

A Railhead Too Far: The Strategic Role of Railroads during Russia's Invasion of Ukraine

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SUMMARY OF CONCLUSIONS

This paper presents an overview of Russia's use of its railroad resources in its ongoing war in Ukraine. These are its four main conclusions:

- Russian military logistics, and thus the Russian Armed Forces, are reliant on rail transportation in order to carry out military operations – both in Russia and Ukraine.
- The Russian Armed Forces' failure to conquer and further utilise the Ukrainian railroad infrastructure has thus far been a determining factor for the development of the war. Reliance on rail transportation has reduced operational reach (including in captured areas), limited maximum throughput of supplies and troops to frontline areas, and generally reduced the pace of advance.
- The Russian Armed Forces are unlikely to establish "rail supremacy" in the near future, since both Russia and Ukraine have systematically destroyed key strategic rail connections in both the north, northeast and southeast of Ukraine.
- Reliance on rail leaves the Russian Armed Forces vulnerable to sabotage and air strikes. It also makes Russian offensive operations and force build-up significantly easier for any opposing force to predict and monitor.

Russia's 2022 invasion of and continuing war in Ukraine has illustrated the relevance of classical strategic concepts connected to logistic support. The Russian Armed Forces' failure to support fighting troops on the battlefield in Ukraine initially surprised several outside observers.¹ Railroad transport has traditionally been a crucial part of Russia's military logistic support; since Russia still depends on rails in order to carry out its wars and military operations, this memo is dedicated to this topic. The author's aim is to provide an overview of the strategic role of railroads before and after Russia's invasion of Ukraine, and briefly sketch the consequences, thus far, of Russia's reliance on railroads in the war.

To date, the war in Ukraine is still raging, and reliable open primary sources that concern this topic are scarce. The present analysis therefore relies mainly on secondary sources, such as news articles, the analytical works of others, and briefs; this makes the study subject to some degree of uncertainty.

RAILROAD TRANSPORT AND RUSSIA'S ARMED FORCES: A BACKGROUND

Approximately 122,000 km of railroad stretch over Russia; its railroad network is dense in the western parts of the country, and sparser in the northern and eastern regions. The broad gauge (1520 mm) is distinguishing for countries that formerly were part of the Russian Empire, such as Finland, Estonia, Latvia, Lithuania, Belarus and Ukraine, making them interoperable to this day. These areas are generally thought to constitute the geographical limits of the ability of Russia's Armed Forces to conduct larger ground-based operations.

The Russian Railways company (*Rossiiskie Zheleznye Dorozi*) is responsible for operating and maintaining Russia's railroad networks. Russian Railways is state-owned, and has a monopoly on railroad services in Russia. Russian Railways plays an integrated role in Russia's war against Ukraine; for historical and geographical reasons, Russia's Armed Forces are entirely dependent on rail

¹ Dalsjö, Robert and Norberg, Johan. Chapter 2, "Why We Got Russia Wrong", in *Another Rude Awakening – Making Sense of Russia's War against Ukraine*. Lundén, Jenny (ed.) et al. FOI-R--5332--SE, Swedish Defence Research Agency. July 2022.

transport in order to deploy troops and equipment – this is key to Russian military logistic supply. As Alex Vershinin describes it, “Russian forces are tied to railroad [sic] from factory to army depot and to combined arms army and, where possible, to the division/brigade level”.²

In general, military transport requires a high level of coordination between the Armed Forces and Russian Railways. Consequently, officers from the Armed Forces are stationed at every larger railroad station, of which there are roughly 370, in the country.³ However, despite possessing unique rail transport resources, the Armed Forces cannot simply roll its troops and tanks on a fast track. Moving a train from points A to B requires planning, and in this regard, military transport is not exempted from the same bureaucratic procedures as civilian rail traffic endures, and they have to share rails with them.

