A Sorbonne Alliance project

In collaboration with ESCP, Sorbonne Nouvelle and Inalco

Europe and the war in Ukraine – Policy papers 3/8, 2026

The Russian arms industry and sanctions: between resilience and degradation

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Abstract

After four full years of war in Ukraine, one might have expected Western sanctions to amplify the structural weaknesses of the Russian defense industrial base, accelerate the signs of decay already visible before 2022, and hamper its production. And to some extent, they have. Yet the OPK appears to have found ways to exploit both the conceptual and practical flaws of Western sanctions, as well as their key limitation: their unilateral nature. With the West's continued effort to fine-tune sectoral sanctions and the Russian state's reduced financial margins, a scenario for the defense industry, faced with increased costs for foreign-produced components – sometimes of inferior quality – and with disruption in production planning is slow degradation, reduced reliability of the weapons and military systems produced, and more dependence on non-Western suppliers. Anyone familiar with the structural inertia within the Russian OPK would be skeptical of any significant innovation or modernization gains emerging from expanded state-private interaction in the context of the war. However, one should be cautious in interpreting negative trends within the OPK as the Russian defense industry is accustomed to operating under challenging conditions and to functioning at a technological level that often falls short of high-end standards – yet functioning. Economic, industrial, and technological cooperation between Russia, China, Iran, and North Korea could entail potential synergies, with potentially positive effects in the defense sector. Slow degradation is thus a more likely scenario than collapse.

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EAWU Policy Papers Serie presents the discussions held during three workshops co-organized in 2025 by ESCP Business School, Inalco and Sorbonne Nouvelle, with the support of Sorbonne Alliance. The papers are freely circulated for the purposes of comment and discussion. The views expressed in the articles are those of the author(s).

The Russian arms industry and sanctions: between resilience and degradation

It has always been difficult to determine where to set the bar when assessing the true condition of the Russian defense industrial complex (*oboronno-promyshlennyi kompleks*, OPK), as persistent narratives of decay and corruption have stood in stark contrast to the OPK's position as the world's second-largest arms exporter starting in the 2000s. This assessment has become even more complex since Russia's full-scale invasion of Ukraine in February 2022. One day, it is announced that Russia produces in three months three times as much ammunition as the whole of NATO does in a year. But the next day, one can read from the press that Russia is desperately relying on North Korean ammunition supplies to keep up on the front line.[1] The situation in the Russian OPK is a topic saturated with disinformation from all sides of the conflict, and one on which reliable information is increasingly scarce due to rising secrecy in Russia around anything military-related and relentless pressure on those reporting on it. What is undisputable is that the defense industry has been a primary target of Western sanctions since 2014, as a key pillar of Russian military power and international influence (through arms sales), with the Western pressure escalating significantly after February 2022.

Sanctions after the annexation of Crimea: an additional burden for the Russian OPK

The illegal annexation of Crimea by Russia sparked the first Western sanctions against Russian strategic sectors, including the defense industry. Many large defense conglomerates were targeted. European countries and the United States stopped exporting military equipment to Russia (with the emblematic cancellation of the French contract for the sale of two Mistral-class ships) but also many dual-use and commercial technologies usable in weapons production. The restrictions led the Russian government to establish an *ad hoc* commission for dealing with import substitution, with one sub-commission dedicated to this task in relation to military production; two import substitution programs were subsequently launched – one for substituting Ukrainian components and parts,[2] one for replacing the more than 800 items that used to be procured from Western countries.[3]

These sanctions have added to a range of structural problems and chronic deficiencies within the OPK, among which a shortage of qualified workers, corruption, lack of innovation (with the OPK still struggling to design genuinely new equipment, i.e. technologies not based on Soviet designs), and a very difficult financial situation for many defense companies. They also brought more pressure from the government on the OPK, which was expected to be a key source of import substitution both for the defense sector itself and for other sanctions-stricken sectors of the economy, including the energy complex. Before the Russian full-scale invasion of Ukraine of February 2022, all these problems had combined to affect the OPK's position on the

[1] Speech by NATO Secretary General Mark Rutte followed by a Q&A at the Comenius University, in Bratislava, 20 February 2025; "Thousands of troops, millions of shells. Inside North Korea's vast operation to help Russia's war on Ukraine", Reuters, 15 April 2025.

[2] The annexation of Crimea had caused the collapse of most of the Russia-Ukraine defense industrial cooperation that had continued since 1992.

