

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

#16 (2022)
December '22



WWW.SMART-SCM.ORG

ISSN 2708-3195

DOI.ORG/10.46783/SMART-SCM/2022-16



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/2022-16>

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

Released 6 times a year

№ 16 (2022)
December 2022

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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

DOI: <https://doi.org/10.46783/smart-scm/2022-16>
e-mail: support@smart-scm.org

t.me/smart_scm
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INTRODUCTION

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

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

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

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

Therefore, we invite scientists, researchers and business representatives, as well as our colleagues from abroad, to cooperate and present the results of scientific research, to 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.

HRYHORAK Mariia
Chief Editor



UDC 005.935:658.7

DOI: <https://doi.org/10.46783/smart-scm/2022-16-1>

JEL Classification: L15, O11, Q13.

Received: 04 November 2022

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PROACTIVE RISK MANAGEMENT OF UKRAINIAN AVIATION TRANSPORT POST-WAR RECOVERY AND SUSTAINABLE DEVELOPMENT

Dmytro Bugayko, Olga Shevchenko, Nadiia Perederii, Natalia Sokolova, Mykhaylo Podrieza, Danylo Bugayko. *"Risk management of Ukrainian aviation transport post-war recovery and sustainable development".* Global air transport is an open system that is influenced by a large number of factors, both related and unrelated. One of its most vulnerable components is the activity of airlines. This is especially felt during the period of hostilities. The Malaysian Airlines Boeing 777 crash as a result of being hit by a Russian missile and the 2014 Boeing 737 crash of Ukraine International Airlines in Iran as a result of being hit by Iranian anti-aircraft missiles in 2020 are examples of the vulnerability of civil aviation in the rapidly changing conditions of military operations and determine the need for anticipatory risk management of airlines. Unfortunately, the full-scale military aggression of the Russian Federation against Ukraine from the first minute dealt a devastating blow to the activity of air transport in general, and to the activity of Ukrainian airlines, in particular. In order to formulate strategic scenarios for the post-war recovery and sustainable development of air transport of Ukraine, the article proposes to use the Concept of National Integrated Risk Management of Air Transport of Ukraine.

Keywords: aviation transport, risk management, post-war recovery, sustainable development of civil aviation.

Дмитро Бугайко, Ольга Шевченко, Надія Передерій, Наталія Соколова, Михайло Подреза, Данило Бугайко. *«Ризик менеджмент повоєнного відновлення та сталого розвитку авіаційного транспорту України».* Світовий авіаційний транспорт є системою відкритого типу, на яку мають вплив велика кількість, як пов'язаних, так і не пов'язаних між собою чинників. Однією із найбільш вразливих його складових є діяльність авіакомпаній. Особливо це відчувається у період проведення воєнних дій. Катастрофа Боїнг 777 Малайзійських Авіаліній у наслідок влучення російської ракети та катастрофа у 2014 році Боїнг 737 Міжнародних авіаліній України в Ірані у наслідок влучення іранських протиповітряних ракет у 2020 році є прикладом вразливості цивільної авіації у швидкозмінних умовах воєнних дій та обумовлюють необхідність застосування випереджаючого ризик менеджменту авіакомпаній. На жаль повномасштабна воєнна агресія Російської Федерації проти України з першої хвилини нанесла руйнівний удар по діяльності авіаційного транспорту в цілому, та на діяльність авіакомпаній України, зокрема. У статті з метою формулювання стратегічних сценаріїв післявоєнного відновлення та сталого розвитку авіаційного транспорту України пропонується використання Концепції національного управління інтегрованими ризиками авіаційного транспорту України.

Ключові слова: авіаційний транспорт, ризик менеджмент, повоєнно відновлення, сталий розвиток цивільної авіації.

Дмитрий Бугайко, Ольга Шевченко, Надежда Передерий, Наталья Соколова, Михаил Подреза, Даниил Бугайко. *«Риск менеджмента послевоенного восстановления и устойчивого развития авиационного транспорта Украины».* Мировой авиационный транспорт является системой открытого типа, на которую оказывают влияние большое количество как связанных, так и не связанных между собой факторов. Одной из наиболее уязвимых его составляющих является деятельность авиакомпаний. Особенно это ощущается в период проведения военных действий. Катастрофа Боинг 777 Малайзийских Авиалиний в результате попадания российской ракеты и катастрофа в 2014 году Боинг 737 Международных авиалиний Украины в Иране в результате

попадания иранских противовоздушных ракет в 2020 году является примером уязвимости гражданской авиации в необходимости изменяющихся условий военно-транспортных условий. К сожалению, полномасштабная военная агрессия Российской Федерации против Украины с первой минуты нанесла разрушительный удар по деятельности авиационного транспорта в целом, и на деятельность авиакомпаний Украины, в частности. В статье с целью формулирования стратегических сценариев послевоенного обновления и устойчивого развития авиационного транспорта Украины предлагается использование Концепции национального управления интегрированными рисками авиационного транспорта Украины.

Ключевые слова: авиационный транспорт, риск менеджмент, послевоенное восстановление, устойчивое развитие гражданской авиации.

Introduction. Global air transport is an open system that is influenced by a large number of factors, both related and unrelated. One of its most vulnerable components is the activity of airlines. Unfortunately, the full-scale military aggression of the Russian Federation against Ukraine from the first minute dealt a devastating blow to the activity of air transport in general, and to the activity of Ukrainian airlines, in particular. In order to formulate strategic scenarios for the post-war recovery and sustainable development of air transport of Ukraine, the article proposes to use the Concept of National Integrated Risk Management of Air Transport of Ukraine. The article is a logical continuation of a number of publications devoted to the development of air transport sustainable development of Ukrainian scientists Y. Kharazishvili [1 -4, 8], D. Bugayko [1 – 11], O. Shevchenko [11], A. Antonova [8], M. Hryhorak [3 – 4], Y. Ierkovska [6 – 7], O. Ovdienko [4], V. Marchuk [4], V. Lyashenko [5], V. Sokolovskiy [5], V. Baranov [5], M. Bahrii [7], Polish scientists (Z. Zamiar [3,8]), Azerbaijan Scientists F. Aliev [7], and scientists of other countries.

The purpose of the article is to provide structural analysis of risk management measures for Ukrainian aviation transport and to represent institutional measures for post-war recovery and sustainable development of aviation industry.

Presentation of the main results.

Risk management and implementation of strategic scenarios of post-war recovery and sustainable development of Ukrainian airlines

Table 1 offers strategic scenarios for the post-war recovery and sustainable development of Ukrainian airlines.

Threats to Ukrainian airlines:

- Delay in the evacuation of aviation equipment abroad. Planes of Ukrainian airlines partially remained at other blocked airports, which created a real threat to operations.

- Problems with the leasing fleet of aircraft. One of the indisputable immediately pre-war triggers was the refusal to further fulfill the leasing conditions of a number of leasing companies, which led to the return of a significant part of the aircraft equipment of the airlines "Ukraine International Airlines", "Sky Up", "Bees" in the last weeks before the start of hostilities. On the one hand, it protected them from possible destruction and damage. On the other hand, the operating fleet of Ukrainian airlines has been significantly reduced.

- Closure of Ukrainian airspace for civil aviation flights. Closing the airspace of Ukraine for civil aviation flights on the first day of the war is a necessary and effective measure to protect civil aviation in the conditions of military operations. At the same time, the operational activities of Ukrainian airlines are currently possible only from foreign bases under charter programs, which significantly narrows the potential market for air transportation and reduces possible financial income.

Therefore, the above-mentioned threats led to an increase in the *Vulnerability of Ukrainian airlines*, which is expressed in:

- Vulnerabilities of aviation equipment in the conditions of direct hostilities.
- Imperfections of the leasing conditions in terms of using the principle of force majeure in wartime.
- Impossibility of performing commercial air transport activities by airlines of Ukraine.

The combination of the mentioned threats and vulnerabilities leads to the following *Consequences for Ukrainian airlines*:

- Losses and damage to aviation equipment. Airline planes continue to be under attack from the air and the ground at other blocked airports and airports that are potential targets of enemy airstrikes.
- Some of the planes of the fleet of Ukrainian air carriers were recalled by lessors, which sharply reduced the operational capabilities of Ukrainian airlines.
- The suspension of commercial air transport activities in the airspace of Ukraine led to the suspension of the aviation activities of a number of Ukrainian airlines and to a sharp reduction in the operational activities of others.

The main negative results of the above were the decrease in the level of efficiency and safety of Ukrainian airlines, which consists of:

- Problems with maintaining the national agreed level of aviation security.
- Leads to possible bankruptcy of Ukrainian airlines.
- Leads to significant losses of the effective aircraft fleet of Ukrainian airlines

We offer to consider *optimistic, realistic and pessimistic strategic scenarios of post-war recovery and sustainable development of Ukrainian airlines*

The optimistic scenario includes:

- Updating the provisions of the Safety State Program (Decree of the Cabinet of Ministers of Ukraine No. 656 dated June 16,

2021) regarding the conditions of post-war reconstruction and sustainable development [12].

- Development of mechanisms for the support of domestic airlines in the post-war period by the state.
- Stopping the destruction of aviation equipment
- Optimization of the aircraft leasing fleet under conditions of dynamic recovery of the air transportation market.
- Gradual return to the level of profitability of Ukrainian airlines in the second year after the war.

A realistic scenario includes:

- Updating the provisions of the Safety State Program (Decree of the Cabinet of Ministers of Ukraine No. 656 dated June 16, 2021) regarding the conditions of post-war reconstruction and sustainable development [12].
- Development of mechanisms for partial support of domestic airlines in the post-war period by the state.
- Insignificant subsequent damage to aviation equipment as a result of hostilities
- Step-by-step optimization of the aircraft leasing fleet under conditions of gradual recovery of the air transport market.
- Gradual return to the level of profitability of Ukrainian airlines in the third year after the war.

The pessimistic scenario includes:

- Updating the provisions of the Safety State Program (Decree of the Cabinet of Ministers of Ukraine No. 656 dated June 16, 2021) regarding the conditions of post-war reconstruction and sustainable development [12].
- Impossibility of implementing support mechanisms for domestic airlines in the post-war period by the state due to a significant decrease in GDP.
- Considerable further destruction and damage to aviation equipment as a result of hostilities

Table 1 – Risk management and implementation of strategic scenarios of post-war recovery and sustainable development of Ukrainian airlines

Classification of threats	Vulnerability of protection systems (GAP Analysis)	Consequences	Risks	Implementation of strategic scenarios
1. Threats to airlines: 1.1 Delay in the evacuation of aircraft equipment abroad. 1.2. Problems with the leasing fleet of aircraft. 1.3. Closure of Ukrainian airspace for civil aviation flights	1. Vulnerability of airlines: 1.1. Insecurity of aviation equipment in the conditions of direct hostilities. 1.2. Imperfection of the leasing conditions in terms of the use of the principle of force majeure in wartime. 1.3. Impossibility of performing commercial air transport activities by airlines of Ukraine	1. Consequences for airlines: 1.1 Losses and damage to aviation equipment. Airline planes continue to be under attack from the air and the ground at blocked airports. 1.2 Some of the aircraft in the fleet of Ukrainian air carriers were recalled by the lessors 1.3. Termination of commercial air transport activities in the airspace of Ukraine	1. Reduction in the level of efficiency and safety of airline operations: 1.1 Problems with maintaining the national agreed level of aviation security. 1.2 Bankruptcy of national airlines. 1.3 Significant losses of the effective aircraft fleet of Ukrainian airlines	The optimistic scenario 1.1. Update of the provisions of the Safety State Program (Decree of the Cabinet of Ministers of Ukraine No. 656 dated June 16, 2021) regarding the conditions of post-war recovery and sustainable development [12]. 1.2. The development of mechanisms for the support of domestic airlines in the post-war period by the state. 1.3. Stopping the destruction of aviation equipment 1.4. Optimization of the aircraft leasing fleet under conditions of dynamic recovery of the air transportation market. 1.5. Gradual return to the level of profitability of Ukrainian airlines in the second year after the war The realistic scenario 1.1 Update of the provisions of the Safety State Program (Decree of the Cabinet of Ministers of Ukraine No. 656 dated June 16, 2021) (Decree of the Cabinet of Ministers of Ukraine No. 656 dated June 16, 2021) regarding the conditions of post-war reconstruction and sustainable development [12]. 1.2. Development of mechanisms for partial support of domestic airlines in the post-war period by the state. 1.3. Insignificant subsequent damage to aircraft as a result of hostilities 1.4. Step-by-step optimization of the aircraft leasing fleet under conditions of gradual recovery of the air transport market. 1.5. Gradual return to the level of profitability of Ukrainian airlines for the third year after the war The pessimistic scenario 1.1 Update of the provisions of the Safety State Program (Decree of the Cabinet of Ministers of Ukraine No. 656 dated June 16, 2021) (Decree of the Cabinet of Ministers of Ukraine No. 656 dated June 16, 2021) regarding the conditions of post-war reconstruction and sustainable development [12]. 1.2. Impossibility of implementing support mechanisms for domestic airlines in the post-war period by the state due to a significant decrease in GDP. 1.3. Significant further destruction and damage to aviation equipment as a result of hostilities 1.4. Loss of the main part of the aircraft leasing fleet due to prolonged stagnation in the air transport market. 1.5. Gradual return to the level of profitability of Ukrainian airlines for the fifth year after the war

Source: developed by D. Bugayko

- Loss of the main part of the aircraft leasing fleet due to prolonged stagnation in the air transport market.

Gradual return to the level of profitability of Ukrainian airlines for the fifth year after the war.

Risk management and implementation of strategic scenarios of post-war recovery and sustainable development of the system of airports and airfields of Ukraine

The system of airports and airfields of Ukraine became one of the main goals of the aggressor from the first day of the war. In Table 2 strategic scenarios of post-war recovery and sustainable development of the system of airports and airfields of Ukraine are proposed.

Threats to the system of airports and airfields of Ukraine:

- Air and ground strikes on buildings, infrastructure and equipment of airports and airfields.

- Closure of airspace for civil aviation flights from airports and airfields. Closing the airspace of Ukraine for civil aviation flights on the first day of the war is a necessary and effective measure to protect civil aviation in the conditions of military operations. At the same time, the operational activity of the system of airports and airfields of Ukraine is currently impossible.

Therefore, the above-mentioned threats led to an increase in *the Vulnerability of the system of airports and airfields of Ukraine*, which is expressed in:

- Vulnerabilities of buildings, infrastructure and equipment of airports and airfields in the conditions of direct hostilities.
- Impossibility of performing commercial air transport activities in the system of airports and airfields of Ukraine.

The combination of the mentioned threats and vulnerabilities leads to the

following *consequences for the system of airports and airfields of Ukraine*:

- Buildings, runways, taxiways, aprons and equipment of a number of airports and airfields were damaged to varying degrees, and they continue to be at risk of air and ground strikes.

- Termination of commercial air transport activities by the system of airports and airfields of Ukraine

The main negative results of the above were the decrease in the level of efficiency and safety of the system of airports and airfields of Ukraine, which consists of:

- Problems with maintaining the national agreed level of aviation security.

- Significant destruction of buildings, infrastructure and equipment of airports and airfields of Ukraine.

- Possibilities of bankruptcy of the national system of airports and airfields of Ukraine.

We offer to consider *optimistic, realistic and pessimistic strategic scenarios of post-war recovery and sustainable development of the system of airports and airfields of Ukraine*.

The optimistic scenario includes:

- Updating the provisions of the State target program for the development of airports for the period until 2023 (Resolution of the Cabinet of Ministers of Ukraine No. 126 of February 24, 2016) regarding the conditions of post-war recovery and sustainable development [13].

- Development of mechanisms for the support of the system of airports and airfields in the post-war period by the state.

- Stopping the destruction of buildings, infrastructure and equipment of airports and airfields

- Complex reconstruction of the system of airports and airfields of Ukraine

– Gradual exit to the level of profitability of the system of airports and airfields in the second year after the war.

Table 2 – Risk management and implementation of strategic scenarios of post-war recovery and sustainable development of the system of airports and airfields in Ukraine.

Classification of threats	Vulnerability of protection systems (GAP Analysis)	Consequences	Risks	Implementation of strategic scenarios
<p>2. Threats to the system of airports and airfields:</p> <p>2.1 Air and ground strikes on buildings, infrastructure and equipment of airports and airfields</p>	<p>2. Vulnerability of the system of airports and airfields:</p> <p>2.1. Vulnerability of buildings, infrastructure and equipment of airports and airfields in the conditions of direct hostilities.</p>	<p>2. Consequences for the system of airports and airfields:</p> <p>2.1. Buildings, runways, taxiways, aprons and equipment of a number of airports and airfields were damaged to varying degrees, and as of May 2022, they continue to be at risk of air and ground strikes.</p>	<p>2. Reduction of the level of efficiency and safety of the system of airports and airfields:</p> <p>2.1 Problems with maintaining the national agreed level of aviation security.</p>	<p>The optimistic scenario</p> <p>2.1. Update of the provisions of the State target program for the development of airports for the period until 2023 (Resolution of the Cabinet of Ministers of Ukraine No. 126 of February 24, 2016) regarding the conditions of post-war recovery and sustainable development [13].</p> <p>2.2. Development of mechanisms for the support of the system of airports and airfields in the post-war period by the state.</p> <p>2.3. Stopping the destruction of buildings, infrastructure and equipment of airports and airfields</p> <p>2.4. Comprehensive reconstruction of the system of airports and airfields of Ukraine</p> <p>2.5. Gradual exit to the level of profitability of the system of airports and airfields in the second year after the war</p> <p>The realistic scenario</p> <p>2.1. Update of the provisions of the State target program for the development of airports for the period until 2023 (Resolution of the Cabinet of Ministers of Ukraine No. 126 of February 24, 2016) regarding the conditions of post-war recovery and sustainable development [13].</p> <p>2.2. Development of mechanisms for partial support of domestic airlines in the post-war period by the state.</p> <p>2.3. Minor further damage to buildings, infrastructure and equipment of airports and airfields as a result of military operations</p> <p>2.4. Step-by-step reconstruction of the system of airports and airfields of Ukraine, primarily international hub airports and gradually regional airports/airfields.</p> <p>2.5. Gradual return to the level of profitability of the system of airports and airfields of Ukraine for the third year after the war</p> <p>The pessimistic scenario</p> <p>2.1. Update of the provisions of the State target program for the development of airports for the period until 2023 (Resolution of the Cabinet of Ministers of Ukraine No. 126 of February 24, 2016) regarding the conditions of post-war recovery and sustainable development [13].</p> <p>2.2. Impossibility of implementation of support mechanisms for the system of airports and airfields in the post-war period by the state due to a significant decrease in GDP</p> <p>2.3. Significant further destruction and damage to buildings, infrastructure and equipment of airports and airfields as a result of military operations.</p> <p>2.4. Partial reconstruction of the system of airports and airfields of Ukraine, primarily international hub airports, with a significant delay in regional airports/airfields.</p> <p>2.5. Gradual return to the level of profitability of the system of airports and airfields of Ukraine for the fifth year after the war</p>
<p>2.2. Closure of airspace for civil aviation flights from airports and airfields</p>	<p>2.2. Impossibility of carrying out commercial air transport activities by the system of airports and airfields of Ukraine</p>	<p>2.2. Suspension of commercial air transport activities by the system of airports and airfields of Ukraine</p>	<p>2.2 Significant destruction of buildings, infrastructure and equipment of airports and airfields of Ukraine</p> <p>2.3 Bankruptcy of the national system of airports and airfields of Ukraine.</p>	

Source: developed by D. Bugayko

Table 3 – Risk management and implementation of strategic scenarios of post-war recovery and sustainable development of the air traffic control system of Ukraine

Classification of threats	Vulnerability of protection systems (GAP Analysis)	Consequences	Risks	Implementation of strategic scenarios
<p>3. Threats to the air traffic control system:</p> <p>3.1 Air and ground strikes on buildings, infrastructure and air traffic control system equipment</p> <p>3.2 Closure of airspace for civil aviation flights</p>	<p>3. Vulnerability of the air traffic control system:</p> <p>3.1. Vulnerability of buildings, infrastructure and equipment of the air traffic control system in the conditions of direct hostilities.</p> <p>3.2. Impossibility of performing commercial activities by the air traffic control system</p>	<p>3. Consequences for the air traffic control system:</p> <p>3.1. Buildings, infrastructure and equipment of the air traffic control system, which, as of May 2022, continues to be vulnerable to air and ground strikes, sustained varying degrees of damage.</p> <p>3.2. Understanding of commercial activity by the air traffic control system</p>	<p>3. Reduction of the level of efficiency and safety of the air traffic control system:</p> <p>3.1 Problems with maintaining the national agreed level of aviation security.</p> <p>3.2. Significant destruction of buildings, infrastructure and equipment of the air traffic control system of Ukraine</p> <p>3.3 Bankruptcy of the national air traffic control system of Ukraine.</p>	<p>The optimistic scenario.</p> <p>3.1. The development of mechanisms to support the system of commercial activity by the air traffic control system in the post-war period from the side of the state.</p> <p>3.2. Stopping the destruction of buildings, infrastructure and equipment of commercial activity by the air traffic control system.</p> <p>3.3. Comprehensive reconstruction of commercial activity by the air traffic control system of Ukraine</p> <p>3.4. Gradual exit to the level of profitability of commercial activity by the air traffic control system in the second year after the war</p> <p>The realistic scenario</p> <p>3.1. Development of mechanisms for partial support of commercial activity by the air traffic control system in the post-war period by the state.</p> <p>3.2. Minor further damage to buildings, infrastructure and equipment of commercial activities by the air traffic control system as a result of hostilities</p> <p>3.3. Step-by-step reconstruction of the system of commercial activity by the air traffic control system of Ukraine, primarily to ensure air navigation support on the route, international hub airports and gradually regional airports/airfields.</p> <p>3.4. Gradual return to the level of profitability of the commercial activity of the air traffic control system of Ukraine in the third year after the war</p> <p>The pessimistic scenario</p> <p>3.1. Impossibility of implementation of mechanisms to support the air traffic control system in the post-war period by the state due to a significant decrease in GNP.</p> <p>3.2. Significant further destruction and damage to buildings, infrastructure and air traffic control system equipment as a result of hostilities.</p> <p>3.3. Partial reconstruction of the air traffic control system of Ukraine, primarily to ensure air navigation support on the route, international nodal airports-hubs, with a significant delay of regional airports/airfields.</p> <p>3.4. Gradual return to the level of profitability of the system of airports and airfields of Ukraine for the fifth year after the war</p>

Source: developed by D. Bugayko

A realistic scenario includes:

- Updating the provisions of the State target program for the development of airports for the period until 2023 (Resolution of the Cabinet of Ministers of Ukraine No. 126 of February 24, 2016) regarding the conditions of post-war recovery and sustainable development [13].
- Development of mechanisms for partial support of domestic airlines in the post-war period by the state.
- Minor further damage to buildings, infrastructure and equipment of airports and airfields as a result of military operations
- Step-by-step reconstruction of the system of airports and airfields of Ukraine, first of all, international hub airports and gradually regional airports/airfields.
- Gradual return to the level of profitability of the system of airports and airfields of Ukraine in the third year after the war.