The Military Communications Service (*Sluzhba Voyennykh Soobshchenii*, or *VOSO*) facilitates and plans all major military transport in Russia, including military railroad transport.⁴ The Military Communications Service sorts under the Ministry of Defence, and has a contract with Russian Railways, which facilitates the majority of all Armed Forces rail transport. Even though the Armed Forces uses the Russian Railways rail network under special pre-conditions, transport orders still have to be made beforehand, then logged and facilitated in the ETRAN system (*Elektronnaia Transportnaia Nakladnaia*), an automated system for shipping documents for rail transportation, which is mandatory for all types of goods transport orders in Russia. There are no official statistics, however, or public data, for military transport that is logged through the ETRAN system.⁵

Russia’s Armed Forces also disposes over a particular combat branch, the Railroad Troops (*Zheleznnye Voiska*), which specialises in railroad movement, protection, construction and support. As described by Charles K. Bartles and Dr. Lester W. Grau, “They consist of ten brigades and several independent battalions scattered throughout the Russian Federation which are operationally attached to their respective military districts. These units provide rail-related logistical support for military operations to include repair, bridge building, and concealment”. The Railroad Troops are essentially an auxiliary to Russia’s ground forces. They are able to carry out a wide range of tasks of strategic significance, including not only transport of ammunition and other critical equipment, but also gathering intelligence.⁶ They have previously been present in larger exercises and other military enterprises. They were also employed to aid the re-construction and repair of the Baikal Amur Mainline (BAM), in Russia’s Far East.⁷ It is thus no surprise that the Railroad Troops are participating in the 2022 invasion of Ukraine.

SETTING THE STAGE FOR INVASION

Russia’s 2021 military buildup along the Ukrainian border took place in different stages. From March 2021, transportation of equipment and units from the Eastern and Central Military Districts to western Russia and the Western and Southern Military Districts (including Crimea) was observed, but varied in intensity over time. As noted by Western analysts, these were the largest irregular movements by Russia’s Armed Forces ever observed. Over the course of several months various social media outlets carried posts (many allegedly by Russian civilians passing

2 Vershinin, Alex. “Feeding the Bear: A Closer Look at Russian Army Logistics and the Fait Accompli”. *War on the Rocks*. November 23, 2021. <https://warontherocks.com/2021/11/feeding-the-bear-a-closer-look-at-russian-army-logistics/> (Accessed October 14 2022).

3 *Tutu.ru* “Vse vokzaly Rossii” https://www.tutu.ru/poezda/vkz/%D0%B2%D1%81%D0%B5_%D0%B2%D0%BE%D0%BA%D0%B7%D0%B0%D0%BB%D1%8B_%D0%A0%D0%BE%D1%81%D1%81%D0%B8%D0%B8/ (Accessed October 14 2022).

4 *Ministerstvo Oborony*. Entsiklopediya. http://encyclopedia.mil.ru/encyclopedia/dictionary/details_rvsn.htm?id=10007@morfDictionary (Accessed October 14, 2022).

5 Troitsky, Artyom. “Eksklyuzivnaya sluzhba”. *Voyenno-Promyshlenny Kur’yor*. April 16, 2008. <https://vpk-news.ru/articles/4287> (Accessed October 14, 2022). As stated in the article, the contract with Russian Railways is classified. It presumably regulates the prerequisites of troop transports, transportation in relation to the annual drafts, as well as transport of military goods. Goods of greater strategic significance, such as nuclear warheads, are carried out by special operations troops.

6 Bartles, Charles K. and Grau, Lester.W. Dr., *The Russian Way of War. Force Structures, Tactics and Modernization of the Russian Ground Forces*. Foreign Military Studies Office (FMSO). Fort Leavenworth, KS. 2016, p. 327.

7 Ferris, Emily. “Problems of Geography. Military and Economic Transport Logistics in Russia’s Far East”. Royal United Services Institute for Defence and Security Studies. October 2020. Pp.18-22.

by) showing footage of trucks and tanks loaded onto open railcars, apparently moving westward, while satellite images showed units and materiel gradually mounting up far from their home bases.⁸

Preparations for the invasion intensified between October 2021 and January 2022, culminating in the ten-day exercise, Union Resolve 2022 (*Soiuznaia rezhimost*), which was held, together with Belarus, from February 10–20, ending just four days before the invasion, with Russian units still on Belarusian ground, ready to enter Ukraine.⁹ It proved difficult for Russia to hide its intentions, and the element of surprise was in part lost. U.S. and British intelligence, who shared their assessments that a Russian invasion of Ukraine was underway during the autumn and winter of 2021–2022, turned out to be correct. Despite continuous reports in Russian media (and even by the Russian Ministry of Transport itself) of malfunctioning railroads over the years, Russia's railroad system proved sufficient to conduct an invasion on a scale not seen in Europe since the Second World War.¹⁰ However, rail transport on home ground in peacetime is different from rail transport while at war on enemy territory.

