technology ecosystem for interaction between companies at both the macro and micro levels; exploring the forms that combinations of digital manufacturing, logistics, and equipment use can take, and how these new combinations can affect the relationship between logistics service providers (LSPs), users, and equipment manufacturers; setting new standards for customer focus, innovation, and efficiency, etc.

Table 1 – The most cited articles on the problems of digital transformation of logistics activities of companies in the scientometric database Scopus for 1985-2024

Author(s), title of publication	Year	Title of publication	Number of citations in Scopus	Number of views
Weisberg S. Applied Linear Regression: Third Edition [45]	2005	Book [Hoboken, New Jersey: Wiley Blackwell]	1348	68
Neumann W. P. et al. Industry 4.0 and the human factor – A systems framework and analysis methodology for successful development [46]	2021	International Journal of Production Economics	308	674
Kayikci Y. Sustainability impact of digitization in logistics [47]	2018	Procedia Manufacturing	230	533
Cichosz M., Wallenburg C. M., Knemeyer A. M. Digital transformation at logistics service providers: barriers, success factors and leading practices [48]	2020	International Journal of Logistics Management	222	427
Garay-Rondero C. L. et al. Digital supply chain model in Industry 4.0. [49]	2020	Journal of Manufacturing Technology Management	201	568

Source: built on the basis of data from the Scopus scientometric database.

Among the most cited publications (Table 1), the work of researcher S. Weisberg [45] deserves special attention, in which the possibilities of using logistic regression analysis methods are considered. In addition, it is worth paying attention to the work of the team of authors W. Neumann et al. [46], which states that the fourth industrial revolution is changing the role of humans in operating systems. Although automation technologies are becoming increasingly common in production and logistics, there is a consensus that people will remain an integral part of operating systems. However, the human factor is still underrepresented in this research stream, which leads to an important gap in research and application. Therefore, this paper first reveals this gap, presenting the results of a targeted content analysis of previous studies of Industry 4.0.

The main publications that publish works on the chosen topic include the following: Sustainability Switzerland (21 documents); Lecture Notes In Networks And Systems (20); ACM International Conference Proceeding Series (18); Lecture Notes In Computer Science Including Subseries Lecture Notes In

Artificial Intelligence And Lecture Notes In Bioinformatics (15); IFIP Advances In Information And Communication Technology (12); Procedia Computer Science (7); Aip Conference Proceedings, Ceur Workshop Proceedings, Communications In Computer And Information Science, Lecture Notes On Data Engineering And Communications Technologies, Smart Innovation Systems And Technologies (6 documents each); International Journal Of Logistics Research And Applications, Lecture Notes In Information Systems And Organisation, Multimedia Tools And Applications (5 documents each); Applied Sciences Switzerland, International Journal Of Logistics Management, Journal Of Transport And Supply Chain Management, Lecture Notes In Intelligent Transportation And Infrastructure, Logforum, Logistics, Management For Professionals, Studies In Computational Intelligence, Transportation Research Part E Logistics And Transportation Review, Transportation Research Procedia, ZWF Zeitschrift Fuer Wirtschaftlichen Fabrikbetrieb (4 documents each) (Fig. 2).

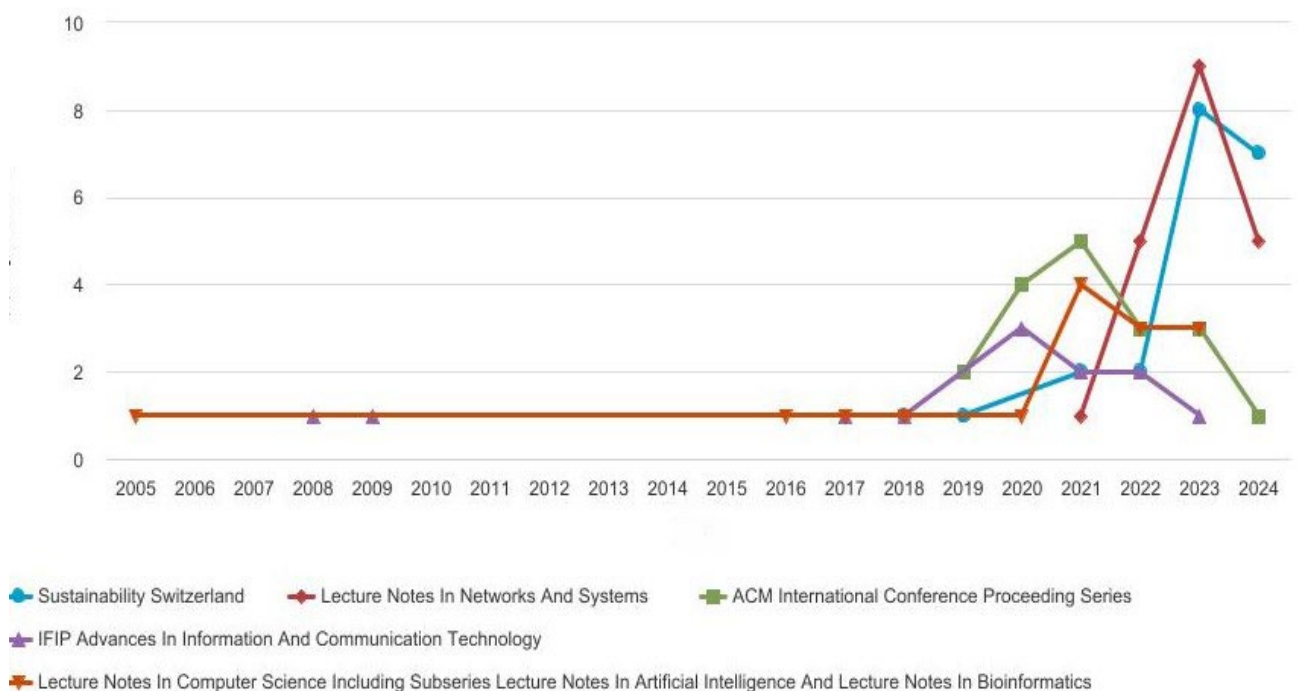


Figure 2 – Dynamics of the number of scientific publications by sources
 Source: built on the basis of data from the Scopus scientometric database.

The Scopus database contains 5 documents by scientists J. Pahl, S. Voß; 4 by F. Behrendt, A. Gunasekaran, N. Schmidtke, M.

Woschank, J. Zhang; 3 works by A. Al-Banna, A. Appolloni, J. Arambarri (Fig. 3).

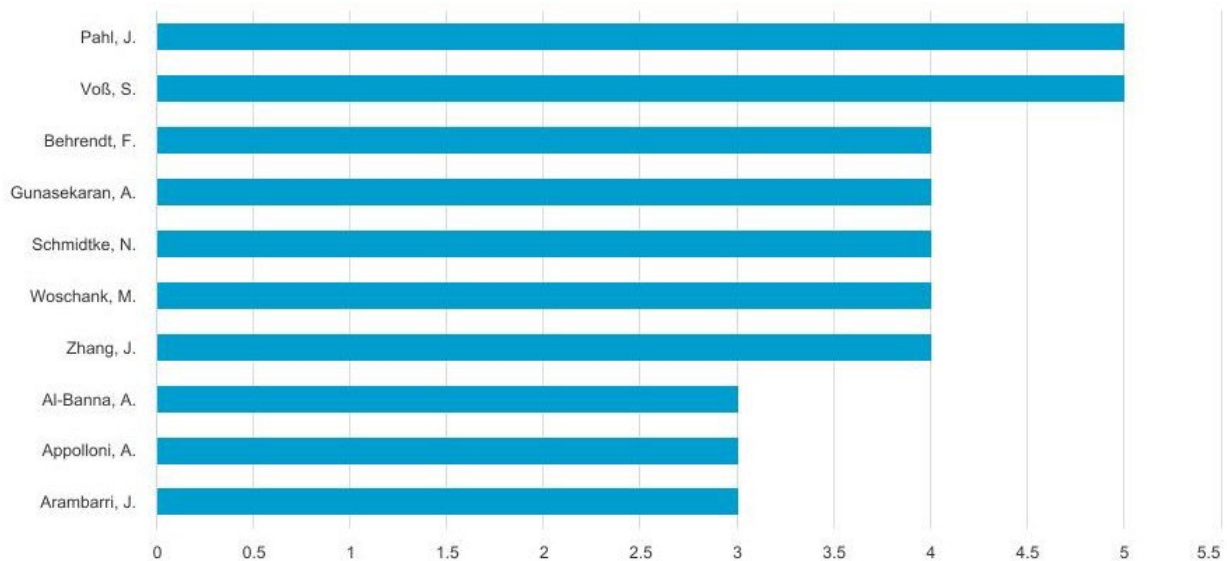


Figure 3 – Dynamics of the number of scientific publications by authors
Source: built on the basis of data from the Scopus scientometric database.

The key organizations involved in solving the problems of organizing logistics activities in the context of digitalization are: Technische Universität Dortmund (9 documents); Universität Hamburg, Universidad Politécnica de Madrid, Tallinna Tehnikaülikool, Universidad Peruana de Ciencias Aplicadas (8 works each); Technische Universität München

(7); Ministry of Education of the People's Republic of China, Tecnológico de Monterrey, Vellore Institute of Technology, Syddansk Universitet, Shanghai Maritime University, Università degli Studi di Roma Tor Vergata, Montanuniversitat Leoben, Tongji University (5 documents each) (Fig. 4).

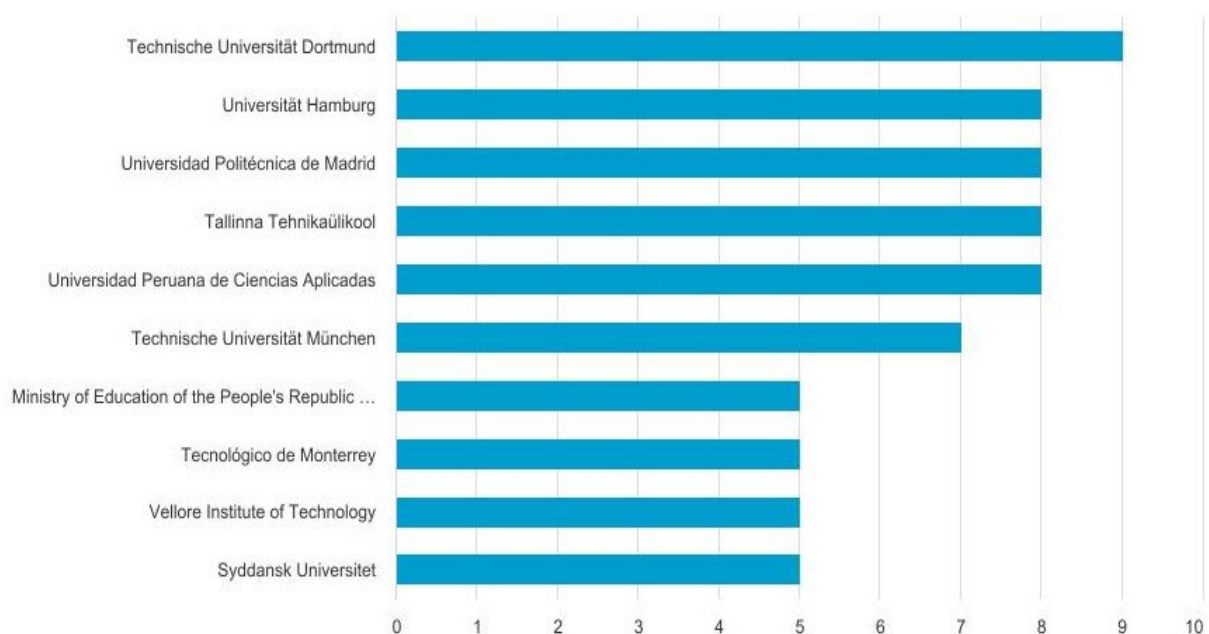


Figure 4 – Number of scientific publications by organization
Source: built on the basis of data from the Scopus scientometric database.

