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THE IMPACT OF THE CHALLENGES OF THE NEW REGIONAL SECURITY ENVIRONMENT ON THE IMPROVEMENT OF LOGISTIC TRANSPORT SYSTEMS AT THE TACTICAL AND JOINT LEVELS IN NATIONAL AND ALLIED OPERATIONS WITHIN NATO

Dragoș GHERGHINOIU
"Nicolae Bălcescu" Land Forces Academy, Sibiu, Romania
dragosgherghinoiu@gmail.com

ABSTRACT

In the context of the rapidly deteriorating regional security environment and the lessons generated by the war in Ukraine, this article examines how contemporary challenges reshape the role and requirements of logistic transport at the tactical and joint levels in national and allied operations within NATO. The study applies a qualitative documentary content analysis to a corpus of open-source NATO and EU policy/doctrinal documents and selected specialised studies. Using a directed coding scheme derived from the conceptual framework, the analysis maps, the main categories of challenges affecting military mobility and the corresponding enablers and mitigation measures relevant to logistic transport planning and execution. The findings consolidate two dominant adaptation tracks: the integration and interoperability of logistic transport through institutional coordination, standardisation and digital logistics/C2, and the adaptation of movement and sustainment to emerging threats, including UAS, electronic warfare and cyber disruption. At the same time, the corpus highlights persistent governance fragmentation and uneven procedural harmonisation as recurring constraints. The article concludes that logistic transport is evolving from a supporting function optimised for peacetime efficiency to a strategic enabler of operational resilience and deterrence under crisis conditions.

KEYWORDS: military mobility; interoperability; logistic transport; operational resilience; emerging threats

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1. Introduction

In the context of the continuously evolving European and global security architecture, the issue of ensuring efficient and resilient logistic transport systems, both at the tactical and joint levels within NATO operations, has gained new significance. The intensification of geopolitical tensions, particularly following Russia's aggression against Ukraine, has not only redefined threat perceptions but has also imposed new requirements for interoperability, agility, and coordination between allied and national logistic structures. Military mobility in the Euro-Atlantic context is a key strategic element in strengthening

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regional and global security (Giurgiu, Virca & Noja, 2024).

In this regard, the article aims to explore how the challenges of the new regional security environment stimulate innovation and improve logistics transport systems within NATO structures. The objective of this article is twofold: first, to analyse the nature of current regional security challenges and their operational implications for NATO logistics, and second, to assess how these challenges drive the adaptation of transport logistic structures and processes at the tactical and joint levels.

The war in Ukraine has served as a real-time laboratory for understanding the operational consequences of constrained mobility and disrupted supply chains. The Russian invasion of Ukraine outlined the importance of military mobility in times of crisis (Chihaia, 2024). The conflict demonstrated that the ability to rapidly deploy and sustain forces logistically is essential for deterrence and collective defence. Consequently, NATO and the European Union have intensified joint initiatives to simplify and harmonise procedures for moving military assets and equipment across member states (Chihaia, 2024), promoting a dual approach to transport infrastructure and logistic integration.

2. Review of the Literature, Conceptual Framework, and Hypotheses

The new regional security environment has transformed operational and strategic thinking within NATO and the European Union, particularly regarding military transport and mobility. Logistic support for multinational joint operations represents a key facilitator of operations and a major component of combat potential at all levels of command (Minculete, 2024). This perspective aligns with NATO's current doctrine, which identifies mobility and sustainment as pillars of operational effectiveness, especially in the context of hybrid and high-intensity warfare.

2.1. The Conceptual Framework of Military Mobility

From a conceptual standpoint, military mobility is defined as the ability to rapidly move personnel, materials, and equipment between strategic, operational, and tactical theatres. This is increasingly viewed as an essential factor in NATO's collective defence posture. Enhancing military mobility has become a priority for security-generating organisations in the current and foreseeable security environment (Herciu & Manolache, 2025). Their analysis highlights that NATO and the EU are investing not only in physical infrastructure but also in harmonising normative and procedural frameworks to ensure the unhindered deployment of forces across borders. This multidimensional approach integrates transport infrastructure, legal frameworks, and logistical coordination.

2.2. Institutional and Structural Challenges

However, although NATO and the EU have made notable progress, several reports emphasize that governance mechanisms for military mobility within the EU remain complex, with no single point of contact for military mobility measures (European Court of Auditors, 2025).