WAGING A WAR BY RAIL

In the majority of Soviet and Russian wars during the 20th century, both railroad transport and the Railroad Troops have played a vital role in logistic support and its protection. This has not changed since the turn of the century. As seen in the Chechen Wars, the 2008 invasion of Georgia, and the ongoing war in Ukraine, railroad transport is a vital part of contemporary Russian warfare.

In the early stages of the invasion, if Russia was to advance further into Ukraine, it was crucial that it seized and

held strategic railheads, so as to establish supply lines. It did not manage to achieve this, especially not in the north of Ukraine; taking rail hubs around Chernihiv, for example, would have been crucial in order to advance towards and later take Kiev.

Railroad transport is vulnerable to external force, such as airstrikes, sabotage, or other types of destruction. This has been illustrated on several occasions since the start of the war. Soon after the invasion commenced, on February 26th, the Ukrainian Railways company (*Ukrzaliznytsia*) announced that the Ukrainian Armed Forces had blown up all railroad connections between Ukraine and Russia.¹¹ Russia, however, could still use rails leading from Russia into the occupied territories of Donetsk and Luhansk. Nevertheless, there were early reports that Russian trains had entered southern Ukraine via Crimea.¹² Russia's Armed Forces established rail connections in the south of Ukraine, between Crimea and the cities of Kherson and Melitopol, at the beginning of the invasion; these connections were severed during the summer of 2022, according to the Armed Forces of Ukraine, and it remains unclear whether they have been restored.¹³

The rail connection that runs on the Kerch Bridge, between the Russian mainland and occupied Crimea, is equally important for Russia, in order to 1) support the southern front, and 2) maintain supplies to Crimea. The explosion on the Kerch Bridge, on October 8th, appears to have halted Russian rail transport to and from the peninsula for a short period, but now seems to have been at least partially restored.¹⁴

During the first months of the invasion, there were reports of railroad sabotage not only inside Russia itself, but also most noticeably in Belarus, in order to prevent

8 *Radio Free Europe*. "Satellite Images Show Military Buildup In Russia, Ukraine". April 21, 2021. <https://www.rferl.org/a/russia-ukraine-military-buildup-satellite-images/31214867.html> (Accessed October 14, 2022).

9 Muzyka, Konrad. "When Russia Went to War" *Russia's War in Ukraine, Series No.7*. July 2022. ICDS. https://icds.ee/wp-content/uploads/dlm_uploads/2022/07/ICDS_Brief_Russia%C2%B4s_War_in_Ukraine_No7_Konrad_Muzyka_July_2022_correct.pdf (Accessed October 14, 2022).

10 *MinTrans Rossii*. Strategiya razvitiya zheleznodorozhnogo transporta v RF do 2030 goda. 17 June 2008. <https://mintrans.gov.ru/documents/3/1010?-type=> (Accessed October 14, 2022). P.35.

11 Van Leijen, Majorie. "Railway between Ukraine and Russia completely destroyed". *Railfreight.com*. February 26, 2022. <https://www.railfreight.com/beltandroad/2022/02/26/railway-between-ukraine-and-russia-completely-destroyed/?gdpr=accept&gdpr=accept> (Accessed October 14, 2022).

12 Trevithick, Joseph. "A Russian Armored Train Has Joined The Invasion Of Ukraine". *The Drive*. March 7, 2022. <https://www.thedrive.com/the-war-zone/44620/a-russian-armored-train-has-joined-the-invasion-of-ukraine> (Accessed October 14, 2022).

13 *CNBC*. "Ukraine says scores of Russian's killed, rail links cut in southern fighting". July 30, 2022. <https://www.cnbc.com/2022/07/30/ukraine-says-scores-of-russians-killed-rail-links-cut-in-southern-fighting.html> (Accessed October 14, 2022).

14 *DW News*. "Some rail and road traffic restored on Kerch Bridge". October 10, 2022. <https://www.dw.com/en/some-rail-and-road-traffic-restored-on-kerch-bridge/av-63397602> (Accessed October 14, 2022).