The results of the analysis show that most of the works on the researched issues are published by scientists from China (196 documents), Germany (106), India (86), USA (66), Great Britain (44), Italy (40), France (32),

Spain (30), Turkey (29), Australia (21), Poland (20 documents). In Ukraine, 19 documents were found using the specified search criteria (Fig. 5).

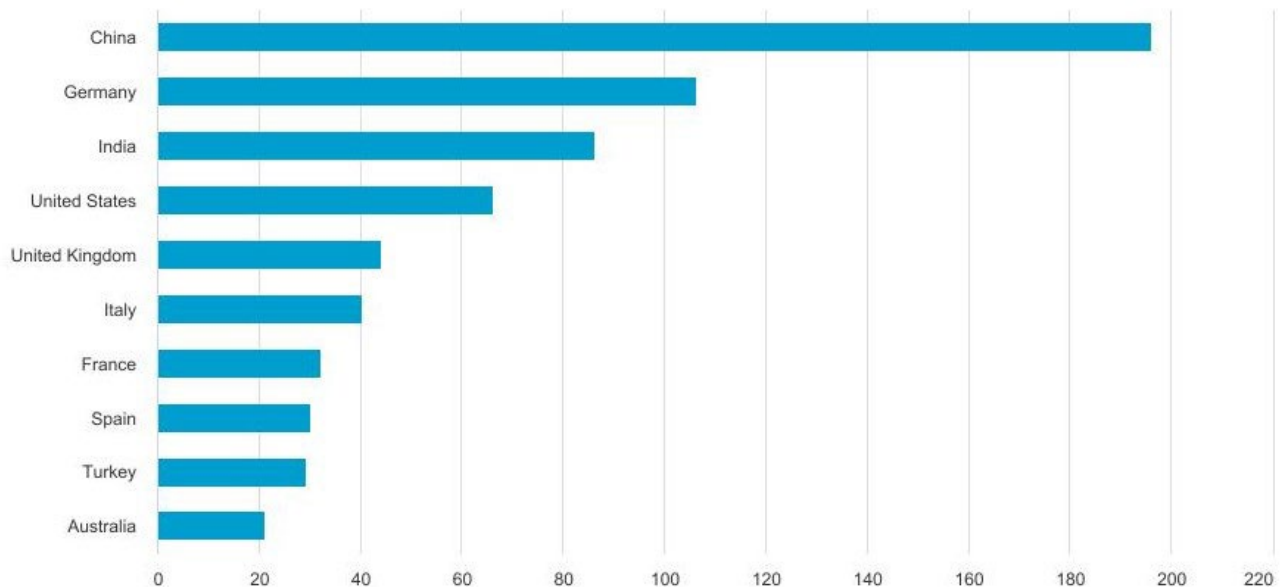


Figure 5 – Number of publications on the issues of digital transformation of logistics activities by country

Source: built on the basis of data from the Scopus scientometric database.

Most of the scientific works of the problems of digitalization of logistics activities of companies are published in the following fields of knowledge: computer science (425 documents); engineering (381); business, management and accounting (266);

decision sciences (176); social sciences (151); economics, econometrics and finance (98); energy (73 documents) (Table 2). All this indicates the multifaceted and multidisciplinary nature of the chosen research topic.

Table 2 – Total number and share of scientific publications by field of knowledge

Field of knowledge	Number of publications	Share of scientific publications, %
Computer science	425	20.6
Engineering	381	18.5
Business, management and accounting	266	12.9
Decision sciences	176	8.5
Social sciences	151	7.3
Economics, econometrics and finance	98	4.7
Energy	73	3.5

Source: built on the basis of data from the Scopus scientometric database.

The ranking of scientific works by document types is given in Table 3. As we can see, most scientists highlight the problems of implementing digital technologies for

transforming the logistics activities of enterprises in scientific articles and test them at conferences of various levels.

Table 3 – Number and share of scientific publications by document types

Type of publication	Number of scientific publications	Share of scientific publications, %
Articles	442	45.1
Conference proceedings	334	34.1
Part of a book or section of a monograph	90	9.2
Review articles	27	2,8
Books or monographs	18	1.8

Source: built on the basis of data from the Scopus scientometric database.

Among the main sponsors that finance scientific publications on the selected research topic, the following can be mentioned: National Natural Science Foundation of China (35 documents); European Commission (15); Horizon 2020 Framework Programme (14); Deutsche Forschungsgemeinschaft (8); Bundesministerium für Bildung und Forschung, Ministry of Science and Technology of the People's Republic of China (7 each); National Key Research and

Development Program of China, National Office for Philosophy and Social Sciences (6 each); Conselho Nacional de Desenvolvimento Científico e Tecnológico, Fundação para a Ciência e a Tecnologia, Ministry of Education of the People's Republic of China (5 each); Bundesministerium für Wirtschaft und Energie, European Regional Development Fund, Fundamental Research Funds for the Central Universities, H2020 Marie Skłodowska-Curie Actions (4 documents each) (Fig. 6).

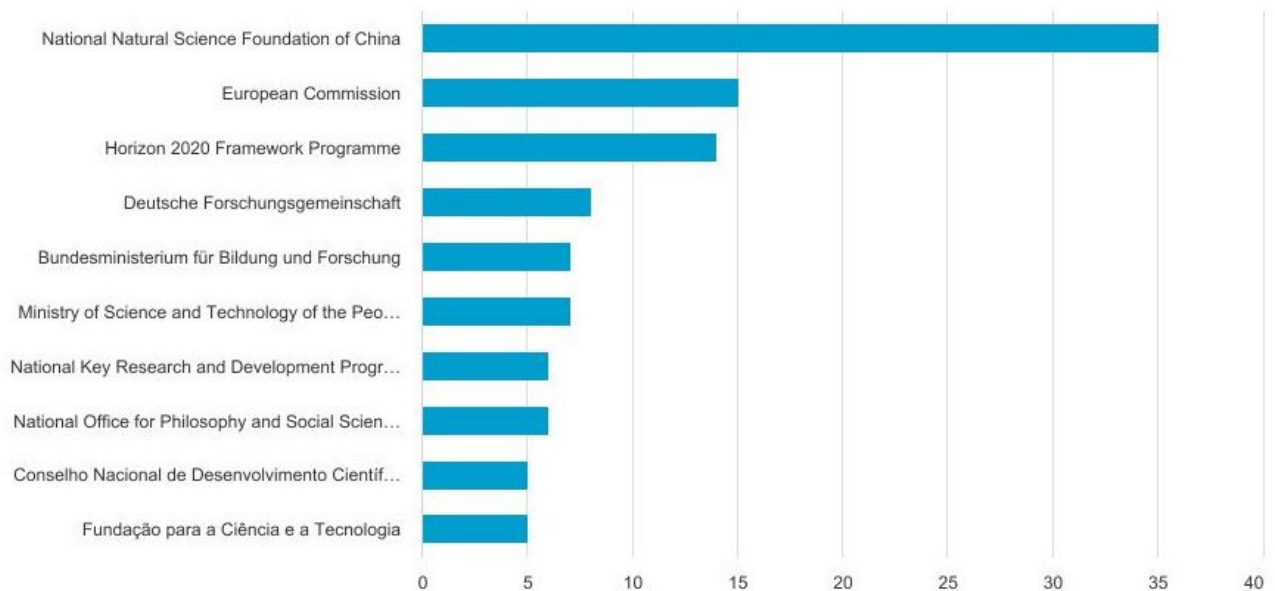


Figure 6 – List of sponsors that finance publications on the digital transformation of logistics processes in countries around the world

Source: built on the basis of data from the Scopus scientometric database.

At the next stage of the study, a search was conducted for publications posted in the international scientometric database Scopus using the following keywords: "information and communication technologies or digital technologies" and "logistics." The search

resulted in 6,025 documents published between 1976 and 2024 (Fig. 7).

If we put the conjunction "and" between the categories "information and communication technologies" and "digital

technologies", we can find only 487 publications for the years 1988-2024 (Fig. 8).

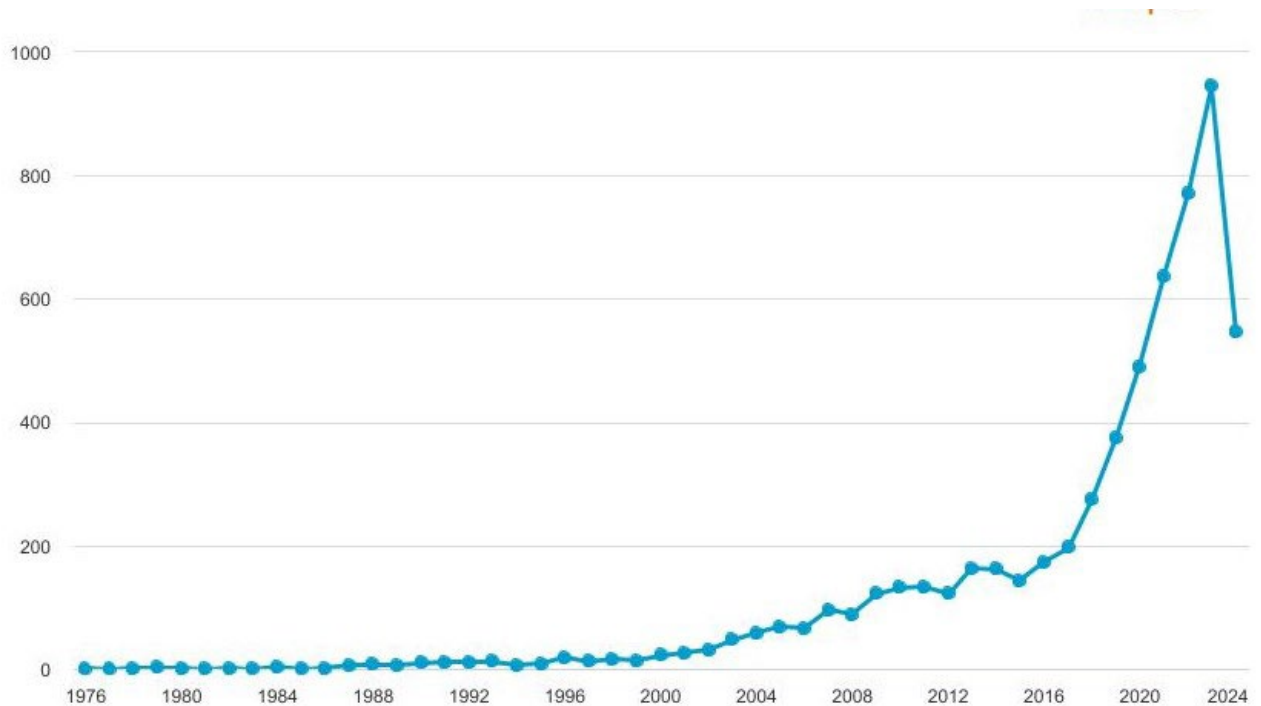


Figure 7 – Dynamics of the number of scientific publications in the Scopus database that cover the issue of ICT implementation in the field of logistics
Source: built on the basis of data from the Scopus scientometric database.

