Research Paper

STRATEGIC MOBILITY AND VULNERABILITY: RUSSIA'S RELIANCE ON RAILWAYS FOR LARGE-SCALE OPERATIONS

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Introduction

Several generals in history have emphasised logistics as a crucial and primary factor in achieving victory in war. Operational logistics (deployment, employment, and sustainment) not only form the backbone of success but also represent the most vulnerable target for adversaries. In 2025-2026, logistics became the defining problem for both armies during Russian aggression against Ukraine. Analysing and identifying the weaknesses of the Russian logistic system in Ukraine can enhance the chances of winning a future conflict against a potential aggressor in the Baltic region. Russia's logistical performance during the war in Ukraine offers important lessons for NATO and the Baltic States.

Ukrainian forces' systematic attacks on vehicles carrying diesel and fuel along the land corridor to Crimea, which started in early June 2026, clearly show that this artery is highly vulnerable at the tactical level. Geography, reinforced by systematic targeting, may eventually achieve the desired effect, possibly turning this tactical challenge into a strategic dilemma for Russia. On the contrary, this study focuses on the core of operational logistics – the significance of the Russian railway network. While acknowledging some limitations, the main emphasis is on the railway system, which is Russia's primary means of supplying large forces abroad. The research excludes Russian production, political or geopolitical events, doctrinal and structural legacies, and corruption within the armed forces. It adopts an argumentative essay approach, based on a qualitative analysis of open-source and academic sources research. The thesis statement of this paper is that Russia's ability to support large-scale manoeuvre operations effectively relies on a well-developed railway system and its resilience to shocks.

1. Operational-level logistic patterns in Russian large-scale conflicts.

Russia has always been a land logistics-based country. Under these conditions, rail is the most effective mode of transportation for large volumes of cargo. This was also beneficial in Soviet times, during the armed conflict in Afghanistan from 1979 to 1989. Vehicles and cargo within the Soviet Union were primarily transported by rail. Subsequently, due to the mountainous terrain and the lack of a railway system, all supplies were transported in long convoys escorted to prevent ambushes (Grau, et al., 2002, pp. 139-141). Russia inherited the railway system from Soviet times. Russia is among the world's most dependent countries on rail for freight transport. Clearly, the Russian Armed Forces consistently utilise this system for deployment, employment, and sustainment. Especially for rapid unit movement within Russia, but not exclusively. For example, this was observed during the brief but intense Russian – Georgian conflict in 2008. Even before the conflict, Russian railway troops had been deployed to Abkhazia to prepare for the operation (Blandy, 2008, p. 2).

A similar logistical scenario was used to rapidly deploy forces and invade Ukraine with conventional troops in August 2014, when Ukrainian forces quickly recaptured territory from the separatists during an anti-terrorist operation (Götz & Ekman, 2024, p. 199). At the time, this radically changed the course of the conflict. 'From the point of view of logistics and sustainment, Russia probably made its most significant advances during the earlier stages of war in South Ukraine from occupied Crimea at least partially because of the higher-quality sustainment capabilities available from Crimea, including via rail' (Kepe, 2023 p. 10). The only operation where the railroad was not heavily used is the Syrian operation. If not including related redeployment within Russia, this operation relied on SLOCs, utilising so-called private companies like "Syrian Express", which remained under the authority of the Russian General Staff. Additionally, for personnel, equipment, and high-value cargo, strategic airlift (Il-76, An-124) was frequently utilised, as observed in Africa as well (Hamilton, et al., 2020 pp. 45-46).

Table 1: Comparison of different LOCs usage in Russian wars.

Conflict	Logistics model	Deployment reliance	Dominant LOC
Afghanistan (1979-1989)	Soviet rear bases in Central Asia supporting expeditionary forces	Land – High, Air – Medium, Sea – None	Land (roads)
Georgia (2008)	Rapid mobilisation from Russian territory	Land – High, Air – Low, Sea – Low	Land (rail)
Syria (2015-2024)	Expeditionary overseas logistics	Land – Low, Air – High, Sea – High	Sea and Air
Ukraine (2014-2026)	Close border strategic logistics	Land – High, Air – Low, Sea – Low	Land (rail)

Source: Developed by the author.

