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Present Trends, Emergencies and Their Impact on Supply Chain Security

Současné trendy, krizové stavy a jejich vliv na bezpečnost dodavatelských řetězců

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Abstract: The article examines the impact of recent geopolitical, economic, and security changes on logistics support capabilities in EU and NATO member states. The study analyzes the effects of the COVID-19 pandemic and the armed conflict in Ukraine on logistics supply chains, considering environmental, social, and security concerns. The research questions focus on identifying the main changes and assessing their implications for commercial, military, and humanitarian logistics. The prolongation of the conflict in Ukraine and the economic sanctions imposed on Russia have been found to have a significant impact on logistics capabilities, perceptions of the structure of supply chains and the risks arising from this. The impact of these events is also producing third-country poverty and dehumanizing the UN SDG goals. On the other hand, improvements in NATO troop readiness and weaponry have been noted.

Abstrakt: Článek zkoumá dopad nedávných geopolitických, ekonomických a bezpečnostních změn na schopnosti logistického zabezpečení v členských státech EU a NATO. Studie analyzuje dopady pandemie COVID-19 a ozbrojeného konfliktu na Ukrajině na dodavatelské řetězce s ohledem na environmentální, sociální a bezpečnostní aspekty. Výzkumné otázky se zaměřují na identifikaci hlavních změn a posouzení jejich důsledků pro obchodní, vojenskou a humanitární logistiku. Byl zjištěn významný dopad prodlužování konfliktu na Ukrajině a ekonomických sankcí uvalených na Rusko na logistické schopnosti, na vnímání struktury dodavatelských řetězců a rizika z toho plynoucí. Dopad těchto událostí se také produkuje bídu třetích zemí a dehonestuje cíle UN SDG.

Key words: Risk Analysis; Military Logistics; Humanitarian Logistics; Crisis Management.

Klíčová slova: Analýza rizik; vojenská logistika; humanitární logistika; krizové řízení.

INTRODUCTION

Logistics is the discipline of optimizing physical, information and financial flows to ensure delivery of the right product, to the right recipient, in the right quantity and quality, at the right place, time and cost. In NATO terms, military logistics is defined as the science of planning and carrying out the movement and maintenance of forces.[1] Together with military logistics, emergency logistics has also come to the fore in recent years. In the conditions of the Czech Republic, Act No 110/1999 Coll. characterises emergency logistics as the logistics carried out under uncertain and dangerous conditions. Entities providing such logistics include the Integrated Rescue System (IRS), the Czech Armed Forces (CAF), NGOs, international organisations, etc.

In today's highly global world, significant changes are taking place in the field of safety and security. With increasing connectivity comes increasing complexity which increases exposure to a wide range of changes, uncertainties and risks. While from a business perspective, we are looking at the resilience of supply chains to these factors, from a logistics in crisis perspective, we are examining the ability of logistics to perform the required functions under adverse conditions. The incidence of many adverse conditions generally varies from region to region. However, the problem affecting almost the entire world is climate change and environmental degradation.[2] Climate change is currently one of the causes of security destabilisation in the affected areas.[3] An indicator of the importance of this problem is the inclusion of climate change and related natural disasters in the list of security threats in the Security Strategy of the Czech Republic.[4] Therefore, the climate crisis can see as a multiplier of current negative phenomena of the world.

We have observed an increasing trend of black swan-type emergencies in recent years. Since 2020, humankind faced a global pandemic, severe tornadoes or war on the territory of Europe. The dynamically changing environment requires a response in the current state of logistic support for the armed forces and the protection of the population. During the last few years, procedures and attitudes were updated within NATO, the European Commission (EC), the CAF, the NGOs and the IRS.[5,6] However, with the increasing frequency of threats of a heterogeneous nature, even updated documents are losing their relevance and practical usefulness. Our study examines these recent changes and their impact on global supply chains.

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1 NATO, 2012. *NATO Logistics Handbook* [online]. Brusel: NATO [cit. 2023-04-11]. Dostupné z: https://www.nato.int/docu/logi-en/logistics_hndbk_2012-en.pdf

2 *EM-DAT* [online], 2023. [cit. 2023-04-24]. Dostupné z: https://public.emdat.be

3 North Atlantic Treaty Organization. *Strategic Concept: NATO 2022*. Brussels, 2022.

4 Ministerstvo zahraničních věcí České republiky. *Bezpečnostní strategie 2015*. Praha: Ministerstvo vnitra České republiky, 2015. ISBN 978-80-7441-005-5.

5 North Atlantic Treaty Organization. *Strategic Concept: NATO 2022*. Brussels, 2022.

6 DG ECHO, 2022. *Humanitarian Logistics Policy: DG ECHO Thematic Policy Document* [online]. Luxembourg: Publications Office of the European Union [cit. 2023-04-24]. ISBN 978-92-76-42313-3. Dostupné z: doi:10.2795/009117

1 RESEARCH AIM AND METHODS

The research aims to identify the possible impacts of dynamic changes in the security environment on current military and humanitarian logistics. We formulated research questions (RQ) to fulfil the objective:

RQ1: How have aspects of logistics management changed with changes in the security environment?

RQ2: What is the impact on the logistical support?

We used qualitative research methods supported by quantitative data to answer the RQs. We synthesized the research framework into five phases, i.e. (1) identification of research gaps and definition of research questions, (2) literature research, (3) data collection, (4) data analysis and (5) data interpretation.

The research uses statistical tools and qualitative research methods (see Figure 1). The core research method is the grounded theory method, probably the most widely used method in qualitative research.[7] It allows us to explore phenomena and discover theories based on real-world data. We conducted literature research and data collection using the snowball technique.[8] We collected data and information from relevant sources such as national and allied authorities and trusted NGOs.