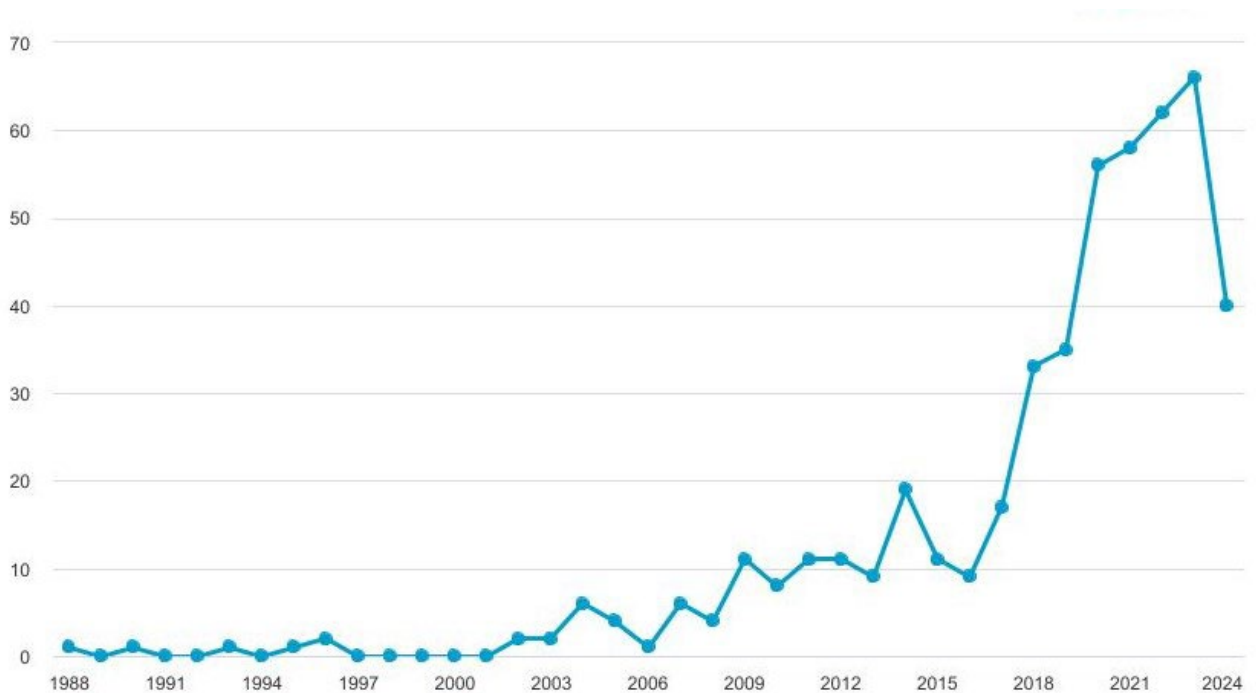


Figure 8 – Dynamics of the number of scientific publications in the Scopus database that cover the issues of implementing ICT and digital technologies in the field of logistics
Source: built on the basis of data from the Scopus scientometric database.

By the title of the articles, abstracts and keywords "information and communication technologies" or "digital technologies" and "logistics activities" in the international scientometric database Scopus, 738 documents were found for the years 1984-

2024 (Fig. 9). As the analysis shows, the publication activity of scientists has begun to grow since 2005. Over the years 2005-2024, the number of publications increased 6.6 times or from 11 to 73. The average annual growth rate was 9.9%.

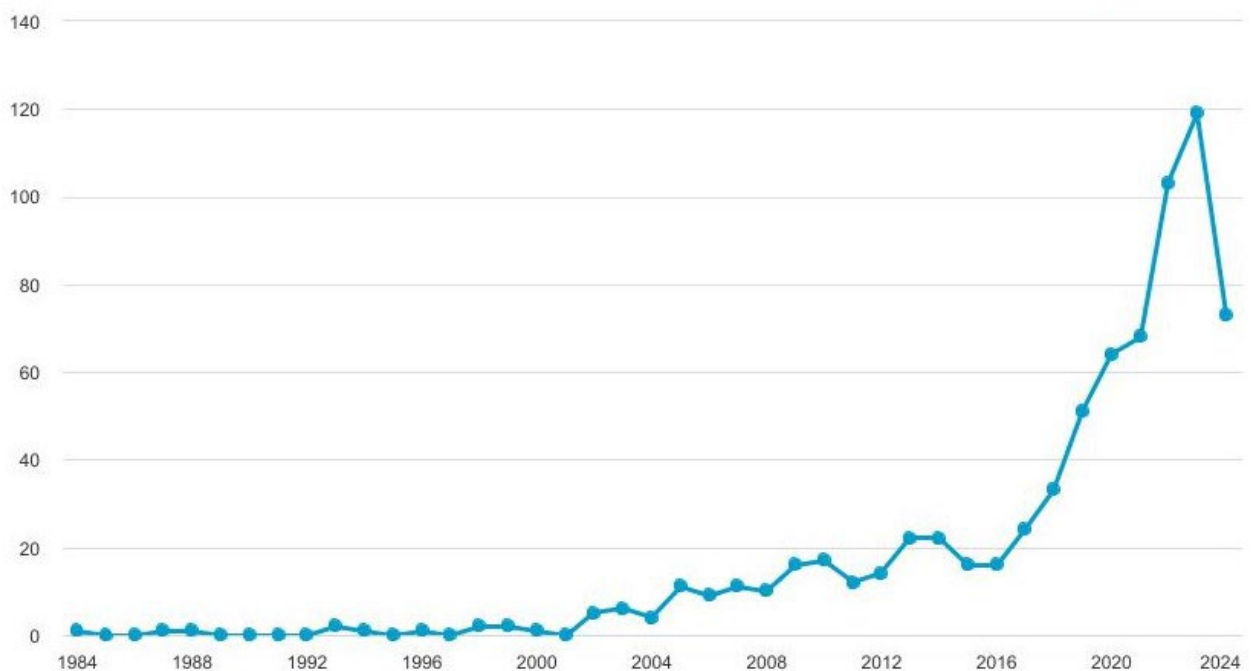


Figure 9 – Dynamics of the number of scientific publications in the Scopus database that cover the issue of implementing ICT or digital technologies in the field of logistics

Source: built on the basis of data from the Scopus scientometric database.

The most frequently used keywords in the publications are logistics (97 documents), information and communication technologies (53), supply chain management (50), digital transformation (39), Industry 4.0 (38), Internet of Things (36), digital technologies (36), artificial intelligence (39 documents).

The most cited scientific works include:

1) Rai A., Patnayakuni R., Seth N. "Firm performance impacts of digitally enabled supply chain integration capabilities" [50] – which states that digital platforms play a crucial role in supply chain management and partnerships that provide increased efficiency for companies. The results indicate that integrated IT infrastructures allow companies to develop higher-level integration capabilities of supply chain processes. This capability allows companies to separate

information flows from physical flows and share information with their supply chain partners to create information-based approaches for better demand planning, for locating and moving physical products, and for optimizing large and complex financial workflows. . In addition, the ability to integrate the supply chain with IT support leads to significant and sustainable improvements in firm performance, especially in operational excellence and revenue growth. Managerial initiatives should be aimed at developing an integrated IT infrastructure and using it to create process capabilities for integrating resource flows between the firm and its supply chain partners;

2) Bosona T., Gebresenbet G. "Food traceability as an integral part of logistics management in food and agricultural supply

Table 4 – Characteristics of clusters of keyword phrases in scientific research on the problems of digitalization of logistics processes

Cluster	Most used terms	Number of keywords	Related keywords
1 (red)	time	182	Concept, supply chain, supply chain management, digital supply chain, logistics, logistics activity
2 (green)	participant	157	Behavior, logistics model, ICTs, digital divide, digital device, association
3 (blue)	operation	73	Theory, planning, software, algorithm, evaluation, modeling, technologies, networks, risk assessment
4 (yellow)	provider	22	Item, expectation, intervention, self management, smart technology

Source: formed by the authors using the VOSviewer program.

As can be seen from Table 4, each of the clusters symbolizes a separate direction of scientific research on the development of critical infrastructure. The grouped keywords in the first cluster indicate that scientists consider the digital transformation of logistics activities from the perspective of temporal changes. Particular attention is paid to digital supply chains and supply chain management.

The second cluster takes into account the principles of partnership and cooperation in organizing logistics activities in the context of digitalization. The third cluster is related to the issues of planning and modelling logistics processes and risk assessment. The fourth is aimed at the work of providers using smart technologies.

Secondary clusters include the 5th cluster (purple), which contains 12 keywords; the 6th (turquoise) – 8 words; the 7th (orange) – 2 keywords.

The last stage of our research is to determine the contextual and temporal

patterns of the development of scientists' views on the problems of digital transformation of logistics activities of enterprises using trend analysis.

Trend analysis using the Google Trends tool confirms the high level of interest worldwide in the topic of "digital transformation" (average 71 points) (Fig. 11). Thus, at present, there is a pattern in the use of such concepts as digital business transformation, business transformation, digital transformation management, digital strategy, digital technologies. Among the leaders in popularity are the following topics: digital transformation (100 points); digital business transformation (58); business transformation (57); digital strategy transformation (34); digital transformation management (30); digital technology (28); digital industry transformation (28); digital transformation technology (28); digital data transformation (27); digital transformation services (26 points).

● digital transformation ● Logistics activity

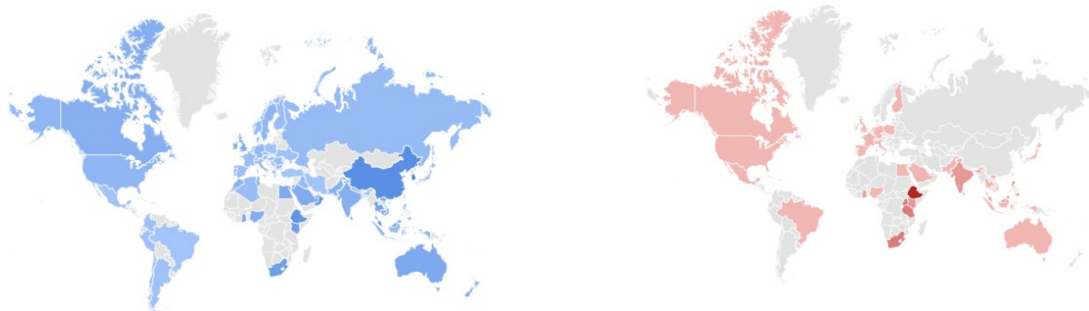


Figure 11 – Popularity of user searches for the topics “Digital transformation” and “Logistics activity” in the world since 2020-2024 Note: colour intensity depends on the percentage of queries.

Source: built using the Google Trends tool.

It should be noted that the query for the concept of “logistics” has a low level of popularity in the world (on average 1 point). The most popular queries are logistics, logistics management, supply chains. The

leaders in user searches include logistics (93 points); logistics management (35); supply chain (30); value added chain (19); supply chain management (18 points) (Fig. 12).



a) Digital transformation

b) Logistics activity

Figure 12 – Popularity of selected topics by world region for 2020-2024 Note: colour intensity depends on the percentage of queries.

Source: constructed using Google Trends tools.

The results of trend analysis using Google Trends tools are shown in Fig. 13.



Figure 13 – Dynamics of search frequency changes in terms of definitions “Digital transformation” and “Logistics activities” in the world

Notes: digital transformation (blue), logistics activities (red).

Source: built using the Google Trends toolkit.

As trend analysis shows, in most countries of the world in the last five years, topics related to the development of the concepts of digital, intelligent logistics, smart logistics and logistics 4.0 have been popular (Fig. 14, 15). At the same time, in most countries of the world,

various aspects of the development and implementation of digital logistics and smart logistics development strategies are gaining popularity and prevalence among search sources (Table 5).

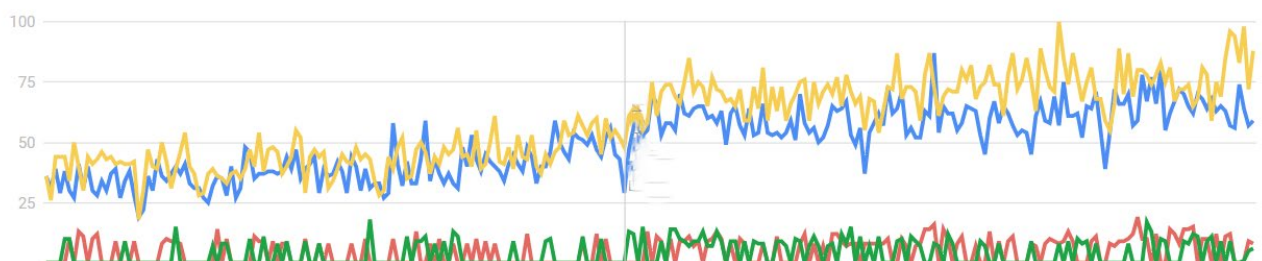


Figure 14 – Dynamics of search frequency changes in terms of definitions “Digital Logistics”, “Intelligent Logistics”, “Smart Logistics”, “Logistics 4.0” in the world for the period 2020-2024

Notes: Digital Logistics (blue colour), Intelligent Logistics (red), Smart Logistics (yellow), Logistics 4.0 (green).