The pessimistic scenario includes:

- Updating the provisions of the State target program for the development of airports for the period until 2023 (Resolution of the Cabinet of Ministers of Ukraine No. 126 of February 24, 2016) regarding the conditions of post-war recovery and sustainable development [13].
- Impossibility of implementation of support mechanisms for the system of airports and airfields in the post-war period by the state due to a significant decrease in GDP.
- Significant further destruction and damage to buildings, infrastructure and equipment of airports and airfields as a result of military operations.
- Partial reconstruction of the system of airports and airfields of Ukraine, primarily international hub airports, with a significant delay in regional airports/airfields.
- Gradual return to the level of profitability of the system of airports and airfields of Ukraine for the fifth year after the war.

Risk management and implementation of strategic scenarios of post-war recovery and sustainable development of the air traffic control system of Ukraine

Together with the system of airports and airfields, the air traffic control system of Ukraine became one of the main goals of the aggressor from the first day of the war. Table 3 offers strategic scenarios for post-war recovery and sustainable development of the air traffic control system of Ukraine.

Threats to the air traffic control system of Ukraine:

- Air and ground strikes on buildings, infrastructure and equipment of the air traffic control system
- Closure of airspace for civil aviation flights

Therefore, the above-mentioned threats led to an increase in *the Vulnerability of the air traffic control system of Ukraine*, which is expressed in:

- Vulnerabilities of buildings, infrastructure and equipment of the air traffic control system in the conditions of direct hostilities
- Impossibility of performing commercial activities with the air traffic control system
- The combination of the mentioned threats and vulnerabilities leads to the following Consequences for the air traffic control system of Ukraine:
 - Buildings, infrastructure, and equipment of the air traffic control system, which continues to be vulnerable to air and ground strikes have suffered varying degrees of damage.
 - Suspension of commercial activity by the air traffic control system.

The main negative results of the above were the decrease in the level of efficiency and safety of the air traffic control system of Ukraine, which consists of:

- Problems with maintaining the national agreed level of aviation security
- Significant destruction of buildings, infrastructure and equipment of the air traffic control system of Ukraine
- Possibilities of bankruptcy of the air traffic control system of Ukraine.

We propose to consider *optimistic, realistic and pessimistic strategic scenarios of post-war recovery and sustainable development of the air traffic control system of Ukraine.*

The optimistic scenario includes:

- Development of mechanisms to support the system of commercial activity by the air traffic control system in the post-war period on the part of the state.
- Stopping the destruction of buildings, infrastructure and equipment of commercial activities by the air traffic control system.
- Comprehensive reconstruction of the commercial activity of the air traffic control system of Ukraine
- Gradual exit to the level of profitability of commercial activity of the air traffic control system in the second year after the war.

A realistic scenario includes:

- Development of mechanisms for partial support of commercial activity by the air traffic control system in the post-war period from the side of the state.
- Minor further damage to buildings, infrastructure and equipment of commercial activities by the air traffic control system as a result of hostilities
- Step-by-step reconstruction of the commercial activity system of the air traffic control system of Ukraine, primarily to ensure air navigation support on the route, international hub airports and gradually regional airports/airfields.
- Gradual return to the level of profitability of the commercial activity of the air traffic control system of Ukraine in the third year after the war

The pessimistic scenario includes:

- Impossibility of implementation of support mechanisms for the air traffic control system in the post-war period by the state due to a significant decrease in GDP.
- Significant further destruction and damage to buildings, infrastructure and air traffic control system equipment as a result of hostilities.
- Partial reconstruction of the air traffic control system of Ukraine, primarily to ensure air navigation support on the route, international hub airports, with a significant delay in regional airports/airfields.
- Gradual return to the level of profitability of the system of airports and airfields of Ukraine for the fifth year after the war.

Risk management and implementation of strategic scenarios of post-war recovery and sustainable development of the aviation industry system of Ukraine

Table 4 offers strategic scenarios for post-war recovery and sustainable development of the aviation industry system of Ukraine.

Threats to the aviation industry system of Ukraine:

- Air and ground strikes on design bureaus, enterprises and infrastructure facilities of the aviation industry system
- Threats to serial production of aviation equipment during hostilities

Therefore, the above-mentioned threats led to an increase in *the Vulnerability of the aviation industry system of Ukraine*, which is expressed in:

- Vulnerabilities of buildings, infrastructure and equipment of design bureaus and enterprises of the aviation industry system in the conditions of direct hostilities.
- Impossibility of mass production of aircraft during hostilities.

Table 4 – Risk management and implementation of strategic scenarios of post-war recovery and sustainable development of the aviation industry system of Ukraine

Classification of threats	Vulnerability of protection systems (GAP Analysis)	Consequences	Risks	Implementation of strategic scenarios
<p>4. Threats to the aviation industry system:</p> <p>4.1 Air and ground strikes on the design bureau, enterprises and infrastructure facilities of the aviation industry system</p> <p>4.2. Threats to serial production of aircraft during hostilities</p>	<p>4. Vulnerability of the aviation industry system:</p> <p>4.1. Vulnerability of buildings, infrastructure and equipment of design bureaus and enterprises of the aviation industry system in the conditions of direct hostilities.</p> <p>4.2. Impossibility of serial production of aircraft during hostilities</p>	<p>4. Consequences for the aviation industry system:</p> <p>4.1. Buildings, infrastructure and equipment of the air traffic control system, which continues to be vulnerable to air and ground strikes, sustained varying degrees of damage.</p> <p>4.2. Stopping serial production of aircraft during hostilities</p>	<p>4. Lowering the level of efficiency and safety of the aviation industry system</p> <p>4.1. Significant destruction of buildings, infrastructure and equipment of design bureaus and enterprises of the aviation industry system of Ukraine</p> <p>4.2. Bankruptcy of the national system of the aviation industry of Ukraine.</p>	<p>The optimistic scenario</p> <p>4.1. Update of the provisions of the Concept of the State targeted scientific and technical program for the development of the aviation industry for 2021-2030 (Decree of the Cabinet of Ministers of Ukraine No. 1412-r dated November 11, 2020) regarding the conditions of post-war recovery and sustainable development [14].</p> <p>4.2. The development of mechanisms for the support of the aviation industry system in the post-war period by the state.</p> <p>4.3. Stopping the destruction of buildings, infrastructure and equipment of the commercial activity of the aviation industry system</p> <p>4.4. Restoration of mass serial production of aviation equipment in the second year after the war</p> <p>The realistic scenario</p> <p>4.1. Update of the provisions of the Concept of the State targeted scientific and technical program for the development of the aviation industry for 2021-2030 (Decree of the Cabinet of Ministers of Ukraine No. 1412-r dated November 11, 2020) regarding the conditions of post-war recovery and sustainable development [14].</p> <p>4.2. Development of mechanisms for partial support of the aviation industry system in the post-war period by the state.</p> <p>4.3. Minor further damage to buildings, infrastructure and equipment of the aviation industry as a result of military operations</p> <p>4.4. Gradual restoration of mass serial production of aviation equipment in the third year after the war</p> <p>The pessimistic scenario</p> <p>4.1. Updating the provisions of the Concept of the State targeted scientific and technical program for the development of the aviation industry for 2021-2030 (Decree of the Cabinet of Ministers of Ukraine No. 1412-r dated November 11, 2020) regarding the conditions of post-war recovery and sustainable development [14].</p> <p>4.2. Impossibility of implementation of mechanisms to support the aviation industry system in the post-war period by the state due to a significant decrease in GDP.</p> <p>4.3. Significant subsequent destruction and damage to buildings, infrastructure, and equipment of the aviation industry as a result of hostilities.</p> <p>4.4. Gradual restoration of mass serial production of aviation equipment for the fifth year after the war.</p>

Source: developed by D. Bugayko

The combination of the mentioned threats and vulnerabilities leads to the following *Consequences for the aviation industry system of Ukraine*:

- Buildings, infrastructure, and equipment of the air traffic control system, which, as of May 2022, continues to be vulnerable to air and ground strikes have suffered varying degrees of damage.
- Stopping serial production of aircraft during hostilities.

The main negative results of the above were the decrease in the level of efficiency and safety of the aviation industry of Ukraine, which consists of:

- Significant destruction of buildings, infrastructure and equipment of the aviation industry of Ukraine.
- Possibilities of bankruptcy of the aviation industry system of Ukraine.

We offer to consider *optimistic, realistic and pessimistic strategic scenarios of post-war recovery and sustainable development of the aviation industry of Ukraine*.

The optimistic scenario includes:

- Updating the provisions of the Concept of the State targeted scientific and technical program for the development of the aviation industry for 2021-2030 (Decree of the Cabinet of Ministers of Ukraine No. 1412-r dated November 11, 2020) regarding the conditions of post-war recovery and sustainable development [14].
- Development of mechanisms for the support of the aviation industry system in the post-war period by the state.
- Stopping the destruction of buildings, infrastructure and equipment of the commercial activity of the aviation industry system.
- Restoration of mass serial production of aviation equipment in the second year after the war.

A realistic scenario includes:

- Updating the provisions of the Concept of the State targeted scientific and technical program for the development of the aviation industry for 2021-2030 (Decree of the Cabinet of Ministers of Ukraine No. 1412-r dated November 11, 2020) regarding the conditions of post-war recovery and sustainable development [14].
- Development of mechanisms for partial support of the aviation industry system in the post-war period by the state.
- Minor further damage to buildings, infrastructure and equipment of the aviation industry system as a result of hostilities
- Gradual restoration of mass serial production of aviation equipment in the third year after the war.

The pessimistic scenario includes:

- Updating the provisions of the Concept of the State targeted scientific and technical program for the development of the aviation industry for 2021-2030 (Decree of the Cabinet of Ministers of Ukraine No. 1412-r dated November 11, 2020) regarding the conditions of post-war recovery and sustainable development.
- Impossibility of implementation of mechanisms to support the aviation industry system in the post-war period by the state due to a significant decrease in GNP.
- Significant further destruction and damage to buildings, infrastructure and equipment of the aviation industry system as a result of hostilities.
- Gradual restoration of mass serial production of aviation equipment for the fifth year after the war.

Risk management and implementation of strategic scenarios of post-war recovery and sustainable development of aviation education and science of Ukraine

Table 5 offers strategic scenarios for post-war recovery and sustainable development of aviation education and science in Ukraine.

Table 5. - Risk management and implementation of strategic scenarios of post-war recovery and sustainable development of the aviation education and science system of Ukraine

Classification of threats	Vulnerability of protection systems (GAP Analysis)	Consequences	Risks	Implementation of strategic scenarios
<p>5. Threats to the system of aviation education and science:</p> <p>5.1 Air and ground strikes on buildings, infrastructure and equipment of the aviation education and science system.</p> <p>5.2 Threats to the educational process and scientific activity of the aviation education and science system.</p>	<p>5. Vulnerability of the aviation education and science system:</p> <p>5.1. Vulnerability of buildings, infrastructure and equipment of the aviation education and science system in the conditions of direct hostilities.</p> <p>5.2. Forced evacuation of leading scientific and pedagogical personnel, doctoral students, graduate students, students from the combat zone.</p>	<p>5. Consequences for the system of aviation education and science:</p> <p>5.1. Buildings, infrastructure and equipment of the aviation education and science system, which continues to be under the threat of air and ground strikes, received damage of varying degrees of severity.</p> <p>5.2. Suspension or transfer to a remote form of the educational process and scientific activity of the aviation education and science system of Ukraine.</p> <p>5.3. A significant decrease in the financing of aviation education and science in conditions of a significant decrease in GDP.</p>	<p>5. Reduction of the level of efficiency and safety of the aviation education and science system:</p> <p>5.1. Significant destruction of buildings, infrastructure and equipment of the aviation education and science system.</p> <p>5.2. Lowering the level of the educational and scientific process in the conditions of reduced financing of Ukraine.</p> <p>5.3. Lowering the level of the educational and scientific process in the conditions of reduced financing of Ukraine.</p>	<p>The optimistic scenario</p> <p>5.1. Development and implementation of the national program of training of aviation personnel and scientific research in the field of aviation for the purpose of post-war recovery and sustainable development of aviation transport of Ukraine.</p> <p>5.2. Stopping the destruction of buildings, infrastructure and equipment of the aviation education and science system.</p> <p>5.3. Comprehensive reconstruction of the system of aviation education and science.</p> <p>5.4. Restoration of a full-fledged off-line educational and scientific process.</p> <p>5.5. Gradual exit to the level of funding of the aviation education and science system in the second year after the war.</p> <p>The realistic scenario</p> <p>5.1. The development and gradual implementation of the national program for the training of aviation personnel and scientific research in the field of aviation for the purpose of post-war recovery and sustainable development of aviation transport of Ukraine.</p> <p>5.2. Minor further damage to buildings, infrastructure and equipment of the aviation education and science system as a result of military actions.</p> <p>5.3. Step-by-step reconstruction of the aviation education and science system.</p> <p>5.4. Partial restoration of a full offline educational and scientific process.</p> <p>5.5. Gradual exit to the level of funding of the aviation education and science system in the third year after the war.</p> <p>The pessimistic scenario</p> <p>5.1. The development and delayed implementation of the national program for the training of aviation personnel and scientific research in the field of aviation for the purpose of post-war recovery and sustainable development of aviation transport of Ukraine.</p> <p>5.2. Significant subsequent destruction and damage to buildings, infrastructure and equipment of the aviation education and science system as a result of military actions.</p> <p>5.3. Partial reconstruction of the system of aviation education and science.</p> <p>5.4. The impossibility of restoring a full-fledged offline educational and scientific process.</p> <p>5.5. Gradual exit to the level of funding of the aviation education and science system for the fifth year after the war.</p>

Source: developed by D. Bugayko

Threats to the system of aviation education and science of Ukraine:

- Air and ground strikes on buildings, infrastructure and equipment of the aviation education and science system
- Threats to the educational process and scientific activity of the aviation education and science system.

Therefore, the above-mentioned threats led to an increase in *the Vulnerability of aviation education and science of Ukraine*, which is expressed in:

- Vulnerabilities of buildings, infrastructure and equipment of the aviation education and science system in the conditions of direct hostilities.
- Forced evacuation of leading scientific and pedagogical personnel, doctoral students, graduate students, and students from the war zone.

The combination of the mentioned threats and vulnerabilities leads to the following *Consequences for the aviation education and science system of Ukraine*:

- Buildings, infrastructure and equipment of the aviation education and science system received damage of varying degrees of severity, which continues to be under the threat of air and ground strikes
- Termination or transfer to a remote form of the educational process and scientific activity of the system of aviation education and science of Ukraine
- A significant decrease in funding of aviation education and science in conditions of a significant decrease in GDP.

The main negative results of the above were the decrease in the level of efficiency and safety of the aviation education and science system of Ukraine, which consists of:

- Significant destruction of buildings, infrastructure and equipment of the aviation education and science system of Ukraine

- Reduction in the effectiveness of the educational process and scientific research in the conditions of remote communication
- Lowering the level of the educational and scientific process in the conditions of reduced financing of Ukraine.

We offer to consider optimistic, realistic and pessimistic strategic scenarios of post-war recovery and sustainable development of the aviation education and science system of Ukraine.

The optimistic scenario includes:

- Development and implementation of the national program for training aviation personnel and scientific research in the field of aviation for the purpose of post-war recovery and sustainable development of aviation transport of Ukraine.
- Stopping the destruction of buildings, infrastructure and equipment of the aviation education and science system.
- Comprehensive reconstruction of the system of aviation education and science.
- Restoration of a full-fledged off-line educational and scientific process.
- Gradual rise to the level of funding of the aviation education and science system in the second year after the war

A realistic scenario includes:

- Development and gradual implementation of the national program for training aviation personnel and scientific research in the field of aviation for the purpose of post-war recovery and sustainable development of aviation transport of Ukraine.
- Minor further damage to buildings, infrastructure and equipment of the aviation education and science system as a result of military actions
- Step-by-step reconstruction of the system of aviation education and science.
- Partial restoration of a full offline educational and scientific process.

– Gradual rise to the level of funding of the aviation education and science system in the third year after the war.

The pessimistic scenario includes:

- Development and delayed implementation of the national program for training aviation personnel and scientific research in the field of aviation for the purpose of post-war recovery and sustainable development of aviation transport of Ukraine.
- Significant further destruction and damage to buildings, infrastructure and equipment of the aviation education and science system as a result of military operations.
- Partial reconstruction of the system of aviation education and science.
- The impossibility of restoring a full-fledged offline educational and scientific process.
- Gradual exit to the level of funding of the aviation education and science system for the fifth year after the war.

Conclusions. The above research allows us to come to the conclusion about the expediency of the proactive risk management toolkit for the recovery of air transport in Ukraine. Ukraine, which is among the ten countries with a full cycle of development, serial production, exploitation of aviation equipment, as well as a system of training and retraining of personnel for the industry and aviation science, should maintain and develop its position in the post-war period. This concern requires the development of a complex long-term program for the development of the industry, taking into account force majeure circumstances. Implementation of optimistic and realistic strategic scenarios of post-war recovery is the key to sustainable development of aviation transport of Ukraine:

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UDC 656.1; 658.7

DOI: <https://doi.org/10.46783/smart-scm/2022-16-2>

JEL Classification: H53, K32, L98, Q20, P39, R13.