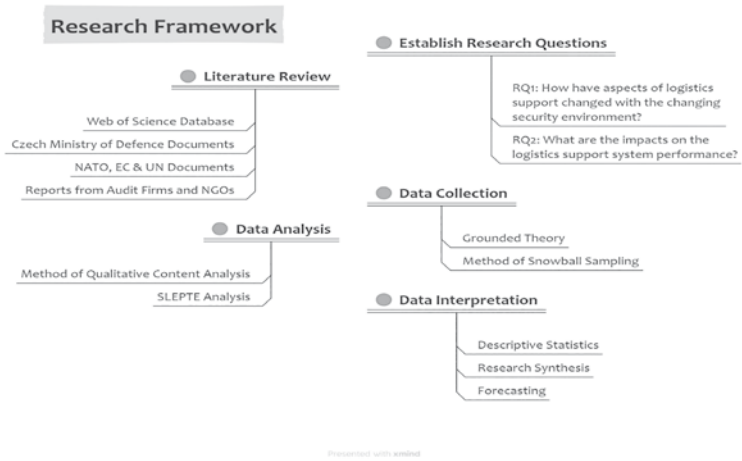

Figure 1: Research methodological framework

7 BRYANT, Antony a Kathy CHARMAZ, 2007, *The SAGE Handbook of Grounded Theory* [online]. 1 Oliver's Yard, 55 City Road, London England EC1Y 1SP United Kingdom, SAGE Publications [cit. 2023-04-11]. ISBN 9781412923460. Dostupné z: doi:10.4135/9781848607941

8 VOGT, Paul W., Dianne C. GARDNER a Lynne M. HAEFFELE, 2012. *When to Use What Research Design*. Guilford Publications, 378 s. ISBN 9781462503629.

We examined a content analysis to describe the substance of the documents as accurately as possible and to reduce the findings to information relevant to our research.[9] The data were disaggregated according to the SLEPTE methodology to systematically describe the impact of changes on different areas, according to social, legal, economic, political, technological, and environmental. A SLEPTE (also PESTLE or PESTEL) analysis is a tool used to gain a macro picture of an industry environment, and it allows a user to form an impression of the factors that might impact an industry, i.e., risk factors.[10] Finally, we synthesized the results using the tools of descriptive statistics. We interpreted the results and predicted the future based on the synthesis.

Research Limitations

The first limitation in research comes from working only with unclassified information. The data presented comes exclusively from publicly available sources. At the same time, all data is secondary. With this in mind, we put a great emphasis on the reputation and relevance of the sources.

2 CURRENT FACTORS AFFECTING LOGISTICS SUPPORT

Functional supply chains are a crucial element in ensuring the resilience and sustainability of a country's critical infrastructure. Disruption to the functionality of these chains has significant implications for society's ability to absorb fluctuations in demand.

2.1 Impacts on Logistics Capacities for Crisis Management

Changes in the differences in risk perception are particularly evident over the last 15 years. There has been an overall transformation in the spectrum of risk factors and resulting threats, their frequency of occurrence, their nature and the magnitude of their impacts. There have been significant changes comparing data on the top six sources of supply chain disruption from 2009 to 2018 against the forecast for the next five years. Only the three risks of the past decade remain among the top ten for the next five.[11] COVID-19 pandemic particularly influenced this matter. In 2020, human illness reached

9 KRIPPENDORFF, Klaus, 2004. *Content analysis: an introduction to its methodology*. 2nd ed. Thousand Oaks: Sage Publications. ISBN 9780761915454.

10 Marketing: PESTLE Analysis [online]. Sydney: University of Sydney Library, 2023 [cit. 2023-06-23]. Dostupné z: https://libguides.library.usyd.edu.au/c.php?g=508107&p=5994242#:~:text=A%20PESTLE%20analysis%20is%20a,a%20new%20business%20or%20industry.

11 *BCI Supply Chain Resilience Report 2023* [online], 18 January 2023. 2023. Reading: Business Continuity Institute [cit. 2023-04-11]. Dostupné z: https://www.thebci.org/resource/bci-supply-chain-resilience-report-2023.html

the first position with a value of 63.7 % as the most significant risk for logistics for the next five years.[12] Two years later, in 2022, it dropped to 8th position. With the decreasing intensity of the impacts of COVID-19, we can observe a decreasing concern about a recurrent event in the coming years.

In addition to the limitations on distribution capacity caused by preventive measures against the spread of infectious diseases, the effects of ongoing climate change and the resulting potential threats are also coming to the fore, according to surveys conducted in 2022.[13] Reflections of this risk can be seen in three areas out of the 10 identified critical threats. According to the results of a questionnaire survey organised by BCI, these are adverse weather (46.0 %), natural disasters (44.4 %) and new laws and regulations (40.5 %).[14]

The armed conflict in Ukraine and its consequences reflects in at least three components of the outlook, i.e., energy scarcity (41.3 %), political change (35.7 %) and civil unrest or conflict (31.7 %). Although cyber-attack and data breach is perceived (by 55.6 % of respondents) as the most significant risk for the next five years, it is surprising that unplanned IT and telecommunications outage, which has been by far the hugest risk for supply chains over the past decade, has dropped out of the ranking.

The analysis of the sources and impacts of disruptions is challenging due to the complexity and interplay of the influencing factors. For this reason, we chose the SLEPTE framework to identify the external environment of supply chains, defining the social, legislative, economic, political, technological and environmental domains of influencing factors.

2.1.1 Social Factors

The UN has defined 17 SDGs to improve the lives of people in poor parts of the world, typically Asia and Africa.[15] The first blip in the implementation was the COVID-19 pandemic, which diverted society from meeting its goals and set humanity back many years. The impact of international armed conflicts is also evident, with many others running concurrently in the world in 2022, according to the report, in addition to the Ukraine conflict.[16] As a result of these crises, it is estimated that 75-95 million more people were

12 *BCI Supply Chain Resilience Report 2021* [online], 8 March 2021. 2021. Caversham: Business Continuity Institute [cit. 2023-04-11]. Dostupné z: https://www.thebci.org/resource/bci-supply-chain-resilience-report-2021.html

13 *BCI Supply Chain Resilience Report 2023* [online], 18 January 2023. 2023. Reading: Business Continuity Institute [cit. 2023-04-11]. Dostupné z: https://www.thebci.org/resource/bci-supply-chain-resilience-report-2023.html

14 *Ibid.*

15 *THE 17 GOALS: Sustainable Development* [online]. United Nations [cit. 2023-04-11]. Dostupné z: https://sdgs.un.org/goals

16 *SIPRI Yearbook 2022: Armaments, Disarmament and International Security* [online]. 2022. Oxford University Press [cit. 2023-04-24]. ISBN 978-0-19-197961-3. Dostupné z: https://www.sipri.org/yearbook/2022

living in extreme poverty in 2022 compared to pre-pandemic projections.[17] An additional 200 million people faced acute food shortages last year compared to 2019, and the number of people worldwide without electricity rose to approximately 774 million.[18]