Source: built using Google Trends tools.

- digital logistics
- Intelligent logistics
- Smart logistics
- Logistics 4.0

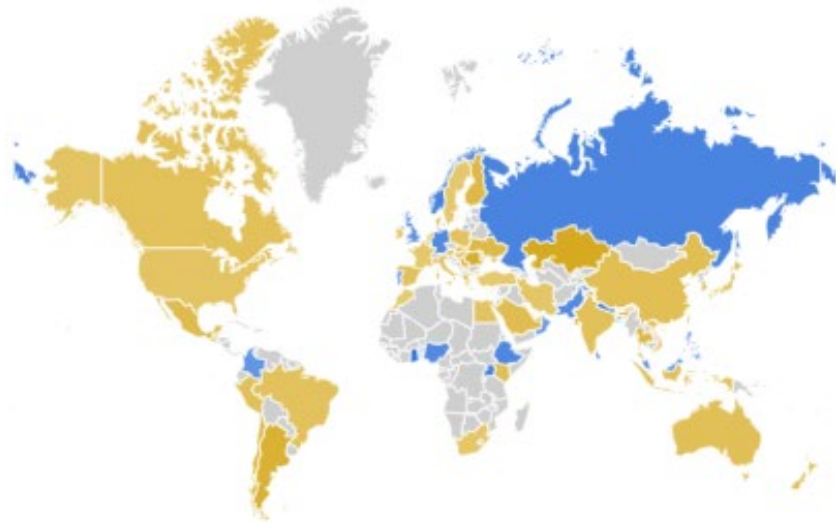


Figure 15 – Popularity of selected topics by world region for 2020-2024
 Note: colour intensity depends on the percentage of queries.
 Source: built using Google Trends tools.

The most common user search queries in countries around the world include: digital marketing (100 points), Industry 4.0 (100), smart tracking (100), digital supply chain (76),

logistics management (64), smart city (52), supply chain 4.0 (39), smart logistics (23 points).

Table 5 – Level of interest in the topic by world regions, %

Region	Search queries			
	Digital Logistics	Intelligent Logistics	Smart Logistics	Logistics 4.0
Norway	61	0	39	0
Germany	55	10	27	8
Singapore	54	5	36	5
UK	47	10	39	4
Denmark	46	0	54	0
USA	44	8	46	2
Korea	42	4	43	11
Switzerland	41	11	38	10
Canada	40	6	51	3
Portugal	39	12	32	17
Poland	37	6	48	9
Ukraine	32	8	60	0
Japan	30	9	52	9
China	24	22	54	0

Note: share of total number of queries in the country.
 Source: built using Google Trends tools.

In most countries of the world, in the last five years, there has been a trend of increasing popularity of topics such as the use of digital technologies (average 60 points) and

information and communication technologies (average 7 points) (Fig. 16, Table 6).

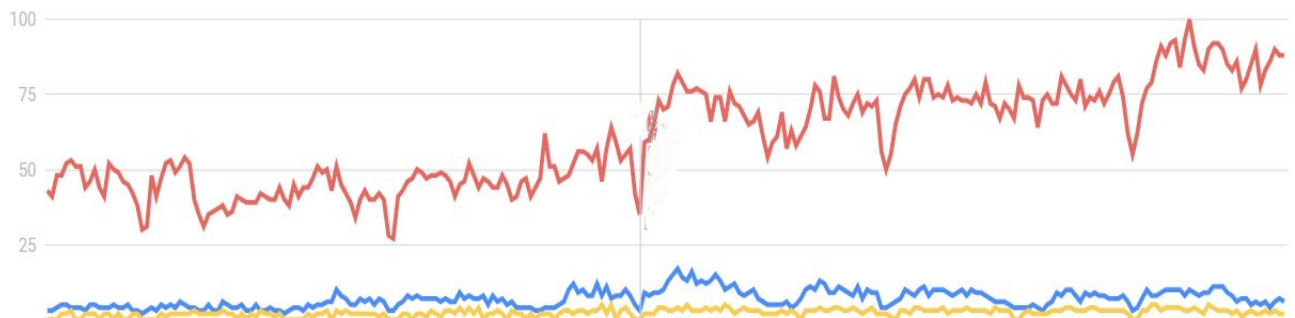


Figure 16 – Dynamics of search frequency changes in the context of the definitions of “Information and communication technologies”, “Digital technologies”, “Logistics activity” in the world for the period 2020-2024

Notes: Information and communication technologies (blue colour), Digital technologies (red), Logistics activity (yellow colour).

Source: built using the Google Trends toolkit.

If we consider Ukraine, it is worth noting that over the past five years, topics related to digital transformations and digital

technologies have been of significant interest in search.

Table 6 – Level of interest in the topic by world regions, %

Region	Search queries		
	ICT	Digital technologies	Logistics activity
Turkey	25	75	0
Portugal	20	80	0
Romania	19	81	0
Slovakia, Ukraine	18	82	0
Czech Republic	14	86	0
Spain	13	86	1
USA	10	84	6
Lithuania	10	90	0
Poland	10	88	2
Korea	9	91	0
China	8	92	0
Canada	8	88	4
Finland	7	88	5
Japan	6	91	3
Italy	5	94	1
Germany	4	95	1
United Kingdom	3	96	1

Note: share of the total number of queries in the country.

Source: built using the Google Trends tool.

Thus, research into trend patterns of publication activity on the digital transformation of logistics activities of enterprises has shown the significant popularity of this issue in academic circles, as well as its permanent growth.

However, based on the results of the trend analysis (based on the analysis of the dynamics of the number of publications on the topic under study, indexed by the Scopus scientometric database, for 1976-2024, analysis of trends in user interest in this issue based on the Google Trends tool for the period 2020-2024), as well as a generalization of the conceptual developments existing in the scientific literature on substantiating the digital transformation of logistics activities, it can be concluded that this problem is complex and multifaceted, it has a synergistic effect on the national economy and is inextricably linked with ensuring economic and food security.

Conclusions. Based on the results of the study, the following conclusions can be drawn. The number of publications indexed in Scopus, the titles, abstracts and keywords of which contain the terms "digital transformation", "information and communication technologies", "digital technologies", "logistics activity" is growing at an accelerated pace every year. Research on transformational changes in logistics activities has been gaining increasing popularity since the 2000s. The main reasons for the growth in the popularity of these scientific studies are: the search for new ideas, the transformation of the logistics management paradigm, the introduction of

the concepts of digital and smart logistics, the activation of the development of digital technologies.

The term "digital transformation of logistics activities" is interdisciplinary in nature, used in research in various fields of science, namely: it is found in publications on engineering, computer science, social sciences, management, economics, decision science, etc.

Visualization of the keyword network map based on bibliographic data allowed us to identify 7 clusters that characterize key areas of research: temporal changes, principles of partnership and cooperation, operational management, provider services using smart technologies.

The leaders in the number of publications indexed in the international scientometric database Scopus and containing the term "digital transformation of logistics activities" are China, Germany, India, the USA, Great Britain, Italy, France, Spain, Turkey, etc.

It should be emphasized that the transformation of logistics activities of companies in publications is mostly considered from the perspective of the application of digital technologies. This, in turn, requires the formation of fundamentally new approaches to the organization of logistics activities based on digitalization. This is also confirmed by the bibliometric analysis, which identified gaps and possible directions for further scientific research. One of such gaps is insufficient substantiation of the strategy for the digital transformation of logistics activities of enterprises. This issue requires special attention and may become a direction for further scientific research.

References

1. Terrar, D. (2015). What is Digital Transformation? February 15. Retrieved from: <http://www.theagileelephant.com/what-is-digital-transformation/> (Last accessed: 1.12.2024).
2. PwC (2018). Shifting patterns the future of the logistics industry. February 15. Retrieved from: <https://www.pwc.com/transport> (Last accessed: 1.12.2024).
3. Winkelhaus, S., Grosse, E. (2020). Logistics 4.0: a systematic review towards a new logistics system. *International Journal of Production Research*, 58(1), 18-43.

4. Zaloznova, Yu., Trushkina, N. (2019). Management of logistic activities as a mechanism for providing sustainable development of enterprises in the digital economy. *Virtual Economics*, 2(1), 63-80. [https://doi.org/10.34021/ve.2019.02.01\(4\)](https://doi.org/10.34021/ve.2019.02.01(4)).
5. Trushkina, N., Dzwigol, H., Serhieieva, O., Shkrygun, Yu. (2020). Development of the Logistics 4.0 Concept in the Digital Economy. *Economic Herald of the Donbas*, 4(62), 85-96. [https://doi.org/10.12958/1817-3772-2020-4\(62\)-85-96](https://doi.org/10.12958/1817-3772-2020-4(62)-85-96).
6. Trushkina, N. (2019). Development of the information economy under the conditions of global economic transformations: features, factors and prospects. *Virtual Economics*, 2(4), 7-25. [https://doi.org/10.34021/ve.2019.02.04\(1\)](https://doi.org/10.34021/ve.2019.02.04(1)).
7. Hryhorak, M., Trushkina, N., Popkowski, T., Molchanova, K. (2020). Digital transformations of logistics customer service business models. *Intellectualization of Logistics and Supply Chain Management*, 1, 57-75. <https://doi.org/10.46783/smart-scm/2020-1-6>.
8. Kwilinski, A., Hnatyshyn, L., Prokopyshyn, O., Trushkina, N. (2022). Managing the Logistic Activities of Agricultural Enterprises under Conditions of Digital Economy. *Virtual Economics*, 5(2), 43-70. [https://doi.org/10.34021/ve.2022.05.02\(3\)](https://doi.org/10.34021/ve.2022.05.02(3)).
9. Kwilinski, A., Trushkina, N., Birca, I., Shkrygun, Yu. (2023). Organizational and Economic Mechanism of the Customer Relationship Management under the Era of Digital Transformations. *E3S Web of Conferences*, 456, 05002. <https://doi.org/10.1051/e3sconf/202345605002>.
10. Khaustova, V., Kyzym, M., Trushkina, N., Khaustov, M. (2024). Digital transformation of energy infrastructure in the conditions of global changes: bibliometric analysis. In: *Proceedings of the 12th International Conference on Applied Innovations in IT* (Koethen, Germany, March 7, 2024), 12(1), 135-142. Koethen: Anhalt University of Applied Sciences. <http://dx.doi.org/10.25673/115664>.
11. Harmash, O., Hubarieva, I., Harmash, T., Trushkina, N. (2024). Relationship between the concepts of "digital transformation" and "industry 5.0": bibliometric analysis. *Intellectualization of logistics and Supply Chain Management*, 24, 89-106. <https://doi.org/10.46783/smart-scm/2024-24-10>.
12. Brzozowska, M., Dzedzic, D., Kolasińska-Morawska, K. (2023). Innovations in last mile logistics – analysis of customer satisfaction with the service of delivery logistics operators using parcel machines. *Logforum*, 19(3), 411-422. <https://doi.org/10.17270/J.LOG.2023.852>.
13. Mourtzis, D., Panopoulos, N. (2022). Digital Transformation Process Towards Resilient Production Systems and Networks. In: *Springer Series in Supply Chain Management*. Springer Nature, Switzerland, vol. 20, pp. 11-42. https://doi.org/10.1007/978-3-031-09179-7_2.
14. Pînzaru, F., Dima, A. M., Zbucea, A., Vereş, Z. (2022). Adopting Sustainability and Digital Transformation in Business in Romania: A Multifaceted Approach in the Context of the just Transition. *Amfiteatru Economic*, 24(59), 28-45. <https://doi.org/10.24818/EA/2022/59/28>.
15. Spivakovskyy, S., Jarvis, M., Boiko, O., Robul, Yu., Liulchak, Z., Salo, Ya. (2023). Digitisation of marketing and logistics activities of manufacturing and trading enterprises. *Journal of Law and Sustainable Development*, 11(4), e0945. <https://doi.org/10.55908/sdgs.v11i4.945>.
16. Uribe-Linares, G. P., Ríos-Lama, C. A., Vargas-Merino, J. A. (2023). Is There an Impact of Digital Transformation on Consumer Behaviour? An Empirical Study in the Financial Sector. *Economies*, 11(5), 132. <https://doi.org/10.3390/economies11050132>.