Received: 07 November 2022

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PECULIARITIES AND THREATS OF MANAGING HUMANITARIAN SUPPLY CHAINS UNDER MARTIAL LAW

Lesia Kostiuchenko, Oleh Harmash. *«Peculiarities and threats of managing humanitarian supply chains under martial law».* The logistics of humanitarian cargo under martial law is definitely new for Ukraine. As a result, many business representatives rallied in a single cluster with the aim of organizing the supply of humanitarian aid in extremely difficult conditions. At the same time, logisticians have faced many significant problems and challenges, which has caused an increase in attention to humanitarian logistics.

The military aggression of the Russian Federation created a large number of humanitarian threats, in particular ecocide. The scale of the destruction exceeded the worst forecasts of world experts. An important factor in the organization of humanitarian supply chain management processes in the conditions of this war is the high threat to people's lives. Due to the fact that air transport is not possible for obvious reasons, all deliveries are long and at high risk of disruption or physical destruction. Therefore, it is critically important to analyze the peculiarities of the organization of humanitarian supply chains, the main problems and challenges that logistics companies of Ukraine had to face in the conditions of martial law. It is important to perform such an analysis in order to take into account the specifics of the structure of the logistics system of humanitarian aid delivery, as well as the efficiency of its key elements. The search for solutions to establish a regular supply of humanitarian aid to Ukrainians in difficult war conditions requires a thorough analysis not only of supply channels, but also of possible threats to their organization.

Keywords: humanitarian logistics, humanitarian chains, supply of humanitarian aid, supply management under martial law, humanitarian threats.

Леся Костюченко, Олег Гармаш. *«Особливості та загрози управління гуманітарними ланцюгами постачання в умовах воєнного стану».* Логістика гуманітарних вантажів в умовах воєнного стану безперечно є новим для України. За таких умов багато представників бізнесу згуртувалися в єдиний кластер спрямований на організацію постачання гуманітарної допомоги у

надскладних умовах. Водночас логісти зіткнулися з безліччю вагомих проблем та викликів, що спричинило зростання уваги до гуманітарної логістики.

Військова агресія РФ породила велику кількість гуманітарних загроз, зокрема екоцидів. Масштаби руйнувань перевершили найжахливіші прогнози світових експертів. Вагомим чинником організації процесів управління гуманітарними ланцюгами постачання в умовах цієї війни є висока загроза життю людей. З огляду на те, що авіаційне сполучення із зрозумілих причин є неможливим, усі поставки є тривалими і з високим ризиком зриву або фізичного знищення. Тому критично важливо проаналізувати особливості організації гуманітарних ланцюгів поставок, основних проблем і викликів, з якими довелося зіткнутися логістичним компаніям України в умовах воєнного стану. Такий аналіз важливо виконати у розрізі врахування специфіки структури логістичної системи постачання гуманітарної допомоги, а також ефективності роботи її ключових елементів. Пошук рішень щодо налагодження регулярного постачання гуманітарної допомоги українцям у складних умовах війни потребує ґрунтовного аналізу не лише каналів постачання, але і можливих загроз для їхньої організації.

Ключові слова: гуманітарна логістика, гуманітарні ланцюги, постачання гуманітарної допомоги, управління постачанням в умовах воєнного стану, гуманітарні загрози.

Леся Костюченко, Олег Гармаш. «Особенности и угрозы управления гуманитарными цепями снабжения в условиях военного положения». Логистика гуманитарных грузов в условиях военного положения, безусловно, является новой для Украины. В таких условиях многие представители бизнеса сплотились в единый кластер, направленный на организацию поставки гуманитарной помощи в сверхсложных условиях. В то же время логисты столкнулись с множеством значительных проблем и вызовов, что привело к росту внимания к гуманитарной логистике.

Военная агрессия РФ породила большое количество гуманитарных угроз, в том числе эцидиров. Масштабы разрушений превзошли самые ужасающие прогнозы мировых экспертов. Весомым фактором организации процессов управления гуманитарными цепями снабжения в условиях этой войны высока угроза жизни людей. Учитывая, что авиационное сообщение по понятным причинам невозможно, все поставки являются длительными и с высоким риском срыва или физического уничтожения. Поэтому важно проанализировать особенности организации гуманитарных цепей поставок, основных проблем и вызовов, с которыми пришлось столкнуться логистическим компаниям Украины в условиях военного положения. Такой анализ важно выполнить в учете специфики структуры логистической системы снабжения гуманитарной помощи, а также эффективности работы ее ключевых элементов. Поиск решений по налаживанию регулярной поставки гуманитарной помощи украинцам в сложных условиях войны требует тщательного анализа не только каналов поставки, но и возможных угроз для их организации.

Ключевые слова: гуманитарная логистика, гуманитарные цепи, поставка гуманитарной помощи, управление поставками в условиях военного положения, гуманитарные угрозы.

Introduction. The Russian war in Ukraine completely destroyed the usual understanding of logistics, and the concept of well-established supply chains remained a thing of the past. And since February 24, 2022, the understanding of the organization of humanitarian supply chains has convinced logisticians to review basic decisions regarding the formation of logistical channels

for the supply of humanitarian aid flows. Only in May 2022, Ukrainian ports were unblocked for grain exports, air traffic will remain unavailable until the end of martial law, and ground logistics routes will require regular reconfiguration. The logistics of humanitarian cargo on such a scale is definitely something new for Ukraine, and that is why it is now a priority. As a result of such conditions, many

business representatives rallied in a single cluster aimed at organizing the supply of humanitarian aid in extremely difficult conditions. At the same time, logisticians faced many important problems and challenges.

Analysis of recent researches and publications. Researching periodicals [3; 4; 9] based on the experience of modern domestic logistics companies, we will highlight groups of main challenges that have faced the field of humanitarian logistics in Ukraine in recent months.

As research has shown, the first challenge was the urgent need to develop supply chains along new undeveloped routes as new participants, modes of transport, new countries, etc. It is not about a one-time restructuring, but about the ability to constantly respond flexibly to challenges and do everything necessary to ensure that goods are delivered with the highest quality and with minimal risks on the way. In order to gain experience in the successful selection of a batch, it is necessary to take into account the requirements for the transportation of certain groups of goods (for example, food products or medicines), clarify all the necessary nuances and exchange contacts and bring it all to automation, which requires time, which in critical conditions is practically nonexistent.

As indicated in [9], until companies adapted, logisticians had to constantly build work algorithms, which necessarily mixed with continuous coordination and control, in order to create effective supplies, as much as possible in a military environment. Difficulties were also associated with a shortage of transport, limits on the purchase of fuel, the danger of certain routes, and a shortage of warehouses for storing products. These are radically new conditions for all Ukrainian logistics, and therefore it is not easy to adapt to them. During the first half of the war, it became clear which companies managed to adapt to the new conditions and were even able to build a successful operation, despite all the difficulties.

For example, NG Shipping's logisticians can cooperate with public organizations and international missions, consolidate cargo from other countries to Ukraine, and provide logistics consulting services. It was also important for them that potential international partners interested in cooperation in this area should know about the possibility of free delivery of humanitarian aid [4]. Thus, the company managed to find a solution that helped create a new and efficient supply chain: it is about combined transportation by two modes of transport: rail and water. For this purpose, maritime registry documents for 30 empty containers were prepared and allocated, and the containers themselves are loaded onto the platforms and go to the port of Ismail. However, logisticians faced another problem: the port of Ismail has a technical limitation for handling containers. As a result, it was necessary to organize loading according to the direct option – immediately to the ships, after which the containers are sent for loading to the Romanian port of Constanta [9].

The observations made it possible to highlight another feature of the practice of road transportation of humanitarian aid. During the transportation of humanitarian aid through the territory of Ukraine, the driver of the transport company has several documents in his hands: a waybill, a declaration for crossing the border (in the case of transportation from abroad) and two copies of acceptance-handover acts, the reconciliation and signing of which must take place at the stage of unloading aid at the warehouse facilities of the recipient (or customer) of such aid. Thus, the peculiarity of road transportation of humanitarian cargo through the territory of Ukraine in the conditions of martial law is determined, in particular, by the need to pass checkpoints. The procedure for the operation of patrols and checkpoints, the inspection of persons and vehicles is regulated by the Procedure for establishing a special entry and exit regime, restricting the freedom of movement of citizens, foreigners and stateless persons. As

well as the movement of vehicles in Ukraine or in some of its localities, where martial law has been imposed, approved by the Cabinet of Ministers of Ukraine Resolution No. 1455 of 12/29/2021. Therefore, in order to pass checkpoints with humanitarian cargo during the curfew, carriers receive special passes from the military administrations of the region through which the humanitarian cargo will move.

Another problematic stage of humanitarian cargo transportation is the stage of receiving aid by recipients. There is practically no documentary reporting on this stage of humanitarian aid delivery. This is explained by the fact that most often humanitarian aid goes to cities in which active hostilities periodically take place. Shelling of the city often begins or continues during the unloading of rubber aid, so there is a need for quick unloading. In the best case, there is a photo/video report of the process, by which you can roughly calculate the number of unloaded boxes or pallets. Sometimes the recipient on the spot checks the quantity of the goods according to the act of acceptance and transfer or according to other information provided by the sender/donor. [8, p. 72].

The purpose and objectives of the study. The analysis of the publications of the above-mentioned authors shows that the views on the essence and content of the organization of humanitarian logistics of practitioners and scientists acquire dynamic changes in the conditions of martial law. However, in the researched sources there is not enough information about the formation of humanitarian chains in the conditions of war. That is why the purpose of this study is to analyze the peculiarities of the organization of humanitarian supply chains, the main problems and challenges that logistics companies of Ukraine had to face in the conditions of martial law. It is important to highlight the elements of the logistical system for the supply of humanitarian aid, as well as the decision to establish the supply of regular aid to Ukrainians under the difficult conditions caused by the war.

Basic material and results. The military aggression of the Russian Federation created a large number of humanitarian threats, in particular ecocide. The scale of the destruction exceeded the worst forecasts of world experts. An important factor in the organization of humanitarian supply chain management processes in the conditions of this war is the high threat to people's lives. Due to the fact that air transport is not possible for obvious reasons, all deliveries are long and at high risk of disruption or physical destruction.

The study of the humanitarian situation in Ukraine shows that, in addition to crimes against people, the Russian army also commits crimes against the environment - ecocide, which, in the end, will also affect the quality of life of Ukrainians. Among the damage caused to nature, the following are observed: shelling of oil depots, poisoning of air, water and soil with ammunition, fires, etc. Thus, according to BBC News Ukraine, the Ecodia Public Organization has already recorded more than 200 ecocides [5].

The Minister of Environmental Protection said that Ukraine could become the first country in the world to receive reparations for crimes against the environment. The damage that Russia has caused to nature already amounts to hundreds of billions of hryvnias. Table 1 provides a brief description of the causes of the humanitarian threat of the Russian war in Ukraine and the consequences of ecocide that are already being observed.

As a result of such trends, Ukraine joined the European Life program, which finances projects in the field of ecology and has huge budgets [5]. After all, in addition to economic, infrastructural, humanitarian and social, large-scale environmental changes are being observed, which have an extremely negative impact on the natural environment not only of Ukraine, but of the whole of Europe in general. In addition, the Russian military's seizure of the Zaporizhzhia Nuclear Power Plant (ZNPP) creates a potential radioactive threat to all of Europe. According to ecologists, in the event of an explosion, the

area of the potential exclusion zone will be up to 30,000 km². For example, according to the State Environmental Inspection [10]:

– more than 180,000 m² of soil is contaminated with harmful substances;

Table 1. Causes and threats of ecocide as a result of the Russian war in Ukraine

Cause of humanitarian threat	Threatening actions / ecocide and their consequences
Radiation	The threat of a nuclear disaster arose from the first days of the war, when the Russians occupied the Chernobyl nuclear power plant. The Zaporizhzhia NPP is still under their control, at the beginning of March the occupiers shelled power units and detonated ammunition. Three missiles were launched over the South Ukrainian NPP, the threat of hitting the nuclear reactor was high. The possibility of using nuclear weapons also remains
Forest fires	Forests are burning due to hostilities. The fire may not be extinguished if the area is occupied. During the clashes in the Kyiv region, the Chernobyl forests were burning, and Kyiv was at the forefront of air pollution
Fires at enterprises	Russians attack oil depots. According to the calculations of ecologists, during the burning of oil at a base with several tanks, approximately the same amount of atmospheric pollution is released as the entire transport of Kyiv produces in a month. Shells hitting chemical plants, such as those in Rubizhny in Luhansk Region or Sumy, led to leaks of nitrogen and ammonia.
Bombs and missiles	During the explosion of a bomb or rocket, chemicals are released into the air. And munitions fragments fall into the ground, poisoning groundwater
Destroyed equipment	Thousands of Russian tanks and armored vehicles pollute the ground with fuel and lubricants. This is carcinogenic waste that poisons the environment with heavy metals that enter the soil and groundwater. In the areas of active hostilities, the quality of drinking water in wells has significantly deteriorated. In addition, all this scrap metal should be processed, while there was a problem with waste in Ukraine before the war.
Flooding of mines	Due to intense shelling, it is not possible to pump out the water in the mines. Yes, the pumps in three mines of the Luhansk region are not working. "Mining water" with heavy metals and salts from mining rocks enters the underground water.
Mines and ammunition remnants	Ukraine is now one of the most mined countries in the world. The consequences of this will have to be overcome for years, if not decades. After all, shells and mines from the Second World War are still being found.
Water pollution and desertification	Even before the war, water shortages were felt in the eastern and southern regions lying in the basin of the Siverskyi Donets river, the Southern Bug river, in the Azov region and the Crimea. Shelling of treatment facilities, such as in Vasylykiv, destruction of water mains and other water infrastructure, inability to quickly repair it, will affect the quality and volume of water.
Destruction of reserves	About 200 territories of the lands of the Emerald Network — a zone that protects the brown bear, black stork, and lynx — are under threat of destruction. The reserve "Askania-Nova" is under occupation. The administration has to purchase feed and maintain the park at its own expense.
Disturbed soil and burned forests	Disturbed soil and burned forests are quickly overgrown with alien invasive species. Unexploded ordnance and mines pose a particular danger to wild animals. A significant threat to rare species of animals is the destruction or change of their habitats and migration corridors. At the same time, hostilities take place in the most sensitive period of the year, when animals are looking for a mate, food and bring young.
Mining of the Black Sea	The Russian military has mined part of its water area, is firing powerful projectiles from surface and submarine boats. Recently, dead dolphins were found on the shore of the national natural park "Tuzlivski lymani" in the Odesa region - they may have died because they lost their orientation by echo signals. The Russian military uses sonar at a high decibel level, which damages the dolphins' hearing.
Impossibility of restoration of natural resources	Environmentalists warn of the risk of maximizing the use of natural resources for post-war reconstruction. For example, to prevent famine, natural areas will be plowed. Emissions may increase due to the production of construction materials. Part of the natural territories can be given over to development for the restoration of settlements. New landfills from the remains of destroyed buildings and "technique cemeteries" have already appeared.

Source: developed by the author on the basis of [5]

- more than 2 million m² of land is littered with the remains of destroyed objects and ammunition;
- more than 680,000 tons of petroleum products were burned during the shelling, which led to significant air pollution;
- more than 23,000 hectares of forest were burned by rockets or projectiles; it will take at least 10 years to restore part of the forest areas;
- at least 50 thousand dolphins died in the waters of the Black Sea;
- more than 6 million domestic animals died;
- possible destruction of hundreds of thousands or even millions of wild animals.

The threats described above justify the increase in the scope of the supply of humanitarian aid throughout the territory of Ukraine. Humanitarian flows are organized mostly after emergency situations and humanitarian crises and are primarily aimed at saving lives, alleviating suffering, helping people with dignity to overcome difficult circumstances, preventing the emergence or

spread of epidemics, etc. Accordingly, the main tasks of humanitarian aid are [8]:

- 1) saving human life;
- 2) provision of assistance to meet basic human needs (water, food, accommodation);
- 3) provision of basic hygiene and medical care.

As of February 2022, it was expected that 2.9 million people would need help due to the war in Donbas alone. Of these, 1.1 million are residents of the Ukrainian-controlled territories of Donetsk and Luhansk regions, including 133,000 internally displaced persons, and another 160,000 internally displaced persons in the rest of Ukraine's regions. Spectrally, the needs of internally displaced persons are distributed in such a way that protection, water, sanitation and hygiene require the most funding (2.5 million hryvnias each); in second place health care and food security (1.5 million and 1.1 million, respectively), followed by education (252 thousand UAH) and housing and non-food products (158 thousand UAH) – see Fig. 1 [8].

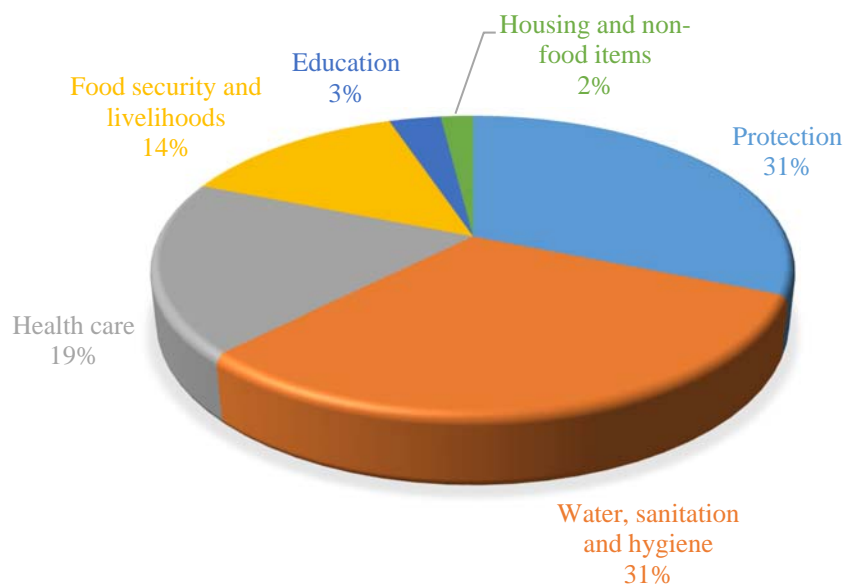


Figure 1 – The structure of financing assistance to internally displaced persons on the territory of Ukraine

Source: developed by the author on the basis of [8]

In general, the systemic problems of the functioning of the humanitarian assistance mechanism include the following [8]:

- imperfect regulatory regulation;
- there is no clear understanding of the list of authorities responsible for providing humanitarian aid to the civilian population, their roles, coordination, interaction
- an imperfect mechanism for determining humanitarian aid needs
- lack of coordination between authorities and international humanitarian organizations (the higher the level of authorities, the higher the risk of ineffective coordination);

- insufficient communication between local authorities and the population;
- lack of mechanisms of effective state control over the supply, distribution, accounting and use of humanitarian aid, which, in particular, is due to the lack of;
- ineffective work of local authorities at the "last mile" stage;
- multiple initiatives to implement IT tools for coordination of humanitarian assistance processes.

The analysis of the humanitarian aid flows delivered to Ukraine makes it possible to carry out such a conditional division into the main types of humanitarian aid [8] (see Table 2).

Table 2. Types of humanitarian aid

Criterion	Group	Subject
Military humanitarian aid	equipment, machinery, equipment, etc	Military units
Medical humanitarian aid	Medicines, equipment, machinery, equipment, etc.	Units of both civilian and military medicine
Humanitarian aid to the civilian population	Food needs - food, hygiene products, clothes and shoes, sanitation, household goods, etc.	Individual individuals, communities, etc.
Fuel	Resources for both military and civil defense needs	All of the above
Humanitarian aid by the source of its receipt	external – provided by foreign donors, domestic – provided by domestic donors	Foreign or domestic donors

Source: developed by the author on the basis of [8]

While the information regarding the provision of humanitarian aid of the second, third and fourth categories (see Table 1) is available and can be analyzed based on the results of the study of regulatory regulations and reports of individual authorized subjects regarding their provision of humanitarian aid within the scope of competence, information on military humanitarian aid mostly belongs to information with limited access and is not available in open sources.

The following elements form the system of providing humanitarian aid in the conditions of martial law [8, p. 23-24]:

- humanitarian help;
- recipients of aid (natural persons, legal entities defined by law);
- recipients of humanitarian aid;

- donors (international and Ukrainian);
- state bodies that perform the function of coordination and control;
- carriers of humanitarian aid;
- logistics hubs and warehouses;
- tools (special accounts, private accounts for collecting financial assistance, IT solutions and initiatives);
- system operation rules, both regulated by normative acts and informally implemented;
- connections between system elements.