Similar impacts are in all SDG categories. The current economic recovery is fragile given the uncertain development of COVID-19, rising inflation, disrupted supply chains, increasing pressure on labour markets, and unsustainable debts of national economies. The risks reflect on several levels, including continued population growth, expected to reach 8.5 billion by 2030,[19] socio-economic progress or the drive to achieve the SDGs by 2030.[20] The world is experiencing a period of the most armed conflict since the foundation of the UN. Approximately 2 billion people live in areas affected by armed conflict.[21] Coupled with this are refugee waves which are also at high numbers, i.e. more than 8 million refugees in European countries from Ukraine alone.[22] About 2.5 million people have been displaced within and outside Sudan since the onset of the conflict on 15 April 2023.[23] Tens of thousands cross the borders of neighbouring countries, such as Ethiopia, which is experiencing its worst food crisis in 40 years.[24] Similarly, Yemen remains the world's worst humanitarian crisis, where nine years of war have driven more than 4.5 million people from their homes, and Yemen remains among the top six largest internal displacements.[25]

The social environment in Europe and the North Atlantic area has undergone significant changes from 2000 to 2023. The main drivers of these changes are the economic crises in the financial sector, the rapid political changes, the natural disasters and the

17 UNITED NATIONS, 7 July 2022. *The Sustainable Development Goals Report 2022* [online]. United States of America: United Nations, Department of Economic and Social Affairs (DESA) [cit. 2023-04-11]. ISBN 978-92-1-001809-8. Dostupné z: https://unstats.un.org/sdgs/report/2022/

18 IEA, 2022. *For the first time in decades, the number of people without access to electricity is set to increase in 2022* [online]. In: . Paris: IEA, 2022 [cit. 2023-04-11]. Dostupné z: https://www.iea.org/commentaries/for-the-first-time-in-decades-the-number-of-people-without-access-to-electricity-is-set-to-increase-in-2022

19 *Data Portal: Population Division* [online]. United Nations [cit. 2023-04-11]. Dostupné z: https://population.un.org/dataportal/home

20 WORLD ECONOMIC FORUM, 11 January 2023. *The Global Risks Report 2023: INSIGHT REPORT* [online]. 18th Edition. Cologny/Geneva: World Economic Forum [cit. 2023-04-11]. ISBN 978-2-940631-36-0. Dostupné z: https://www.weforum.org/reports/global-risks-report-2023/in-full

21 UNITED NATIONS. With Highest Number of Violent Conflicts Since Second World War, United Nations Must Rethink Efforts to Achieve, Sustain Peace, Speakers Tell Security Council. In: *United Nations: Meetings Coverage and Press Releases* [online]. 26 January 2023 [cit. 2023-04-11]. Dostupné z: https://press.un.org/en/2023/sc15184.doc.htm

22 *Operational Data Portal: Ukraine Refugee Situation* [online], 2023. UNHCR [cit. 2023-04-11]. Dostupné z: https://data.unhcr.org/en/situations/ukraine

23 Sudan: Situation report [online]. UN OCHA, 2023 [cit. 2023-06-26]. Dostupné z: https://reports.unocha.org/en/country/sudan/

24 Africa food crisis: more than 140 million people are going hungry [online]. BritishRedCross, 2023 [cit. 2023-06-26]. Dostupné z: https://www.redcross.org.uk/stories/disasters-and-emergencies/world/africa-hunger-crisis-100-million-struggling-to-eat

25 YEMEN HUMANITARIAN CRISIS: more than 140 million people are going hungry [online]. UNHCR, 2023 [cit. 2023-06-26]. Dostupné z: https://www.unrefugees.org/emergencies/yemen/

spread of the COVID-19 pandemic. The dynamism of the impact of these changes has been affected by the security situation, i.e., the Middle East conflicts, Arab Spring, the conflict in Syria, and most recently, in Ukraine. The consequences of these events have been so significant that in some countries, they have influenced the composition of the population (domestic vs immigration), have translated into changes in the labour market,[26] the housing market[27], and have significantly affected the capabilities, capacities and availability of supply chains in Europe.[28]

2.1.2 Legal Factors

As a member of the EU and NATO, the Czech Republic has international legislative documents based on its membership in these organisations enshrined in its legal system. The ratification of most of the European environmental laws into the Czech legal system and their effective compliance with them became necessary conditions for the Czech Republic's accession to the EU in 2004.[29] The approach to the environmental policy-making process at the beginning of the second millennium was still rather repressive.

The breakthrough towards issuing preventive recommendations and regulations came at the beginning of the first decade. NATO established Science and Technology Organisation in 2012. The Green Defence Framework became an output of the 2014 Wales Summit, followed five years later by the release of the NATO 2030 Initiative. In 2021 the Climate Change and Security Agenda was released with the Climate Change and Security Action Plan as an output of the 2021 Brussels Summit. In 2015, all UN Parties signed the Paris Agreement to limit greenhouse gas emissions under the UN Framework Convention on Climate Change and build on the Kyoto Protocol. In the same year, all UN states committed to the 2030 Agenda for Sustainable Development.

In the NATO context, the NATO Joint Doctrine for Environmental Protection During NATO-led Military Activities (AJEPP-4) is in force. This publication outlines environmental aspects of military planning and environmental risk management, identifies commanders' responsibilities for the environment, and environmental training and education. This doctrine adopts STANAG 7141 and applies it to the conditions of NATO member nations.

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26 EUROPEAN COMMISSION, 2022. *Employment and Social Developments in Europe: Young Europeans: employment and social challenges ahead* [online]. European Commission [cit. 2023-04-11]. ISSN 2315-2540. Dostupné z: https://ec.europa.eu/social/main.jsp?langId=en&catId=89&newsId=10330

27 EUROPEAN CENTRAL BANK, 2021. *Economic Bulletin* [online]. 7. Frankfurt am Main: European Central Bank [cit. 2023-04-11]. ISSN 2363-3417. Dostupné z: https://www.ecb.europa.eu/pub/economic-bulletin/html/eb202107.en.html

28 EUROPEAN PARLIAMENT, 2022. *Relaunching transport and tourism in the EU after COVID-19: Part V: Freight transport* [online]. European Parliament, 2022 [cit. 2023-04-11]. ISBN: 978-92-846-8786-2. Dostupné z: doi:10.2861/479690

29 HANÁKOVÁ, Natálie, Pavel MAŇAS, Ota ROLENEC a Tibor PALASIEWICZ. National Defense and Environmental Protection: On the Czech Armed Forces´ Approach to the Development of Environmental Legislation in the Czech, EU and NATO Context. *Vojenské rozhledy* [online]. 2022, **31**(4), 172–202 [cit. 2023-01-15]. ISSN 2336-2995. Dostupné z: vojenskerozhledy.cz

The basic regulation in the field of environment in the CAF is the Basic Order Zákl-1, which establishes the obligation of commanders to ensure environmental protection, especially in the planning and execution of tasks. Act No. 185/2001 Coll., on waste implements in the conditions of the CAF by Normative Decree of the Ministry of Defence (NVMO) No. 87/2014. This normative specifies the method of waste management in the environment of the CAF, including its registration, collection and submission of reports on annual production and waste management directly to the Ministry of Environment.