17. Kavka, L., Kodym, O., Cempírek, V. (2018). Smart units in control of logistics processes. *International Multidisciplinary Scientific GeoConference Surveying Geology and Mining Ecology Management, SGEM*, 18(2.1), 701-708. <https://doi.org/10.5593/sgem2018/2.1/S07.089>.
18. Lin, D. et al. (2023). Application of intelligent logistics inventory optimization algorithm based on digital supply chain. *International Journal of Emerging Electric Power Systems*, 24(1), 61-72. <https://doi.org/10.1515/ijeeeps-2022-0128>.
19. Ravi, C. B. et al. (2024). Overview of Internet of Things-Based Smart Logistics Systems. In: *Internet of Things*. Springer Science and Business Media Deutschland GmbH, Berlin, vol. Part F2482, pp. 241-259. https://doi.org/10.1007/978-981-97-0052-3_12.
20. Zhou, F. et al. (2024). Digital Twin-Enabled Smart Maritime Logistics Management in the Context of Industry 5.0. *IEEE Access*, 12, 10920-10931. <https://doi.org/10.1109/ACCESS.2024.3354838>.
21. Hu, T.-I. (2022). Multichannel customer journeys and their determinants: Evidence from motor insurance. *Journal of Retailing and Consumer Services*, 54, 102022. <https://doi.org/10.1016/j.jretconser.2019.102022>.
22. Rahman, N. A. A. et al. (2019). Digitalization and leap frogging strategy among the supply chain member: Facing GIG economy and why should logistics players care? *International Journal of Supply Chain Management*, 8(2), 1042-1048.
23. Tozanlı, Ö., Kongar, E., Gupta, S. M. (2020). Trade-in-to-upgrade as a marketing strategy in disassembly-to-order systems at the edge of blockchain technology. *International Journal of Production Research*, 58(23), 7183-7200. <https://doi.org/10.1080/00207543.2020.1712489>.
24. Vidal Vieira, J. G. et al. (2017). An AHP-based framework for logistics operations in distribution centres. *International Journal of Production Economics*, 187, 246-259. <https://doi.org/10.1016/j.ijpe.2017.03.001>.
25. Ahmad, R. W. et al. (2022). Blockchain in oil and gas industry: Applications, challenges, and future trends. *Technology in Society*, 68, 101941. <https://doi.org/10.1016/j.techsoc.2022.101941>.
26. Alqarni, M. A. et al. (2023). Use of Blockchain-Based Smart Contracts in Logistics and Supply Chains. *Electronics (Switzerland)*, 12(6), 1340. <https://doi.org/10.3390/electronics12061340>.
27. Angstein, N. A., Parung, J. (2024). The use of smart contracts for third-party comparison web logistics. *AIP Conference Proceedings*, 3077(112), 0500532022. <https://doi.org/10.1063/5.0202066>.
28. Arun Kumar, B. R. (2022). Developing Business-Business Private Block-Chain Smart Contracts Using Hyper-Ledger Fabric for Security, Privacy and Transparency in Supply Chain. In: *Lecture Notes on Data Engineering and Communications Technologies*. Springer Science and Business Media Deutschland GmbH, Berlin, vol. 71, pp. 429-440. https://doi.org/10.1007/978-981-16-2937-2_26.
29. Casado-Vara, R. et al. (2019). Smart Contract for Monitoring and Control of Logistics Activities: Pharmaceutical Utilities Case Study. *Advances in Intelligent Systems and Computing*, 771, 509-517. https://doi.org/10.1007/978-3-319-94120-2_49.

-
30. Hasan, H. et al. (2019). Smart contract-based approach for efficient shipment management. *Computers and Industrial Engineering*, 136, 149-159. <https://doi.org/10.1016/j.cie.2019.07.022>.
31. Liu, S., Hennequin, S., Roy, D. (2021). Enterprise platform of logistics services based on a multi-agents mechanism and blockchains. *IFAC-PapersOnLine*, 54(1), 825-830. <https://doi.org/10.1016/j.ifacol.2021.08.097>.
32. Mezquita, Y. et al. (2021). Blockchain-based architecture for the control of logistics activities: Pharmaceutical utilities case study. *Logic Journal of the IGPL*, 29(6), 974-985. <https://doi.org/10.1093/jigpal/jzaa039>.
33. Varriale, V. et al. (2023). Integrating blockchain, RFID and IoT within a cheese supply chain: A cost analysis. *Journal of Industrial Information Integration*, 34, 100486. <https://doi.org/10.1016/j.jii.2023.100486>.
34. Kirkaldy, J. S. (1985). Pattern formation, logistics, and maximum path probability. *Physical Review A*, 31(5), 3376-3390. <https://doi.org/10.1103/PhysRevA.31.3376>.
35. Nath, A. K., Saha, P., Salehi-Sangari, E. (2008). Transforming supply chains in digital content delivery: A case study in apple. *IFIP International Federation for Information Processing*, 255, 1079-1089. https://doi.org/10.1007/978-0-387-76312-5_32.
36. Dialo, A., MacGilavry, K., Uhl, A. (2016). Digital transformation at DHL freight: The case of a global logistics provider. In: *Digital Enterprise Transformation: A Business-Driven Approach to Leveraging Innovative IT*. Taylor and Francis, New York, pp. 263-277. <https://doi.org/10.4324/9781315577166>.
37. Heilig, L., Lalla-Ruiz, E., Voß, S. (2017). Digital transformation in maritime ports: analysis and a game theoretic framework. *NETNOMICS: Economic Research and Electronic Networking*, 18(2-3), 227-254. <https://doi.org/10.1007/s11066-017-9122-x>.
38. Holmström, J., Partanen, J. (2014). Digital manufacturing-driven transformations of service supply chains for complex products. *Supply Chain Management*, 19(4), 421-430. <https://doi.org/10.1108/SCM-10-2013-0387>.
39. Holzhauser, K., Schalla, P. (2016). Digital transformation in manufacturing. In: *The Palgrave Handbook of Managing Continuous Business Transformation*. Palgrave Macmillan, London, pp. 273-288. https://doi.org/10.1057/978-1-137-60228-2_12.
40. Jin, Z., Yanping, L. (2009). The co-evolution between companies within E-supply chain management in the era of digital economy. *International Conference on Business Intelligence and Financial Engineering (BIFE 2009)*, 5208931, 84-87. <https://doi.org/10.1109/BIFE.2009.29>.
41. Meier, Ch. (2016). Digital supply chain management. In: *Digital Enterprise Transformation: A Business-Driven Approach to Leveraging Innovative IT*. Taylor and Francis, New York, pp. 231-262. <https://doi.org/10.4324/9781315577166>.
42. Papagiannidis, S., Bourlakis, M., Li, F. (2008). E-fulfilling the e-supply chain of digital print. *International Journal of Information Technology and Management*, 7(1), 98-112. <https://doi.org/10.1504/IJITM.2008.015891>.
43. Rößler, M. Ph., Haschemi, M. (2017). Smart Factory Assessment (SFA): Eine Methodik zur integralen Reifegradbewertung von Produktion und Logistik hinsichtlich Lean und Industrie 4.0. *Zeitschrift für wirtschaftlichen Fabrikbetrieb*, 112(10), 699-703. <https://doi.org/10.3139/104.111800>.

-
44. Zeeb, H. Vision becomes reality – Intelligent solutions for the digital transformation of assembly, production and logistics through Industry 4.0. *ZWF Zeitschrift fuer Wirtschaftlichen Fabrikbetrieb*, 111(11), 759-761. <https://doi.org/10.3139/104.111629>.
45. Weisberg, S. (2005). *Applied Linear Regression: Third Edition*. Wiley Blackwell, Hoboken, New Jersey. <https://doi.org/10.1002/0471704091>.
46. Neumann, W. P., Winkelhaus, S., Grosse, E. H., Glock, C. H. (2021). Industry 4.0 and the human factor – A systems framework and analysis methodology for successful development. *International Journal of Production Economics*, 233, 107992. <https://doi.org/10.1016/j.ijpe.2020.107992>.
47. Kayikci, Y. (2018). Sustainability impact of digitization in logistics. *Procedia Manufacturing*, 21, 782-789. <https://doi.org/10.1016/j.promfg.2018.02.184>.
48. Cichosz, M., Wallenburg, C. M., Knemeyer, A. M. (2020). Digital transformation at logistics service providers: barriers, success factors and leading practices. *International Journal of Logistics Management*, 31(2), 209-238. <https://doi.org/10.1108/IJLM-08-2019-0229>.
49. Garay-Rondero, C. L. et al. (2020). Digital supply chain model in Industry 4.0. *Journal of Manufacturing Technology Management*, 31(5), 887-933. <https://doi.org/10.1108/JMTM-08-2018-0280>.
50. Rai, A., Patnayakuni, R., Seth, N. (2006). Firm performance impacts of digitally enabled supply chain integration capabilities. *MIS Quarterly: Management Information Systems*, 30(2), 225-246. <https://doi.org/10.2307/25148729>.
51. Bosona, T., Gebresenbet, G. (2013). Food traceability as an integral part of logistics management in food and agricultural supply chain. *Food Control*, 33(1), 32-48. <https://doi.org/10.1016/j.foodcont.2013.02.004>.
52. Chang, S. E., Chen, Y. (2020). When blockchain meets supply chain: A systematic literature review on current development and potential applications. *IEEE Access*, 8, 62478-62494. <https://doi.org/10.1109/ACCESS.2020.2983601>.

UDC 327

DOI: <https://doi.org/10.46783/smart-scm/2024-28-6>

JEL Classification: A11, G32, M16.

Received: 11 December 2024

Zahorodnia A.S. PhD in Management, Associate professor of the Department of international relations and political consulting, Institute of law and public relations, Open International University of Human Development "Ukraine" (Ukraine)

ORCID – 0000-0003-2741-1953

Researcher ID –

Scopus author id: – 57822517200

E-Mail: akinterdep@ukr.net

Dr. Manish Sharma PhD in Business Administration, Assistant Professor of the Department of Business Administration, Jaipur School of Business, JECRC University, Jaipur, Rajasthan (India)

ORCID – 0009-0005-4990-0979

Researcher ID –

Scopus author id: –

E-Mail: manish8399@gmail.com

INTERNATIONAL EXPERIENCE IN BUSINESS PROCESS MANAGEMENT: RELATIONS BETWEEN UKRAINE AND THE REPUBLIC OF INDIA

Alona Zahorodnia, Manish Sharma. "International experience in business process management: relations between Ukraine and the Republic of India". *The article explores the concept and classification of business processes, their role in ensuring the efficient operation of enterprises, and creating competitive advantages. Global trends in business process management (BPM) are analyzed, with a focus on India's and Ukraine's experience.*

The key areas of cooperation between Ukraine and India are examined, particularly in the fields of trade, technological solutions, and digitalization. The main challenges and prospects of bilateral relations in the context of current geopolitical and economic changes are outlined. Special attention is given to the potential of leveraging India's experience for the development of business processes in Ukraine, which can contribute to strengthening economic resilience and global market integration.

The main of Effective BPM strategies in supply chain management improve logistics, reduce delays, and ensure transparency.