Figur: Broad-gauge railroad networks (Russia, Ukraine, Belarus, Finland, Estonia, Latvia & Lithuania). Source: FOI

Russian military rail transports from entering Ukraine via Belarus.¹⁵ On March 21st, Ukrainian Railways announced that there was no rail connection between Belarus and Ukraine, because of the acts of sabotage.¹⁶ Furthermore, Bayraktar TB2 drones had struck Russian fuel supply rail cars as early as February 28th.¹⁷

Historically, the Soviet Union and the Russian Federation used armoured trains for protection and

intelligence-gathering; at least one armoured train brought from Russia was observed in the south of Ukraine; it was later claimed to have been destroyed by local partisans.¹⁸ In mid-June 2022, reports and photos of an unknown armoured train named *Yenisei* turned up on social media, after first appearing on the Russian Army's own television channel, *Krasnaya Zvezda*.¹⁹ According to the Ukrainian online outlet, *Defense Express*, the Railroad

15 France24. *The Observers*. "Russia: Train saboteurs attempt to prevent transfer of military equipment to Ukraine". July 22, 2022. <https://observers.france24.com/en/europe/20220725-russia-train-saboteurs-attempt-to-prevent-transfer-of-military-equipment-to-ukraine> (Accessed October 14, 2022).

16 Latschan, Thomas. "Ukraine: Will the railroad be what decides the war?". *Deutsche Welle*. May 6, 2022. <https://www.dw.com/en/ukraine-will-the-railroad-be-what-decides-the-war/a-61714831> (Accessed October 14, 2022).

17 Oryx. "Attack on Europe: Documenting Russian Equipment Losses During The 2022 Russian Invasion Of Ukraine". February 24, 2022. <https://www.oryxspioenkop.com/2022/02/attack-on-europe-documenting-equipment.html> (Accessed October 14, 2022).

18 Karlovskij, Denis. "V zakhvachennom Melitopole partizany vzvali bronepoezd okkupantov – SMI". *Ukrainskaia Pravda*. May 18, 2022. <https://www.pravda.com.ua/rus/news/2022/05/18/7346998/> (Accessed October 14, 2022).

19 Telegram. Zvezdanews. "Bronepoezd 'Enisei' zadeistvovan v zone spetsoperatsii na Ukraine [...]" June 14, 2022. <https://t.me/zvezdanews/82586> (Accessed October 14, 2022).

Troops assembled an armoured train from stolen rail cars from the Kharkiv region and put it into service with the Russian Armed Forces.²⁰

As the Russian Armed Forces attempted to take control over specific railheads in order to establish functioning logistic support to the frontlines, Russian troops targeted and destroyed Ukrainian rail infrastructure, for example rail stations and bridges, in order to prevent Ukrainian counterattacks.²¹ Russian forces have continuously mined Ukrainian rail tracks, which reciprocally limits Russia's own advancement by rail. Simultaneously, the Ukrainian Armed Forces have themselves destroyed bridges and railheads of strategic significance in order to halt further Russian advancement.²² In the end, this has left both sides with limited rail transport capability.

Recent events on the battlefield further illustrate the importance of controlling strategic railroad hubs. In the beginning of September 2022, the Ukrainian Armed Forces launched a counteroffensive in the Kharkiv region. The Ukrainian Armed Forces regained control over the city of Iziium (which harboured a Russian logistics supply hub) on September 10th. This breakthrough was only made possible once the Ukrainian Army had recaptured Kupriansk (north of Iziium), which held the only railroad hub "supplying Russia's entire front line across northeastern Ukraine", which, according to *Reuters*, "left thousands of Russian troops abruptly cut off from supplies along a front that has seen some of the most intense battles of the war".²³ Another key city, Lyman, also an important rail hub that leads into the Donbas area, was recaptured by Ukrainian forces on October 1st, only one day after the Russian Federation "annexed" four Ukrainian regions, including Donetsk and Luhansk.²⁴

The Russian Armed Forces' failure to conquer and further utilise the Ukrainian railroad infrastructure for its own purposes and according to their logistical prerequisites has been a determining factor for the development of the war, thus far. It has seriously inhibited Russia's ability to set up functioning logistic supply lines between the front lines and the rear, especially in the north, but to some extent also in the east and south of Ukraine. As a result, this has increased Russian reliance on logistic support through road transport using trucks or other vehicles, which in turn has proved difficult to both establish and defend.²⁵ In the early stages of the invasion, this limited Russia's possibilities to advance further into Ukraine with both troops and materiel, as well as to rotate its staff.²⁶