2.1.3 Economic Factors

Economic factors significantly influence the dynamics in the security environment in which conducts economic relations and transactions. The balance of trade in goods shows that Russia was the fifth-largest export partner for the EU and the third-largest importer to the EU.[30] The Czech Republic among EU countries had the largest similar surplus with Russia among EU countries in 2021 (see Table 1). The most imported products from Russia to the EU are petroleum oils and natural gas. The most exported are medicaments, motor cars, vehicles and their parts.[31] Russia and Ukraine are some of the world's major exporters of commodities, food and agricultural fertilisers. Globally, they are crucial in natural gas, oil, metals and agricultural commodities.[32] Globalisation has widened and deepened the risks of supply chains and their impacts on logistics security. There are 7.6 million second-tier supply relationships with Russian entities worldwide.[33] Although as many as 70 % of executives say they understand the risks with first-tier suppliers, only 15 % have the same confidence about second and other-tier suppliers.[34]

Table 1: Trade balance with the Russian Federation, top 5 European countries (2021)

Country	% of Russia in extra EU imports		% of Russia in extra EU exports		**Trade balance of goods with Russia (mil. €)**
Czechia	6,3	||||||	9,6	||||||||	616
Slovenia	1,9	|	5,4	|||||	436
Sweden	3,8	|||	3,0	||	244
Luxembourg	0,7		5,7	|||||	139
Malta	0,4		0,6		0

Source: based on [35]

30 EUROSTAT, 2023. *International trade in goods: Data* [online]. Eurostat [cit. 2023-04-11]. Dostupné z: https://ec.europa.eu/eurostat/web/international-trade-in-goods/data/main-tables

31 Ibid.

32 DUN & BRADSTREET, 2023. *Russia-Ukraine Crisis: Implications for the global economy and businesses* [online]. Dun & Bradstreet [cit. 2023-04-11]. Dostupné z: https://www.dnb.com/content/dam/english/dnb-data-insight/DNB_Russia_Ukraine_Crisis.pdf

33 Ibid.

34 DELOITTE, 2021. *Agility: The antidote to complexity: Deloitte Global 2021 Chief Procurement Officer Survey* [online]. Deloitte [cit. 2023-04-11]. Dostupné z: https://www2.deloitte.com/ch/en/pages/strategy-operations/articles/deloitte-global-chief-procurement-officer-survey.html

35 EUROSTAT, 2023. *International trade in goods: Data* [online]. Eurostat [cit. 2023-04-11]. Dostupné z: https://ec.europa.eu/eurostat/web/international-trade-in-goods/data/main-tables

Analogous to the reduction in Russian gas imports to the EU, aggregate imports of goods have also been declining since the start of the war, falling by half in this period.[36] Europe is also dependent on other countries for specific inputs for production. For example, while Europe is a crucial net exporter of pharmaceuticals, it depends on the Asia-Pacific region for key inputs of active pharmaceutical ingredients.[37]
The world is struggling with significant inflation, which in the Czech Republic reached above 17.5 % in early 2023.[38] Within the EU, only Hungary and Latvia are worse off.[39] The International Monetary Fund (IMF) forecasts global inflation to fall to 4.1 % in 2024, with a more significant decline in advanced economies.[40] However, the forecasts are a threat by several unknown variables.

2.1.4 Political Factors

The last few years have meant significant changes in risk and safety terms as the wave of NATO and EU strategic document updates launched in response to unprecedented events. The NATO Logistics Handbook[41] has been in force since 2010, extending the original NATO Strategic Concept. In 2022, NATO issued a new Strategic Concept that responds to the changing security environment.[42] The new NATO Strategic Concept focuses on securing peace in the Euro-Atlantic area, ensuring collective defence, the threat of the Russian Federation and the People's Republic of China, international terrorism, instability in Africa and the Middle East, and the threat of the use of nuclear arsenals or the possible use of chemical, radiological and biological weapons.[43] The risk from China

36 EUROSTAT, 2023. *Statistics: EU27 (from 2020) trade by SITC product group* [online]. Eurostat [cit. 2023-04-11]. Dostupné z: https://ec.europa.eu/eurostat/databrowser/view/EXT_ST_EU27_2020SITC__custom_4653539/bookmark/line?lang=en&bookmarkId=c588302b-a6e2-4cba-bce8-5714f45c3c1d

37 SEONG, Jeongmin, Olivia WHITE, Jonathan WOETZEL, Sven SMIT, Tiago DEVESA, Michael BIRSHAN a Hamid SAMANDARI, 15 November 2022 *Global flows: The ties that bind in an interconnected world* [online]. McKinsey Global Institute [cit. 2023-04-11]. Dostupné z: https://www.mckinsey.com/capabilities/strategy-and-corporate-finance/our-insights/global-flows-the-ties-that-bind-in-an-interconnected-world

38 ČSÚ, 2023. *Inflace, spotřebitelské ceny* [online]. Praha: ČSÚ [cit. 2023-04-11]. Dostupné z: https://www.czso.cz/csu/czso/inflace_spotrebitelske_ceny

39 STATISTA RESEARCH DEPARTMENT, 2 March 2023 *Harmonized index of consumer prices (HICP) inflation rate of the European Union in January 2023, by country* [online]. Statista [cit. 2023-04-11]. Dostupné z: https://www.statista.com/statistics/225698/monthly-inflation-rate-in-eu-countries/#:~:text=As%20of%20January%202023%2C%20the,the%20EU%20during%20this%20month

40 INTERNATIONAL MONETARY FUND, 2022. *World Economic Outlook: Countering the Cost-of-Living Crisis* [online]. International Monetary Fund. Washington, DC: International Monetary Fund [cit. 2023-04-11]. ISBN 979-8-40022-128-6. Dostupné z: https://www.imf.org/en/Publications/WEO/Issues/2022/10/11/world-economic-outlook-october-2022

