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IMPACT OF MILITARY MOBILITY ON THE USE OF EUROPEAN TRANSPORT INFRASTRUCTURE

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Abstract

Military mobility has become a central component of European security policy due to changes occuring in the geopolitical environment. The growing demand for rapid and unimpeded relocation of military assets across the European transport area has highlighted persistent gaps between operational requirements and the current state of transport infrastructure and administrative procedures. This review paper examines the limited coherence of European transport infrastructure and accompanying administrative procedures with the operational requirements of military mobility. The existing transport network, including road, rail, and port infrastructure, is often limited due to load-bearing capacity, dimensions, and other technical specifications important for the relocation of military equipment. In the context of the development of the European defense policy, the existing literature emphasizes the importance of systematic civil-military interoperability. It explores the potential for dual-use transport infrastructure that can effectively support both civilian and military transport requirements. Military mobility has been recognized as a vital element of the European strategy of deterrence and defense, especially amid rising security demands. This paper synthesizes findings from academic research, strategic documents, and reports issued by internal institutions to assess the influence of military mobility on the development and utilization of European transport infrastructure. It reviews key challenges and existing solutions of military mobility, with particular attention to the concepts of military corridors and the standardization of procedures. Despite significant investments in the transport network aimed at enabling the transit of heavy military equipment, infrastructural limitations and administrative fragmentation continue to represent key obstacles to the efficient and timely movement of forces. Future research should incorporate detailed quantitative analysis to further clarify the effects of administrative and infrastructural limitations on force deployment dynamics.

Keywords: military deployment, military corridors, procedures standardisation, interoperability, dual-use infrastructure

1 Introduction

The issue of military mobility occupies an increasingly prominent place in European debates on security and defence. After a long period during which Europe perceived its security environment as relatively stable, recent geopolitical developments, including the war in Ukraine, have once again highlighted the importance of the ability to rapidly and efficiently deploy military forces [1, 2]. In this context, military mobility is no longer viewed solely as a logistical issue, but as a strategic capability that directly affects the credibility of deterrence and collective defence [3].

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The EU has recognised this challenge through a series of initiatives, among which the Action Plan on Military Mobility 2.0 stands out in particular [4]. The aim of this plan is to reduce infrastructural and administrative barriers that slow down the movement of forces within the European transport area. However, numerous sources warn that the existing transport system, although well developed, is not fully adapted to the requirements of contemporary military operations [5-7]. The purpose of this paper is to provide a comprehensive analysis of the impact of military mobility on the use of European transport infrastructure and to identify the key challenges.

2 Theoretical framework and the concept of military mobility

In the European context, military mobility has become a "bottleneck" of the defence system because European states, despite having well-developed armed forces, lack the infrastructure and procedures that would enable their rapid and synchronized deployment. In this sense, military mobility acts as either a multiplier or a limiting factor of military power, depending on the level of development of infrastructural and administrative capacities [8, 9]. Military mobility is directly linked to the concepts of "forward defence" and "reinforcement strategy", which envisage a significant increase in the number of North Atlantic Treaty Organization (NATO) units, particularly on the Alliance's eastern flank, where the speed of force deployment often plays a decisive role in the early stages of a crisis [1]. One of the fundamental problems is the fact that most European transport infrastructure has been designed exclusively according to civilian standards, without taking into account military requirements such as load-bearing capacity, dimensions, security corridors, and priority access [4, 6].
One of the central theoretical concepts in discussions on military mobility is civil–military interoperability, which denotes the ability of civilian and military systems to operate in a coordinated manner without mutual constraints [10-12]. Civil–military interoperability encompasses: technical compatibility of infrastructure, procedural alignment of administrative processes, and institutional cooperation between civilian and military authorities. Without the clear involvement of the civilian sector (transport providers, logistics operators, and port authorities), military mobility cannot be effective, since the majority of transport capacities lie outside direct military control [8, 12]. The concept of dual-use infrastructure occupies a central place in the theoretical framework of military mobility. Dual-use infrastructure refers to transport capacities that are designed or adapted to simultaneously meet civilian and military needs without compromising the core functions of the system. The dual-use approach has a threefold value: operational (as it enables rapid military deployment), economic (as it justifies investment through civilian use) and political (as it reduces the perception of infrastructure militarisation) [12]. Dual-use projects represent the most realistic way to enhance military mobility in Europe, as they do not require the construction of entirely new military infrastructure, but rather the adaptation of existing capacities [6]. For the period 2021–2027, a budget of approximately 1.7 billion EUR has been planned for the co-financing of dual-use transport infrastructure, however, in the period 2021–2023, grants amounting to 1.76 billion EUR were allocated to 95 projects across 21 Member States [13]. The theoretical concepts of military mobility are operationalised in practice through the idea of military corridors and the standardisation of procedures. Military corridors represent predefined transport routes that are infrastructurally and administratively prepared for the rapid movement of military forces [1]. The Trans-European Transport Network (TEN-T) consists of nine core corridors, which have also been identified as key transport routes for military mobility in European Commission and NATO documents [4, 9]. The successful implementation of military corridors requires: harmonised technical standards, pre-approved administrative procedures, and coordination between civilian and military authorities [9]. Without standardisation, military corridors remain a conceptual framework without real operational value [1, 3].