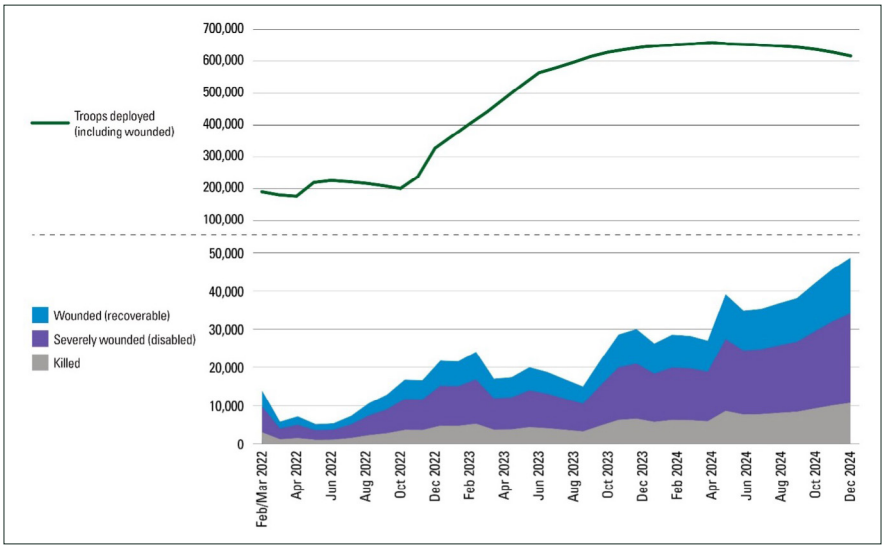
This comparison of Russia's (or the Soviet Union's) last four wars fought on other states' territories indicates that land lines of communication (LLOCs) are the main logistical method Russian forces rely on to build operational momentum and achieve ground force superiority on the battlefield. However, until now, Russian forces have never engaged in such a large-scale and extended conflict, posing considerable challenges to Russia's logistical system.

2. Overview of the Russian armed forces' logistical challenges at the operational level during the war against Ukraine 2024-2026.

The year 2024 is often seen as the start of a new phase in the war. Despite several notable events, such as Ukraine's operation in the Kursk region or the capture of Avdiivka by Russian forces, this marks the beginning of an attrition phase of the war (Halem, 2024, p. 44). Despite it, through 2025, Russian forces continue offensive operations step by step, increasing troop numbers in occupied territories. At the beginning of 2026, extreme weather conditions place additional strain on transport networks, fuel consumption, troop care, and support. Troops on the front lines in this cold climate need increased supplies, especially fuel. Harsh weather conditions make this more difficult to achieve. Although increasing the number of troops may give Russia certain short-term tactical advantages, over time, this will further burden its already overloaded logistics network.

Additionally, it is worth noting that since 2022, the number of the Russian Armed Forces has risen almost every year despite casualties. According to US officials, Russia started with 120,000 soldiers out of 160,000 that were along the border with Ukraine (Garamone, 2022). In 2023, according to the Royal United Services Institute for Defence and Security Studies (RUSI), there were already around 360,000 troops. At the beginning of the Ukrainian offensive operation in June 2023, this number had reached 410,000. Moreover, by the beginning of 2024, the Russian Operational Group of Forces in the occupied territories comprised 470,000 troops (Watling, et al., 2024). In 2024, the peak was reached in April, when the number rose to 650,000 personnel, after which a decline began. By the end of 2024, it had already reached 617,000 (Clavilier, et al., 2025). The number stabilised in the middle of 2025 at approximately 600,000 troops, and it can be assumed that at the beginning of 2026, the number did not change drastically either (Carlough, et al., 2025). The continuous growth in Russian troop numbers and their redeployment between frontline locations highlighted a critical need for large-scale supplies, which could only be transported via rail.

Table 2: Estimated number of Russian troops deployed and personnel losses from 2022 to 2024.



Source: IISS (Clavilier, et al., 2025).

Meanwhile, many military transport vehicles are destroyed or suffer mobility kill due to Ukrainian drone or artillery attacks. This complicates organising supplies in the last-mile zone from the Rail Port of Debarkation (RPOD) to the front line (final destination). However, in 2025-2026, there are some advantages for Russians. The frontline remains stable, and forces are largely in a defensive posture or advancing very slowly, which facilitates the organisation of sustainment and supply. Between 2024 and 2026, the tactical landscape has also shifted. There has been a reduction in platoon- and company-size manoeuvre-based indirect fire-supported (IDF) operations, alongside an increase in actions involving small units supported by first-person-view (FPV) drones. Motorised and mechanised attacks are now very rare compared to offensive operations in 2022-2023 (Horobet, 2026). Considering these changes, logistics challenges have shifted. The threat from Ukrainian drones and the IDF along a stable frontline has increased the need for last-mile supply. At the same time, this has heightened risks to rail-to-road transfer RPODs, complicating Russian forces' efforts to expand this network.

On the other hand, the Russians had no alternative options, as transporting cargo by air or sea was nearly impossible.