41 NATO, 2012. *NATO Logistics Handbook* [online]. Brusel: NATO [cit. 2023-04-11]. Dostupné z: https://www.nato.int/docu/logi-en/logistics_hndbk_2012-en.pdf

42 NATO, 29 June 2022, *NATO 2022 STRATEGIC CONCEPT* [online]. Madrid: NATO [cit. 2023-04-11]. Dostupné z: https://www.nato.int/strategic-concept/

43 Ibid.

and Russia is particularly severe, as both stand among the countries with the highest military expenditure.[44]

There are currently nine countries with nuclear programmes[45], including several risky ones. The concept also notes threats in cyberspace, new technologies or climate change. In light of the climate crisis, there is also a shift at the political level in the European Commission (EC) towards renewable energies and away from dependence on Russia.[46] The NATO Strategic Concept aims to strengthen the military and non-military security of these energy sources, which are part of the critical infrastructure. The concept also mentions maritime security and the protection of trade routes or main lines of communication. Nord Stream explosions only underline this threat.[47] Another pillar of the new strategic concept is the need to protect countries that aspire to member NATO and to extend defence from the narrow circle of alliance members.

2.1.5 Technological Factors

Europe is a powerful manufacturing region but imports more than 50 % of its energy needs.[48] Before the invasion of Ukraine, the EU took half of its gas imports from Russia (see Figure 2). The prospect of an unprecedented change in the gas supply structure raises concerns about gas shortages, rising prices and other economic impacts. Dependence on Russian gas varies considerably from country to country. Some of the most vulnerable countries in Central and Eastern Europe, including the Czech Republic, face the risk of a loss of up to 40 % of their gas consumption and a drop in GDP of up to 6 %.[49] That may harm macroeconomic indicators and logistics security across the EU and NATO.

The EU is trying to mitigate the impact by securing alternative energy supplies and sources, easing infrastructure bottlenecks, promoting energy conservation, protecting vulnerable households and extending solidarity gas-sharing agreements between countries.[50] Alongside this, emerging risks and threats may be part of the drive for political and civil escalation, i.e. terrorist attacks, cyber-attacks from the Russian Federation, or

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44 *SIPRI: Military Expenditure Database* [online]. SIPRI, 2023 [cit. 2023-06-26]. Dostupné z: https://milex.sipri.org/sipri

45 ICAN. *Which countries have nuclear weapons?* [online]. ICAN [cit. 2023-04-11]. Dostupné z: https://www.icanw.org/nuclear_arsenals

46 *Infographic - Where does the EU's gas come from?* [online], 7 February 2023. European Council [cit. 2023-04-11]. Dostupné z: https://www.consilium.europa.eu/cs/infographics/eu-gas-supply/

47 *Three Inquiries, but No Answers to Who Blew Holes in Nord Stream Pipelines* [online], 2022. USA: The New York Times [cit. 2023-04-11]. Dostupné z: https://www.nytimes.com/2022/10/25/world/europe/nord-stream-pipeline-explosions.html

48 SEONG, Jeongmin, Olivia WHITE, Jonathan WOETZEL, Sven SMIT, Tiago DEVESA, Michael BIRSHAN a Hamid SAMANDARI, 15 November 2022 *Global flows: The ties that bind in an interconnected world* [online]. McKinsey Global Institute [cit. 2023-04-11]. Dostupné z: https://www.mckinsey.com/capabilities/strategy-and-corporate-finance/our-insights/global-flows-the-ties-that-bind-in-an-interconnected-world

49 FLANAGAN, Mark, Alfred KAMMER, Andrea PESCATORI a Martin STUERMER, 19 July 2022. *How a Russian Natural Gas Cutoff Could Weigh on Europe's Economies* [online]. International Monetary Fund [cit. 2023-04-11]. Dostupné z: https://www.imf.org/en/Blogs/Articles/2022/07/19/blog-how-a-russias-natural-gas-cutoff-could-weigh-on-european-economies

50 Ibid.

the declining level of resource diversification. Bottlenecks could reduce the ability to redirect gas within Europe due to a lack of import capacity or transport constraints.

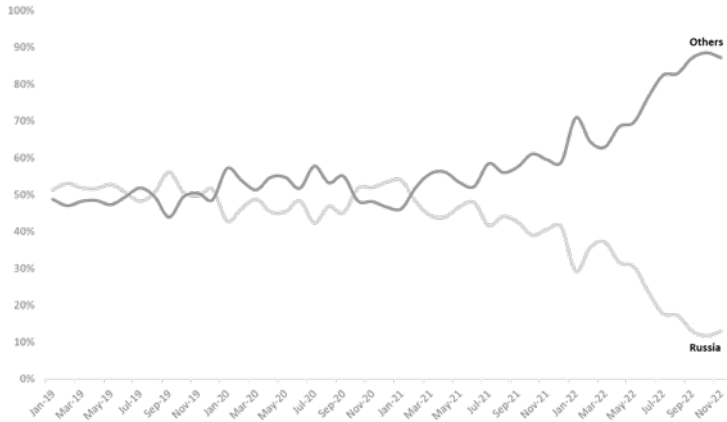

Figure 2: Diverting the EU away from Russian gas
Source: based on [51]

2.1.6 Environmental Factors

In recent years, climate change has put increasing pressure on its consideration in planning in both the civilian and military sectors. One of NATO's most recent reports assesses climate change as "the overarching challenge of our time", measurably increasing security risks and worsening as the world warms. Among other things, the report calls for a transformation in NATO's approach to defence and security while also identifying NATO as the leading organisation in climate change and adaptation.[52] NATO thus forms a synergistic element alongside the UN to help manage the effects of climate change and prevent further environmental damage. Climate Action, as the 13th development goal, represents an opportunity to achieve all the other defined SDGs.[53]

One of the emerging overriding issues to threaten logistics capacity is the urgency of climate change and the associated environmental risks. According to data published in

51 FLANAGAN, Mark, Alfred KAMMER, Andrea PESCATORI a Martin STUERMER, 19 July 2022. *How a Russian Natural Gas Cutoff Could Weigh on Europe's Economies* [online]. International Monetary Fund [cit. 2023-04-11]. Dostupné z: https://www.imf.org/en/Blogs/Articles/2022/07/19/blog-how-a-russias-natural-gas-cutoff-could-weigh-on-european-economies