3 Research methodology

This paper is based on a qualitative review methodology, which is appropriate for analysing complex and interdisciplinary topics such as military mobility, where relevant data are often dispersed across strategic documents, policy reports, and academic literature. Given that military mobility is simultaneously an infrastructural, administrative, and security-related issue, a review-based approach enables the integration of different analytical perspectives into a coherent analytical framework [5, 7].

3.1 Selection and literature corpus

The analysis is based on literature published in the period 2019–2025, ensuring relevance to the current security context in Europe. The literature corpus was selected according to the following criteria: thematic relevance to military mobility, transport infrastructure, and civil–military interoperability; institutional credibility of sources, with an emphasis on documents issued by the EU and NATO, analytical and scientific basis, including policy briefs and peer-reviewed academic publications. Accordingly, the study draws on strategic documents of the European Commission and the European Parliament that define the political and regulatory framework of military mobility, as well as NATO reports that emphasise the operational and security dimensions of force mobility [1, 6, 16]. In addition, analytical studies by international think tanks and expert organisations addressing infrastructural and logistical aspects were included, alongside academic research that examines military mobility within the broader context of European defence policy [5-7, 10, 16-18].

3.2 Methodological approach to the analysis

A thematic content analysis was applied, through which key analytical categories recurring in the relevant literature were identified. These categories emerge from shared findings across strategic documents and academic studies and include: a) infrastructural constraints of the transport network (bridge load capacity, technical standards, port capacities), b) administrative and procedural barriers (permits, regulatory fragmentation, cross-border procedures), c) civil–military interoperability and dual-use infrastructure, d) the strategic importance of military mobility for deterrence and defence, e) the impact of military mobility on EU transport and defence policy. For example, infrastructural constraints were identified by comparing findings from policy analyses and expert reports with assessments produced by EU institutions [5, 6, 9]. Administrative barriers were analysed on the basis of the European Commission's Action Plan and its evaluations, while the strategic dimension of military mobility was examined through NATO documents and the academic literature [1, 13, 16, 17].

3.3 Analytical framework and synthesis of the paper

To ensure a systematic examination of the problem, an integrated analytical framework was employed, linking three interdependent levels: the operational level, which encompasses the requirements of military forces for rapid and secure deployment, the infrastructural level, which refers to the physical capacities of road, rail, and port networks, the institutional–regulatory level, which includes legal and administrative procedures. This framework enables military mobility to be understood as a systemic challenge arising from the interaction between military requirements and civilian structures, in line with the concept of civil–military interoperability emphasised in the literature [10, 12, 18]. The synthesis was carried out by comparing conclusions across different sources in order to identify common patterns and key obstacles.

For example, consensus on the existence of infrastructural constraints is evident in documents produced by the EU, NATO, and independent analytical sources [1, 4, 6, 13, 19]. At the same time, the literature points to differences in emphasis: EU institutions stress the need for procedural standardisation, whereas academic studies and policy briefs highlight political and financial barriers to implementation [5, 7].

3.4 Limitations of the research

The limitations of the study stem from its reliance on secondary sources and qualitative analysis. A portion of relevant data, particularly those related to specific military operations and logistical capacities, remains classified or inaccessible to the public, which is a common constraint in defence-related research [16]. Nevertheless, the applied methodology allows for a reliable identification of key trends and challenges.

3.5 Tabular presentation of findings

Table 1 Overview of Military Corridors in Europe

TEN-T corridor	Covered countries (primary)	Military significance of the corridor	Concrete example of military mobility	Key challenges	Sources
North Sea – Baltic	NL, DE, PL, LT, LV, EE	Primary corridor for strengthening NATO's eastern flank	Deployment of heavy mechanised equipment from North Sea ports to NATO eFP units in the Baltic region	Different track gauges and bridge load capacities	[1, 4, 5]
Baltic – Adriatic	PL, CZ, AT, SI, IT	Connection between Central Europe and the Adriatic	Unloading of military equipment in the ports of Trieste and Koper, followed by onward rail transport northwards	Mountainous terrain and limited rail profiles	[5, 12]
Rhine – Alpine	NL, DE, CH, IT	Logistically most advanced dual-use corridor	Rapid intermodal transport of logistics and support units	Congestion due to civilian traffic	[6]
Rhine - Danube	DE, AT, SK, HU, RO	Connects Western logistics hubs with NATO's eastern and southeastern flank, including the Black Sea region	Deployment of heavy mechanised equipment from the Port of Rotterdam to the Port of Constanța via inland waterways, rail, and road routes	Administrative fragmentation, different axle loads and track load capacities, bridge load limits, and limited Ro-Ro capacities	[5, 6, 19]
Scandinavian – Mediterranean	SE, DK, DE, IT	Connecting the northern and southern flank of the EU/ NATO	Combined maritime–rail transport of forces from Scandinavia to the Mediterranean	Limited capacity at maritime to rail transfer points	[1]