2.1. Sea-based and air-based lines of communication. Why are they limited during the aggression against Ukraine?

Despite its vast geography, Russia has limited access to sea routes. Russia has ports on the Black and Caspian Seas in the south, which, 10-15 years ago, could have served as a backbone of its military logistics during its conflict with Ukraine. Nowadays, Black Sea ports, such as Novorossiysk and Sevastopol, are definitely strategically important but also highly vulnerable to new technologies. Ukraine's sea denial strategy, which employs Neptune and Harpoon anti-ship missiles, unmanned aerial vehicles (UAVs), and unmanned surface vessels (USVs), has reduced Russia's ability to use these sea lines of communication (SLOCs) effectively. The sinking of the cruiser "Moskva" in April 2022 marked a turning point, demonstrating Ukraine's ability to strike high-value naval targets and forcing Russia to limit large-scale maritime resupply operations in Black Sea. Ukrainian forces have also successfully targeted Russian vessels in port and at sea using UAVs and USVs, including attacks on Snake Island and oil platforms used by Russia for electronic surveillance (Lyashenko, 2024). Russia's seaports on the Caspian Sea are Olya Port in the Astrakhan Region and Makhachkala Port in the Republic of Dagestan. It is the locations where Shahed drone components and ammunition arrived from Iran (Interfax Ukraine, 2025). It can be assumed that the use of this SLOC is also declining for two reasons. The first reason is that Russia is now capable of manufacturing components for the Shahed drone and assembling drones on its own. The second reason is the extensive air campaign launched by the U.S. and Israel against the Iranian regime. It is worth noting that during this conflict in Iran, logistical shipments across the Caspian Sea even started moving in the opposite direction, from Russia to Iran (ISW & CTP, 2026).

For the Russians, air-based lines of communication became dangerous from the outset of the large-scale war. Russian deep-strike capabilities and air force failed to achieve air superiority at the beginning of the

aggression (Deptula & Bowie, 2024, p. 3). Without control of the airspace, the Russians' ability to use transport aircraft safely for supply operations was severely restricted, as large transport aircraft (e.g., Il-76) became highly vulnerable. Even if Russia tries to use an airlift to deliver supplies, landing zones and airfields would be quickly targeted. Furthermore, the Ukrainian Ground-Based Air Defence (GBAD) denies the Russian air force safe corridors in the air (Deptula & Bowie, 2024, p. 16). The combination of air parity and Ukrainian advanced air defence makes air-based lines of communication nearly impossible to use effectively.

A brief overview reveals numerous constraints and significant risks for Russian large-scale logistical operations by sea or air. Operational-level air logistics near the war theatre in Ukraine are unfeasible. Some cargo transport across the Caspian or Azov seas might happen, but the risk-reward ratio stays unfavourable. Russia's most historically reliable method has been land-based logistics, which continues to dominate in its conflicts. Given Russia's vast territory and its third-largest railway network, it makes sense to utilise this infrastructure for military purposes.

2.2 Land lines of communication. Why is the rail important?

The Russian armed forces were organised around the operational mobility provided by 'railway distribution as close to the combat units as possible, and wheel-based distribution for the last mile only' (Skoglund, et al., 2022, p. 107). First, it is important to understand that in the Russian Armed Forces, logistics drive strategy, and the main logistic system is railway-based. Like in Soviet times, the national railway system in Russia is operated under the government-owned company Russian Railways (RZD). This company manages most of the railway infrastructure and operates nearly all long-distance passenger and freight services across Russia. It is a

fully state-owned, vertically integrated monopoly with responsibility for infrastructure, freight operations, and passenger transport. The Russian rail network transports around 90% of Russia's cargo and spans over 122,000 kilometres of track (Annex A), including Mongolia, China, and former Soviet republics such as Ukraine (Sőukand, 2024, p. 1).

According to the organisational structure, rail-based LLOCs are incorporated into Russia's material and technical support (MTO) system, which also includes strategic transportation, maintenance, warehousing, and daily supply for the armed forces. The MTO system is centrally overseen by the Deputy Minister of Defence and the Logistics Command. It is implemented by the Russian Railway Forces (RRF), material and technical support brigades, and a large but unevenly developed rear support structure (Schwartz, et al., 2023, p. 12). The presence of the RRF already shows that this type of force has always been important for Russia. Reliable figures on troop numbers are hard to find, but they may total approximately 29,000 (Peck, 2019). Possibly 30-50% of them, or 10,000-15,000, are deployed in the occupied territories of Ukraine. Interesting fact, that by 2010, RRF had been reduced from 42,000 in 2009 to just 27,000, and these forces became subordinate to regional command structures and were mostly involved in combat training exercises (Ferris, 2023, p. 4). Of course, after the 2014 Russian invasion of Donbas and the annexation of Crimea, the importance of RRF started to grow.

Despite various situations over the years, the Russian Armed Forces are entirely dependent on the rail network to move troops and equipment (Sőukand, 2024, p. 2). It is indeed considered the optimal way of transporting entire armoured divisions and thousands of troops from one end of the country to the other in just a few days, which is inevitable in the world's largest country (Caron, 2023, p. 297).