52 *The Secretary General's Report: Climate Change and Security Impact Assessment*. NATO HQ, Bruxelles, Belgique, 2022. Dostupné také z: https://www.nato.int/nato_static_fl2014/assets/pdf/2022/6/pdf/280622-climate-impact-assessment.pdf

53 GUTERRES, Antonio. Climate Actions and Synergies. In: *Sustainable Development Goals: United Nations* [online]. New York, United States: United Nations, 2023, 6th February 2023 [cit. 2023-03-16]. Dostupné z: https://sdgs.un.org/topics/climate-action-synergies

the BCI Supply Chain Resilience Report 2023, 42.9 % of respondents consider the impact of severe weather to be one of the causes of supply chain threats in the past year, with up to 46 % of respondents seeing this issue as relevant for the next five years. For the risk of an environmental incident, this percentage is lower, with a total of 15.6 % of respondents citing this issue as a cause of supply chain risk in the past year and 23 % of respondents perceiving the likelihood of logistics being at risk as a result of an environmental incident in the five-year outlook.[54] Compared to the same questionnaire in 2022, where 9.6 % of respondents reported the consequence of disruption by an environmental incident by 2021[55], the perception of environmental impact, climate change, and anthropogenic activity is taking centre stage.

2.2 Impacts of the Security Environment on the Implementation of Logistics Capability in Emergencies

The robust global response from governments and risk managers accompanied COVID-19. However, we observe only short-term volatility in the data. The recovery to the original level of demand[56] and further growth followed immediately (see Figure 3). China's COVID Zero Policy compounded the supply chain disruptions associated with the COVID-19 pandemic. The question is how much the response to COVID-19 influenced the media landscape and the societal setting at the time. The same trend exists in container exports from China as in the turnover in seaports in the US[57], air freight[58] or road freight in the EU.[59] All these data reflect indicators of international trade.

54 ELLIOTT, Rachael, Maria Florencia LOMBARDERO GARCIA a Gianluca RIGLIETTI. *BCI Supply Chain Resilience Report 2023*. United Kingdom, 2023.

55 *BCI Supply Chain Resilience Report 2023* [online], 18 January 2023. 2023. Reading: Business Continuity Institute [cit. 2023-04-11]. Dostupné z: https://www.thebci.org/resource/bci-supply-chain-resilience-report-2023.html

56 World Bank. 2022. Global Supply Chain Disruptions: Competition Policy Implications. Equitable Growth, Finance & Institutions Notes. © Washington, DC. http://hdl.handle.net/10986/37507 License: CC BY 3.0 IGO.

57 UNCTAD, 2022. *Resilient Maritime Logistics: Case Study 1: Ports of Los Angeles and Long Beach, United States* [online]. United Nations Conference on Trade and Development [cit. 2023-04-24]. Dostupné z: https://resilientmaritimelogistics.unctad.org/guidebook/case-study-1-ports-los-angeles-and-long-beach-united-states

58 STATISTA, 2023. *Number of scheduled passengers boarded by the global airline industry from 2004 to 2022* [online]. Statista [cit. 2023-04-24]. Dostupné z: https://www.statista.com/statistics/564717/airline-industry-passenger-traffic-globally/

59 EUROSTAT, 2023. *Summary of quarterly road freight transport by type of operation and type of transport* [online]. Eurostat [cit. 2023-04-24]. Dostupné z: https://ec.europa.eu/eurostat/databrowser/bookmark/f64c848c-b7f2-4b77-a7c4-72df35563198?lang=en

Figure 3: China Exports of Containers (in USD THO)
Source: based on [60]

The impact of the changes from 2019 is also beyond business and crisis management. The event has implications for the strategic aspects of NATO armies. Defence industries around the globe have also encountered logistical challenges resulting from the lack of resilience in commercial supply chains. Examples include the disruption of F-35 production in Japan and Italy[61] or the impact on the food supply chain within the Polish military.[62]

As the world economy recovered from the pandemic, carbon dioxide emissions rose again. The rise in food and energy prices caused by the armed conflict in Ukraine is pushing inflation to levels unprecedented in modern history. The world's interconnectedness has created turbulence in monetary policy. Russia and Ukraine account for more than 25 % of world wheat trade, more than 60 % of world sunflower oil exports and 30 % of world barley exports.[63] Russia is a major world exporter of fertilisers, which means

60 TRADING ECONOMICS, 2023. *China Exports of Containers* [online]. Trading Economics [cit. 2023-04-11]. Dostupné z: https://tradingeconomics.com/china/exports-of-containers

61 MEHTA, Aaron, 20 March 2020 *How coronavirus could impact the defense supply chain* [online]. Defense News [cit. 2023-04-11]. Dostupné z: https://www.defensenews.com/industry/2020/03/20/how-coronavirus-could-impact-the-defense-supply-chain/

62 WINCEWICZ-BOSY, Marta, Adam SADOWSKI, Katarzyna WĄSOWSKA, Zbigniew GALAR a Małgorzata DYMYT, 2022. Military Food Supply Chain during the COVID-19 Pandemic. *Sustainability: Economic and Social Consequences of the COVID-19 Pandemic* [online]. Sustainability, 2022, **14**(4) [cit. 2023-04-11]. Dostupné z: doi:10.3390/su14042464

63 FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, 2022 *THE IMPORTANCE OF UKRAINE AND THE RUSSIAN FEDERATION FOR GLOBAL AGRICULTURAL MARKETS AND THE RISKS ASSOCIATED WITH THE WAR IN UKRAINE* [online], 10 June 2022 Food and Agriculture Organization of the United Nations [cit. 2023-04-11]. Dostupné z: https://www.fao.org/3/cb9013en/cb9013en.pdf

that any interruption or reduced access to supply could impact global harvests.[64] Russia is a significant source of many critical elements that the US Department of the Interior considers vital to national economic and security interests, including 30 % of the world's platinum element reserves, 13 % of titanium, 11 % of nickel, and neon.[65] The price of palladium, a key component of automotive catalytic converters, has increased by up to 80 % since the start of the conflict.[66]

Whether the global pandemic or the armed conflict in Ukraine, logistics problems arise when supply chains are not resilient.[67] The vulnerability comes with low levels of diversification. Products with origins concentrated in only a few geographical areas exist in all sectors but mainly in electronics.[68] Low diversification also exists in worldwide available products, i.e., wheat. Some countries' flows are highly concentrated even though globally distributed production. Turkey and Egypt imported more than 75 % of wheat from Ukraine and Russia before 2022.[69] The invasion of Ukraine and the subsequent sanctions against Russia may lead to shortages of critical supplies, increased material costs, more volatile demand and logistical and capacity constraints. In response to events in recent years, some governments are initiating accelerated development of value chains that are considered critical to national strategic priorities, e.g., the United States, the EU, South Korea, China or Japan are introducing measures to support domestic value chains.[70]