Determining the constituent elements of the system is important for understanding the processes and cycles of humanitarian aid implementation by the relevant entities. Thus, if some subjects are characterized by the

formation of a full cycle of providing humanitarian aid, which begins with the collection of needs from recipients of humanitarian aid and ends with the receipt of such aid by the recipients, for others only certain functions (or operations) are inherent, such as coordination and control at various stages cycle of implementation of humanitarian aid.

The Law of Ukraine "On Humanitarian Aid" defines specially authorized state bodies in the field of humanitarian aid, whose powers include, in particular, control over the receipt, distribution, use according to the intended purpose, preparation of statistical reports, accounting of humanitarian aid. There is defines the subjects of providing humanitarian aid In Art. 4 of the Law of Ukraine "On Humanitarian Aid" [3]:

- the central body of the executive power, which implements the state policy in the field of social protection of the population;
- Council of Ministers of the Autonomous Republic of Crimea;
- regional, Kyiv and Sevastopol city state administrations.

At the same time, the Decree of the President of Ukraine "On the Formation of Military Administrations" dated 24.02.2022 No. 68/2022 in implementation of the Law of Ukraine "On the Legal Regime of Martial Law" established 25 military administrations, respectively regional, Kyiv city state administrations [8, p. 57].

In connection with the need to quickly coordinate the key processes of receiving humanitarian aid, the circle of subjects has actually changed and is now characterized by a plurality of such subjects that play different, often duplicative roles in the process of providing humanitarian aid. For the most part, each of the analyzed entities has established its own internal processes for collecting, processing and analyzing needs and ways of responding to them. At the same time, a low level of inter-institutional coordination is observed [8, p. 26]. In particular, the vast majority of processes that

are implemented at the level of coordination headquarters, ministries for the purpose of collecting and analyzing needs, finding donors and ensuring that humanitarian aid needs are met are not connected to each other and take place in parallel. Each body (entity) acts within the limits of competence assigned to it or according to the principle "I can do it", while the separation of powers is not always obvious. As a result, on March 2, 2022, the Decree of the President of Ukraine No. 93/2022 "On coordination of measures to resolve humanitarian and social issues" was adopted, which established the Coordination Headquarters for Humanitarian and Social Issues (Coordinating Headquarters) under the chairmanship of the Head of the Office of the President of Ukraine, which included individual officials of the Office of the President of Ukraine and representatives of individual ministries:

- Deputy Head of the President's Office for Social Policy and Health Care;
- Vice Prime Minister for European and Euro-Atlantic Integration;
- one representative each from the Ministry of Foreign Affairs, the Ministry of Defense, the Ministry of Health and the Ministry of Social Policy.

According to the Presidential Decree, the Government is instructed to establish cooperation with diplomatic missions and consular institutions of foreign countries, international organizations, and foreign donors regarding the provision of humanitarian aid to Ukraine. The National Bank was recommended to open a special account for the purpose of collecting funds for the provision of humanitarian aid to the Ukrainian population [8, p. 28]. The coordination headquarters works in three directions:

1) Involvement of humanitarian aid through the European Civil Protection Mechanism, NATO Disaster Response Coordination Headquarters, involvement of humanitarian aid on a bilateral level from the governments of foreign countries and international organizations (Cooperation with

Caritas and the international technical assistance project "Supporting Governmental Reforms in Ukraine" has been established (SURGe) performed by Alinea International Ltd with support from the Government of Canada, UNICEF, Doctors Without Borders);

2) help from big business to military administrations and communities (help comes from business – companies Teva, Bayer, Novo Nordisk, Pfizer, Nestle, Medtronic,

Sanofi, Eric, "Biopharma", Stada, "Farmak", Galexis (Switzerland), Rinat Akhmetov's Fund, Ernst von Bergmann clinic (Germany);

3) assistance from authorities to military administrations and communities.

Based on the researched material, you can build a diagram of the structure of the management of humanitarian supply chains in Ukraine under martial law conditions - fig. 2.

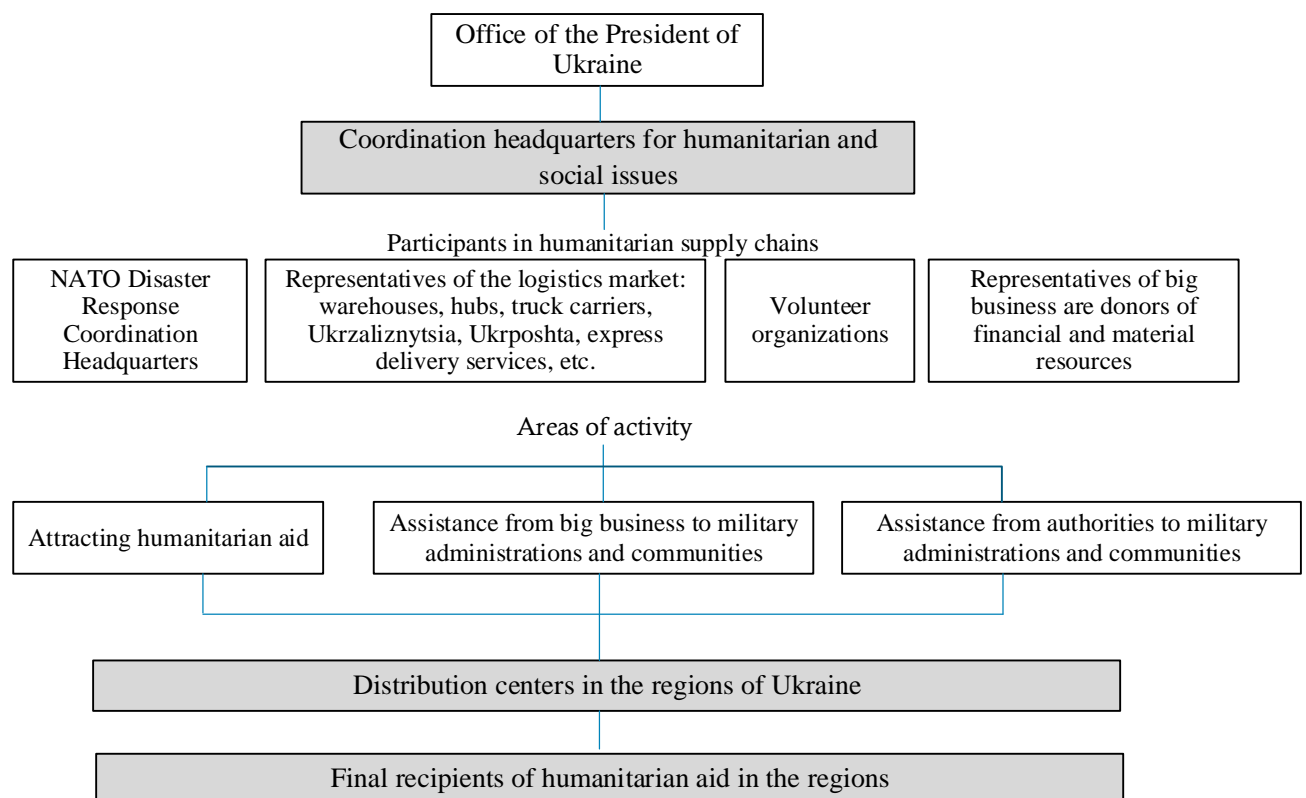


Figure 2 – Scheme of the structure of the management of humanitarian supply chains in Ukraine under martial law

Source: developed by the author on the basis of [8]

Thus, in accordance with the legislation, the military administrations are entrusted with two key tasks for providing humanitarian aid on the "last mile" segment: first, collecting needs and formulating proposals for humanitarian needs based on the needs of ensuring the region's vital activities; secondly, the distribution of humanitarian aid received as a result of consideration of submitted proposals among other recipients and final recipients. As practice shows, the volume of demand comes from:

- territorial communities (which independently collect needs on the ground),
- district state administrations,
- local structural divisions of the Emergency Situations Service,
- individual individuals who apply for assistance,
- executive committees of local self-government bodies,
- social protection authorities (which collect the needs of displaced persons during their registration).

The method of collecting needs, which would be based, in particular, on the norms of provision based on one person, and would allow forecasting needs for the future, is mostly not implemented and not applied. Military administrations do not have clear instructions on the mechanism for collecting needs in territorial communities. The Office of the President of Ukraine instructed the regional and Kyiv city military administrations to record the collected needs of the regions for humanitarian aid on the portal of the State System of Humanitarian Aid (human.help.gov.ua). Territorial communities (local self-government bodies) do not have access to the system, the need for humanitarian aid is recorded in a self-determined manner, in particular with the help of technical online tools. The criteria for prioritizing the distribution of humanitarian aid also differ. So, first of all, the needs of the communities of those regions that suffer from active hostilities, or whose settlements are or were under temporary occupation, are met. Other regions prioritize the humanitarian needs of registered displaced persons who are in the territories of the oblast's communities. To account for the receipt and

distribution of humanitarian aid, the following approach has been introduced [8, p. 58]: firstly, the accounting of receipts, shipments and balances of humanitarian aid in wholesale transit warehouses belonging to the jurisdiction of regional military administrations is carried out in the specified warehouse accounting system; then – relevant statistical data are transferred to the portal of the State Humanitarian Aid System (human.help.gov.ua).

It is worth noting that as of the fall of 2022, the powers of the members of the Coordination Staff, the procedure for their implementation, interaction, and responsibility have not been determined by law. In particular, the legislation of Ukraine regulates only certain issues of providing, under the coordination of the Coordination Headquarters, international humanitarian aid and the transportation of humanitarian goods by railway transport of JSC "Ukrzaliznytsia". Algorithm for providing international humanitarian aid transported by rail transport under the coordination of the Coordination Headquarters at the Office of the President of Ukraine [8, p. 65-66] (see Table 3).

Table 3. Algorithm of actions regarding the provision of international humanitarian aid transported by railway transport of Ukraine

Stage	Subject	Action	Notes
I	Recipients of humanitarian aid (regional, Kyiv city military administrations (hereinafter - military administrations) or other subjects determined by the CMU	Formation of the need for humanitarian aid	The volumes are based on the real need to ensure the vital activities of the region and on the results of consultations with the advisory and auxiliary bodies of the President of Ukraine (with the consent) and/or the relevant government representative as needed
II	Coordination headquarters	Centralized collection of needs at the level of military administrations and through the Ministry of Foreign Affairs - other entities determined by the CMU	Other subjects are mainly central bodies of the executive power (MoH, Ministry of Urban Policy, Ministry of Energy and Coal Industry of Ukraine and other subjects

Continuation of the table 3.

III	Coordination headquarters	Assessment of declared needs of military administrations	The needs collected by the Ministry of Foreign Affairs from other ministries and central executive bodies are not evaluated. Confirmed needs of military administrations and needs of ministries and other central executive bodies are transferred to Ukrainian embassies abroad mainly through the Ministry of Foreign Affairs
IV	Embassies of Ukraine abroad	Ensuring the search for sources of humanitarian aid, donors of humanitarian aid	Performed in accordance with the needs expressed by the authorities
V	Donors wishing to provide humanitarian aid	Appeals to logistics hubs, which are formed on the basis of state institutions of other countries, process information about what humanitarian aid donors want to provide, compare it with applications received from the Ministry of Foreign Affairs, and confirm or not confirm a specific type of aid to the donor.	In Poland - Government Agency of Strategic Reserves of Poland - RARS, in Slovakia - Ministry of Internal Affairs of Slovakia - RARS, Ministry of Internal Affairs of Slovakia. In the case of confirmation of the provision of humanitarian aid, donors are provided with information on authorized warehouses for the shipment of aid, as well as instructions for its packaging.
VI	Partners are participants in humanitarian supply chains	Humanitarian aid is loaded from authorized warehouses by consignors who take humanitarian cargo to the border docking station, where the aid is handed over to the Ukrainian railway carrier - JSC "Ukrzaliznytsia"	On the territory of Poland - RARS; on the territory of Slovakia - the Ministry of Internal Affairs of Slovakia - railway transportation to the wagons of carriers on the territory of Poland is provided by LHS; on the territory of Slovakia - ZSSK.
VII	State Customs Service	Passage of humanitarian aid through the customs border of Ukraine	
VIII	Regional military administrations (on the basis of the decision of the Coordination Headquarters), other recipients determined by the CMU	Forming an application for the transportation of humanitarian goods in the form specified by JSC "Ukrzaliznytsia"	It is implemented through the online humanitarian aid logistics management platform
IX	Partners – participants in humanitarian supply chains (after confirmation in the online platform)	Loading wagons of JSC "Ukrzaliznytsia" with humanitarian cargo, taking into account the volume and general specification of the cargo, preliminary applications of military administrations, the forecast of needs, as well as the remains of humanitarian aid in warehouses,	The coordination headquarters makes decisions regarding the priority and volume of distribution of humanitarian aid between regional military administrations and other recipients. Donors who ensure the sending of humanitarian aid do not receive or see applications. The wagons are loaded on the basis of an informal decision of the coordination headquarters, which is later verified by the application of the recipient of humanitarian aid.

End of the table 3

Xa	JSC "Ukrzaliznytsia"	Ensuring the delivery of humanitarian aid through the territory of Ukraine to the address of the confirmed recipient to the specified station of destination, where humanitarian aid is received or transferred to authorized road carriers by military administrations (subject to combined transportation)	If the senders in the accompanying documents (rail waybills) indicate the recipient of humanitarian aid (regional military administrations, other subjects determined by the CMU) and in the online platform the military administration or another recipient confirms their application for humanitarian aid loaded into specific wagons
Xb	JSC "Ukrzaliznytsia"	Technical receipt of humanitarian cargo and its delivery and storage at sorting authorized (transit) warehouses	If at the time of cargo transfer to JSC "Ukrzaliznytsia" the recipient of humanitarian aid has not been determined and the application in the online platform has not been confirmed
Xc	JSC "Ukrzaliznytsia"	Acceptance of humanitarian aid at authorized sorting (transit) warehouses on the territory of Ukraine.	If the donors themselves deliver by road transport
XI	JSC "Ukrzaliznytsia"	Delivery of humanitarian aid from the sorting authorized (transit) warehouse to the destination station specified in the application, where humanitarian aid is received or transferred to road carriers authorized by military administrations (in the case of combined transportation)	After receiving an application in the online platform from the military administration or another designated recipient of the Cabinet of Ministers of Ukraine (CMU)
XII	Distribution centers in the regions of Ukraine	Humanitarian aid is distributed by the recipient among aid recipients in the region.	Also, humanitarian aid can be redirected from the logistics warehouses of one recipient to another by both rail and road transport - humanitarian convoys (for example, from the military administration of the western region to military administrations in other regions of the country).
XIII	Distribution centers in the regions of Ukraine or final buyers	Distribution among final purchasers	
XIV	Recipient of humanitarian aid	Collection of feedback and needs among recipients of humanitarian aid and reports on receipt and distribution of humanitarian aid among recipients	

Source: developed by the author on the basis of [8, p. 65-66]

Thus, as the above list of operations shows, JSC "Ukrzaliznytsia" organized the operation of an online platform for registration and processing of applications of

recipients of humanitarian aid. Based on the processed data, you can determine the main elements of the logistics system of JSC

"Ukrzaliznytsia" for the delivery of humanitarian aid (see Table 4).

During the period of martial law, in accordance with the resolution of the Cabinet of Ministers of Ukraine dated 17.03.2022 No. 305 "On the peculiarities of the work of JSC "Ukrposhta" in the conditions of martial law", JSC "Ukrzaliznytsia" is assigned the task of delivering humanitarian aid (if there is a technical possibility) and carrying out free transportation of food products and packaging products for their packaging for free distribution to the population in accordance with the list formed by the

Ministry of Economy in accordance with the procedure established by JSC "Ukrposhta". Usually, for the transportation of humanitarian aid, in addition to JSC "Ukrzaliznytsia", military and state administrations use vehicles that are on their balance sheet and vehicles of third parties. At the same time, these processes have no special legal regulation. Also, the resources of entities to which aid is redistributed, volunteer organizations and logistics facilities of JSC "Ukrposhta" and "Nova Poshta" LLC are involved in transportation.

Table 4. Elements of the logistics system of JSC "Ukrzaliznytsia" for the delivery of humanitarian aid

Elements of coordination.	Elements of logistics operations.	Types of flows of humanitarian aid
Coordination center	Expedition system	Aid that is centrally delivered by donors through the state institutions of Poland and Slovakia
Online platform for registration and processing of applications of humanitarian aid recipients	Transport system	Aid that crosses the border of Ukraine and is unloaded at the sorting warehouses of JSC "Ukrzaliznytsia" without specifying the recipient in the accompanying documents (JSC "Ukrzaliznytsia" is the technical recipient of the cargo and waits for an application in the online system)
CRM system	Warehouse system	Aid transported on the basis of private-law transportation contracts at the tariffs of JSC "Ukrzaliznytsia"
Coordination center	Expedition system	Aid transported under contracts concluded with JSC "Ukrposhta"

Source: developed by the author on the basis of [5; 8]

"Nova poshta" LLC is one of the founders of the Help initiative. Ukraine.Centre and provides transportation of humanitarian aid from abroad and through the territory of Ukraine. "Meest Express" LLC organized the reception of humanitarian aid at a warehouse in Poland and ensures the delivery of humanitarian aid to the Lviv Regional Military Administration [7]. Regarding other carriers, according to Ukrtransbezpeka, in the period from 02/24/2022 to 04/19/2022, 342 vehicles of third parties were engaged by it to carry out measures for the transportation of humanitarian aid cargoes. Private cars, cars of volunteer initiatives, charitable/public/religious organizations and foundations are also involved in the transportation of humanitarian aid.

One of the elements of the humanitarian assistance system is the system of logistics

centers and warehouses as well. To ensure the collection, sorting and dispatch of humanitarian aid from abroad by partner countries, the activity of logistics centers coordinated by the embassies of Ukraine abroad is organized (in particular, on the basis of the Government Agency of Strategic Reserves of Poland, the Ministry of Internal Affairs of Slovakia, the State Emergency Service of Romania). The activities of logistics hubs abroad are also organized by numerous private business initiatives (for example, the logistics hub of the Help.Ukraine.Centre initiative opened hubs in Poland and Romania).

Numerous logistics hubs and warehouse centers have been established on the territory of Ukraine to ensure the reception, sorting, transit, and distribution of humanitarian aid at the initiative of ministries, central executive

authorities, military administrations, local self-government bodies, and other state bodies. These hubs operate on the basis of state, communal and private property. Warehouses (hubs) for the first unloading of goods are allocated. As a rule, they operate on the border territory of the rear, safe regions (these are hubs in the Lviv, Volyn, Zakarpattia, Chernivtsi regions, as well as hubs in the Odesa region), as well as other transit and receiving warehouses humanitarian cargo at military administrations, local self-government bodies, in territorial communities. Among the important aspects of the work of logistics centers and warehouses, which should be paid attention to in the context of ensuring transparent and effective humanitarian aid, are the issues of control over the delivery of aid specifically to authorized warehouses, access to warehouses, and control over the organization of their activities [8, p. 70].

Resolution of the CMU dated 03.05.2022 No. 528 regulates the algorithm for providing humanitarian aid in the form of food products and sanitary and hygienic products and products for their packaging in the following sequence [8, p. 43-44]:

I. Recipients (regional, Kyiv city military administrations (hereinafter referred to as military administrations) are customers and form proposals for the needs of goods in accordance with the list of administrative-territorial units on the territory of which assistance is provided within the framework of the "e-Support" Program.

II. Recipients submit an application to the Ministry of Economy indicating the list, quantity (volume) and place of delivery of goods, taking into account the number of the population that needs to be supplied with goods.