This was evident in 2022 when over 200 trains transported Russian armed forces personnel and equipment to Belarus in preparation for the "Union Resolve" exercises (Ferris, 2023, p. 7). This formed the backbone of the northern axis of the invasion. Interestingly, during the actual offensive, the Russians did not take control of Ukrainian railway hubs such as Chernihiv, Nizhyn, and Korosten, but instead advanced as quickly as possible (Sǒukand, 2024, p. 8). As a consequence, Russian supply units were eventually compelled to rely on roads rather than railway lines. In eastern Ukraine, rail-based logistics were used more effectively. Even before the full-scale war, Russian control of Debaltseve and the capture of hubs such as Kupiansk and Lyman allowed the logistics network to access the Luhansk and Donetsk regions. In 2022 spring/summer the capture of hubs such as Kupiansk,Lyman, Iziumpotentially made ground for improvement, but during Ukrainian counter offensive in 2022 autumn Russians lost those regions, and this lost disrupted Russian logistics (Sǒukand, 2024, p. 8). More importantly, Russians couldn't multiply their logistical capabilities in full scale. These regions have had a well-developed railway system since the Soviet era, which was utilised by heavy industry. In late 2022, thanks to Ukraine's counteroffensive, Kupiansk was liberated, In the south, before the large-scale aggression, the Russians transported everything through the Kerch Strait, and after the offensive operation, via Crimea's limited rail connection to mainland Ukraine. This gave Ukraine an advantage, as there were two key terrain areas to focus deep-strike operations on. Later, after occupying southern Ukraine, the situation improved for the Russians (Sǒukand, 2024, p. 9). They even started building a new railway line called Tavrida-2 (Segura, 2024). This line would create an additional route linking Dzhankoi (Crimea) with Rostov-on-Don through Melitopol, Berdiansk, Mariupol, and Taganrog (Annex B). Although there is currently no reliable data confirming that all

sections of the railway are fully completed and operational, this recalls the rapid construction of the Zhuravka – Millerovo railway line in 2014 (Ferris, 2023, p. 5). It is evident that whenever Russians occupy new territories, they aim to establish operational conditions for rail logistics as swiftly as possible.

A significant drawback of the Russian rail-based logistics system is its inability to ensure transportation to the front line. Therefore, it is crucial to analyse the Russian forces' logistics system via roads or the so-called "last-mile logistics". Even at the start of this war, the Russian army lacked enough support brigades for all its manoeuvre units. The Russian General Staff believed that the conflict would end in 3-5 days with Ukraine's capitulation, or the capture of Kyiv and a change of government, leading to the installation of a puppet regime (Trif, 2023, p. 149). It is important to note that, with the increased use of UAVs, these LLOCs have become particularly vulnerable. After the cargo reaches the RPOD, it must be moved to the final destination. Cargo must be moved by road, which further weakens the Russian Armed Forces' logistics system. In 2024-2025, Russian supply lines relied on a mix of standard military trucks, such as GAZ and KAMAZ, and civilian cargo vehicles. For example, the KAMAZ factory increased the supply of multi-purpose vehicles by 17,6 times (Grisé, et al., 2025, p. 63). These trucks could carry several tonnes of fuel or ammunition, but they had limited off-road capability, and the supply routes were predictable. As a result, it made supply vehicles easier targets for Ukrainian drones and the IDF. According to the General Staff of the Armed Forces of Ukraine, on 18 January 2026, Russian losses in transport and logistics vehicles reached 74,706, surpassing those in tanks, IFVs, APCs, Artillery systems, MLRS, and AD systems combined – 74,678 (Annex C). In 2026, these figures are rising, but not as quickly as before because Russia is adapting. Instead of sending logistical convoys that could be destroyed in a single strike,

the Russians are increasingly using smaller vehicles, ATVs and even motorcycles for the final leg of delivery (McGovern, 2025). Furthermore, logistics are becoming more decentralised. Instead of moving large quantities of supplies along the main supply routes (MSRs), the Russians prefer smaller, varied deliveries to reduce the risk of drone surveillance and attacks. While this approach is less efficient, survival on a drone-dominated battlefield takes precedence over efficiency. As a result, Russian resupply near the front now appears fragmented, moving in small packets, much less frequently than before and mainly at night (Edwards, et al., 2025). It is important to recognise that the last-mile issue mentioned is primarily a tactical-level challenge for the Russians. Of course, this should not be underestimated. The operational level clearly gains from rail-based logistics.

Answering the question "why is rail important?", two main advantages can be emphasised that enable the Russians to continue this war. First and foremost, the Soviet-era 1,520 mm gauge extends across Russia, Belarus, Ukraine, and other former Soviet states, including the Baltic countries (Ferris, 2023, p. 2). Additionally, the RRF's ability to repair damaged railway tracks or bridges quickly is very important. What might take civilians months, RRF units can accomplish in weeks. Russian history includes many examples, even going back to World War II. Still, a more recent one was on 30 May 2020, when a new railway bridge across the Kola River in Murmansk Oblast collapsed and was swiftly repaired by the RRF (Sǒukand, 2024, p. 14). Another key advantage is the Russian Armed Forces' rail-based logistics infrastructure, which demonstrates high throughput and broad strategic reach. Russian Defence Minister Sergei Shoigu has stated that 10,000-15,000 tonnes of ammunition and fuel are transported to Russian forces via rail every day (Sǒukand, 2024, p. 5). Supplying such volumes from various industrial sites in

Russia (Tikhoretsk, Mozdok, Voronezh, etc.) is only feasible by rail. 'Most factories have direct railway connections from where the ammunition is taken to storage areas in Russian regions bordering Ukraine or in Ukrainian oblasts that have been occupied since 2014' (Sőukand, 2024, p. 5).