This fragmentation complicates joint-level logistical transport, as multiple military, political, and civilian entities must cooperate in the absence of a unified command and control structure. Furthermore, the EU's Action Plan 2.0, while ambitious, suffers from design deficiencies that limit monitoring and reporting, with most actions lacking sufficient operational utility (European Court of Auditors, 2025).

These structural issues directly affect the performance of logistical transport in NATO joint operations. Close cooperation and coordination between the EU and NATO are essential to advance military mobility across Europe (Chihaia, 2024).

The transport infrastructure, used for both civilian and military purposes due to its dual nature, generates both cooperation and tension. While the Connecting Europe Facility (CEF) provides critical funding for dual-use infrastructure, its prioritisation mechanisms have been criticized for underestimating geopolitical and military aspects in the evaluation of mobility projects (European Court of Auditors, 2025).

2.3. The Operational Resilience Model in Logistic Transport Systems

Conceptually, the model of logistic transport systems resilience integrates adaptability, interoperability, and sustainability as core dimensions of efficiency. The model assumes that logistic transport systems networks must function as complex adaptive systems capable of absorbing shocks from infrastructure destruction to cyberattacks while maintaining operational tempo. This perspective resonates with NATO's joint logistic doctrine and with the theoretical framework formulated by Watling and Bronk (2024), who argue that effective, layered, and cost-efficient anti-UAS capabilities are not a luxury but a fundamental requirement for a land force prepared for modern battlefield operations (Watling & Bronk, 2024). Applied to logistic transport systems, this technological adaptation entails a transition toward digitalised, interconnected, and protected logistic corridors.

Figure no. 1 synthesises the conceptual framework derived from the reviewed literature and policy/doctrinal sources. The figure depicts the expected interaction between:

(i) regional security challenges;

(ii) institutional and procedural interoperability mechanisms;

(iii) resilience-oriented technological enablers, and how these jointly shape logistic transport performance at tactical and joint levels.

This framework informs the analytical dimensions (D1-D2) and underpins the formulation of hypotheses H1-H2.

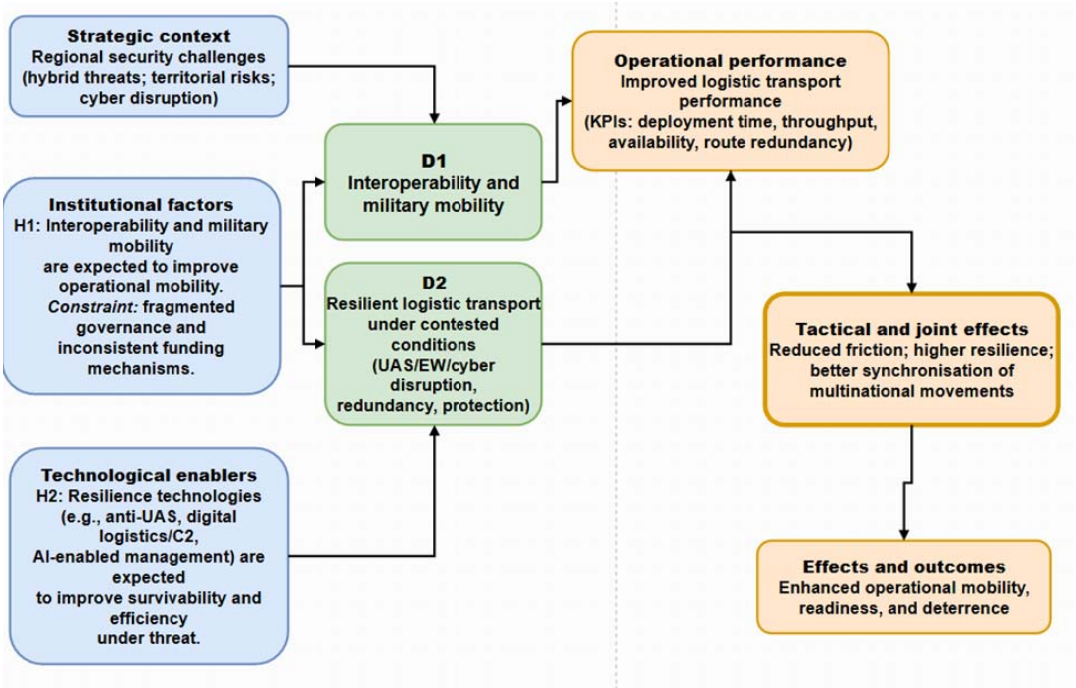

Figure no. 1: *Conceptual framework and analytical dimensions (D1-D2) linking regional security challenges to NATO logistic transport adaptation*
(Source: Author's elaboration based on literature synthesis)

2.4. Research Hypotheses

Based on the literature and conceptual framework presented, the article formulates the following hypotheses:

H1: Strengthening interoperability between NATO and EU logistic frameworks enhances operational mobility; however, the lack of coordinated governance and inconsistency in funding mechanisms persist as significant challenges.