Table 1 Overview of Military Corridors in Europe - continuation

TEN-T corridor	Covered countries (primary)	Military significance of the corridor	Concrete example of military mobility	Key challenges	Sources
Mediterranean	ES, FR, IT, SI, HR, HU	Crucial for NATO's southern flank	Use of the ports of Barcelona, Marseille, and Rijeka for the reception and redistribution of forces	Uneven port standards and capacities	[12, 16]
Orient / East-Med	DE, AT, HU, RO, BG, GR	Access to the southeastern flank and the Black Sea	Deployment of forces to Greece and Romania	Infrastructural constraints in Southeastern Europe	[9, 13]
Atlantic	PT, ES, FR, DE	Entry point for allied forces from outside Europe	Disembarkation of allied forces in Atlantic ports and onward transport into the EU hinterland	Dependence on intermodal capacities	[6]
North Sea – Mediterranean	IE, BE, FR, IT	Linking Atlantic and Mediterranean ports	Rapid transfer of forces between Northern and Southern Europe	Administrative fragmentation	[9]
Western Balkans Extension	HR, RS, BiH, ME, MK	Stability and interoperability of Southeastern Europe	Land-based logistics routes to support operations in the region	Weak infrastructure and uneven procedures	[13, 16]

Table 2 Comparison of Military Corridors According to Military Mobility Criteria

TEN-T corridor	Infrastructural readiness	Administrative readiness	Operational significance
North Sea–Baltic	Medium	Medium	Very high
Baltic–Adriatic	Medium	Low–medium	High
Rhine–Alpine	High	Medium	Medium
Scandinavian–Mediterranean	High	Medium	Medium
Rhine-Danube	Medium	Low–medium	High
Mediterranean	Medium	Low	Medium
Orient/East-Med	Low–medium	Low	High
Atlantic	High	Medium	Medium
North Sea–Mediterranean	High	Medium	Medium
Western Balkans	Low	Low	Medium

The highest relative level of obstacles to military mobility is found along the Eastern and Western Balkans routes, a moderate level along the Mediterranean and Baltic–Adriatic routes, while the lowest level is observed along the Rhine–Alpine and Atlantic Corridor routes.

4 Discussion

One of the key findings of this paper is that transport infrastructure in Europe, although well developed in civilian terms, has not been designed with the requirements of contemporary military operations in mind. As highlighted in the literature, civilian criteria of efficiency, economic viability, and sustainability often conflict with military needs, which require greater load-bearing capacity, flexibility, and infrastructural robustness [5]. This mismatch is particularly evident in road and rail networks, where limitations in load capacity and technical standards directly affect the speed and safety of force deployment. At the same time, the analysis confirms that administrative and procedural barriers are often as restrictive as physical infrastructure constraints. Lengthy procedures for issuing diplomatic clearances, differing national regulations on the transport of dangerous goods, and non-harmonised security procedures result in significant delays in force deployment [13, 16]. In this respect, military mobility cannot be viewed solely as a technical or logistical issue, but rather as a profoundly political and administrative one that touches upon fundamental questions of Member State sovereignty. A particularly important aspect of the discussion relates to the concept of dual-use infrastructure. The literature indicates that this concept has the potential to function as a compromise solution between civilian and military interests [10, 12]. Infrastructure that simultaneously serves civilian and military needs can enhance the resilience of transport systems, improve regional connectivity, and justify substantial public investment. However, such an approach requires a high level of coordination across sectors and levels of governance, which in practice often represents a significant challenge. Based on the applied methodology and the reviewed literature, future research should incorporate quantitative indicators of transport capacity, case studies of individual TEN-T and military corridors, and a more detailed analysis of the effects of administrative procedures on deployment timeframes and costs.

5 Conclusion

Changes in the geopolitical environment, the growing unpredictability of security threats, and the need for rapid and flexible crisis response have made military mobility a strategic priority for both the EU and NATO. However, the research results clearly indicate that the operational requirements of military mobility are still not fully aligned with the current state of European transport infrastructure and administrative procedures. The concept of dual-use infrastructure has emerged as a particularly important instrument, simultaneously enhancing security, resilience, and economic connectivity across the European space. The findings suggest that military mobility is primarily a challenge of governance and coordination rather than a purely technical or infrastructural issue, underscoring its strong political dimension. Future research should focus on the quantitative assessment of the effects of infrastructural and procedural constraints on the speed and cost of force deployment, as well as on the analysis of concrete case studies within key transport corridors. Such an approach would enable more precise policy planning and investment decisions and would further contribute to the development of effective and sustainable European military mobility.

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