Keywords: business processes, business process management, automation, digitalization, India, Ukraine, economic cooperation, digital technologies, bilateral relations, international experience

Альона Загородня, Маніш Шарма. «Міжнародний досвід управління бізнес-процесами: українсько-індійські відносини». *У статті досліджено поняття та класифікацію бізнес-процесів, їх роль у забезпеченні ефективної діяльності підприємств та створенні конкурентних переваг.*

Розглянуто світові тенденції у сфері управління бізнес-процесами (BPM) з акцентом на досвід Індії та України.

Проаналізовано основні напрями співробітництва між Україною та Індією, зокрема у сфері торгівлі, технологічних рішень та цифровізації, а також окреслено основні виклики та перспективи двосторонніх відносин у контексті сучасних геополітичних і економічних змін. Особливу увагу приділено потенціалу використання досвіду Індії для розвитку бізнес-процесів в Україні, що може сприяти підвищенню економічної стійкості та інтеграції у світові ринки.

Визначено, що ефективні BPM-стратегії у сфері управління ланцюгами поставок покращують логістику, скорочують затримки та забезпечують прозорість.

Ключові слова: бізнес-процеси, управління бізнес-процесами, автоматизація, цифровізація, Індія, Україна, економічна співпраця, цифрові технології, двосторонні відносини, міжнародний досвід.

Introduction. Business Process Management (BPM) serves as a strategic approach to improving organizational efficiency and competitiveness. In the context of international cooperation, BPM fosters enhanced collaboration by streamlining workflows, improving resource allocation, and fostering innovation. The Ukraine-India relationship offers a compelling case study for examining the interplay of BPM within the frameworks of economic and technological partnerships.

Analysis of recent research and publications. In recent years, the study of business processes and their management has gained significant attention in both academic and professional spheres. H. Binner and other researchers have defined business processes as interrelated actions designed to produce goods or services valued by internal and external stakeholders. Recent studies scientists O. Bordilovska, V. Hlushchevskiyi, O. Nyshenko, R. Shulyar emphasize that business processes consist of interconnected steps that require resource optimization and motivation to achieve common goals and results.

The formulation of the goals of the article is to study the concept and classification of business processes, to analyze global trends in business process management (BPM) on the example of India and Ukraine. The article is aimed at studying cooperation between Ukraine and India in the field of BPM, trade and technological

interaction, identifying key areas for mutual development and overcoming challenges related to geopolitical and economic factors.

Presentation of the main results. The main business processes are formed depending on customer requirements. The output of these processes is finished products or services sold to customers. As a result of sales, the company receives revenues and profits, which are the basis for the company's operation. In turn, the outputs of the supporting business processes are aimed at ensuring the main aspects of the enterprise's activities. The mechanism of supporting business processes is formed depending on the requirements of the enterprise.

Business processes of development are important for the enterprise. The mechanism is formed on the basis of environmental conditions and is designed to adapt existing business processes depending on the impact of changing external factors. In general, this classification allows you to prioritize business processes, their importance and place in the overall model of the business system, choose ways of development, set goals for the implementation of processes and monitor the results.

Today, the concept of "business process" is not new. In modern scientific publications, authors try to give the broadest and most complete definition of the term "business process". The scientist H. Binner believes that a "business process" is a system of interrelated actions, the final results of which are the

production of products/services that are of value to external and internal consumers [9].

Most scholars understand business process management as activities aimed at optimizing, accelerating and improving accuracy, including through the automation of such processes. The main stages of this activity at the enterprise are modeling, implementation, control and optimization of business processes [9].

Thus, business processes are a set of actions and activities that interact with each other in order to create products or services that are valuable to customers [3]. The peculiarity of business processes is that they consist of interrelated steps based on the use of economic resources and motivation to achieve common goals and results [8].

So, above the international experience of cooperation between Ukraine and India in the field of business. Diplomatic relations with the Republic of India are traditionally called friendly and partners, with a high degree of trust and mutual understanding. Recently, the two countries have been able to build a fairly solid base for the development of economic cooperation, trade relations and scientific ties, using the traditions of cooperation of the XX century and common approaches to understanding the modern world [1].

Ukraine and India have long-standing diplomatic relations, established in 1992. Over the years, these ties have expanded to include economic, cultural and scientific cooperation. Ukraine is a significant supplier of machine-building products, technologies and agricultural goods to India, while India is an important partner in the field of pharmaceuticals and information technology.

Ukraine's main exports to India include agricultural products, machinery, and minerals, while India exports pharmaceuticals, chemicals, and IT services. Effective BPM strategies in supply chain management improve logistics, reduce delays, and ensure transparency.

Indian investments in Ukrainian IT companies and the pharmaceutical sector highlight the potential of BPM to optimize

project implementation, improve communication, and monitor performance.

India's Business Process Management Landscape. From last number of years India has been a leader in global BPM and outsourcing markets. It is because of a well established Information technology (IT) services sector. The Indian BPM market comprises a wide range of services which include finance & accounting, human resources, customer support, supply chain management etc. India has been favorite country for global outsourcing for rest of the world. It is because of large skilled work force, cost benefits and advanced technological infrastructure.

In India, BPM is evolved with a rapid adoption of automation, AI & machine learning. The latest technologies are creating automation in routine tasks, improve process visibility and enhance decision-making for the companies [11]. The efforts by the tech companies and support by the government is accelerating BPM adoption across various industries such as banking, retail, healthcare etc. As per the survey report of Nasscom, the Indian business process management industry is growing rapidly and is expected to reach USD 100 billion by 2032 [2]. India has the largest concentration of G2000 organizations using and evaluating as delivery locations for BPM services. 60% or the organizations are focusing on digital transformation. In the present era technology emerges as the source of competitive differentiation and more than 90% of the G2000 companies are expected to increase their IT budgets for 10% in coming years. Although there are number of uncertainties such as geopolitics, issues related to macroeconomics, delayed decision making etc. play a vital role in development of BPM in India. In fact, technology and data capabilities emerge as the most important value creation levers to drive BMP for growth.

Revenue generated by BPM industry in India. The growth of BPM industry in India is tremendously high in past few decades. Here

is a table presenting the growth and revenue (tab. 1) [5].

Table 1 – Revenue generated by BPM industry in India

Year	Revenue Generated (USD Billion)	Growth Rate (%)	Export Revenue (USD Billion)	Domestic Revenue (USD Billion)
2019-2020	190.5	7.9	146	44.5
2020-2021	194	2.3	150	44
2021-2022	227	17	170	57
2022-2023	245	7.9	194	51
2023-2024	276	12.7	216	60

Course: Department of Commerce, Ministry of Commerce and Industry, New Delhi

Emerging Roles in Business Process Management (BPM) in India. With the evolve of BPM in India, certain new roles are also emerging to meet the needs of rapidly changing business environment. This field has been reshaped with the integration of advanced technologies and focus on customer centric processes. Following are the emerging key roles-

Business Analyst. Business Analysts play a crucial role in BPM by assessing and optimizing business processes. They are the key mediator between technical teams and the business stakeholders. They identify inefficiencies and propose better solutions. Further they analyse current processes for improvement, collaborate with the IT teams for technological solutions etc.

Strategy Manager. Strategy managers are responsible to align BPM initiatives with the master business strategies. They play a critical role in formulating growth strategies and ensure support of every process for organizational goals. Their primary functions include analysing the market trends, structuring workflows, setting metrics for performance to evaluate success etc.

Automation Specialists. Automation is treated as an integral part to BPM. Automation specialists are the key players who focus on integrating robotics process automation and other technologies into

existing flow of work. Their responsibilities within the company are identifying suitable processes for automation, to design and implement automated solutions, to monitor the performance of automated processes to ensure effectiveness.

Data Analysts. Decision making is one of the most important function of any business organization. Data analysts play a vital role in leveraging data driven insights for decision making for organizations. Further their role involves collection and analysing the data relate to business processes of the organization, creation of dashboards and reports to provide performance metrics, recommending process adjustments based on different data findings etc.

The BPM landscape is evolving in India rapidly. With the help of technological advancements and changing market demands the need of BPM is on hike. There are many more roles reflect the need for skilled professionals who can be a part of these changing needs. Organizations focus efficiency and customer satisfaction on high priority. Thus these emerging roles for skilled professionals become crucial in shaping the future of BPM in India.

Trade between Indian and Ukraine: Bilateral trade between the two countries had grown steadily to reaching US\$ 3.386 billion in 2021-2022 (Department of Commerce,

GOI). However, the bilateral trade declined in the last two years due to the challenges posed by the Russia-Ukraine conflict including

logistical issues. The trade figures for the last 5 years are presented in the tab. 2.

Table 2 – Values in US\$ Millions

Year	2019-2020	2020-2021	2021-2022	2022-2023	2023-2024
Indian Exports	46381	450.97	472.68	132.68	173
Import from Ukraine	2060.79	2139.86	2913.61	650.26	540
Total Trade	2765.14	2590.83	3386.29	782.94	713

Course: Department of Commerce, Ministry of Commerce and Industry, New Delhi

Overview of India-Ukraine Cooperation in Business Process Management. There is a significant development in relationship between India and Ukraine. The evolvement of BPM is one of the major attraction in between both of the nation. This cooperation is facilitated through different initiatives and agreements which aim in enhancing economic ties, trade and technological collaboration.

The major key areas of cooperation are:

1. Inter-Governmental Commission (IGC):

The IGC plays a critical role in guiding bilateral cooperation across number of sectors. These sectors include trade, economic cooperation, technology, pharmaceuticals etc. [10]. The commission focuses to boost trade and investment. This includes enhancing bilateral trade and exploring new areas of economic collaboration. Recent meetings between the officials of two nations have focused on revitalizing trade relations that have diminished because of conflict.

2. Agreements and initiatives: In terms of recent high-level contacts, Prime Minister Shri Narendra Modi and the President of Ukraine, President Volodymyr Zelenskyi have had three bilateral meetings on the margins of multilateral events. There were four significant agreements were signed which includes agriculture, pharmaceutical and humanitarian assistance [4]. These

agreements will play a vital role in enhancing the ease of doing business between India and Ukraine.

3. Digital and technological collaboration: Both of the countries want to enhance their digital public infrastructure. For example the DIIA app of Ukraine can be a potential model for improving governance in India whereas the electronic voting systems in India can be useful in Ukraine [6].

It should be noted that on August 23, 2023, Ukraine and India signed agreements on cooperation in the medical, agricultural, humanitarian and cultural spheres. They were agreed upon during the visit of Indian Prime Minister Narendra Modi to Ukraine. A joint statement "On Building a Strategic Partnership between Ukraine and India, Development of Trade and Military-Technical Cooperation" was also prepared during this visit.

Conclusions. Based on the analysis of the scientific study, business processes are systems of interrelated actions aimed at creating products or services that are valuable to consumers. Core business processes focus on the final product or service, while supporting processes ensure key aspects of enterprise activities, such as resource management and informational support.

India holds a leading position in the global business process management (BPM) and outsourcing market due to its large pool of skilled professionals, advanced

technological infrastructure, and relatively low labor costs. Key BPM service directions include finance, supply chain management, human resource support, and customer service.

The Indian BPM sector is rapidly adopting automation, artificial intelligence (AI), and machine learning (ML), which enable process optimization, enhance transparency, and facilitate data-driven decision-making.

The development of BPM in India has led to the emergence of new roles, such as business analysts, strategy managers, automation specialists, and data analysts. These roles form the foundation of modern BPM, focusing on efficiency and customer satisfaction.

Cooperation between Ukraine and India shows positive prospects due to intergovernmental agreements and initiatives covering economic, technological, healthcare, and digital transformation areas. Both nations aim to enhance digital

infrastructure and share expertise in implementing electronic governance solutions.

Despite logistical challenges posed by the conflict and geopolitical factors, both countries continue to work toward restoring and expanding economic relations. Recent agreements in healthcare, agriculture, and humanitarian assistance are expected to facilitate business processes and foster economic cooperation.