H2: Integrating resilience technologies (e.g., anti-UAS systems, AI-based logistic management) will significantly improve the survivability and efficiency of logistic transport systems in contested environments.

Therefore, these hypotheses illustrate how the changing security environment and the institutional reforms within NATO and the EU reshape the theory and practice of military logistic transport systems in the 21st century.

To illustrate the theoretical relationships presented above more clearly, the conceptual framework below synthesises the interactions among the study's main variables. It demonstrates that regional security challenges manifested through hybrid warfare, territorial threats, and cyber risks are independent drivers of NATO's logistical adaptation.

These hypotheses are derived from the conceptual framework presented in Figure no. 1 and will be assessed through the documentary evidence synthesised in Section 4.

Figure no. 1 illustrates this conceptual linkage, demonstrating how strategic, institutional, and technological variables interact to produce measurable outcomes in NATO's logistic performance.

3. Materials and Methods

This research adopts a qualitative, multi-source documentary content analysis grounded in the examination of open-source institutional publications, strategic policy documents, and selected specialised academic studies. The methodological design integrates doctrinal, operational, and political perspectives relevant to the transformation of logistic transport systems within NATO and the EU in response to the evolving regional security environment.

Given the classified nature of many operational details regarding NATO logistic transport systems, the study explicitly relies on unclassified and publicly accessible materials. This limitation is addressed through systematic cross-source triangulation, focusing on convergent themes and recurring constraints across the analysed documents.

3.1. Data Corpus and Selection Criteria

The study uses a primary open-source document corpus (n = 9) that was coded for the directed documentary content analysis. The corpus includes: (1) European Commission & High Representative of the Union for Foreign Affairs and Security Policy (2022); (2) European Court of Auditors (2025); (3) North Atlantic Treaty Organization (2023); (4) North Atlantic Treaty Organization & European Union (2025); (5) Council of the European Union (2025); (6) North Atlantic Treaty Organization (2025); (7) Bundeswehr (2023); (8) Lithuanian Armed Forces (2024); and (9) Watling and Bronk (2024).

Inclusion criteria were:

(a) direct relevance to military mobility and/or logistic transport in NATO/EU contexts;

(b) explicit references to interoperability, cross-border movement, infrastructure, governance, readiness, resilience, or emerging threats affecting movement and sustainment; and

(c) publication within the period 2022-2025.

Additional academic sources were retained as supporting literature to contextualise institutional positions; however, they were not included in the coded primary corpus and therefore do not underpin the evidence matrix reported in the Results section.

3.2. Coding Frame and Analytical Procedure

A directed qualitative content analysis was conducted using a coding frame derived from the conceptual framework (Figure no. 1). Two overarching analytical dimensions guided the coding and synthesis: (D1) integration and operational interoperability of logistic transport (institutional coordination, standardisation, procedures, readiness and digital logistics/C2); and (D2) adaptation of movement and sustainment to emerging threats and contested environments (UAS/EW/cyber disruption, force protection, redundancy and resilience).

The following thematic codes were applied across the corpus: GOV-FRAG (governance fragmentation and coordination gaps), X-BORDER (cross-border clearances and procedures), DUAL-INFRA (dual-use transport infrastructure constraints), STANDARD (standardisation/interoperability mechanisms), READINESS-DEPLOY (readiness and deployment timelines shaping movement), DIGITAL-C2 (digital logistics and C2/visibility), JOINT-COORD (joint and multinational coordination arrangements), MULTIMODAL-REDUND (multimodal transport and redundancy of routes), UAS-THREAT (UAS threats to convoys/nodes), EW-CYBER (electronic warfare/cyber disruption), and PROTECTION-RES (protection and resilience measures).

For each coded segment, the analysis extracted:

(i) the stated challenge/constraint;

(ii) the operational effect on logistic transport at the tactical level and/or at the joint level;

(iii) the mitigation measure or enabling mechanism proposed or implied by the source.

The analysis followed a two-pass procedure:

(1) initial coding across the entire corpus to populate an internal evidence matrix linking challenges, effects and mitigations;

(2) a consolidation passes to merge overlapping codes and synthesise recurring patterns across documents. The consolidated evidence matrix underpins the structure of the Results section and supports the mapping of findings to the research hypotheses.