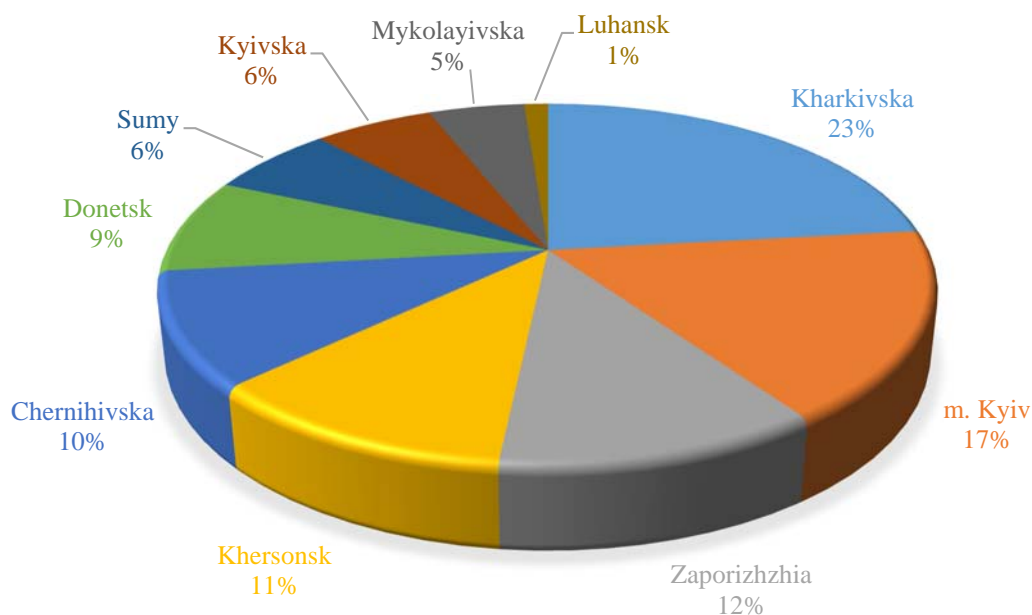


Figure 3. The structure of providing humanitarian aid in the form of food products by region
Source: developed by the author on the basis of [6]

III. The Ministry of Economy compiles the volume of the necessary purchase of food and sanitary hygiene products and packaging products for their packaging. Based on this, the amount of subvention from the state

budget to local budgets for the relevant purchase is determined.

IV. The Ministry of Infrastructure is the administrator of the subvention and provides it to JSC "Ukrzaliznytsia" by making a transfer to an account in a state bank. JSC

"Ukrzaliznytsia" acts as a payer in tripartite agreements on the purchase of goods, works or services, the customer of which is the regional and Kyiv city military administrations.

V. JSC "Ukrzaliznytsia", JSC "Ukrposhta" and other involved logistics companies deliver goods to the warehouses of military administrations, which ensure the issuance of sets of goods, on a free basis.

VI. Each military administration, on the basis of the procedure approved by it for the free distribution of food and sanitary-hygienic goods to the population, ensures their distribution to the population with its own resources.

According to the report of the Coordination Headquarters dated April 16, 2022, 9 regions of Ukraine and the city of Kyiv received food kits in this ratio (see Fig. 3) [8, p. 45].

According to the First Vice Prime Minister of Ukraine - Minister of Economy Yulia Svyrydenko, 5 billion hryvnias have been allocated for the implementation of the program by mid-April 2022 [6]. By the way, the criteria for the distribution of sets of goods and the procedure for issuing them to the population by the military administrations are not made public.

Another function assigned to the Ministry of Economy from February 26, 2022 was to coordinate the distribution of fuel at gas stations for the needs of the Armed Forces of Ukraine and civil protection of the population. Resolution No. 238 of the Cabinet of Ministers of Ukraine dated 09.03.2022 "Some issues of recognition of goods as humanitarian aid and their use under martial law" established that: firstly, during the period of martial law, a group of such goods as mineral fuel, oil and its distillation products, bituminous substances, mineral waxes; secondly, necessary for the implementation of measures to ensure national security and defense in connection with the military aggression of the Russian Federation against Ukraine and civil protection of the population, are recognized as humanitarian aid. The recipients of such

humanitarian aid are the Ministry of Economy, the State Reserve, state enterprises, institutions, and organizations. The Ministry of Economy of Ukraine, the State Reserve, state enterprises, institutions, and organizations are instructed to provide such humanitarian aid directly to national networks of gas stations both for the purposes of national security and defense, as well as to ensure livelihoods and civil protection of the population, on a free basis. It is stipulated that humanitarian aid is provided free of charge to the Armed Forces of Ukraine, military formations, carriers of humanitarian aid and other organizations, the list of which is approved by the Ministry of Economy of Ukraine, within the limits of the needs determined by them [8, p. 46].

Humanitarian aid needs for the Armed Forces are also collected and provided at the expense of [8, p. 49]:

- international military assistance, the provision of which is coordinated both by the state at the highest level (represented by the President of Ukraine, members of the Cabinet of Ministers of Ukraine, the Ministry of Defense, the Ministry of Internal Affairs, the State Emergency Service, the Ministry of Foreign Affairs) and separately by military-civilian administrations (to which information about needs is also received);
- aid provided in the form of necessary goods by domestic donors;
- assistance provided by volunteer initiatives, charitable and public organizations through fundraising and procurement from foreign and domestic partners (public-private partnership).

Since February 24, 2022, the procedure for the passage of humanitarian aid through the customs border of Ukraine, in particular, for the needs of the Armed Forces of Ukraine, has been repeatedly changed with the aim of simplifying formal procedures, speeding up its delivery to the end user and eliminating certain corruption risks. Currently, the main act regulating the passage of humanitarian aid for the Armed Forces of Ukraine into the customs territory of Ukraine is the Resolution

of the Cabinet of Ministers of Ukraine dated 01.03.2022 No. 174 "Some issues of the passage of humanitarian aid through the customs border of Ukraine under martial law" (with changes; the latest edition of 05/26/2022). In accordance with this resolution, 4 categories of goods are distinguished, which according to their purpose can be characterized as assistance to the armed forces, that is, goods necessary for the implementation of measures to ensure national security and defense in connection with the military aggression of the Russian Federation against Ukraine and civil protection of the population [8, p. 50].

Health interacts with the largest volunteer initiatives in the part of [8, p. 55]:

- informing them about the most priority needs, expected deliveries and verification of the needs of institutions;
- accounting by volunteer teams of medical support and its distribution;
- assistance in attracting resources (if necessary).

Currently, help from partners is provided in several ways [8, p. 55]:

- provision of humanitarian aid in the form of the most necessary medical supplies;
- by transferring funds to a special account, including through the United 24 fundraising platform, which will be used for the purchase of urgent medical needs.

Thus, as studies have shown, thanks to the decisions of logistics companies, today Ukraine is able to receive humanitarian aid from other countries. There is an extremely large number of people willing to help Ukrainians on their way to overcoming the humanitarian crisis. According to [9], today the following are involved in establishing the supply of regular humanitarian aid to Ukrainians:

- European Civil Protection Mechanism (EUCPM),
- NATO Disaster Prevention Coordination Center (EADRCC),
- United Nations Office for the Coordination of Humanitarian Affairs (OCHA),
- WFP (Global Food Program),

- United Nations Children's Fund (UNICEF),
- United Nations Refugee Agency (UNHCR),
- the Population Fund (UNFPA),
- the United Nations Development Program (UNDP),
- the International Committee of the Red Cross (ICRC)
- many other disaster response mechanisms at both international and national levels.

Also, international charitable organizations and foundations, as well as state agencies, such as ISRAID, the national development agency of Italy, etc., are now registering and significantly increasing their presence in Ukraine [9]. However, various sources of information and forums emphasize that such a large number of international supply chains has caused another problem, namely: the receipt of humanitarian aid requires state regulation and often coordination. After all, the establishment of legal and administrative support and logistics of aid from abroad on such a scale with the provision of the necessary transparency. Donors have to feel supported and interested in cooperation from the state, so the president's office has developed a special portal for managing humanitarian aid. Now, in the online mode, needs from the regions are collected, customs declarations are formed, containing defined categories of humanitarian aid and a unique code, which allows you to track the crossing of the Ukrainian border by cargo and simplify the customs clearance procedure. A unified classification of humanitarian aid categories and data exchange between the main logistics hubs are already in the works. All this is intended to make humanitarian aid flows as transparent and manageable as possible.

In some logistics hubs in border countries, such as Romania, there is already a pallet tracking system, which was provided by the ISRAID organization [9]. Thanks to the creation of such a portal, it was possible to achieve the formation of a multi-level system,

and Ukraine demonstrates a decent level of management of international humanitarian aid and increases transparency. State bodies of executive power (ministries and various services) and military-civilian administrations on the ground collect and form a generalized list of needs. This information is regularly disseminated and updated through international response mechanisms and through our embassies to potential donors. This link is coordinated by the Ministry of Foreign Affairs of Ukraine. Next, international partners work out requests on a bilateral level with the embassies of Ukraine. As soon as the Ukrainian side has an offer from the donor, this information is sent to the aid recipient [9].

However, there are still problems that have not yet been resolved, so delivery remains the biggest challenge, especially for aid from such remote areas as Japan, India, Mexico. The issue of monitoring the delivery of aid and the transparency of reporting on distribution needs significant refinement. The low adaptability and extreme bureaucratization of the existing assistance

mechanisms clearly showed the need to reform this direction in Ukraine and in the world. Therefore, it is necessary to provide a clear clearing mechanism and exclude duplication of requests. The absolute unpreparedness of international agencies for a humanitarian disaster on the scale of the country became obvious, as they were used to working with a static problem - fires, floods, etc.

However, today Ukraine is a dynamic disaster that changes its configuration every day and requires a comprehensive approach in order to preserve lives, the functioning of the economy and the protection of cultural heritage. But the only way to solve all these problems is to recognize their existence and consistently seek and implement solutions. So, based on the results of the analysis of different approaches to solving problems in the field of humanitarian logistics, we will distinguish two groups of challenges (see Table 5), as well as ways of solving them or possibilities of elimination and consequences.

Table 5 – Analysis of approaches to solving problems in the field of humanitarian logistics

Challenge	Methods of elimination	Consequences
I The need to establish a flexible supply system capable of flexibly responding to critical conditions	Creation of a new and efficient supply chain by two types of transport (land and water).	Ukraine receives regular humanitarian aid from other countries.
II Establishing legal and administrative support and ensuring the necessary transparency	Creation of a portal for managing humanitarian aid by collecting needs, forming customs declarations online. Implementation of a simplified procedure for customs clearance of rubber cargoes.	Ukraine demonstrates a decent level of international aid management and increases transparency. State bodies of executive power form a generalized list of needs.

Source: developed by the author

Conclusions. Studies have shown that, along with the solved problems, there are a number of challenges that require thorough solutions, in particular, such as:

- the need to solve the issue of transparency and monitoring of the delivery of humanitarian goods;
- problems with the delivery of rubber aid from such remote areas as Japan, India, Mexico;

- the need to reform the bureaucratic nature of the existing assistance mechanisms due to their low adaptability;

- the need to provide a clear clearing mechanism and exclude duplication of requests in supply mechanisms, etc.

Due to the fact that Ukrainian transport and forwarding companies are involved in the formation of logistics corridors, interaction with Ukrainians becomes safer and more harmonious for international organizations. This minimizes discomfort and risks, so it has

now become much easier for international partners to interact with Ukraine in a logistical sense. Today, everyone who can contribute to the quality delivery of humanitarian goods to Ukraine should support our logistics industry. Every day, Ukrainians need help (medicines, first-aid kits and mobile medical devices, etc.).

And also systems and tablets for water purification to provide drinking water to regions where critical infrastructure has been

destroyed or significantly damaged, as well as special vehicles, means for preserving cultural heritage. The volume of needs, the number of recipients, the regions to which it is necessary to deliver in the first place change every day. Therefore, a quick search for a solution to these challenges will benefit Ukrainians, but the final solution to the problems requires quick innovative solutions.

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UDC 005.52:005.334

DOI: <https://doi.org/10.46783/smart-scm/2022-16-3>

JEL Classification: H53, Q20, P39.

Received: 15 November 2022

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CHALLENGES OF SUSTAINABLE DEVELOPMENT AND SAFETY MANAGEMENT OF WORLD CIVIL AVIATION IN THE CONDITIONS OF GLOBALIZATION

Dmytro Bugayko, Ganna Gurina, Marina Korzh, Kateryna Sydorenko *"Challenges of sustainable development and safety of world civil aviation in the conditions of globalization". The UN's global strategic document is the 2030 Agenda for Sustainable Development. It is an action plan aimed at ensuring global sustainable development in economic, social and environmental directions, which ensures that no UN member country is left behind. The 17 Sustainable Development Goals in the 2030 Agenda can be used as guidelines for the coordinated development of UN member states. Every year, the number of countries that also*

connect aviation to a wider range of UN Sustainable Development Goals, such as 4, 8, 9, 11, 13, 14, 16 and 17, is increasing. At the same time, the achievement of these goals requires working out the theoretical foundations of strategic management of global civil aviation safety. The issue of aviation safety is one of the top priority challenges from the first day of flights. Years passed, technology, avionics, engines, navigation aids changed and developed, but the problem did not lose its relevance. ICAO's purpose: to ensure the safe and orderly development of all aspects of international civil aviation. ICAO develops Standards and Recommended Practices. They are set out in 19 Annexes to the Convention on International Civil Aviation. ICAO's new strategies are the basis for further sustainable development of global civil aviation.

Keywords: sustainable development, world civil aviation, globalization, safety.

Дмитро Бугайко, Ганна Гуріна, Марина Корж, Катерина Сидоренко «Ризик менеджмент повоєнного відновлення та сталого розвитку авіаційного транспорту України». Стратегічним документом глобального рівня ООН є Порядок денний сталого розвитку до 2030 року. Це план дій, орієнтований на забезпечення світового сталого розвитку в економічному, соціальному та екологічному напрямках, який гарантує, що жодна країна-член ООН не залишається позаду. 17 Цілей сталого розвитку в порядку денному на 2030 рік можуть використовуватися як орієнтири для узгодженого розвитку країн-членів ООН. Щорічно зростає кількість держав, які також підключають авіацію до більшого кола Цілей сталого розвитку ООН, таких як 4, 8, 9, 11, 13, 14, 16 та 17. При цьому досягнення зазначених цілей потребує відпрацювання теоретичних засад стратегічного управління безпекою світової цивільної авіації. Проблема безпеки авіації є одним із найпріоритетніших викликів з першого дня виконання польотів. Плинули роки, змінювалась та розвивалась техніка, авіоніка, двигуни, засоби навігації, але проблема не втрачала власної актуальності. Мета ІКАО: забезпечення безпечного й упорядкованого розвитку всіх аспектів міжнародної цивільної авіації. ІКАО розробляє Стандарти і Рекомендовану практику. Вони викладені в 19 Додатках до Конвенції про міжнародну цивільну авіацію. Нові стратегії ІКАО є підґрунтям подальшого сталого розвитку глобальної цивільної авіації.

Ключові слова: сталий розвиток, світова цивільна авіація, глобалізація, безпека.

Дмитрий Бугайко, Анна Гурина, Марина Корж, Екатерина Сидоренко «Риск менеджмента послевоенного восстановления и устойчивого развития авиационного транспорта Украины». Стратегическим документом глобального уровня ООН является Повестка дня устойчивого развития до 2030 года. Это план действий, ориентированный на обеспечение мирового устойчивого развития в экономическом, социальном и экологическом направлениях, гарантирующий, что ни одна страна-член ООН не остается позади. 17 Целей устойчивого развития в повестке дня на 2030 год могут использоваться в качестве ориентиров для согласованного развития стран-членов ООН. Ежегодно растет количество государств, также подключающих авиацию к большому кругу Целей устойчивого развития ООН, таких как 4, 8, 9, 11, 13, 14, 16 и 17. При этом достижение указанных целей требует отработки теоретических основ стратегического управления безопасностью мировой гражданской авиации. Проблема безопасности авиации является одним из самых приоритетных вызовов с первого дня выполнения полетов. Проходили годы, менялась и развивалась техника, авионика, двигатели, средства навигации, но проблема не теряла собственной актуальности. Цель ИКАО: обеспечение безопасного и упорядоченного развития всех аспектов международной гражданской авиации. ИКАО разрабатывает Стандарты и Рекомендуемую практику. Они изложены в 19 Приложениях Конвенции о международной гражданской авиации. Новые стратегии ИКАО являются основой для дальнейшего устойчивого развития глобальной гражданской авиации.

Ключевые слова: устойчивое развитие, мировая гражданская авиация, глобализация, безопасность.

Introduction. The UN's global strategic document is the 2030 Agenda for Sustainable Development. It is an action plan aimed at ensuring global sustainable development in economic, social and environmental directions, which ensures that no UN member country is left behind. The 17 Sustainable Development Goals in the 2030 Agenda can be used as guidelines for the coordinated development of UN member states. air transport is an open system, which, on the one hand, is affected by a wide range of technical, natural, human and economic threats, and on the other hand, it itself is a generator of significant threats to the external environment. It was determined that the achievement of the following Global Sustainable Development Goals (SDGs) directly or indirectly depends on the results of aviation activities: 4. Quality education; 8.

Decent work and economic growth; 9. Industry, innovation and infrastructure; 11. Sustainable cities and societies; 13. Climate changes.

The defined list of Sustainable Development Goals, in the solution of which aviation transport participates, is not exhaustive. Every year, the number of countries that also connect aviation to a wider range of UN Sustainable Development Goals, such as 4, 8, 9, 11, 13, 14, 16 and 17, is growing. In the future, this list will only expand. At the same time, the achievement of these goals requires working out the theoretical foundations of strategic management of global civil aviation safety. Organizational and economic mechanism for the interaction of sustainable development goals with goals of aviation strategic management is shown in the Figure 1.

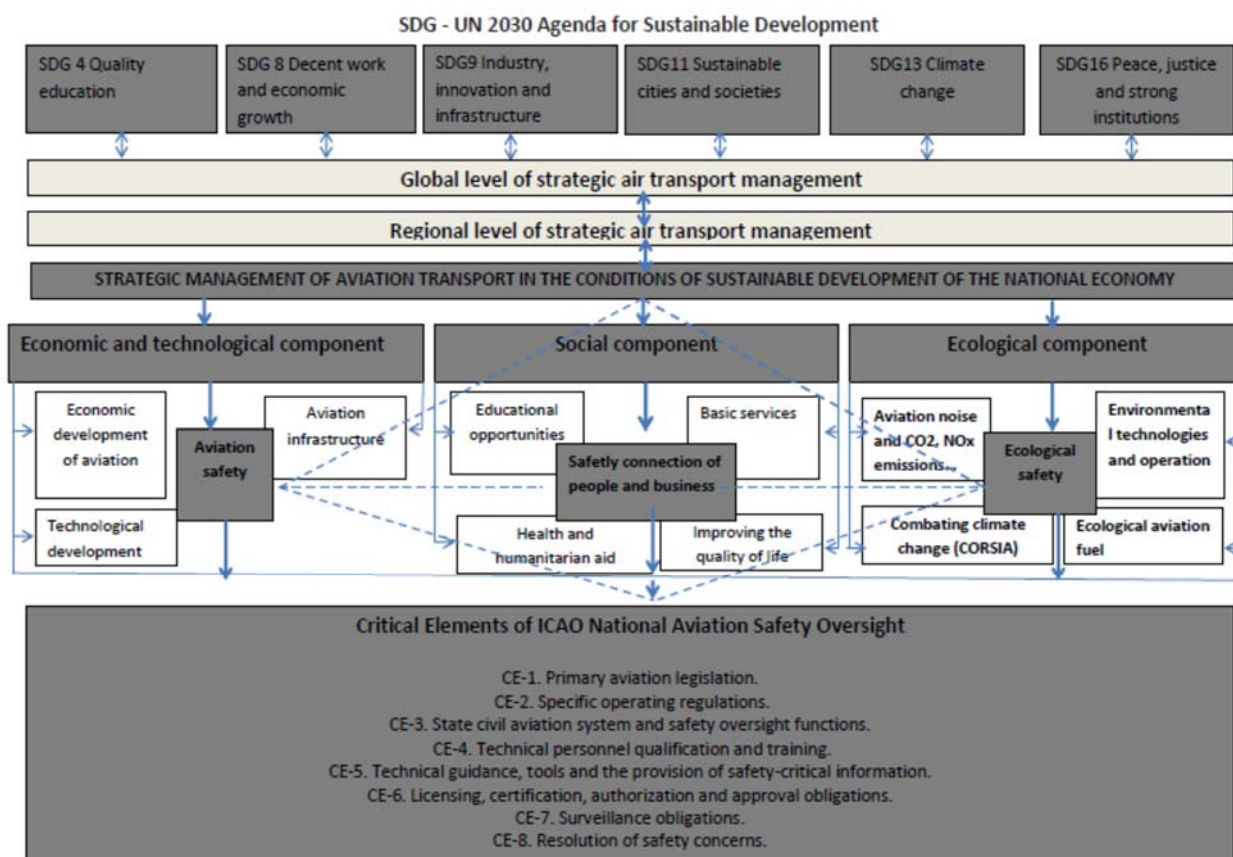


Figure 1. Organizational and economic mechanism for the interaction of sustainable development goals with goals of aviation strategic management

Source: Bugayko D.O., Kharazishvili Yu.M. Theoretical bases of aviation branch strategic safety management in the context of maintenance of sustainable development of national economy. Bulletin of Economic Science of Ukraine. 2020. № 1 (38). Pp. 166-175. Institute of Industrial Economics of the National Academy of Sciences of Ukraine, Academy of Economic Sciences of Ukraine [1].