3. Resilience of the Russian rail network system.

To understand how to undermine Russian logistics, it is essential to analyse the most vulnerable railway infrastructure through detailed modelling. An early study, conducted in 1955 by Harris and Ross, aimed to identify critical points in the Soviet Union's railway network in Eastern Europe (Annex D). This classified research was not made public until 1999. Harris and Ross, the authors, were among the first to model the railway system as a capacity-constrained network, with nodes and arcs representing railway connections limited in throughput (Harris & Ross, 1955, pp. 31-32). Their key insight is based on the concept of maximum flow and the effort required to reduce it, which depends on the network's "most-vital" arc (Harris & Ross, 1955, pp. 22-23). From a military point of view, this means logistical capacity relies on its weakest links. Consequently, even a large, reliable system could be critically disrupted by targeting just a few links. To adapt the main idea of the referenced study to this analysis of Russia, the primary question should be framed as follows: which specific links should be targeted to maximise disruption of Russian logistics?

In 2013, other researchers reviewed and expanded upon the study by Harris and Ross. Alderson, Brown, Carlyle and Cox drew additional conclusions using network interdiction theory. The most relevant finding was that 'there is no simple rule of thumb for identifying critical sets of arcs (or, in general, components) without analysing the system's operation as a whole' (Alderson, et al., 2013, p. 31). To identify critical weaknesses in a railway network, it is essential to

consider the full interdiction problem. The researchers drew three main conclusions:

1.There is no single critical link. The importance of each arc depends on how many other arcs are disrupted at the same time.

2. Criticality depends on the combination of arcs, not on any one arc alone. It is a specific set of arcs (a combination), rather than any individual one, that leads to network collapse.

3. The priority list is unreliable. Selecting targets based on their importance leads to suboptimal results. In such cases, even optimal targeting sets are not linked within the overall system (Alderson, et al., 2013, pp. 27-29).

These conclusions have direct implications for planning the destruction of Russian logistics. The destruction of the Russian Reinforcement and Sustainment Network (RSN) must be planned as a systematic campaign, rather than a series of isolated strikes. At the start of the war in 2022, when Ukraine had virtually no deep-strike weapons, disruption was achieved through other means. Attacks on the railway system were not just kinetic. They also included harm to the electrical system, substations, depots, and other critical infrastructure. Targeting of RZD itself was conducted through cyberattacks and sabotage by bribed Russian citizens or other organised groups. For example, when Russia invaded Ukraine, there were diversions against railways and military registration offices. The Insider has calculated that, based on media reports alone, 63 freight trains derailed in Russia between March and June 2022. At the same time, the geography of the derailments has shifted westward, and some of the trains were involved in accidents near military units (Zemlyanskaya, 2022). On the other hand, it was a chaotic, improvised action lacking a comprehensive system approach. Later, with the advent of deep-strike capabilities and the development of various drone technologies, strikes became more coordinated, but still

did not significantly disrupt Russian logistics for a longer period. However, the success of previous operations targeting the Crimean Bridge, together with the intensification of strikes against the Zaporizhzhia – Crimea railway infrastructure in 2026, suggests that this previous assessment may need to be reconsidered.

The Russian railway system used in the conflict with Ukraine closely resembles the Soviet model analysed by Harris and Ross. It operates as a hub-and-spoke network, efficiently transporting large volumes of cargo from different parts of Russia to the operational area. From these hubs, cargo is distributed at the last mile via road-based LOCs. Despite these characteristics, it remains challenging to answer a question: how to identify the "most-vital" arc in the Russian rail-based logistics system. There are probably a dozen, if not more, arcs and nodes that could be analysed, but this would require a much broader study. The next subchapter will focus on only a few of the main sites. However, because Ukraine has strategically prioritised strikes against Russian oil production infrastructure, the Russian railway network has not been subjected to sustained and systematic attacks for an extended period.

3.1. Which combinations of rail network disruptions can reduce Russian logistical throughput in the ongoing Ukraine war?

Although this study will not use Alderson et al.'s method to identify the "most vital" arc, it is still possible to determine which locations might contribute to a combination of rail disruptions that could significantly disrupt Russia's logistics throughput. Primarily, Ukrainians should create a strategic dilemma for the Russians by attempting to sever connections to the Crimean Peninsula. As previously noted, the key objective for Tavrida-2 is Melitopol (Annex B). However, since the operational status of the Melitopol – Dzhankoi route is uncertain, it might be more effective to focus on disrupting both the

Mariupol and Volnovakha hubs simultaneously. If the goal is a railway line rather than a specific node, the most logical target is the Taganrog – Rostov-on-Don segment. However, this approach involves addressing risks associated with rerouting traffic through the Donbas region by Russian forces.