4. Results

The findings reported below are derived from the directed documentary content analysis applied to the coded primary corpus (n = 9) described in Section 3.1. Using the coding frame in Section 3.2, the evidence was synthesised by mapping (i) challenges/constraints, (ii) operational effects on logistic transport at tactical and joint levels, and (iii) enabling mechanisms/ mitigation measures. The results are organised along the two analytical dimensions: (D1) integration and operational interoperability; and (D2) adaptation to emerging threats in contested environments.

4.1. Integration and Operational Interoperability

Across the coded corpus, a recurring finding is that the operational effectiveness of logistic transport is increasingly conditioned by institutional and procedural interoperability, not only by physical transport capacity. The documentary evidence consistently points to coordination and governance as central determinants of military mobility performance, with fragmentation and uneven harmonisation of procedures repeatedly highlighted as practical constraints in NATO–EU contexts (Council of the European Union, 2025; European Court of Auditors, 2025; North Atlantic Treaty Organization & European Union, 2025).

From a tactical perspective, these constraints translate into friction in movement execution (time delays, administrative burdens, reduced predictability of routes and timings), which directly affects sustainment responsiveness and convoy scheduling. At the joint level,

the same constraints manifest as planning misalignment and reduced agility in synchronising multinational movements across corridors, especially when rapid reinforcement and readiness timelines become decisive (North Atlantic Treaty Organization, 2023; North Atlantic Treaty Organization, 2025).

A second consistent pattern concerns the role of dual-use infrastructure and corridor capacity as enablers and bottlenecks. The coded documents converge on the need to align infrastructure standards and investments with operational movement requirements, particularly for heavy equipment and large-scale deployments, and to treat infrastructure constraints as a planning factor that shapes feasible transport options and timelines (European Commission & High Representative of the Union for Foreign Affairs and Security Policy, 2022; European Court of Auditors, 2025).

Finally, large-scale deployment exercises are reflected in the corpus as practical validation mechanisms for interoperability and readiness assumptions. The analysed exercise-related sources illustrate the operational logic of accelerated movement and multinational coordination under compressed timelines, reinforcing the need for anticipatory planning at both tactical and joint levels (Bundeswehr, 2023; Lithuanian Armed Forces, 2024; North Atlantic Treaty Organization, 2025). Overall, these findings are consistent with the direction of Hypothesis H1, indicating that regional security challenges elevate the importance of interoperability and institutional integration for logistic transport.

4.2. Adaptation to Emerging Threats

A dominant finding within the coded corpus is that logistic transport is increasingly treated as an activity conducted under threat, requiring resilience-oriented planning and protection measures. The evidence emphasises that contested environments – especially those characterised by pervasive surveillance and precision strike – alter convoy and node vulnerability and therefore reshape transport-related risk management and force protection requirements (Watling & Bronk, 2024).

In operational terms, the corpus supports the view that both tactical transport execution (convoy movement, staging, and protection) and joint-level sustainment arrangements (node survivability, route resilience, and continuity of movement control) must incorporate mitigation measures and redundancy. This shifts logistic transport planning away from peacetime efficiency optimisation and toward survivability, dispersion, and continuity under disruption (North Atlantic Treaty Organization, 2023; Watling & Bronk, 2024).

In this context, the documentary evidence also links resilience to the enabling role of coordination and information management: protection and continuity depend not only on physical assets but also on the ability to maintain movement control, visibility, and adaptive rerouting under conditions of disruption (North Atlantic Treaty Organization, 2023; North Atlantic Treaty Organization & European Union, 2025). Overall, the findings support the direction of Hypothesis H2, indicating that emerging threats increase the strategic importance of resilient logistic transport as an operational enabler at both tactical and joint levels.

5. Discussion

The documentary content analysis indicates that the challenges associated with the new regional security environment are reshaping logistic transport from a predominantly efficiency-driven support function into an operational enabler whose performance directly conditions readiness, reinforcement, and sustainment at both

tactical and joint levels. The findings suggest that two adaptation tracks must be treated as mutually reinforcing: (D1) institutional and procedural integration for mobility and interoperability, and (D2) resilience-oriented adaptation of movement and sustainment under threat conditions (European Commission & High Representative of the Union for Foreign Affairs and Security Policy, 2022; European Court of Auditors, 2025; North Atlantic Treaty Organization & European Union, 2025; Watling & Bronk, 2024).