Business processes play a crucial role in building the competitive advantages of enterprises. India's experience in BPM demonstrates the potential of automation and digitalization to enhance business efficiency. Strengthening Ukraine-India cooperation in technology and BPM could become a significant factor for economic growth and global market integration for both nations.

References

1. Bordilovska, O. (2020). Modern Ukrainian-Indian relations. Retrieved from: <http://ud.gdip.com.ua/wp-content/uploads/2020/02/1-2018-65.pdf>.
2. Business Process Management Trends for 2024. Retrieved from: <https://www.boc-group.com/en/blog/bpm/business-process-management-trends-for-2024>.
3. Hlushchevskyi, V. V. (2015). Modeling of flow processes of distribution of resources and products on the network of business processes of the enterprise. Bulletin of KNUTD: Series «Economic Sciences», No. 2 (85), Pp. 139-148.
4. India IT-BPM Exports Revenue: USD: IT Services: Outsourcing: Application Management. Retrieved from: <https://www.ceicdata.com/en/india/information-technology-statistics-national-association-of-software-and-service-company-itbpm-exports-revenue/itbpm-exports-revenue-usd-it-services-outsourcing-application-management>.
5. India, Ukraine ink four pacts; resolved to expand defence, trade ties. Retrieved from: <https://economictimes.indiatimes.com/news/defence/india-ukraine-ink-four-pacts-resolved-to-expand-defence-trade-ties/articleshow/112753216.cms>.
6. India-Ukraine Bilateral Relations. Retrieved from: <https://www.mea.gov.in/Portal/ForeignRelation/India-Ukraine-Bilateral.pdf>.
7. India-Ukraine Relations in the Evolving Global Landscape: The Significance of Modi's Historic Visit and Emerging Global Challenges. Retrieved from: <https://plutusias.com/india->

ukraine-relations-in-the-evolving-global-landscape-the-significance-of-modis-historic-visit-and-emerging-global-challenges.

8. Nyshenko, O. V. (2015). Approaches to the definition and classification of business processes of a manufacturing enterprise. *Bulletin of Odessa National University*, Vol. 20, No. 5, Pp. 127–131.

9. Shulyar, R.V. (2018). *Development of economic and managerial tools for ensuring business processes: modeling, regulation and economic justification: monograph*. Lviv: Lviv Polytechnic Publishing House, 276 p.

10. The Evolution of BPM Services, Cost, Outcomes, and Growth. Retrieved from: <https://nasscom.in/knowledge-center/publications/evolution-bpm-services-cost-outcomes-and-growth>.

11. The Role of Business Process Management in India's Rising Sector. Retrieved from: <https://www.teleperformance.com/en-us/insights-list/insightful-articles/india/the-role-of-business-process-management-in-india-s-rising-sector>.

UDC 338.2

DOI: <https://doi.org/10.46783/smart-scm/2024-28-7>

JEL Classification: D83, L63, M11.

Received: 12 December 2024

Dabizha V.V. PhD in Public administration, Associate Professor, Associate Professor of the Department of International Relations and Political Consulting, Open International University of Human Development «UKRAINE» (Ukraine)

ORCID – 0000-0002-7000-4635

Researcher ID –

Scopus author id: – 57218620866

E-Mail: verynchik@ukr.net

Dryha D. Yu. postgraduate student of the Department of International Relations and Political Consulting, Open International University of Human Development «UKRAINE» (Ukraine)

ORCID – 0000-0003-4426-7551

Researcher ID –

Scopus author id: –

E-Mail: dimadriga6@gmail.com

Pyskun D.V. postgraduate student of the Department of International Relations and Political Consulting, Open International University of Human Development «UKRAINE» (Ukraine)

ORCID – 0000-0002-7000-4635

Researcher ID –

Scopus author id: –

E-Mail: piskundmitro90@gmail.com

COMMUNICATIONS MANAGEMENT IN MODERN ENTERPRISES: STRATEGIC, OPERATIONAL AND TACTICAL APPROACHES

Vira Dabizha, Dmytro Druha, Volodymyr Pyskun. *"Communications management in modern enterprises: strategic, operational and tactical approaches". This article explores the role of communication as a fundamental element of enterprise management and its influence on internal and external organizational processes. The study examines the concept of "communication" from multidisciplinary perspectives, including sociology, psychology, and management science, emphasizing its importance for effective decision-making and interaction within organizations.*

Special attention is paid to the levels of communication management – strategic, operational, and tactical – each of which has specific goals, methods, and tools. The proposed methodological approach to communication management highlights the significance of modern digital platforms, feedback systems, and innovative strategies to improve the efficiency of information exchange.

The article concludes that the implementation of an integrated communication system enhances an organization's competitiveness, supports corporate culture development, and provides a foundation for sustainable and innovative growth.

Keywords: communication, management, information flow, strategic communication, feedback, digital platforms, organizational processes

Віра Дабіжа, Дмитро Дрига, Володимир Пискун. «Управління комунікаціями в сучасних підприємствах: стратегічний, операційний та тактичний підходи». У статті досліджено роль комунікації як фундаментального елементу управління підприємством та її вплив на внутрішні й зовнішні процеси організації. Розглянуто поняття «комунікація» з міждисциплінарних позицій, зокрема соціології, психології та науки управління, із акцентом на її значенні для ефективного прийняття рішень та взаємодії в організаціях.

Особливу увагу приділено рівням управління комунікаціями стратегічному, операційному та тактичному кожен із яких має специфічні цілі, методи та інструменти. Запропонований методологічний підхід до управління комунікаціями підкреслює значення сучасних цифрових платформ, систем зворотного зв'язку та інноваційних стратегій для підвищення ефективності обміну інформацією.

Зроблено висновок, що впровадження інтегрованої комунікаційної системи підвищує конкурентоспроможність підприємства, сприяє розвитку корпоративної культури та створює умови для стійкого інноваційного розвитку.

Ключові слова: комунікація, управління, інформаційні потоки, стратегічна комунікація, зворотний зв'язок, цифрові платформи, організаційні процеси

Introduction. In the context of rapid digitalization of society and the development of information and communication technologies, communication has become an integral part of management processes in modern organizations. Effective communication ensures the coordination of actions between structural units, supports corporate culture, and forms the foundation for implementing innovative changes. The development of digital platforms, data exchange tools, and feedback systems has significantly expanded the capabilities of communication channels, contributing to the improvement of decision-making speed and quality.

The relevance of this study lies in the fact that communication is no longer limited to the mere transmission of information but serves as a strategic tool that enables enterprises to quickly adapt to changes in the external environment and ensure effective interaction at all management levels. Effective communication management contributes to the formation of competitive advantages,

which is critical for modern companies in a globalized economy.

This article examines both the theoretical aspects of communication and practical methods for improving its effectiveness. In particular, the study focuses on the strategic, operational, and tactical levels of communication management and emphasizes the importance of implementing modern information technologies to optimize data exchange. Thus, the research covers an analysis of existing theoretical concepts as well as recommendations for the practical application of communication methods in the activities of enterprises across various industries.

Analysis of recent research and publications. The study of communication processes in organizations has attracted significant attention from scholars across various disciplines. Researchers have explored different aspects of communication, focusing on its role in decision-making, organizational behavior, and interaction between individuals and groups.

Classical communication theories have been developed by prominent scholars such as W. Schramm, who emphasized that communication is inherently a human activity, requiring mutual understanding between participants. G. Simon linked communication processes to organizational management, defining communication as the transfer of decision premises within an organization, which is vital for forming organizational behavior. G. Pochetsov considered communication as a process of accelerating information exchange, highlighting its efficiency-oriented nature.

Recent research emphasizes the role of digital platforms, automation, and artificial intelligence in optimizing communication channels. Studies highlight that effective communication is closely linked to the use of modern tools, such as customer relationship management (CRM) systems, internal corporate platforms, and feedback systems that enhance information flow and decision-making transparency.

Despite the abundance of studies on communication, gaps remain in the understanding of the integration of strategic, operational, and tactical communication management. Additionally, the dynamic nature of the external environment and the rapid evolution of information technologies require constant updates to communication management methodologies.

This study builds upon previous research by proposing an integrated approach to communication management, aimed at enhancing the flexibility, adaptability, and overall efficiency of organizational information flows. The analysis of recent findings serves as a basis for developing practical recommendations for improving communication processes at all levels of enterprise management.

The objective of this article is to determine the role of communication in the enterprise management system, analyze its functions and levels of implementation, and develop a methodological approach for effective management of information flows.

Presentation of the main results. In the era of information civilization and the development of the latest technologies and communication, it is impossible to imagine a modern organization without communication links, information and communication technologies, which are now able to radically change the way communications are managed in enterprises.

The word "communication" comes from the Latin *communicatio* ("communication, transmission"), which is related to the verb *communico* ("to make common; to communicate; to connect"), which is derived from *communis* ("common") [6].

Communication is the most important element of a management system. Therefore, communication is understood as the process of exchanging information between people using various signs, symbols, and methods of communication.

The concept of "communication" is the object of study of many sciences: philosophy, semiotics, sociology, psychology, technical sciences, etc. Each of the sciences investigates certain aspects of communications. Thus, philosophy speaks of the interaction of objects of any nature; semiotics studies the properties of signs and sign systems that function in society, natural and artificial languages, and the features of the symbolic behavior of animals and humans; sociology considers communications in terms of studying the laws and mechanisms of social interaction of social subjects, the social conditioning of norms, stereotypes of communication and behavior, and the formation of public opinion; psychology studies individual and group psychophysiological features of communication; technical sciences study the possibilities and methods of transmitting, processing, and storing information in the process of communication.

Communication theorist V. Schramm: "Communication is what is carried out by people. By itself, without people, it does not exist. To understand the process of human

communication, you need to understand how people communicate with each other" [12].

Researcher H. Pocheptsov proposes to define communication "as a process of accelerating information exchange" [10].

Scientist H. Simon connects the concept of "communication" with the management process, in particular, the formation of organizational behavior: "Communication can be formally defined as the process of transferring the prerequisites of a decision from one member of the organization to another. Obviously, there can be no organization without communication, since then the group cannot influence the behavior of the individual" [4].

So, there are quite a few different interpretations of the concept of "communication". However, it is worth paying attention to the fact that all definitions have something in common: attention is focused on the process of information exchange. Also important for understanding the content of the concept of "communication" is that according to the above definitions, its participants are considered as elements of the system, and communication itself is an element of managerial influence.

Communication is the basis of cooperation in the company, as well as in the personal life of each person. The concept of "communication" is not easy to define, it is a term of broad understanding.

Communication within an enterprise is an integral part of all management actions, and is also the main element that connects and coordinates all activities in a company through people management. In this context, we can understand the communication process as a process of providing, exchanging and receiving information, which should be based on understanding and feedback.

Basically, we can see the meaning of communication in the following types of company activities:

- transmitting news, information and decisions;
- clarifying situations and the state of current affairs of the company;

- persuasion and influence.

Communication in a broader sense can include working with information, summarized in the following types of activities:

- monitoring searching for and understanding the content, collecting, recording and storing information;
- interpretation using information for its intended purpose;
- distribution using information with a certain efficiency in accordance with its value;
- dissemination understanding the meaning of information by all team members;
- implementation practical implementation and use of information to set standards in the company [16].

Therefore, communication is a continuous process of exchanging verbal and non-verbal messages. A prerequisite for communication is a message that must be understood by the addressee (receiver), who, in turn, must respond, taking into account certain time frames. Therefore, communication is a two-way process that is incomplete without feedback (from the addressee to the addressee (sender)) about the understandability of a particular message.

Communicating information to employees and ensuring that all information is involved in the work are essential components of communication for modern companies. For this purpose, companies use certain means of communication [8].

Communication management in enterprises is mainly carried out between employees, and it is a process of information exchange within the team, where the transmission through the communication chain is distributed across departments and between individual employees of the enterprise.