The main tasks of the aviation industry are the development of transportation at the global, regional and national levels in order to ensure economic, social and environmental priorities, as well as maintaining an acceptable level of safety of world civil aviation [1].

The purpose of the article is to consider the main challenges of sustainable development and safety of world civil aviation in the conditions of globalization.

Presentation of the main results. If you delve into history, you can tell that the first post-war decades were marked by a very high level of accidents. Almost every thousandth flight had serious safety problems. At the same time, in the list of the main causes of events, the first place was occupied by the failure of aviation equipment. At this stage, the most effective tool for combating disasters has become reverse methods - investigation of aviation events and serious incidents. It was they who made an invaluable contribution to the modernization of aviation equipment. The joint work of specialists from many countries of the world has led to the fact that gradually technical factors, although they take place in the development of emergency situations in aviation, have mostly lost their critical nature.

The achievements of designers, scientists and experts managed to reduce the probability of a disaster to one in 100 thousand flights until the 70s. The period from the 70s to the 90s of the 20th century was marked by the active development of ICAO Standards and Recommended Practice within the 18 annexes to the Chicago Convention [2]. Among the main methods that are widely used at this stage, it is possible to identify preventive ones. Preventive method – on the basis of analysis of the organization's structure and activities,

identification of vulnerable places, measures are developed to eliminate them and reduce the level of risk. At the same time, the person himself became the critical link of the "people - technology - environment" system. Research in the field of the human factor received an undisputed priority.

Further development of the aviation safety toolkit included predictive method approaches. The predictive method captures system characteristics that appear in real time under normal conditions. The role of the human factor in the process of development of crisis situations has been changed and understood. The concept of the organizational factor was proposed in the development of human factor research. The organizational factor means the following maxim - if a person makes a catastrophic mistake in a given situation, not only the person is to blame, but also the system that allowed the person to make such a mistake and did not provide additional means of protection.

The integrated application of the three above-mentioned methods made it possible to increase the global level of safety to 1 disaster per 10 million flights. These figures are a confirmation of the undeniable progress of the global aviation security system. But, unfortunately, numbers do not always fully reveal the real picture. According to the estimates of the world's leading civil aviation organizations, the number of flights doubles every 15-20 years. Therefore, reducing the probability of a disaster, unfortunately, does not cancel the probability of human losses [3].

Clearly aware of this trend, ICAO emphasized the need to change the global approach to the problem of aviation security. A new Annex 19 to the Convention on the International Civil Aviation Organization "" was proposed. It is proposed to combine the

Standards and Recommended Practices from six different Appendices with the aim of:

- strengthening the role of the state at the highest level (coordination between all resources and all interested parties);
- ensuring the availability of a legal basis in one document;
- development of agreed standards that can be applied to different resources;
- improving identification and development of future needs;
- organization of a specialized group of ICAO experts in the field of aviation safety for cooperation with the European Union, the European Safety Agency and other regional aviation organizations;
- ensuring a global approach through the implementation of new ICAO strategies for civil aviation safety [4].

A new definition of aviation safety was proposed: "Safety is a state of the air transport system in which the risk is reduced to an acceptable level as a result of the continuous process of threat identification and risk management and is maintained at this level or further reduced" [3].

According to the provisions of the new ICAO aviation safety strategies, the aviation safety management system (SMS) is a structured approach to management that includes: the necessary organizational structures, areas of responsibility, policies and procedures. According to ICAO's systemic approach to aviation safety issues, any product/service provided by aviation organizations must be safe. In order to ensure this goal, ICAO adopted new documents. The widespread use of the latest proactive methods ensured the detection of new threats and the correction of change management to threats that were identified in the past.

The main strategic document for the implementation of ICAO's systemic approach in the field of aviation safety is the Global Aviation Safety Plan (GASP). GASP is a high-level policy document on strategy and planning. The GASP defines a strategy for continuous improvement, which includes the

goals of the states, which must be achieved by:

- implementation of effective control systems for ensuring flight safety,
- implementation of state safety programs (SSP),
- development of improved flight safety control systems, including anticipatory risk management [5].

According to the new ICAO strategies, each state requires the implementation of an aviation safety management system by the following aviation organizations: approved training organizations; aircraft or helicopter operators; approved maintenance organizations; organizations responsible for type design or manufacturing of aircraft; air traffic service providers; operators of certified airfields. In modern conditions, the development of safety culture is of fundamental importance. A safety culture is a set of enduring values and attitudes related to safety that are shared by all employees at all levels of the organization. This is the level of awareness of each employee of the organization regarding possible risks and threats caused by their activities. A safety culture establishes a framework for acceptable behavior in the workplace by imposing norms and restrictions. It provides a basis for decision-making by managers and staff.

Civil aviation is an open system that is affected by a wide range of technical, natural, human and economic threats. Each threat leads to the potential development of a number of risks. At the same time, according to the estimates of the world's leading civil aviation organizations, the number of flights doubles every 15-20 years. Under such conditions, the application of ICAO's new strategies for civil aviation safety is seen as the most effective tool for ensuring an acceptable level of safety in world civil aviation [6].

The development of world civil aviation is accompanied by continuous technological progress and requires constant improvement in the field of control and reduction of dangerous factors in its activity. However,

despite all efforts to prevent failures and errors, they will nevertheless occur, and 100% security cannot be achieved. No type of human activity and no artificial system can be guaranteed to be absolutely safe, that is, free from risks. Safety is a relative concept, which implies that in a "safe" system, the presence of risk factors is considered an acceptable situation.

An effective tool for reducing the level of risks is global cooperation in international civil aviation. One of the main goals of the activities of the leading world and regional organizations in the field of civil aviation is the creation of a single global system for ensuring aviation safety.

The cooperation of ICAO member states is aimed at the global support of ICAO Standards and Recommended Practices (ISARPS), which are constantly updated within the framework of 19 annexes to the 1944 Chicago Convention. ICAO's strategic goals are to ensure flight safety, aviation and environmental safety. An important step in the development of world civil aviation security was the decision to put into effect in November 2013 the 19th Annex to the Chicago Convention, dedicated to the management of aviation security. The new application incorporated the concept of the State Flight Safety Program and 8 critical elements of the flight safety oversight system. The application covers activities in the field of general aviation and commercial aviation. Annex 19 reinforces the role of the state in maintaining safety at the national level, emphasizing the concept of joint work to ensure safety in all areas, in coordination with air navigation service providers.

The new application is being developed in two stages. The first stage consists in the generalization of already existing safety management provisions contained in 6 Annexes into one new Annex. At the same time, the main provisions related to flight safety management are transferred from the following Annexes:

Appendix 1 – Issuance of certificates to aviation personnel;

Appendix 6 – Operation of aircraft, Part I – International commercial air transport – Airplanes, Part II – International general aviation – Airplanes and Part III – International flights – Helicopters;

Appendix 8 – Airworthiness of aircraft;

Appendix 11 – Air traffic service;

Appendix 13 – Investigation of aviation events and incidents;

Appendix 14 – Aerodromes, Volume I – Design and operation of aerodromes.

The principle difference of the provisions of Annex 19 was the expansion of the conceptual framework of the flight safety management system to the level of organizations responsible for the design of the type or manufacture of aircraft, raising the level of Standards in the field of safety, expanding the powers of the state control system over ensuring flight safety to the level of all service and product suppliers.

Particular attention is paid to the collection, analysis and exchange of flight safety data and the legal principles of information protection in flight safety data collection and processing systems [4]. Based on these approaches, the fourth edition of Document 9859 "Safety Management Manual" was published, which is based on the conceptual framework of the State Safety Program and the Aviation Safety Management System [3]. The second stage of the development of Program 19 will be devoted to the definition of expanded Standards and Recommended Practices in the field of a unified aviation safety management system.

Cooperation within corporate associations (for example, the International Air Transport Association (IATA), the Air Transport Association of America (ATA) and the Civil Aviation Service Organization (CANSO) [7].

Cooperation within national and international aviation associations (for example, National Business Aviation Association (NBAA), European Business Aviation Association (EBAA) and others).

Cooperation within the framework of international federations of national associations (for example, the International Federation of Airline Pilot Associations (IFALPA) and the International Federation of Air Traffic Controller Associations (IFATCA).

Activities of international aviation safety bodies (for example, the World Flight Safety Foundation (FSF) and the International Society of Aviation Safety Investigators (ISASI));

Collaboration within industry / government groups (eg, the Commercial Aviation Safety Team (CAST) and the Pan American Commercial Aviation Safety Team (PAST));

Conducting large forums on aviation safety with the participation of manufacturers of aviation equipment and equipment [8].

A positive aspect of such cooperation is the development of a comprehensive approach only to the problems of aviation safety, taking into account not purely technical and technological issues, but also the determination of commercial and economic market risks for various air transport entities. This is extremely important, given that in the context of globalization, there has been a tendency to decrease state support for aviation enterprises.

Under such conditions, world civil aviation is focused on achieving three main goals - safety, efficiency and economic feasibility. Problems in achieving any of them endanger the normal functioning of the industry [9]. The issues of efficiency and economic feasibility are among the priorities in solving the tasks of maintaining the acceptable level of safety & security [10].

In fact, the philosophy of aviation safety changes with the understanding of its technical and technological component and expands to determine the degree of severity of risks to property, life and health of people, the environment, financial security and legal responsibility of the air transport enterprise, its image and public trust in it. At the same time, harmonization, integrity and operational system of interchangeability of

the complex safety sector is achieved; expands worldwide information related to aviation security; detection and elimination of global systemic sources of danger at an early stage. Effective management of aviation security policy requires a systematic approach to development, procedures and recommended practices [11].

The issue of ensuring flight safety always remains the main priority of the development of the industry. By combining membership in the International Civil Aviation Organization and obligations within the framework of the Convention on International Civil Aviation (Chicago Convention of 1944), aviation states make efforts to improve the level of aviation safety. Coordination of their activities, identification of common threats and approaches to risk management, common terminology and mechanisms for notification and information exchange play an essential role in this.

One of the effective tools for implementing a systemic approach to aviation safety issues is the Global Aviation Safety Plan (GASP) (Doc 10004) – a high-level directive document on strategy, planning and implementation, developed simultaneously with the Global Air Navigation Plan (Doc 9750) [5, 11].

The Global Aviation Safety Plan and the Global Air Navigation Plan coordinate international, regional and national initiatives for the systemic development of international civil aviation.

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The Global Aviation Safety Plan and the Global Air Navigation Plan coordinate international, regional and national initiatives

for the systemic development of international civil aviation.

The Global Aviation Safety Plan is aimed at:

- implementation of effective control systems for ensuring flight safety,
- implementation of state programs on flight safety,
- development of improved flight safety control systems, including anticipatory risk management [5].

The main objective of the Global Aviation Safety Plan is the coordinated development of regional and national aviation safety plans. It is aimed at providing assistance to States and regions in their implementation of aviation safety policy, planning and implementation. Constant improvement of the level of flight safety is achieved with the help of:

- development of global strategies contained in the Global Aviation Safety Plan and the Global Air Navigation Plan;
- development and updating of Standards and Recommended Practices (SARPS) and Air Navigation Service Rules (PANS);
- monitoring trends and indicators of aviation safety;
- implementation of targeted aviation safety programs to eliminate deficiencies in this area and infrastructural deficiencies;
- effective response to disruptions in the aviation system caused by natural disasters, conflicts or other reasons [5, 13].

States should implement the Global Plan for ensuring flight safety, relying on the basic systems of national control over ensuring flight safety. As part of the Global Aviation Safety Plan, a Global Aviation Safety Roadmap has been proposed to provide an action plan for the global aviation community. Coordination of actions of different aviation countries will allow coordinating actions and correcting inconsistencies and avoid duplication of efforts.

Conclusions. ICAO promotes cooperation between States and other

stakeholders to ensure a coherent, transparent and proactive approach to aviation safety. Stakeholders include ICAO, States signatories to the Convention on International Civil Aviation (1944 Chicago Convention), international and regional aviation organizations, Regional Aviation Safety Groups (RASGs), Regional Safety Oversight Organizations (RSOOs), regional aviation event and incident investigation organizations, industry representatives, air navigation service providers, operators, airfields, manufacturers of aviation

equipment and equipment, organizations for maintenance of aviation equipment and equipment. A deep integration of actions and a systematic approach to the implementation of the aviation safety strategy is the key to the development of the global civil aviation industry. The step-by-step implementation of the provisions of the above-mentioned document will allow achieving a unified approach to the implementation of aviation safety requirements in all 193 ICAO member countries.

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UDC 339.976.2

DOI: <https://doi.org/10.46783/smart-scm/2022-16-4>

JEL Classification: F15, L90, M21, O19, P45.

Received: 24 November 2022

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STATE, COMPETITIVENESS AND PROSPECTS OF SUPPLY CHAINS DEVELOPMENT IN UKRAINE IN CONTEXT OF EUROPEAN INTEGRATION ASPIRATIONS

Iryna Popovychenko, Kira Spiridonovsa, Olesya Kirnos « State, competitiveness and prospects of supply chains development in Ukraine in context of european integration aspirations». The state and peculiarities of the operation of supply chains in Ukraine under the conditions of martial law are considered. The fundamental impact of the Russian Federation's war in Ukraine on the current state of the domestic logistics infrastructure and on the Logistics Performance Index (LPI), the value of which is significantly related to the global competitiveness of the country, is characterized. Based on the results of the research of colleagues from the National University "Lviv Polytechnic" called "Logistics landscape-2022+", in which the authors of this article took an expert part in July-August 2022, presents the author's vision of the key factors that have affected supply chains, their modern state and development, the main characteristics of the current state of supply chains and logistics infrastructure in Ukraine and events that have radically affected their current state over the past almost three years are given. The study of the military operations impacts in Ukraine on the domestic logistics industry and, accordingly, on the competitiveness of supply chains integrated with the international space is characterized. The authors have determined their own vision of priorities in the management of supply chains in modern conditions in Ukraine, based on seven characteristics (criteria) of the supply chain proposed in the

study "Logistics landscape-2022+". The characteristics of supply chains that according to the authors received the first three advantages are: 1) safety, 2) reliability, 3) flexibility of supply chains. It is emphasized that the mechanisms, tools, methodology, technologies, strategies for managing supply chains in conditions of disruptions / restoration of logistics should be based on digitalization of management of logistics business processes. It is proposed to pay special attention to the introduction of a procedural approach to managing the competitiveness of the logistics business. Conceptually, three interrelated blocks of indicators are proposed, their systematic assessment will allow to monitor and control the progress of operational, management and supporting business processes in supply chains. In the context of Ukraine's European integration steps, the advantages and problematic issues of including Ukrainian logistics routes in the Trans-European Transport Network TEN-T (Trans-European Transport Network) - a network of highways, railways, airports and waterways in the European Union, are considered. The authors hypothetically expressed the opinion that there is a close relationship between the position of Ukraine in the World Competitiveness Ranking and the state of its logistics infrastructure, taking into account the fact that the determining factors of competitiveness according to the results of 2021 were: level of innovations, digitalization, supportive policies and social cohesion. The authors see a retrospective analysis of the cause-and-effect relationships of the pre-war state and functioning of the Ukrainian logistics industry and forecasting its development in the perspective of European integration in post-war times as directions for further research.

Keywords: supply chains; martial law; European integration of Ukraine; factors affecting supply chains; logistics infrastructure; competitiveness.

Ірина Поповиченко, Кіра Спірідонова, Олеся Кірнос. «Стан, конкурентоспроможність та перспективи розвитку ланцюгів постачання в Україні в контексті євроінтеграційних прагнень». Розглянуто стан та особливості функціонування ланцюгів постачання в Україні в умовах воєнного стану. Охарактеризовано принциповий вплив війни РФ в Україні на сучасний стан вітчизняної логістичної інфраструктури та на показник Індексу Ефективності Логістики (LPI), значення якого суттєво пов'язане із показником глобальної конкурентоспроможності країни. Спираючись на результати дослідження колег з Національного університету «Львівська політехніка» під назвою «Логістичний ландшафт-2022+», в якому автори статті брали експертну участь у липні-серпні 2022 року, представлено авторське бачення ключових чинників, які впливають на ланцюги постачання, їх сучасний стан і розвиток, наведено основні характеристики теперішнього стану ланцюгів постачання та логістичної інфраструктури в Україні й події, які радикально вплинули на їх сучасний стан за останні майже три роки. Охарактеризовано наслідки впливу воєнних дій в Україні на вітчизняну логістичну галузь та, відповідно, на конкурентоспроможність інтегрованих із міжнародним простором ланцюгів постачання. Авторами визначено власне бачення пріоритетів в управлінні ланцюгами постачання в сучасних умовах в Україні, відштовхуючись від запропонованих у дослідженні «Логістичний ландшафт-2022+» семи характеристик (критеріїв) ланцюга постачань. Характеристиками ланцюгів постачання, що отримали перші три пріоритети на думку авторів є: 1) безпека, 2) надійність, 3) гнучкість ланцюгів постачання. Підкреслено, що механізми, інструменти, методології, технології, стратегії управління ланцюгами постачання в умовах збоїв / відновлення логістики мають базуватися на цифровізації управління логістичними бізнес-процесами. Запропоновано приділяти особливу увагу впровадженню процесного підходу до управління конкурентоспроможністю логістичного бізнесу. Концептуально запропоновано три взаємопов'язаних блоки показників, системна кількісна оцінка яких дозволить моніторити та контролювати хід виконання операційних, управлінських та забезпечуючих бізнес-процесів у ланцюгах постачання. В контексті євроінтеграційних кроків України розглянуто переваги та проблемні питання включення українських логістичних маршрутів до Транс'європейської

транспортної мережі TEN-T (Trans-European Transport Network) — мережі автодоріг, залізниць, аеропортів і водних шляхів у Європейському Союзі. Авторами гіпотетично висловлено думку, що існує тісна залежність між позицією України у Світовому рейтингу конкурентоспроможності та станом її логістичної інфраструктури, зважаючи на те, що визначальними факторами конкурентоспроможності за результатами 2021 року стали: наявність інновацій, цифровізація, підтримуюча політика та соціальна згуртованість. Напрямами подальших досліджень автори бачать ретроспективний аналіз причинно-наслідкових зв'язків довоєнного стану та функціонування логістичної галузі України та прогнозування її розвитку в перспективі євроінтеграції у повоєнні часи.

Ключові слова: ланцюги постачань; воєнний стан; євроінтеграція України; чинники впливу на ланцюги постачання; логістична інфраструктура; конкурентоспроможність.