A key interpretive implication is that focusing on only one track produces fragile outcomes. Interoperability and improved procedures cannot deliver the intended operational effect if transport and movement control are vulnerable to disruption, while resilience measures remain insufficient if governance and procedural harmonisation continue to generate delays and planning friction. This reinforces the need to treat logistic transport as a joint capability area that links institutional design, infrastructure, procedures, and protection measures into a coherent operational system (North Atlantic Treaty Organization, 2023; North Atlantic Treaty Organization, 2025).

5.1. Institutional Adaptation and Doctrinal Integration

The findings emphasise governance and procedural harmonisation as central determinants of military mobility performance. The coded institutional documents repeatedly highlight complex and fragmented governance arrangements, including the absence of a single coordinating function for military mobility at EU level, which complicates alignment between EU mechanisms and NATO operational requirements (European Court of Auditors, 2025; Council of the European Union, 2025; North Atlantic Treaty Organization & European Union, 2025). From a tactical perspective, these constraints tend to translate into administrative burdens and reduced predictability for movement execution; at the joint level, they manifest as synchronisation friction for multinational deployments and sustainment planning, particularly under compressed timelines associated with readiness and reinforcement (North Atlantic Treaty Organization, 2023; North Atlantic Treaty Organization, 2025).

Within this context, the EU's Action Plan on Military Mobility 2.0 and EU-NATO progress reporting can be interpreted as institutional attempts to converge regulatory, procedural, and investment lines of effort with operational needs (European Commission & High Representative of the Union for Foreign Affairs and Security Policy, 2022; North Atlantic Treaty Organization & European Union, 2025). The exercise-related sources included in the coded corpus further underline that large-scale movement and deployment activities act as practical validation mechanisms for these assumptions, exposing procedural bottlenecks and coordination requirements under realistic conditions (Bundeswehr, 2023; Lithuanian Armed Forces, 2024).

5.2. Operational Transformation: Resilience under Emerging Threats

The findings also indicate a qualitative shift in how logistic transport is conceptualised: it is increasingly treated as an activity conducted under threat, requiring protection, redundancy, and continuity measures. In contested environments characterised by persistent surveillance and precision strike, convoys and logistic nodes become high-value targets, and the operational feasibility of movement and sustainment depends on risk management and force protection arrangements (Watling & Bronk, 2024).

From a doctrinal and operational standpoint, this implies that both tactical transport execution (movement discipline,

staging, dispersion, and protection measures) and joint-level sustainment design (node survivability, route resilience, and continuity of movement control) must incorporate resilience-oriented mitigation. In practical terms, the institutional emphasis on readiness and reinforcement can be sustained only if transport corridors and movement coordination arrangements are able to function under disruption (North Atlantic Treaty Organization, 2023; North Atlantic Treaty Organization & European Union, 2025). Accordingly, resilience should be understood not merely as an additional requirement, but as a condition for effective interoperability and operational mobility in the current security environment.

5.3. Comparative Synthesis and Limitations

Across the coded institutional corpus, three priority lines of effort recur: (1) streamlining cross-border movement permissions and procedures; (2) aligning dual-use infrastructure capacity and standards with operational movement requirements; and (3) strengthening coordination and information-sharing arrangements between EU and NATO work strands to reduce administrative friction and improve planning coherence (European Commission & High Representative of the Union for Foreign Affairs and Security Policy, 2022; European Court of Auditors, 2025; North Atlantic Treaty Organization & European Union, 2025).

This study is limited by its reliance on open-source and unclassified materials and by the qualitative nature of the analysis, which does not provide quantitative performance measurement. The internal evidence matrix used to synthesise the coded segments is not reproduced in the manuscript due to space constraints; however, the methodological steps and coding frame are described to ensure transparency and replicability.

6. Conclusions

This article examined the impact of the new regional security environment on the importance of logistic transport at the tactical and joint levels in national and allied operations within NATO. Using a directed documentary content analysis of a coded open-source corpus (n = 9), the study mapped challenges, operational effects, and enabling/mitigation measures, structured along two analytical dimensions: (D1) integration and interoperability of logistic transport, and (D2) adaptation to emerging threats and contested environments.

The findings indicate that logistic transport is increasingly shaped by institutional and procedural interoperability, not only by physical transport capacity. Governance fragmentation and uneven procedural harmonisation emerge as recurring constraints that generate friction for tactical movement execution and complicate joint-level synchronisation of multinational deployments, particularly under compressed readiness and reinforcement timelines. In parallel, the results confirm a qualitative shift toward resilience-oriented transport planning, as contested environments characterised by persistent surveillance and precision strike alter convoy and node vulnerability and require protection, redundancy, and continuity measures.