64 KILPATRICK, Jim, 2022 *Supply chain implications of the Russia-Ukraine conflict* [online]. Canada: Deloitte, 25 March 2022 [cit. 2023-04-11]. Dostupné z: https://www2.deloitte.com/xe/en/insights/focus/supply-chain/supply-chain-war-russia-ukraine.html

65 Ibid.

66 KALISH, Ira, 15 March 2022 *How sanctions impact Russia and the global economy* [online]. United States: Deloitte, 15 March 2022 [cit. 2023-04-11]. Dostupné z: https://www2.deloitte.com/us/en/insights/economy/global-economic-impact-of-sanctions-on-russia.html

67 JALOWIEC, Tomasz, GRALA Dariusz. *The Effectiveness of Logistic Processes in Military Supply Chains.* In. 35th International-Busienss-Information-Management-Association Conference (IBIMA). Seville: Int. Business Informat Management Assoc., 2020. ISBN978-9998551-4-0. p 972-982.

68 SEONG, Jeongmin, Olivia WHITE, Jonathan WOETZEL, Sven SMIT, Tiago DEVESA, Michael BIRSHAN a Hamid SAMANDARI, 15 November 2022 *Global flows: The ties that bind in an interconnected world* [online]. McKinsey Global Institute [cit. 2023-04-11]. Dostupné z: https://www.mckinsey.com/capabilities/strategy-and-corporate-finance/our-insights/global-flows-the-ties-that-bind-in-an-interconnected-world

69 Ibid.

70 SEONG, Jeongmin, Olivia WHITE, Jonathan WOETZEL, Sven SMIT, Tiago DEVESA, Michael BIRSHAN a Hamid SAMANDARI, 15 November 2022 *Global flows: The ties that bind in an interconnected world* [online]. McKinsey Global Institute [cit. 2023-04-11]. Dostupné z: https://www.mckinsey.com/capabilities/strategy-and-corporate-finance/our-insights/global-flows-the-ties-that-bind-in-an-interconnected-world

2.3 IMPACT OF RISK FACTORS ON THE POSSIBILITIES OF LOGISTIC SUPPORT OF COMBAT OPERATIONS

As a result of the reduction of oil and gas supplies to Europe and the search for new sources, NATO's new Strategic Concept highlights the need to address the energy and climate crisis.[71] The Strategic Concept also mentions the efforts of players to exploit openness, connectivity and digitalisation among allies, economic factors and energy supplies. We see many of these things in current events, i.e., attacks on energy networks in Ukraine or attacks in digital and cyberspace on state authorities around the globe. The prices of elementary goods and services such as housing, energy or food were already rising before the COVID-19 pandemic, and the war in Ukraine has further accelerated the trend.[72] The cyberspace risks are significant from a global perspective.[73] At first glance, Russia may not be as important to global supply chains. However, the situation is different when looking beyond first-tier suppliers.[74] The exclusion of Russia and Ukraine from supply structures may have implications for logistics support not just in the energy, agriculture, healthcare or automotive sectors. The situation also has implications for the security chains and increases the pressure on humanitarian supply chains facing the impact of crises.

Following the COVID-19 pandemic, there have already been moves to reorganise global supply chains into a more regional structure. The world becomes less open and connected to external actors from a security perspective.[75] The conflict in Ukraine or the dubious intentions of China's invasion policy will probably accelerate these initiatives. While transformation can offer governments and societies greater control and remove the volatility of dependence on foreign countries, there are areas where this is difficult or impossible.[76] Dynamics in geopolitics are also driving shifts towards more energy-efficient logistics solutions. The situation will probably influence a move from lean and cost-optimising principles to increasing supply chain resilience for strategic items. A need for

71 NATO, 29 June 2022, *NATO 2022 STRATEGIC CONCEPT* [online]. Madrid: NATO [cit. 2023-04-11]. Dostupné z: https://www.nato.int/strategic-concept/

72 WORLD ECONOMIC FORUM, 11 January 2023. *The Global Risks Report 2023: INSIGHT REPORT* [online]. 18th Edition. Cologny/Geneva: World Economic Forum [cit. 2023-04-11]. ISBN 978-2-940631-36-0. Dostupné z: https://www.weforum.org/reports/global-risks-report-2023/in-full

73 Ibid.

74 FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, 2022 *THE IMPORTANCE OF UKRAINE AND THE RUSSIAN FEDERATION FOR GLOBAL AGRICULTURAL MARKETS AND THE RISKS ASSOCIATED WITH THE WAR IN UKRAINE* [online], 10 June 2022 Food and Agriculture Organization of the United Nations [cit. 2023-04-11]. Dostupné z: https://www.fao.org/3/cb9013en/cb9013en.pdf

75 DEBICKI, Tomasz, KOLINSKI, Adam. Influence of EDI Approach for Complexity of Information Flow in Global Supply Chains. In. Business Logistics in Modern Management. 18th International Scientific Conference on Busienss Logistics in Modern Management. Osijek: Josip Juraj Strossmayer University, 2019. ISSN 1849-5931. p 683-694.

76 KILPATRICK, Jim, 2022 *Supply chain implications of the Russia-Ukraine conflict* [online]. Canada: Deloitte, 25 March 2022 [cit. 2023-04-11]. Dostupné z: https://www2.deloitte.com/xe/en/insights/focus/supply-chain/supply-chain-war-russia-ukraine.html

new transport options occurs with the uncertain situation in Russia, Ukraine and even Belarus. Authorities report that more than 32,000 civilian facilities have been damaged across Ukraine since the start of the war, including at least 700 critical infrastructure facilities such as airports, bridges, oil depots and electrical substations.[77] That complicates the capabilities of security and humanitarian supply chains, which have limited logistical options to support people at risk in Ukraine. By the end of November, the World Health Organization (WHO) verified 715 attacks on health facilities in Ukraine in 2022, more than 70 % of all attacks on health infrastructure reported worldwide this year.[78]

Technological advances reflect the evolution of warfare. However, the increasing level of technology does not always correlate with higher regard for the environment. The war in Ukraine is proof of this. Although the negative environmental impacts are already visible, particularly in soil contamination,[79] addressing them is still not a priority. As a rule, the focus is on the course and outcome rather than the environmental impact during an armed conflict. Peacetime or peacekeeping operations are exceptions in assessing risks and environmental impacts of military activities. The Hazard and Impact Index serves this purpose.[80] The effects on civilian and military logistics associated with removing ecological burdens in the Ukrainian conflict will only occur with the war's end and the requirements for the resettlement of areas affected by the war.