Ирина Поповиченко, Кира Спиридонова, Олеся Кирнос. «Состояние, конкурентоспособность и перспективы развития цепей поставок в Украине в контексте евроинтеграционных устремлений». Рассмотрены состояние и особенности функционирования цепей поставок в Украине в условиях военного положения. Охарактеризовано принципиальное влияние войны РФ в Украине на современное состояние отечественной логистической инфраструктуры и на показатель Индекса эффективности логистики (LPI), значение которого существенно связано с показателем глобальной конкурентоспособности страны. Опираясь на результаты исследования коллег из Национального университета «Львовская политехника» под названием «Логистический ландшафт-2022+», в котором авторы статьи принимали экспертное участие в июле-августе 2022 года, представлено авторское видение ключевых факторов, влияющих на цепи поставок, их современное состояние и развитие, приведены основные характеристики нынешнего состояния цепей поставок и логистической инфраструктуры в Украине и события, которые радикально повлияли на их современное состояние за последние три года. Охарактеризованы последствия влияния военных действий в Украине на отечественную логистическую отрасль и, соответственно, на конкурентоспособность интегрированных с международным пространством цепей поставок. Представлено авторское видение приоритетов в управлении цепями поставок в современных условиях в Украине, отталкиваясь от предложенных в исследовании «Логистический ландшафт-2022+» семи характеристик (критериев) цепи поставок. Характеристиками цепей поставок, получившими первые три приоритета, по мнению авторов, являются: 1) безопасность, 2) надежность, 3) гибкость цепей поставок. Подчеркнуто, что механизмы, инструменты, методологии, технологии, стратегии управления цепями поставок в условиях сбоев/восстановления логистики должны базироваться на цифровизации управления логистическими бизнес-процессами. Предложено уделять особое внимание внедрению процессного подхода к управлению конкурентоспособностью логистического бизнеса. Концептуально предложены три взаимосвязанных блока показателей, системная количественная оценка которых позволит мониторить и контролировать ход выполнения операционных, управленческих и обеспечивающих бизнес-процессов в цепях поставок. В контексте евроинтеграционных шагов Украины рассмотрены преимущества и проблемные вопросы включения украинских логистических маршрутов в Транс'європейську транспортну сеть TEN-T (Trans-European Transport Network) — сеть автодорог, железных дорог, аэропортов и водных путей в Европейском Союзе. Авторы гипотетически высказали мнение, что существует тесная зависимость между позицией Украины во Всемирном рейтинге конкурентоспособности и состоянием ее логистической инфраструктуры, учитывая, что определяющими факторами конкурентоспособности по результатам 2021 года стали: наличие инноваций, цифровизация, поддерживающая политика и социальная сплоченность. Направлениями дальнейших исследований авторы видят ретроспективный анализ причинно-

следственных связей довоенного состояния и функционирования логистической отрасли Украины и прогнозирование ее развития в перспективе евроинтеграции в послевоенном периоде.

Ключевые слова: цепи поставок; военное положение; евроинтеграция Украины; факторы воздействия на цепи поставок; логистическая инфраструктура; конкурентоспособность.

Introduction. Full-scale war aggression of Russian Federation against our country that brutally started on 24 February, 2022, led to great destruction of logistics, industrial and civil infrastructure and numerous human victims.

Efficiency of logistics in any country is determined with six universal internationally accepted indices and criteria that are basis for estimation of LPI - Logistics Performance Index using the World Bank methods. Among them: efficiency of customs and border processing; quality of logistics infrastructure; simple organization of international transportation at competitive prices; quality and competence of logistics service provided by market operators; cargo tracking; promptness of delivery. LPI is assessed every two years. The last time the World bank estimated this index in 2018 due to impact of Covid-19 pandemic. Ukraine took 69th place among 167 countries, Russia took 85th place and Kazakhstan 77th [1]. It is obvious that LPI indices for Ukraine would be much worse if calculated in 2020 due to the war in our country. However more than 10 months of the full-scale war showed that Ukrainian economy and logistics branch as its important element continue functioning despite these hard conditions. Therefore, after Ukrainian victory in post-war period in order to enter to European Unity Ukraine has not only to restore, but also modernise its economy and logistics sector particularly through implementing modern business-models, organizational and management approaches, investment projects.

Analysis of recent research and publications. In research conducted by I.P. Marchuk in pre-war period (2021) based on statistical analysis he proved that logistics is a significant component of economic shift and through LPI index showed close connection of logistics efficiency with basic economic

indices (gross domestic product, export, import, direct foreign investment) and economic indices (global competitiveness, conducting business, global innovation index, index of market potential) that give foreign partners opportunity to assess conditions of conducting business in the country, its implementation in international trade and participating in global delivery chains. We agree with the author that logistics plays an important role in providing economic prosperity and can be catalyst for economic development [2].

Ukrainian scientists and researchers of logistics business and logistics sphere N. V. Chornopyska and N.V. Hayvanovych pay special attention to such criteria as "logistics competitiveness" [3]. Based on the analysis of Polish and German experience these authors concentrate on improvement of "logistics competitiveness" criteria that is significantly lower than the average European level. Thus, professionalism of companies (logistics providers) and specific logisticians is the key to successful future development of Ukrainian logistic potential.

A. Dlihach, a co-founder of Center of Economic Recovery, CEO of Advanter Group (strategic consulting and market analytics), theorist and practitioner, who participates in number of important projects connected with development of Ukrainian logistics sphere, points out that in pre-war years Ukraine slightly used its advantageous logistics location on the map of Eurasian space. He reminds the experience of countries restoring after the war: it was development of logistics infrastructure that became a driver of the country's restoring and further economic growth [4]. Assessment methodology of using logistics infrastructure potential is considered in articles of M. Hryhorak, L. Kostiuchenko, O. Harmash. The authors used integrated approach to understanding of logistics

infrastructure potential in the form of three dimensional model with the coordinate system "resources – abilities – competence". Resources allow to transform opportunities into abilities. In its turn abilities are transformed into competences through their reveal and development using education. Potential assessment is offered to make in the context of three elements providing directions of formation and using objects of logistics infrastructure: resources (assessment of material and energy consumption), organizational (effectiveness of management), and functional.

Therefore, condition and potential of logistics infrastructure, level of specialists' logistics competence, quality of management of integrated over-arching business processes in supply chains are guarantee of efficient cooperation of producers, suppliers, trade structures, consumers both within and outside the country while implementing European integration processes and full integration of Ukraine in international trade. Characteristics above are organic components of logistics business as an important element of competitiveness of the country's economy and demand constant attention of researchers and practitioners in difficult conditions of martial law.

The purpose of the research. The purpose of the article to characterize the current state of supply chains in Ukraine, problems of domestic logistics and justify ways of their solving for prospects of successful European integration of Ukraine.

The main part of the research. In summer of 2022 (July – August) research team of marketing and logistics department of Lviv Polytechnic National University conducted research "Logistics Landscape – 2022+" where the authors of this article took an expert part.

The purpose of the research was to show changes of logistics landscape under influence of the war of Russian Federation against Ukraine. Logistics landscape was considered as combination of factors

affecting supply chains, its current state and development.

The research was conducted in two stages:

- 1) Identifying key factors, characteristics, events, results while changing logistics landscape of Ukraine under influence of war actions;

- 2) Quantitative evaluation of force and significance of identified factors and events on changing Ukrainian logistics landscape in war conditions;

The author approach and opinion, considered in the results of the mentioned research, is given below.

The main factors that impact supply chains, its modern condition and development are:

1. Architecture and condition of Ukrainian logistics infrastructure before the war.

2. State of logistics processes digitalization.

3. Competence of logistics operators.

Three major characteristics of modern logistics landscape:

1. Rapid development of e-commerce using alternative, the safest in war conditions transport routes.

2. Flexibility of logistics decisions depending on theatre of war operations.

3. Response speed on war challenges along with ability to predict safe logistics corridors.

Events that have significantly affected Ukraine's modern logistics landscape for last three years:

1. Covid-19 pandemic and online transformation of logistics flows, processes, systems.

2. Full-scale war of Russian Federation against Ukraine – destruction of cities, villages, airports, railway stations, etc.

3. Economic decline due to the war (temporary occupation of our territories, fuel shortage and sharp rise in its prices, grain crises because of seaports mining for defending of regions located on the coasts of the Azov and the Black seas.

Direct consequences of war action influence on Ukraine's logistics branch and as a result competitiveness of integrated with international space supply chains are:

1. High risks for drivers' and expeditors' lives while delivering of loads to the regions of active military operations and frontline zone (risk/benefit ratio).
2. Destruction of warehouse infrastructure.
3. Destruction of airports, motorways and railroad infrastructure.
4. Shortage of drivers, lorries due to their involvement to transportation of humanitarian aid, volunteer activities, recruitment to Armed Forces of Ukraine specialists in logistics sphere.

5. Total decline of business activity and state enterprises, especially during first war months, lack of orders.

However, gradual restoring of logistics infrastructure on liberated territories and increasing of business activity is the positive trend.

As a result of the research and processing of experts' assessment priorities in management of supply chains in modern conditions were ranged (1st range – 1st priority, 2de range – 2nd priority, etc.). Data as to the results of experts' opinions processing by organisers of the research and author's assessment are presented in table 1.

Table 1 – Priorities in management of supply chains in modern Ukrainian conditions (using the results of the survey of representative expert group)

Characteristic of supply chain (SC)	Range (priority)		
	Average	Median	Author assessment
Resilience SC	3,72	4	4
Visibility&Transparency SC	5,92	6	6
Efficiency&Agility SC	3,76	4	5
Sustainability SC	5,28	6	7
Flexible&Elastic SC	3,56	3	3
Reliability SC	2,36	2	2
Security SC	2,65	2	1

As we can see, the first three places take security, reliability and flexibility of supply chains.

Mechanism, tools, methodology, techniques and strategies of supply chains management in conditions of failure / restoring of logistics should be based on implementation of distant technologies of supply chains management, i.e. digitalization of logistics processes. Computer programs of distant access to database must be placed in the cloud on reliable servers. Only highly organised Electronic data interchange (EDI) can minimize failures of logistics, including war logistics. Companies, that mastered such distant technologies in Covid pandemic (i.e. well-known platforms such as Office 365 or specialized products combining chains

"manager – warehouse – accounting – carrier".

An important role in the effective functioning of international supply chains is played by innovations in the customs clearance of goods, related to import and export operations, the procedure of customs authorities, legal regulation of the import of certain goods, etc. Ukrainian customs procedures are entering a new phase, which will be based on European rules. Currently, Ukraine has fulfilled more than 80% of its obligations to the EU in the field of customs law. From October 1, 2022, the provisions of the Convention on the Joint Transit Procedure entered into force for Ukraine, and the possibility of international movement of goods with 35 other participating countries under one transit document was opened for

business. Also, the Customs Tariff of Ukraine has been brought into line with updated international standards.

The Verkhovna Rada of Ukraine supported the government's initiative to bring the Ukrainian product nomenclature in line with the modern international one and adopted the law dated 10.19.2022 No. 2697-IX "On the Customs Tariff of Ukraine", which comes into force on January 1, 2023 [6].

Thus, the changes in the customs legislation mostly relate to the cancellation or documentary simplification of import registration when imported into Ukraine, but also the promotion of exports, in the current conditions, is a priority direction for our country.

Special attention should be paid to management of logistics business competitiveness by means of business processes optimization. Using processing approach provides transparency and efficiency of logistics functions and operations performance, optimization of product / service value chain.

Monitoring of business processes in supply chains should be performed while using adequate system of indicators, grouped into three interconnected blocks:

- The first block contains indices characterising efficiency of operation activity management, that is performing of core business processes, rationality of operational expenses in supply chain, efficiency of using fixed assets and human resources, modern technology and equipment;
- Indices of the second block may allow to determine efficiency of business processes of financial resources management by participants of supply chain, particularly working capital while assessing solvency, level of independence from external financial resources, prospects of sustainable development of logistics system in general;
- Indices of the third group characterize efficiency of business processes of sales and promotion, service, etc.

On the bases of the analysis we are going to make assumptions and forecast of Ukrainian future logistics landscape.

It is obvious that after Ukrainian victory as a candidate to European Union and seeking to become a member of European Union, strategic prospects of future "Logistics landscape 2022+" should be directed to integration of Ukrainian logistics infrastructure to European transport space, namely Trans-European Transport Network that is a network of highways, railway stations, airports and water infrastructure in European Union that is going to connect Europe from west to east and north to south.

Mechanism of integration of Ukraine to transport network TEN-T was determined by plans of investment in trans-European transport network developed by European Commission and the World Bank. However, TEN-T maps at the end of 2018 included four port projects (in Mykolaiv, Kherson, Southern, Chornomorsk), development of river navigation through dredging works in the riverbed of the Dnipro river (Kaniv, Kremenchuk, Dnipro, Zaporizhzhia, Nova Kakhovka), modernization of four airports. Unfortunately, at present these cities are attacked by Russian missiles, they are located in the frontline area or are occupied, logistics and civil infrastructure is suffering from devastating attacks.

However, we would like to hope that profitable geographical transition position of Ukraine as well as fulfilling conditions of gaining the candidate to European Union status will become a strong argument for our Western partners after finishing this devastating war. In this case plan of route development TEN-T will become actual again (it was developed until 2030). However, amount of necessary investment may increase up to level of "Marshall plan" after World War 2.

It is necessary to mention that this July after starting the "grain corridor" through Ukrainian ports European Union included Ukrainian logistics routes to trans-European transport network (TEN-T) [7]. EU's decision is

the final step in the integrational process between Ukraine and European Union favouring implementation of the initiative «Path of solidarity» as to export of Ukrainian agricultural product and delivery of humanitarian aid to Ukraine.

European Union continued North-Baltic corridor through Lviv and Kyiv to Mariupol. Baltic-Black- Aegean Sea Corridor continued through Lviv, Chernivtsi (Romania, Moldova) to Odessa. Corridors the Baltic Sea – the Adriatic Sea and the Rhine – the Danube will be through Odessa.

Including logistics routes to TEN-T network allows to solve such problems as:

- removing obstacles while fulfilling logistics operations;
- attracting European investment to modernize transport infrastructure in case of developing attractive investment projects;
- gaining access to European aid concerning development of Ukrainian part of TEN-T network;
- developing multimodal transportation
- reducing logistics expenses;
- increasing quality and reducing risks while transporting goods.

Besides, European Commission excluded Russian and Belarusian routs from TEN-T network and decreased status of routs on the territory of European Union at the junction with aggressor countries.

The steps above will become an important component of our country's competitiveness increasing measured by Global Competitiveness Report.

Conclusions. If we consider the index of global competitiveness as an integral indicator of a country's success in the world economy, according to Ukrinform data, in 2021 [8] the ranking in terms of competitiveness was led by European countries: in first place is Switzerland, the second place takes Sweden, in third place is Denmark, in fourth place - the Netherlands.

Singapore, which was first in 2019 and 2020, is ranked fifth.

The World Competitiveness Rankings-2021 (World Competitiveness Rankings-2021) presents data from 64 countries of the world, according to which Ukraine took the 54th place. For comparison, in 2017, Ukraine was in the 60th position.

The determining factors of competitiveness were: availability of innovations, digitalization, supportive policy and social cohesion. Regarding the digitization of all spheres of social and economic life in the country, we should note the significant progress of Ukraine over the past 2-3 years and a confident orientation towards the development of this direction now and in the future. Today, the improvement of supply chain management through the safe digitalization of business processes in logistics systems and the modernization of EDI (electronic data interchange) is a guarantee not only of effective maintenance of the country's economy, but also an essential component of victory in our war with the aggressor. Social cohesion has now become a natural means of survival and resistance to the aggressor for Ukrainians. The post-war reconstruction of Ukraine will require quite a few innovative solutions related to the recycling of structures of destroyed buildings and structures, the revival of regions, cities, towns, and enterprises, for which it is obvious that restoration, and in many respects the creation of a new logistics infrastructure.

Further directions of research on the topic of this article are the analysis of cause-and-effect relationships of the functioning and development of the logistics industry of Ukraine since the independence of our state and the substantiation of the conditions and factors for the restoration of the logistics potential of Ukraine in post-war times.

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UDC 338.3:338.005.96

DOI: <https://doi.org/10.46783/smart-scm/2022-16-5>

JEL Classification: C67, D29, J29, L23.

Received: 28 November 2022

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TRANSFORMATION OF BUSINESS PROCESSES IN A CHANGING ENVIRONMENT

Oleksander Lysenko, Volodymyr Davydenko «*Transformation of business processes in a changing environment*». The article is devoted to the consideration of a step-by-step approach to the transformation of business processes. The relevance of the research is the possibility of urgent implementation of various technologies and approaches in business processes. The value characteristics in the production process are considered. Attention is focused on the need to take into consideration consumer values during production. It is noted that the transformation of business processes should take place in every organization that wants to remain competitive and popular among customers. A comparative characteristic of the expectations of consumers and producers is given. Attention is focused on fundamental changes in processes, ideas, technologies and employee management to implement new solutions that will help improve the productivity and efficiency of the company. The algorithm for implementing changes in business processes and tools that will be useful are proposed. The main tools for implementing business processes are identified. Step-by-step instructions for the transformation and implementation of business processes are given.

Keywords: business processes, consumer values, lean manufacturing, bottleneck analysis, continuous flow, planning, autonomization, SMART.

Олександр Лисенко, Володимир Давиденко. «Трансформація бізнес-процесів підприємства в мінливих умовах». Стаття присвячена розгляду покрокового підходу до трансформації бізнес-процесів. Актуальністю дослідження є можливість екстреного впровадження різних технологій та підходів в бізнес-процеси. Розглядаються ціннісні характеристики в процесі виробництва. Акцентується увага на необхідності врахування споживчих цінностей під час виробництва. Зауважено, що трансформація бізнес процесів повинна відбуватись в кожній організації, яка хоче залишатися конкурентоспроможною і популярною серед клієнтів. Наведено порівняльну характеристику очікувань споживачів та виробників. Зосереджено увагу на кардинальних змінах в процесах, ідеях, технологіях і

управлінні співробітниками для впровадження нових рішень, які допоможуть в поліпшенні продуктивності і ефективності компанії. Запропонований алгоритм впровадження змін в бізнес-процеси та інструменти, які стануть у нагоді. Визначені основні інструменти при запровадженні бізнес-процесів. Приведена покрокова інструкція з трансформації та запровадження бізнес-процесів.

Ключові слова: бізнес-процеси, споживчі цінності, ощадне виробництво, аналіз вузьких місць, безперервний потік, планування, автономізація, SMART.

Александр Лысенко, Владимир Давиденко. «Трансформация бизнес-процессов предприятия в изменяющихся условиях». Статья посвящена рассмотрению пошагового подхода к трансформации бизнес-процессов. Актуальность исследования - возможность экстренного внедрения различных технологий и подходов в бизнес-процессы. Рассматриваются ценностные свойства в процессе производства. Акцентируется внимание на необходимости учета потребительских ценностей при производстве. Замечено, что трансформация бизнес-процессов должна происходить в каждой организации, которая хочет оставаться конкурентоспособной и популярной среди клиентов. Приведена сравнительная характеристика ожиданий потребителей и производителей. Сосредоточено внимание на кардинальных изменениях в процессах, идеях, технологиях и управлении сотрудниками по внедрению новых решений, которые помогут в улучшении производительности и эффективности компании. Предложен алгоритм внедрения изменений в бизнес-процессы и пригодящиеся инструменты. Определены основные инструменты при внедрении бизнес-процессов. Приведена пошаговая инструкция по трансформации и внедрению бизнес-процессов.

Ключевые слова: бизнес-процессы, потребительские ценности, экономное производство, анализ узких мест, непрерывный поток, планирование, автономизация, SMART.

Introduction. Under different conditions of influence of external and internal risks on the company's activities, there may be a need for rapid transformation of business processes. However, usually enterprises do not have an understanding of where to start and what the first step should be. Therefore, there is a need to have an understanding of the step-by-step approach to the implementation of business processes at the enterprise.

At the first stage, it is necessary to fully track the process of creating value for the consumer, from start to finish and establish communication with consumers and employees of all services and departments of the enterprise that have close interaction.

For effective and useful interaction, there is a need for close communication between managers of the enterprise and consumers, as well as accompanying companies that face the flow of value creation in various services and departments.

At the first stage, it is quite important to formulate the main purpose of the process. This is the value that the consumer wants to receive and what the company must achieve in terms of return on its investment to survive and succeed. To be sustainable, any process of production or provision must lead to the achievement of this purpose. Develop indicators to assess the extent to which this purpose is achieved.

A useful step would be to measure the ability of the current process to provide the consumer with exactly what they need, when they need it, for example, by measuring the probability that the consumer will always find the desired product they need in the store. What we can measure, we can improve. Further, it is necessary to determine to what extent this process solves the problem in full: how many calls to the help desk or repair bureau does the consumer have to make to get the desired value? You can also calculate the total cycle time and inventory in the

process that is required to provide the service level. These are quite large indicators of employee time loss and overall process costs. At the same time, it must be remembered that most of the time is spent on management processes.

The next step is to compare the costs of the processes with what the consumer is ready to pay for. Then it will become clear what time interval we have between acceptable and unacceptable results. It may be quite reasonable to implement a management system in accordance with the requirements of ISO standards, which implement a process approach to management.

The process can be in one of three conditions:

- the way we think he is;
- just the way he is;
- the way it should be.

Usually, these are three completely different processes.