The core contribution of the study is the consolidated, evidence-based mapping of the challenge, effect and mitigation logic relevant to logistic transport across tactical and joint levels, derived from the coded corpus and made explicit through the analytical structure used in the Results section. Practically, the analysis supports the conclusion that NATO and EU efforts to enhance military mobility and readiness must be pursued in a balanced manner: institutional and procedural integration (D1) and resilience under emerging threats (D2) function as interdependent conditions for effective operational mobility.

Future research could complement documentary findings with structured practitioner interviews and/or case-based operational data, where permissible, to validate and refine the mapped relationships between constraints, effects, and mitigation measures for logistic transport at tactical and joint level.

REFERENCES

Bundeswehr. (2023, November 30). *German Army and its NATO partners launch large-scale exercise in 2024 (Quadriga 2024)*. Available at: https://www.bundeswehr.de/en/news/german-army-nato-partners-launch-large-scale-exercise-in-2024-5808200.

Chihaia, M.S. (2024, November 7). *Military mobility 2.0 revisited: Lessons learnt* (Policy brief, Europe in the World Programme). European Policy Centre. Available at: https://epc-web-s3.s3.amazonaws.com/content/Military_mobility-final.pdf epc-web-s3.s3.amazonaws.com.

Council of the European Union. (2025, June 10). *EU-NATO: 10th progress report reaffirms commitment to advancing cooperation amid instability and security challenges.* Available at: https://www.consilium.europa.eu/en/press/press-releases/2025/06/10/eu-nato-10th-progress-report-reaffirms-commitment-to-advancing-cooperation-amid-instability-and-security-challenges/.

European Commission & High Representative of the Union for Foreign Affairs and Security Policy. (2022, November 10). *Action plan on military mobility 2.0* (JOIN (2022) 48 final) Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52022JC0048.

European Court of Auditors. (2025). *EU military mobility – Full speed not reached due to design weaknesses and obstacles en route* (Special report 04/2025). Publications Office of the European Union. Available at: https://doi.org/10.2865/5248734.

Lithuanian Armed Forces. (2024, May 29). *Exercise Grand Quadriga 2024 wraps, effectiveness of NATO defence planes tested, intense military traffic back home starting*. Available at: https://kariuomene.lt/en/exercise-grand-quadriga-2024-wraps-effectiveness-of-nato-defence-planes-tested-intense-military-traffic-back-home-starting/25965.

Giurgiu, T., Virca, I., & Noja, G. (2024). Mobilitatea militară în viziunea NATO şi a Uniunii Europene. *Gândirea Militară Românească*, *2024*(4), 690-703. Available at: https://doi.org/10.55535/gmr.2024.4.43.

Herciu, A., & Manolache, C.I. (2025). Understanding the crucial role of deployment and military mobility within the European Union and the North Atlantic Treaty Organization: A conceptual analysis. *Scientific Journal of the Military University of Land Forces*, *215*(1), 47-70. Available at: https://doi.org/10.5604/01.3001.0055.0126.

Minculete, G. (2024). Specific Approaches to Augmenting Logistics Planning in Joint Multinational Operations. *International Conference KNOWLEDGE-BASED ORGANIZATION*, *30*(1), 118-128. Available at: https://doi.org/10.2478/kbo-2024-0017.

North Atlantic Treaty Organization & European Union. (2025). *Tenth progress report on the implementation of the common set of proposals endorsed by EU and NATO Councils on 6 December 2016 and 5 December 2017*. Available at: https://www.nato.int/content/dam/nato/webready/documents/publications-and-reports/EU-NATO-progress-report-nr10-2025.pdf.

North Atlantic Treaty Organization. (2023, July 11). *Vilnius Summit Communiqué*. Available at: https://www.nato.int/en/about-us/official-texts-and-resources/official-texts/2023/07/11/vilnius-summit-communique.

North Atlantic Treaty Organization. (2025, April 3). *Readiness Action Plan*. Available at: https://www.nato.int/en/what-we-do/deterrence-and-defence/readiness-action-plan.

Watling, J., & Bronk, J. (2024, October 15). *Protecting the force from uncrewed aerial systems*. Royal United Services Institute for Defence and Security Studies. Available at: https://static.rusi.org/protecting-the-force-from-uncrewed-uas.pdf.