CONCLUDING REMARKS AND DISCUSSION

As the invasion of Ukraine commenced on February 24th, Russia's initial goal was (presumably) to take Kiev and oust the Ukrainian political leadership. To achieve that goal, advancing and taking territory fast was key. Russia did not achieve this. A question widely discussed in the research community is whether the initial Russian operational failure should be attributed to bad planning, failing logistics, poor leadership, undermined command and control, or a combination of all of these factors. Russian illusions about the supposed Ukrainian reaction to the "special military operation", and fierce Ukrainian resistance, were also two decisive factors.²⁷

Russia's Armed Forces are heavily reliant on rail transportation for logistics. The Russian railroad system and logistic support functions were sufficient to enable the military buildup during 2021–2022. However, as the invasion of Ukraine commenced, what may have seemed

20 Akhromeeva, Mariia. "PHOTO: The Russians assembled an armoured train from Ukrzaliznytsia cars stolen in the Kharkiv region". *Railtarget*. June 30, 2022. <https://www.railtarget.eu/freight/photo-the-russians-assembled-an-armored-train-from-ukrzaliznytsia-cars-stolen-in-the-kharkiv-region-2908.html> (Accessed October 14, 2022).

21 Landay, Jonathan. "Russian attacks on rail system fail to paralyse 'lifeline of Ukraine'". *Reuters*. May 9, 2022. <https://www.reuters.com/world/europe/russian-attacks-rail-system-fail-paralyze-lifeline-ukraine-2022-05-08/> (Accessed October 14, 2022).

22 Kaidan, Taras. Matveichuk, Mariana. O'Sullivan, Feargus. "The Trains of Ukraine Go to War". *Bloomberg*. March 31, 2022. <https://www.bloomberg.com/news/features/2022-03-31/inside-ukraine-s-rail-war-against-the-russian-invasion> (Accessed October 14, 2022).

23 Hnidy, Vitalii & Hunder, Max. "Russia gives up key northeast towns as Ukrainian forces advance". *Reuters*. 11 September 2022. <https://www.reuters.com/world/europe/ukraine-troops-raise-flag-over-railway-hub-advance-threatens-turn-into-rout-2022-09-10/> (Accessed October 14, 2022).

24 Gibbons-Neff, Thomas. Kramer, E. Andrew. Porter, Catherine. Troianovski, Anton. "Ukraine Forces Retake Lyman, a Strategic City, as Russians Retreat". *The New York Times*. October 1, 2022. <https://www.nytimes.com/2022/10/01/world/europe/lyman-ukraine-russia.html> (Accessed October 14, 2022).

25 Lendon, Brad. "What images of Russian trucks say about its military's struggle in Ukraine". *CNN*. April 14, 2022. <https://edition.cnn.com/2022/04/14/europe/ukraine-war-russia-trucks-logistics-intl-hnk-ml/index.html> (Accessed October 14, 2022).

26 UNIAN – *Novosti Ukraini*. March 19, 2022. <https://t.me/uniannet/39647> (Accessed October 14, 2022).

27 Skoglund, P., Listou, T. and Ekström, T., 2022. Russian Logistics in the Ukrainian War: Can Operational Failures be Attributed to Logistics? *Scandinavian Journal of Military Studies*, 5(1), pp. 99–110.



simple beforehand turned out to be difficult during an actual invasion. Since the Russian Armed Forces did not succeed in capturing and utilising Ukrainian rail infrastructure, they were not able to establish the “rail supremacy” they would have needed in order to achieve their initial war goals, such as taking Kiev. This affected the development of the initial phase of the invasion.

In this context, the aftermath and reaction in Russia on the political level is telling: Deputy Minister of Defence Dmitrii Bulgakov, who has been responsible for the reform

of Russian military logistics, and the former commander of the Rear of the Russian Armed Forces, were sacked after the Russian failures in the Kharkiv region in September.²⁸

Although the war has evolved into one of attrition, it too, like most wars, will be determined by classical strategic factors, such as political will vs. military ability. Regardless of its outcome, it certainly appears as if Russia, as it commenced its invasion of Ukraine, went a railhead too far. ■

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28 *Radio Free Europe*. “Russian Deputy Defense Minister Removed From Office”. September 24, 2022. <https://www.rferl.org/a/russia-minister-bulgakov-removed/32049316.html> (Accessed October 14, 2022).