The next stage is the analysis of the workplace. To do this, it is necessary to conduct a face-to-face interview with the direct performers. Document all the steps that are performed during this process from start to finish by the manufacturer, consumer, and supplier. Both supplier and consumer can be both external and internal. The main thing is to describe not what should happen, but what actually happens, based on direct observations.

In any company, the process as it actually is, is somewhat different from what it should be. Often this difference is huge, and it is very useful to identify it. Describing what should happen instead of what actually happens to improve the process is not only useless, but also harmful.

We evaluate whether each step that is performed during this process creates value for both the consumer and the supplier. On this basis, depending on the situation, we calculate the ratio of the time of value creation to the total duration of the process compare the "working work" that creates

value and all the work, time, materials, energy resources, etc.

The main tasks at this stage are to briefly formulate the purpose of the process, to develop a few simple indicators of the current performance in comparison with the needs of the consumer and the supplier, and to draw up a simple map that allows anyone to assess the current state of the process at a glance.

Analysis of recent research and publications. The relevance of the study of opportunities and approaches to the transformation of business processes of enterprises is due to the rapid response to the changing conditions of the internal and external environments.

Research and proposals in the field of transformation of business processes of enterprises are based on the practical experience of researchers and thorough theoretical research of scientists who studied the specified direction, namely in the works of D. Bauden, M. Prensky, D. Robertson, D. Tapscott, Sh. Stromayera, K. Shukets, Daniel Roos and others [3,6].

The purpose and tasks of the research. The purpose of this article is to study the possibilities of transforming business processes of an enterprise in changing conditions and to propose a step-by-step algorithm for implementing business processes.

The main part of the research. However, the real purpose is not only to describe the process, but also to radically improve it. The main thing is to understand how to visualize it competently, simply and correctly.

An example of visualization of the process of creating value for the consumer is shown in Figure 1.

Practice shows that the most convenient option for describing and "reading" processes is the graphical method. It has several key advantages:

- Simplicity and integrity of the picture. One diagram shows all participants and the logic of their interaction.

- Easy navigation. Instead of twenty pages of text, you get one page with a diagram that puts everything in its place.
- Sufficient detailing. You choose a sufficient level of detail, if desired, the schemes can be detailed several levels deeper or supported by text explanations of individual blocks.
- Easy to automate. A flowchart is the primary technical task for automation, which

contains clear logic and shows the complexity of the process;

- Everyone understands their part of the process. This is one of the most important points, because when visualizing the schemes, each participant sees himself as part of the system and understands how the team and the success of the process depends on him.

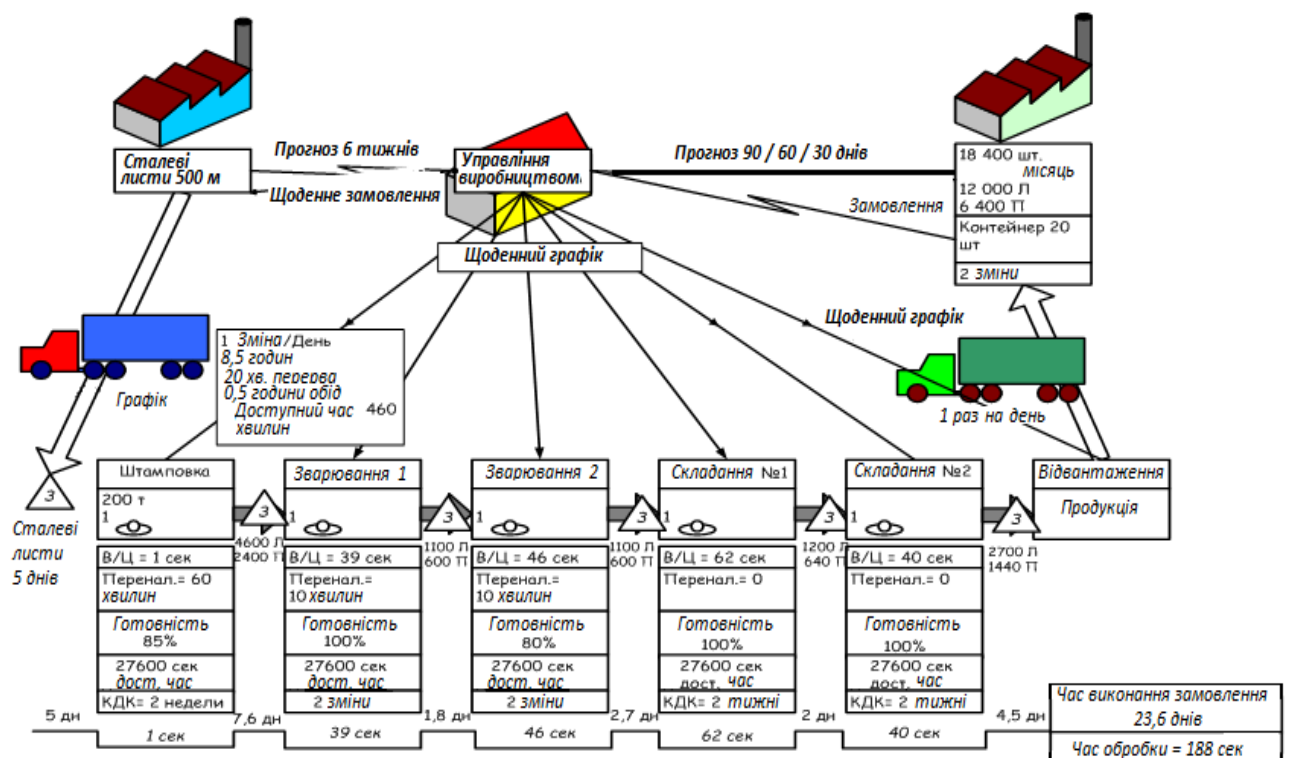


Figure 1 – The process of creating value for the consumer

People who create added value for the customer do their job well only under three conditions: if they can see the whole process and their contribution to the final result, if they understand its logic and the need for change, and if they believe in the benefits of the new process.

The only way to fulfill all three conditions is to involve people who actually deal with the process in analyzing its current state and designing a better process. Reasonable motivation will not hurt. What is profitable for the company should be profitable for the employee [1].

According to the American psychologist B. Skinner "A person who has been punished

does not become less inclined to behave as before, at best he or she learns how to avoid punishment" [9].

A positive aspect that actively shapes the employee's behavior in the desired direction, increases self-esteem, motivates the acquisition of new skills, increases initiative.

Very rarely do people believe that they were punished fairly, so in the long term, negative experiences cause open or hidden resistance.

Revising the process will help impact jobs and change the boundaries of the organization directly.

Analysis of the capabilities of man and technology shows that technology should be

given greater preference: in the development of standard solutions, taking into account the general rules; in mathematical calculations according to certain formulas or rules, when performing standard and repeated movements or actions (especially when there is a shortage of time and in uncomfortable conditions), when it is necessary to store a large amount of information in memory (especially RAM); when it is necessary to recognize an object in the absence of large interference; when a quick reaction and significant forceful influences are required in the process of.

A human should be preferred if it is necessary to: make a message or make a decision based on a limited number of factors (incomplete information); recognize an object in conditions of significant obstacles; react to random and unforeseen circumstances; solve tasks that cannot be algorithmized or tasks of high responsibility (due to the high cost of an error). Man and machine complement each other in their capabilities. If the parameters of the machine do not match the parameters of the human, then fatigue increases, the number of errors and accidents increases.

Ergonomic indicators of a person are used to assess the consistency of his capabilities with the requirements due to the specifics of technology and the environment.

Usually, a person performs his functions at the workplace in an area equipped with technical means. It is necessary to check whether the workplace is adapted for a specific type of work and employees of a certain qualification.

Another necessary approach is to make some simple but important decisions are:

- What to do with "extra" people?
- How will the working methods change?

– How to implement and launch organizational changes?

– How to explain to people why it is necessary?

– How to prevent sabotage?

Whenever possible, the savings in material and labour costs should be used to expand the business in order to rationally use the freed-up resources for improvement.

If this is not possible and the company simply cannot survive without rapid cost reduction, make it clear to employees from the beginning.

In any case, never provide false information. Do not subject employees to slow torture by firing them as the process improves: one by one and each time calling the current reduction the last one. They may respond to this tactic with hidden sabotage, gradually reducing the effectiveness of the new process [2].

A similar approach is needed to employees of other companies involved in our value stream (outsourcers). It may be possible to keep everyone in their current place. It is likely that former partners will be able to perform their previous tasks, but better. At the same time, if the analysis of the value stream shows that some work and even companies can be avoided, then this truth will have to be accepted.

When we understand the purpose, process and people, it will be time to redesign the value stream so that it provides consumers with exactly what they want at a lower cost.

It is very important to understand what consumer expectations coincide with ours.

As shown in Figure 2, only in one position our aspirations coincide with the aspirations of the consumer / customer - to get a quality product or service.

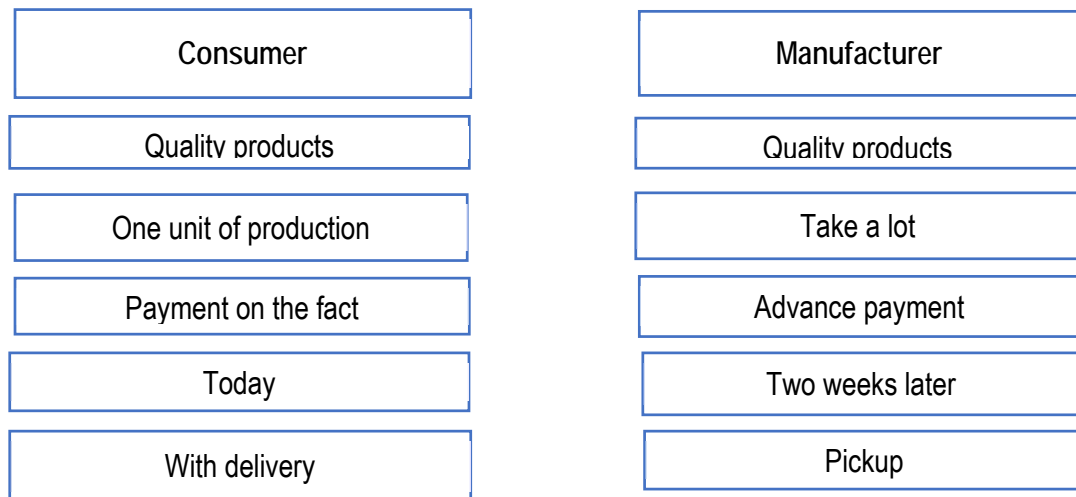


Figure 2 – Expectations of consumers and producers

It is necessary to develop a program to minimize the total costs of the consumer (financial costs plus time and nerves), as well as the total costs of suppliers. Also: give the consumer exactly what he wants; give the consumer value exactly where he wants; give the consumer value exactly when he wants. The following approaches can be proposed for this purpose:

- rationally organize workplaces;
- define (visualize) the value stream and eliminate all unnecessary steps;
- combine all steps into a continuous flow;
- create conditions under which consumers could extract value from the flow [3];
- continuous improvement will not be superfluous.

The main goal is to evaluate the whole process in terms of the possibility of achieving these goals, adjusting it if necessary.

In the future, we can offer a step-by-step algorithm for implementing business processes:

- Choosing a leader who is ready to take responsibility for implementing changes.
- Getting knowledge about "Lean Manufacturing", and as close as possible to the original source, not distorted [1]. In the future, this knowledge should become a new system of values of the leader, which he will

implement holistically, and not as point half-measures.

- Identification of the most critical segments of the company's activities.
- Identification of losses wherever it is possible to do so and their elimination (time, energy, materials, semi-finished products, excess stocks, excess processing, etc.).
- Creating maps: current and future state of the accountable object/process.
- Practical implementation work, which is highly desirable to make visible to all stakeholders.
- Combining the results achieved in different directions.

In the process of implementing business processes, it is desirable to use lean manufacturing tools, which will allow:

- reduce the cost of product quality;
- transparency of production and management processes;
- increasing the level of customer satisfaction with the products of the enterprise;
- increasing the involvement of employees in the production process and strengthening their motivation;
- reduction of resource losses.

When it becomes clear which of the areas is currently the highest priority for the company, but insufficiently developed, you can begin to select tools to improve this particular segment. The main thing is not to forget about staff training, familiarization with

changes and expected results [4]. Therefore, it is worth using the following tools for effective transformation of business processes.

1. Correct organization of the workplace [5,6]

- Sort and remove what is not used
- Arrange in a convenient order what is used
- Maintain cleanliness and order
- Create control standards
- To improve using the established standards.

The result of the implementation is a fairly quick detection of problems in production caused by improper organization of the workplace and minimizing them (for example, getting rid of tools that were used a month ago, and now only make you spend time searching for the right one among them).

2. Do not let the reject to the next operation.

This is a system of actions that immediately informs about the problem that has arisen in the production process and allows you to stop the process before the detected defect becomes widespread. Timely elimination of the problem, which allows in the future not to spend resources on eliminating the consequences of the error on a global scale.

3. Bottleneck analysis.

Finding the bottleneck of production, which does not allow to create more products in less time. Expansion of the "bottle neck" improves the productivity of production facilities. There is an improvement of the weak element in production.

4. Continuous flow

Building production flows in an optimal way. The process, built correctly, does not involve filling the "buffer" and long stops between production stages. As a result - elimination of such losses as ill-conceived transportation, excessive stocks, irrational waste of time.

5. Planning.

Ability to plan orders in a special way. Customer orders are divided into several small lots, which are built in a certain order. It

becomes possible to produce different products as quickly as possible and reduce the likelihood of risks of disruption of the production process at different stages and disruption of the timing of the transfer of the finished product to the customer.

This tool leads to the fact that the need to have a stock of materials and production time is reduced. It allows to reduce losses due to the fact that each type of product is produced more often, and stocks (in other words, frozen assets) are reduced to the necessary minimum. Even in the event of a forced stop of the line, all the products required by the customer are available.

6. Deployment of the policy.

The management sets goals for each of the employees, they move in this direction. Sufficient communication between management and employees allows to reduce losses. The principle "Do as I do" works very effectively.

7. Autonomization.

One employee can control the operation of several devices at once. This leads to lower production costs and minimizes the cost of eliminating errors (compared to if they were detected not immediately, but only at the end of the production cycle).

8. Continuous improvement.

The use of this tool is to unite the efforts of all employees of the enterprise in the direction of forming a special corporate culture and achieving common goals. It is important not to lose suggestions from employees for improvement. The experience gained in the company should work for the company. The synergistic effect of combining the efforts of employees invested in cost reduction becomes, in fact, the "perpetual motion machine" of the progress of lean production for the enterprise.

9. Exactly on time.

Production and delivery system are based on "pulling" the quantity of products required by the client at a given time. At the same time, the forecasted demand is practically not taken into account. Requires the availability of such

systems as "ContinuousFlow", "Kanban", "Takttime" and "Heijunka" [3].

This method is most effective when it is necessary to reduce the number of manufactured products, raw material stocks and the size of the production facility. Promotes optimization of financial flows.

10. Extraction system.

No unit of production is put into production until there is a demand for it. The request comes from the next operation in the value stream, and the request for finished products comes from the consumer/customer. This reduces the number of losses and excess inventory. It positively affects the results of inventory in the warehouse.

11. Key performance indicators (KPIs).

The metrics system is used to analyze the priority segments of the company's activities. It is a powerful stimulator of employee growth. Key indicators that can be changed by employees allow to timely identify potential losses and risks, to achieve strategic goals set for the company.

12. Losses.

Getting rid of everything that is not of value to the customer/consumer. After finding out about all possible types of losses, they should be timely identified and minimized, improving the quality of work of personnel, equipment and the organization in general.

13. The cycle of continuous improvement Plan-Do-Check-Act.

This is an iterative method that allows you to implement all kinds of improvements and/or make changes:

- Plan (creating a detailed plan)
- Do (implement the plan)
- Check (control of achievements)
- Actions (review of the performed actions from the point of view of efficiency, development of more productive actions, if necessary, elimination of the causes that lead to errors at each stage, implementation of changes, new try).

We document both effective solutions and mistakes. We regularly enter the results into the knowledge base.

The principle of continuous improvement allows you to use a systematic approach to solving problems, implement improvements, reduce losses and conduct experiments.

14. Full efficiency of the equipment.

Allows you to track three types of losses related to the operation of equipment: quality, availability, productivity.

It allows to understand how efficiently the equipment is operated. This is a balanced indicator that allows to increase the profitability of production and improve its manufacturability. If the full efficiency of the equipment is 100%, it means that the company currently produces a product without defects, as quickly as possible given the available technologies, avoiding downtime.

15. Protection against errors.

This is the creation of methods that prevent errors in the production process. The main goal is to achieve "0% defect rate". The costs associated with error prevention are much lower than those that the company incurs during regular inspections and, even more so, when correcting defects detected for a long time. A risk and opportunity assessment will be useful.

16. Analysis of the main causes of non-compliance or 5 why.

If the identified factors have no place in production, then their identification is carried out according to the principle of "five why". That is, you need to ask the question "Why?" at least 5 times in relation to each factor that negatively affects the process. As a rule, such work is carried out in the form of brainstorming with the involvement of leading experts. Elimination of the main causes of problems allows to avoid similar situations in the future.

17. Visualization of production.

Simple indicators are used. With their help, information is exchanged, for example,

photos, graphs, diagrams, value stream maps, video fragments.

18. Map of the value stream.

One of the tools that allows you to visually separate processes that add value from those that do not. There are maps of the current state and maps of the future state. A convenient solution for planning changes that are subsequently planned.

19. General maintenance of equipment.

The most common causes of productivity drops include: breakdowns, set-ups, short stoppages, speed reductions, job failures, production failures. All these reasons are a call to action. Downtime can be reduced only if all problems are consistently eliminated. To do this, it is advisable to involve every employee of the company in the maintenance of equipment, not just technicians.

The purpose is to increase the service life of the equipment and its efficiency. Reducing the number of downtime, errors in equipment operation, accidents. Strengthening the sense of responsibility of each employee.

20. Beat time.

An indicator of the frequency with which the customer orders products. Also, the cycle time can reflect the time interval when the company provides the customer with the manufactured product/service.

21. Analysis of planned production time/consumer demand.

It allows to determine the required productivity of a certain production site in order to meet the needs of consumers. A portrait of the consumer may be useful, especially if it is a foreign consumer [7]. Who is the consumer who brings 80% of the profit? How often does he make an order?

22. Standardized work.

It is an instruction (usually documented) on how to perform a certain operation in a close to perfect way. This document is constantly analyzed and updated. If the company has the same equipment - it should work according to a single standardized method (optimal). Maximum efficiency is achieved when using interactive documents

that can be quickly modified and supplemented.

Expected result - losses are reduced (due to the application of only the best practices). The risks of creating a low-quality product are reduced.

23. SMART (Smart goals).

This acronym contains the following words: Specific, Measurable, Attainable, Relevant, and Time-Specific. It sounds like this: the goal is specific, measurable, attainable, relevant, and time-specific. With poorly thought-out communication or misunderstanding of tasks, losses inevitably occur. To eliminate this problem allows to set the right goal.

24. Fast reconfiguration.

This is a set of tools based on the principles of lean manufacturing, which allow much faster equipment debugging (up to 10 minutes). Reconfiguration is based on two actions: internal and external. Internal actions are associated with stopping the equipment, and external actions can be performed with the device running. The methodology involves the transformation of actions from internal to external. It becomes easier to produce small lots of products, the useful life of the equipment increases.

Conclusions. In modern conditions, the minimization of losses should be put at the forefront, which will subsequently lead to the same increase in profits. The main task of business is survival, and the main principle of business economy is not to maximize profits, but to prevent losses.

The most difficult thing for a company is radical changes in working methods. It is important to realize that careful implementation of changes is not an instant transformation, but a long way of learning, testing, analysis and improvement.

Practice shows that the achievement of the following results is real [8]:

- increase in labor productivity by 35-70%;
- reduction of production cycle time by 25-90%;
- reduction of rejects by 58-99%;

- increase in product quality by 40%;
- increase of the equipment operating time in good condition to 98.87%;
- release of production space by 25-50%.
- .

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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/2022-16>

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

№ 16 (2022)
December 2022

ISSN 2708-3195

DOI: <https://doi.org/10.46783/smart-scm/2022-16>



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