On the eastern axis, the main nodes linking the Belgorod railway hub with Luhansk and other Russian-occupied RPODs further south are the Starobilsk node and the previously mentioned Millerovo node (Annex E). These two nodes, together with the arcs linking them to other hubs, could also serve as potential targets. Disrupting these routes would limit freight movement into the large Donbas railway network (Sőukand, 2024, p. 3). Conversely, focusing on this network might be impractical, as logistics flows can be easily rerouted within the Donbas network. When analysing worst-case scenarios, several other key hubs in eastern Ukraine deserve attention. According to the Ukrainian railway and road network, Pokrovsk and Kupiansk are vital connecting points. They could act as potential logistical centres for future Russian operations. As previously mentioned, trains do not deliver cargo directly to the front line. Therefore, rail-to-road transfer hubs could be targeted by Ukrainian forces for systematic destruction. Concentrating on the busiest transfer points (RPODs) may yield significant results. Notable examples include Melitopol, Debaltseve, and Ilovaisk. It is worth noting that the Russians have concentrated their air defence and force protection capabilities in these vital locations. Nevertheless, examples show that many vulnerable areas could be included in the target sets for systematic targeting based on the “most-vital” arc system.

Conclusion

The main thesis of this study argues that Russia’s ability to support large-scale manoeuvre operations effectively depends on a well-developed railway infrastructure and its resilience.

The study demonstrates that rail-based logistics has historically been and remains the backbone of Russian military operations, ensuring the rapid deployment and sustainment of large forces. An analysis of the war in Ukraine reveals that alternative LOCs by sea and air are severely limited, leaving a rail-based logistics system as the only viable option at the operational level. The study indicates that Russian armed forces will continue to rely on a rail-based logistics system as their main method in the Ukraine conflict, with no major changes. Russia has all the necessary conditions for this: suitable infrastructure, a well-prepared RRF, and the required expertise. However, the study also highlights the system's main vulnerabilities. As a result, while Russia's logistics system remains strategically resilient and redundant, it becomes fragile and formidably constrained closer to the Ukrainian theatre.

The theoretical framework developed by Harris and Ross, and expanded by Alderson and others, offers important insights. While research conducted during the Cold War recommended targeting bottlenecks, a study of modern network interdiction has shown that there is no single "most-vital" arc. Applying this to the Russian railway network, it is likely that targeting isolated nodes or lines alone is insufficient. It would be far more effective to carry out simultaneous disruptions that could collapse throughput across the entire Russian logistics system. Disrupting key hubs, rail lines, and rail-to-road transhipment locations such as Tavrida-2, the eastern hubs in Belgorod and Rostov-on-Don, and major RPODs could significantly reduce logistics throughput. Consequently, this study's main conclusion is that the most effective way to disrupt Russian logistics is through coordinated, systematic disruption of multiple interconnected components. This research is important not only for Ukraine but also for the Baltic states. It demonstrates that the logistics system is a critical

vulnerability in modern warfare. Additionally, there are further recommendations worth noting.

Recommendations for the Armed Forces of Ukraine:

1. Considering current capabilities (deep strike, cyber, unconventional methods) and their long-term impacts, develop a structured plan to destabilise the Russian RSN.
2. Ukrainian forces are concentrating on attacking oil production, refining infrastructure, and transportation assets. If resources allow, launch a similar campaign to disrupt the Russian rail network and rail-to-road transhipment hubs.
3. Utilise AI-powered programmes based on probability theory to analyse the long-term impact on Russia's logistics system, and integrate this into DELTA as one of its modules.

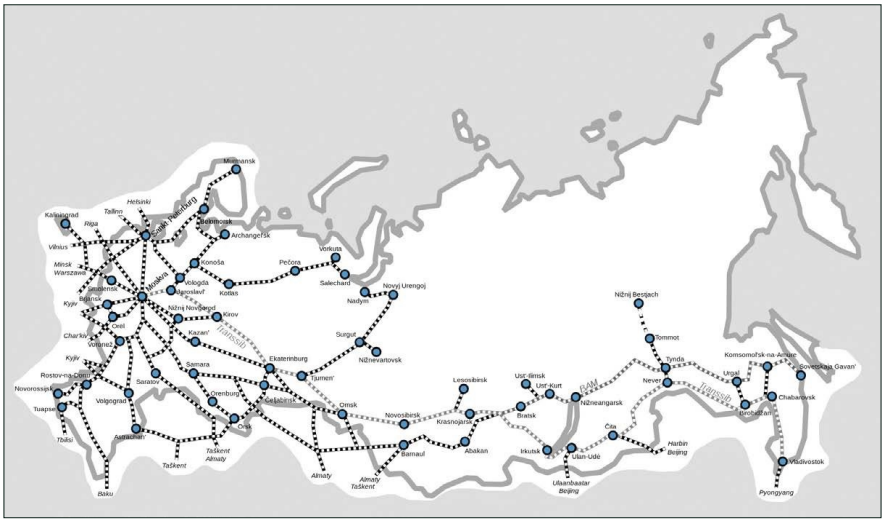
Recommendations for the Baltic States:

1. The extensive and widespread conversion of the Soviet-era 1,520 mm gauge to the European gauge.
2. Adapt the armed forces' structure, procedures, and capabilities to enable effective strikes at medium ranges (50-300 km) and deep ranges (300 km and beyond), where railway hubs and related infrastructure would constitute high-value targets.
3. Identify and include in the national defence plans the systematic destruction of key nodes and rail lines within Russian territory, integrate those plans into NATO defence plans.
4. Strengthen the resilience of their infrastructure against potential similar Russian attacks.

Future research in this field should focus on both qualitative and quantitative modelling of Russia's rail-based logistics system by analysing the capacity of the railway network. The studies should incorporate AI-supported tools to examine various disruptions within the railway network, which can serve as the foundation for a long-term target planning strategy.

Annexes

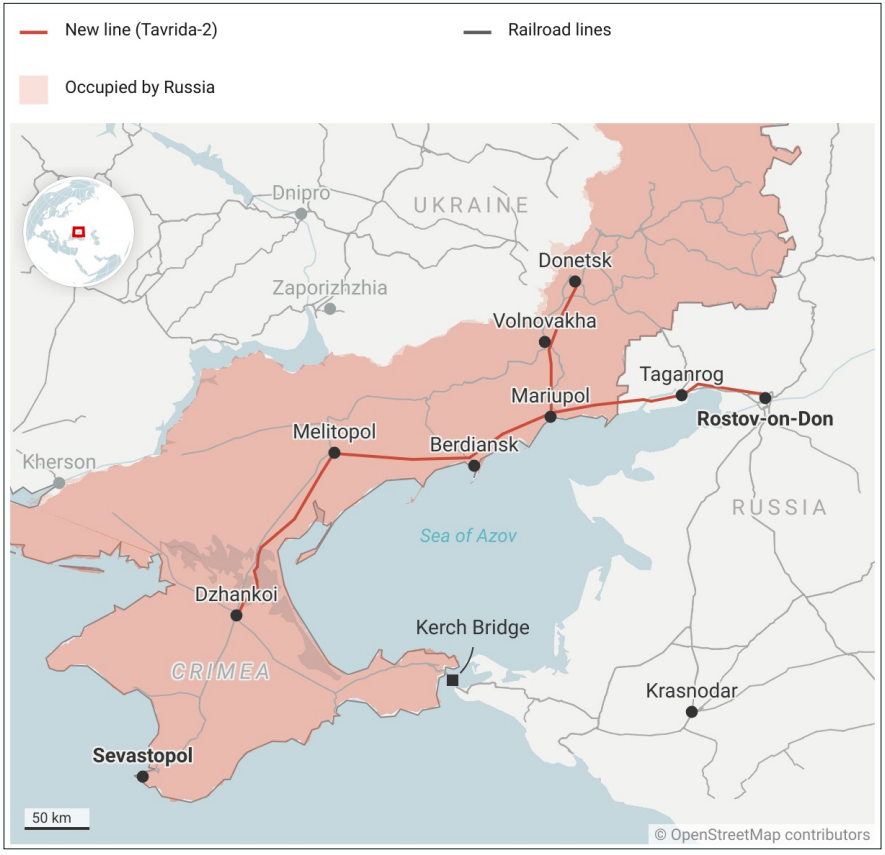
Annex A – Main railways and railway hubs in Russia.



Source: (Sõukand, 2024, p. 2).

Annexes

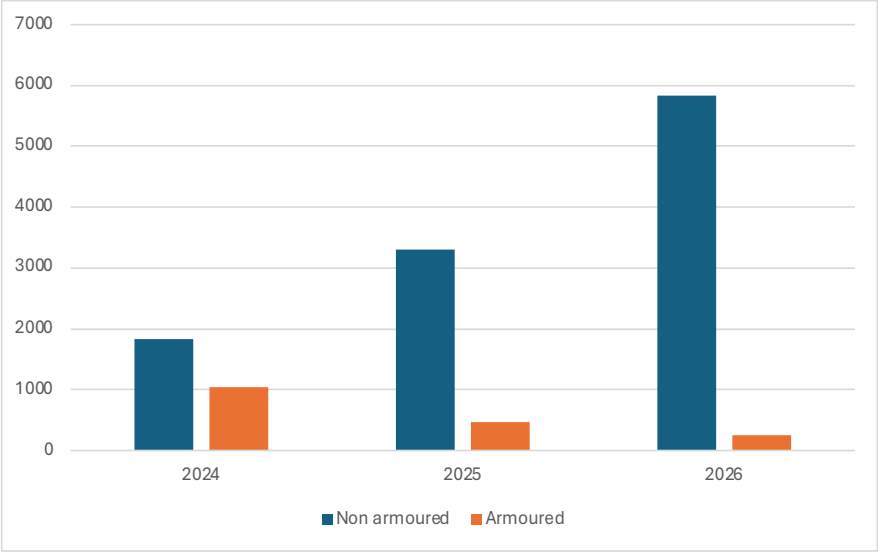
Annex B – Railway line Tavrida-2.