In other words, "communication" is a specific management function that allows, with the correct transfer of information, to ensure reliable connection of all channels of the enterprise and their interaction. Communication as a rapid exchange of information has determined the possibility of

coexistence of human groups of different quantity and quality, and, by and large, has become perhaps the main reason for their long existence [11].

The successful functioning of organizations depends on the links between individual internal variables, the direct and reverse influence of situational factors of the external environment, and the implementation of management functions. None of this is possible without appropriate information flows [7].

Communication is an important component of the effective functioning of an enterprise. In modern organizations, communication has ceased to be an ordinary way of transmitting information. Communication has become an important tool for managing business relationships. The management infrastructure of organizations is made up of information channels, which include: information, communications, and the means to ensure their effective use.

Communications in management are referred to as management processes, and they are connected by the functions of planning, motivation, organization and control.

The quality of management decisions determines the effectiveness of communications in the management system. The entire management system of an organization is permeated with communications (communication). The purpose of communication is to understand and comprehend the transmitted information, because the mere fact of exchanging it does not always ensure the effectiveness of employee communication. The effectiveness of the communication process and the degree of its organization in an organization directly depends on the manager's experience, theoretical knowledge and abilities that will help him or her invent new, more effective methods of communication: master the ability to assimilate and use information and the rational process of information transfer. And if communication is removed from the

workflow, the management of the organization ceases to be manageable, the process of activity becomes uncoordinated and even chaotic [9].

When managing innovative communications, it is necessary to have information about the information needs and capabilities of employees and to master the basic technologies of communication in management [2].

An enterprise is a living organism that cannot exist in the absence of relations within the enterprise and separately from the subjects of the external environment. At the same time, the nature of such relations can be different. For example, Melnyk L.G. [14] distinguishes relations between the owner and the labor collective; between the enterprise and suppliers of material, energy, financial resources; between the enterprise and consumers; between the enterprise and the state, between the enterprise and the higher organization, etc. Accordingly, information is transferred both within the business entity and to other subjects of the micro- and macroenvironment.

Organizational communications can be divided into two separate groups: external (between the organization and its environment) and internal (between divisions and levels of management).

The first group includes communications, which are: "information interaction of the organization with the external environment - the media, consumers, suppliers, other contractors, state regulatory bodies, political and other groups. In this case, various forms are used: marketing and advertising programs are used to sell goods (services); written documentation is required to comply with state regulatory norms; market research is conducted with the help of special organizations, etc [5].

The second group includes communications that arise within the organization in the form of messages, discussions, telephone conversations, etc., and, as a rule, are a reaction to the influence of the external environment. This group

includes communications between different departments, between managers and subordinates, within the department, as well as interlevel and informal communications.

As already noted, communication can occur by various means - in writing, orally, using non-verbal signals, including gestures, facial expressions, body position, and using various channels: orally, in writing, through electronic media. Each of the methods and channels has its advantages and disadvantages, which determines the areas of their use. The sharp complication of the production and sales system, the rapid development of information and computer technologies require the transition to new

management technologies and, first of all, to new communication methods and channels [1].

Under the management of communications in enterprises it is proposed to understand the targeted managerial influence on the exchange of information, to obtain the frequency of data in communication channels through the interaction of several elements of the communication process, which ensures the stability of achieving the established development goals [3].

There are three levels of communications management: operational, tactical and strategic (Tab. 1).

Table 1 –Levels of communications management

No	Levels	Methods of implementation	Ways to achieve goals
1.	Strategic	Communication strategy	A program for achieving the goal for a long-term period that will influence the enterprise and effectively use certain communication resources and create innovative developments for the successful development of the communication environment, as well as lay the foundation for the latest communication strategies and their solutions in the future
2.	Operational	Implementation of various organizational standards	Organizing and conducting operational communication activities aimed at increasing the communication attractiveness of the enterprise
3.	Tactical	Implementation of communication rules	Organizing and conducting tactical communication activities to ensure the clarity and flexibility of information, assessing the communication mechanism of management and developing human resources

Source: compiled by the author

Thus, the emergence of new information and communication systems indicates the growing importance of communications in the functioning of enterprises in various fields of activity. With the development of science and technology, communications in enterprise management began to be considered depending on the specific content with the identification of their varieties that relate to different areas of human activity [15].

So, based on Table 1., we propose to expand our proposed methodological

approach to managing communications in the enterprise.

1. Strategic level. The goal is to form a long-term communication strategy that defines key goals, resources and tools for achieving results.

The implementation methods are:

- development of a strategic communications development program;
- conducting a SWOT analysis to assess external and internal factors influencing communications;

- implementing innovative tools and technologies for the enterprise's communications support.

Ways to achieve goals:

- ensuring the effective use of information resources;
- creating innovative communication products and services;
- forming a sustainable corporate image system;
- involving personnel in building a culture of open information exchange.

2. Operational level. The goal is to implement current communication activities to support the functioning of information flows.

The implementation methods are:

- establishing standards for internal and external communication;
- holding daily meetings and reports for information exchange between departments;
- using electronic means to optimize information transfer (CRM systems, internal platforms).

Ways to achieve goals:

- reducing information barriers between structural units;
- regular monitoring of information flows and adjusting them according to the needs of the company;
- increasing the company's communication attractiveness through rapid data exchange and reports.

3. Tactical level. The goal is to ensure flexibility and transparency of information exchange to perform medium-term tasks.

The implementation methods are:

- establishing communication rules and regulations at the department level;
- training employees in methods of effective communication and information processing;
- implementing feedback mechanisms to assess communication effectiveness.

Ways to achieve the goals:

- conducting internal trainings to develop information skills;

- assessing the effectiveness of communication processes using KPIs (key performance indicators);

- increasing the flexibility and accuracy of transmitted messages through the introduction of digital communication channels.

General recommendations for the implementation of the presented communication system:

1. Using communication platforms that ensure rapid data exchange and integration of teamwork.

2. Supporting transparent information exchange between all levels of management;

3. Regularly assessing the effectiveness of information flows and adjusting communication strategies in accordance with changes in the market and external environment.

The proposed and presented methodology allows you to effectively combine strategic plans with tactical decisions and operational actions to create a holistic communications management system.

Conclusions. Thus, communication is a key element of management and the functioning of an enterprise, as it ensures the coordination of actions between structural units and individual employees, supports effective information exchange, and contributes to achieving the organization's strategic and tactical goals.

Managing communication processes is an essential function of management that integrates the main managerial functions – planning, organizing, motivating, and controlling. Without proper information exchange, it is impossible to ensure the efficiency of managerial decision-making and coordination of the organization's activities.

Levels of Communication Management: The proposed division into strategic, operational, and tactical levels allows for the optimization of information flows depending on the scope of tasks and their implementation timelines. At the strategic level, long-term communication system

development plans are formed; at the operational level, daily information exchange processes are supported; and at the tactical level, the system's flexibility and adaptability to changes are ensured.

Implementation of Innovative Technologies: To increase the efficiency of communication processes, it is crucial to use modern digital platforms that enable the automation of information transfer, data accessibility, and team collaboration integration. This contributes to the operational efficiency and transparency of management processes.

Importance of Feedback: The effectiveness of the communication process depends on establishing a feedback system that provides timely assessment of message comprehension and makes adjustments according to the organization's needs.

Overcoming Information Barriers: To avoid informational gaps between management levels and departments, mechanisms for monitoring and standardizing communication channels should be implemented. This will enhance productivity and foster corporate culture.

Flexibility of the Communication System: Special attention should be paid to adapting the communication system to market changes, allowing the organization to quickly respond to external challenges.

Therefore, the proposed communication management methodology provides a comprehensive approach to the process of information interaction, combining strategic planning with daily operational activities. Its implementation contributes to improving the enterprise's competitiveness, developing corporate culture, and creating conditions for innovative growth.

References

1. Babchynska, O.I. (2018). Communication process in management: basic provisions. Retrieved from: http://www.economy.nayka.com.ua/pdf/9_2018/51.pdf.
2. Betteke Van Ruler (2018). Communication Theory: An Underrated Pillar on Which Strategic Communication Rests. *International Journal of Strategic Communication*. Retrieved from: <https://doi.org/10.1080/1553118X.2018.1452240>.
3. Chukut, S. A. (2021) Communication strategies in public management and administration: foreign and Ukrainian experience. *Investments: practice and experience*. (12), 72-79. Retrieved from: http://nbuv.gov.ua/UJRN/ipd_2021_12_1420.
4. Communication is about listening, not talking. Retrieved from: <https://ecpl.com.ua/comments/15455/>
5. Dabizha, V. V., Pyskun, D. V. (2024). Communication strategies in public management and administration: the Ukrainian context. *Modern scientific journal*. Vol. 3(1), Pp. 92-100. Retrieved from: <https://doi.org/10.36994/2786-9008-2024-3-12>
6. Etymological dictionary of the Ukrainian language: in 7 volumes, ed. by O. S. Melnychuk. Kyiv: Nauk. Dumka, 1985. Vol. 2.
7. Ialoveha, N. I. (2007). Principles of application of the basic communication tools in activity of the enterprises of consumer cooperation. Retrieved from: http://www.rusnauka.com/19_NNM_2007/Economics/23199.doc.htm
8. Lipkan, V. A. The role of strategic communications in countering hybrid war against Ukraine. Retrieved from: <http://goal-int.org/rolstrategichnixkomunikacij-v-protidii-gibridnij-vijni-proti-Ukraini/>.

-
9. Pedchenko, N. S., Shymanovska-Dianich, L. M., Gusakovska, T. O., Rybalko-Rak, L. A., Kuzhel, N. L. (2022). Strategic communications in the enterprise management system. *Scientific Bulletin of Poltava University of Economics and Trade*. Vol. 2 (106), P. 26-30. Retrieved from: <https://doi.org/10.37734/2409-6873-2022-2-4>
 10. Pocheptsov, G.G. (2010). Social communications and new communication technologies. No. 1. P.19-26.
 11. Polovinchak, Yu. M. (2017). Modern information and communication environment as a space for the transformation of Ukrainian national identity: monograph, scientific editor V. Gorovyi. NAS of Ukraine, National University of Ukraine named after V. I. Vernadsky. Kyiv, 372 p.
 12. Schramm, W. (1954). The process and effects of mass communication. In Wilbur Schramm (Ed.). Urbana: University of Illinois Press. Pp. 3–26
 13. Skibitska, L. I. (2007). Management: a textbook / L. I. Skibitska, O. M. Skibitsky. Kyiv: Center for Educational Literature, 416 p.
 14. Stakhurska, S. A., Tkachuk, S. V. (2015). Modern system of enterprise communications as a factor of successful activity in the market. Formation of market relations in Ukraine. No. 12. Pp. 112-115.
 15. Yakubenko, I. M., Makovetska, I. M. (2017). Development of communications in enterprises. *Economics. Management. Business*. No. 1. Pp. 107-113.
 16. Zrazhevska, N. I. (2015). Communication Technologies: Lectures. Cherkasy: Brama-Ukraine, 224 p.

Scientific publication

INTELLECTUALIZATION OF LOGISTICS AND SUPPLY CHAIN MANAGEMENT

The electronic scientifically and practical journal

Electronic scientifically and practical journal “Intellectualization of logistics and Supply Chain Management” included in the list of scientific publications of Ukraine in the field of economic sciences (category "B"): **Order of the Ministry of Education and Culture of Ukraine dated October 10, 2022 No. 894 (Appendix 2)**

Field of science: Economic.

Specialties: 051 – Economics; 073 – Management

ISSN 2708-3195

DOI: <https://doi.org/10.46783/smart-scm/2024-28>

The electronic magazine is included in the international scientometric databases:
Index Copernicus, Google Scholar

№ 28 (2024)

December 2024

ISSN 2708-3195

DOI: <https://doi.org/10.46783/smart-scm/2024-28>



This work is licensed under a Creative Commons Attribution 4.0 International License