3 DISCUSSION

The ongoing crisis is reshaping the world picture for the third year running. The current situation brings about an economic and technological transformation of the status quo. The growing threat in cyberspace and the changing geopolitical situation create a turbulent environment for global cooperation. The efforts to increase resilience in strategic sectors replace openness and the pursuit of low costs. Shrinking space for action on climate change compounds the dynamic we find ourselves in. These aspects harm logistics capacities and require constraining trade-offs, which is little room for.

On research question **RQ1**: *How have aspects of logistics management changed with changes in the security environment?* Reliable and inexpensive access to the most basic needs, i.e., food, water or energy, has proven to be essential to ensure the critical functioning of society. Russia and Ukraine are among the largest exporters of natural gas, oil, metals and agricultural commodities. If the conflict prolongs, it could have significant

77 UN OCHA, 10 February 2023, *UKRAINE HUMANITARIAN RESPONSE - KEY ACHIEVEMENTS IN 2022: Situation Report* [online]. UN OCHA [cit. 2023-04-11]. Dostupné z: https://reports.unocha.org/en/country/ukraine/

78 Ibid.

79 WENNING, Richard J. a Theodore D. TOMASI. Using US Natural Resource Damage Assessment to understand the environmental consequences of the war in Ukraine. *Integrated Environmental Assessment and Management* [online]. 2023, **19**(2), 366–375 [cit. 2023-04-02]. ISSN 15513793. Dostupné z: doi:10.1002/ieam.4716

80 KOMÁR, Aleš, David ŘEHÁK a Jiří DVOŘÁK. Hazard & Impact Index: Effect of Training on the Environment. Brno: University of Defence, Faculty of Economics and Management, 2006. ISBN 80-7231-133-6.

consequences for Europe's energy supply and food security and devastating effects on the global economic recovery. Lenghtening the Ukraine war and sanctions against Russia also produces third-country misery and dehumanizes the goals of the UN SDGs. There could be the compromisation of the availability of critical raw materials, and transport costs would rise, creating the need for a new architecture of transport routes. Hundreds of millions of people are facing acute food and electricity access shortages in 2019. The UN's efforts to meet the SDGs are being undermined, which may be further exacerbated by growing populations, particularly in the most vulnerable African and Asian countries. Supply chain crises of this kind can expose the fragility of states and lead to loss of stability, loss of life, widespread violence, political upheaval and involuntary migration.[81]

On research question **RQ2:** *What is the impact on the logistical support?* The previously mentioned risks highlight the need to examine the interconnected logistical support of commercial, humanitarian and military supply chains. Supply chain resilience affects both military and emergency logistics support. There are uncontrollable variables, and thus complete control of supply chain performance is not likely. However, based on system theory, supply chain performance can be improved by improving the influenceable parts.[82] The global interconnectedness of the world shows that conflict on the other side of the globe poses a far greater threat than it used to. Security in the form of peace or the availability of energy and basic industrial raw materials is no longer limited to a selected region. Disruption is also not only a threat to natural gas or oil supplies. It multiplies its negative effect by affecting other areas, including the SDGs. Emphasis on greener transport and logistics, in general, is therefore relegated to the background, as it is less of a priority in times of war compared to meeting the acute needs of the population.

The conflict on NATO's eastern border puts pressure on the readiness of NATO troops, and NATO troop readiness and armaments have improved. The Multi-National Battle Group Slovakia (MN BG SVK) 2022 and similar groups in Romania and Bulgaria will strengthen an eastern wing. In the past decade, NATO has strengthened its presence in the Baltic countries. The Logistics Construction Concept approved by the Chief of the General Staff of the CAF in April 2021 was less than two years after its approval when changes started taking place in the area of military transport, and we already identified a need to go beyond the concept, i.e. no carrier in the Czech Republic would be able to transport some of the new tanks.

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81 WORLD ECONOMIC FORUM, 11 January 2023, *The Global Risks Report 2023: INSIGHT REPORT* [online]. 18th Edition. Cologny/Geneva: World Economic Forum [cit. 2023-04-11]. ISBN 978-2-940631-36-0. Dostupné z: https://www.weforum.org/reports/global-risks-report-2023/in-full

82 REPÍK, Dušan a Pavel FOLTIN, 2022. Applications of performance indicators for optimization of humanitarian chains. *Logforum* [online]. 18(4), 495-504 [cit. 2023-04-11]. ISSN 18952038. Dostupné z: doi:10.17270/J.LOG.2022.765

CONCLUSION

Europe has not yet fully recovered from COVID-19 when the armed conflict in Ukraine increased the number of migrants, soaring energy prices, inflation and the growing threat of recession. This paper analyses and summarises the changes that have significantly transformed the economic, environmental, social and security environments of EU and NATO member states with links to logistics support. The changes that have taken place since 2019 have significantly affected logistics capabilities and the view of the structure of commercial, military and humanitarian supply chains. This paper analyses and summarises developments of geopolitical, economic and security factors. The paper also outlines the implications for logistics support capabilities. The findings are relevant to the commercial, security and humanitarian supply chains.

Further research should include a more detailed analysis of the environment, identified threats and different supply chain types. At the environmental level, aspects of individual SLEPTE domains could be more focused, or research could focus on a selected EU and NATO member state. Researchers can analyze identified threats in more detail regarding their origin, exposure, potential impacts and domino effects. The analysis can be specific to the different needs, processes and objectives of each type of supply chain. The topic is complex and constantly evolving. There is scope for new aspects and associated perspectives to emerge from which to view and explore the issue in further research.

Climate change is an unavoidable problem that must be addressed and mitigated by legislation and practically applied in all spheres of human activity, including logistics. Current political problems are putting environmental issues on the back burner, as conflict resolution is the priority, despite the destruction of the environment. The COVID-19 pandemic already showed this short-sighted view, where society perceived its positive impact on nature due to lower transportation and production. Crisis management during the pandemic and war conflict neglects climate change and environmental protection. In the case of Ukraine, it is likely to create problems in the reconstruction of war-affected areas.

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