Source: (Segura, 2024).

Annexes

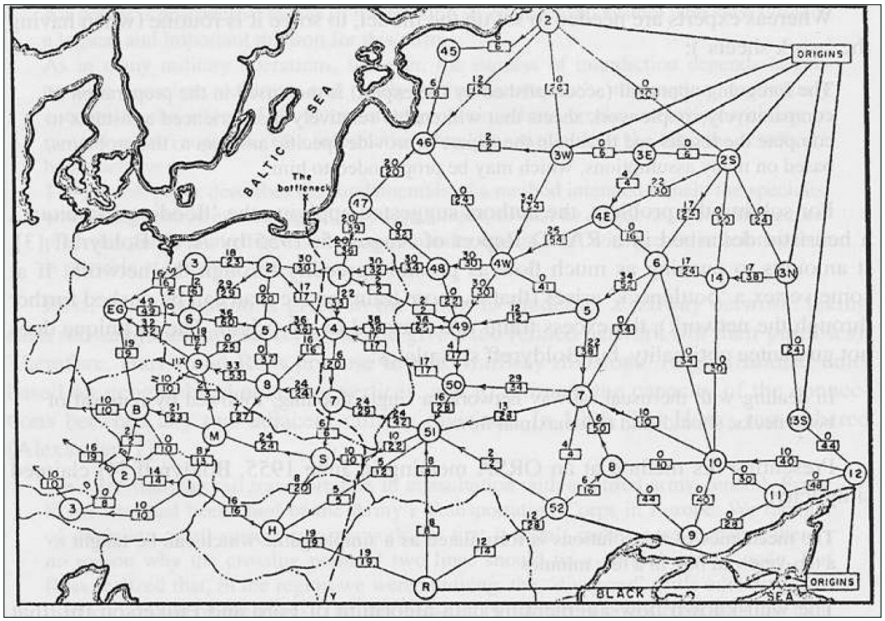
Annex C – Russian losses as of 18 January 2026.



Source: (Armed Forces of Ukraine, 2026).

Annexes

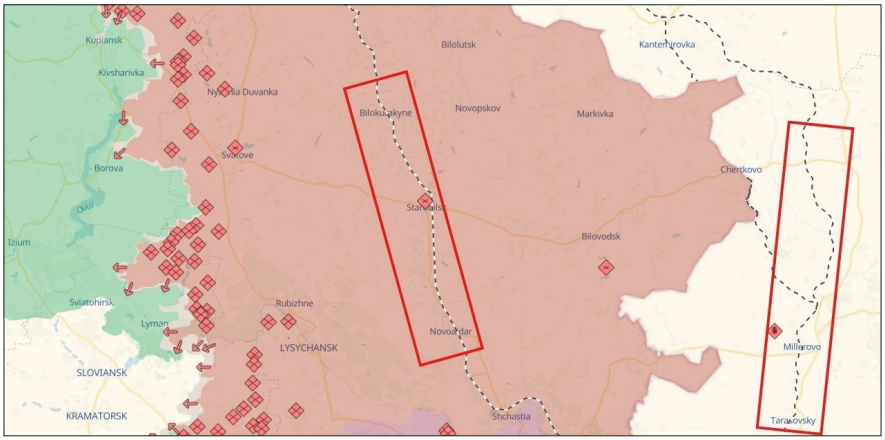
Annex D – The Soviet rail system in 1955.



Source: (Harris & Ross, 1955, p. 28).

Annexes

Annex E – Starobilsk and Millerovo arcs.



Source: (Deep State, 2026).

Abbreviations

AD – Air Defence.
APC – Armoured Personnel Carrier.
AVT – All-Terrain Vehicles.
FPV – First Person View.
GBAD – Ground-Based Air Defence.
GUR – Main Intelligence Directorate of Ukraine (ukr. *Головне управління розвідки*).
IDF – Indirect Fire.
IFV – Infantry Fighting Vehicle.
LLOC – Land Line of Communication.
LOC – Line of Communication.
MLRS – Multiple Launch Rocket System.
MSR – Main Supply Road.
MTO – Material-Technical Support (rus. *Материально-техническое обеспечение*).
NATO – North Atlantic Treaty Organisation.
RPOD – Rail Port of Debarkation.
RRF – Russian Railway Forces (rus. *Железнодорожные войска*).
RSN – Reinforcement and Sustainment Network.
RUSI – The Royal United Services Institute for Defence and Security Studies.
RZD – Russian Railways (rus. *Российские железные дороги*).
SLOC – Sea Line of Communication.
UAV – Unmanned Aerial Vehicle.
USV – Unmanned Surface Vessel.

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