[3] Richard A. Bitzinger, Nicu Popescu (ed.), "Defence industries in Russia and China: players and strategies", *ISS UE Report n° 38*, December 2017.

world arms market.[4] Russian arms exports were also challenged by the adoption of the Countering America's Adversaries Through Sanctions Act (CAATSA) in 2017, which, among other measures, included the possibility of sanctions against countries doing business with sanctioned Russian defense entities. China and Turkey were sanctioned for buying Russian military systems, and other countries, including Egypt and Indonesia, were deterred by the risk of sanctions, along with other considerations, from pursuing arms deals with Russia.

After 2022: adapting to more stringent sanctions, taking advantage of loopholes

The "special military operation" has, in part, been good news for the Russian OPK: it got many more government orders, thus much more funding from the federal budget and other sources. Some companies – in production of UAVs, loitering munitions, explosives, missiles, engines, powder… – have expanded production capacities or constructed new workshops. The defense industrial sector, proposing higher salaries (up to double the national median wage[5]), has recruited thousands of workers leaving other sectors of the economy. However, supplying the front in an attrition war has also meant mounting pressure from the government,[6] and a decline in profitable foreign contracts as most of the OPK's production is now aimed at the Russian armed forces.

Above all, this has meant operating in a far more complex supply environment, as successive rounds of Western sanctions have targeted a greater number of entities in the Russian defense sector and increasingly restricted exports to Russia of dual-use[7] and commercial technologies usable in weapons production. The list of such controlled goods has been progressively expanded based on the observations from the battlefield as the wreckage of many lost or destroyed Russian weapons and military equipment was found to contain significant amounts of Western-made components and electronics.[8] This persistent dependence of the OPK's supply chains on Western technologies underscores the limited effectiveness of domestic import substitution programs to date.[9] The establishment, starting in 2023, and subsequent regular updating of the Common High Priority List has reflected a more cohesive and comprehensive approach among Western countries.[10]

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[4] According to SIPRI, Russia's share of the global arms market declined from 22% in 2013-17 to 16% in 2018-22. In real terms, after adjusting for inflation, the value of its arms sales fell by 31% between the two periods (« Trends in international arms transfers, 2022 », *SIPRI Fact Sheet*, March 2023).

[5] "Did Russia's Defense-Sector Boom Peak in 2025?", *The Moscow Times*, 26 December 2025.

[6] "Russia Sees Wave of Criminal Cases Over Defense Contract Failures", *The Moscow Times*, 23 December 2025.

[7] Before 2021 the EU accounted for 42 % of Russia's imports of dual-use goods to Russia (machinery, chemicals, metals…). See Charlotte Emlinger, Kevin Lefebvre, "Russia's Supply of Dual-Use Goods Amid Sanctions", *La Lettre du CEPII*, n° 455, May 2025.

[8] Plus parts and components coming from like-minded non-Western countries such as Japan, South Korea, Taiwan (for examples, see James Byrne *et al.*, *Silicon Lifeline: Western Electronics at the Heart of Russia's War Machine*, RUSI, 8 August 2022).

[9] Since 2014, in such key sectors as machine tooling and microelectronics, financial resources have been allocated by the state to revive domestic production, and there have been moves to consolidate all the players into big corporations. Although production has been scaled up, OPK managers have occasionally complained about the quality of the domestic supply, saying it is lagging behind foreign technologies.

[10] European Union + United Kingdom + United States + Japan; see List of Common High Priority Items as of February 2024 here.

However, many experts question the extent to which the sanctions are effective, given the apparent failure to constrain Russia's arms production. Output has expanded across numerous categories of military equipment. This is the case for artillery ammunition of various calibers, multiple launch rocket systems, various types of missiles, but also tanks as well as air-defense and artillery systems. Russia's rapid development of a diversified drone industry has drawn significant attention – despite (or because of?) its heavy reliance on foreign-made components. It is likely that, beginning in 2014, the OPK anticipated even harsher conditions and stockpiled substantial quantities of dual-use goods and technologies at a time when export restrictions were less stringent. While sourcing more electronic components, microprocessors and other critical items from non-Western suppliers such as China, Southeast Asian countries and India, the defense industry has relied, in some cases with assistance from intelligence services, on foreign networks, sometimes very complex ones, to retain access to crucial Western weapons-grade and dual-use technologies. This post-2014 experience has been leveraged and intensified after 2022. Russia has relied on fraudulent end-user certificates, front companies, and offshore firms to mislead legitimate manufacturers into supplying embargoed products to the Russian OPK.

A detailed examination of the numerous loopholes in the enforcement of Western sanctions lies beyond the scope of this article. However, these loopholes have contributed to mitigating the impact of sanctions on the OPK. Among the flaws, the concentration of sanctions on high-profile OPK individuals and entities stands out, as it has permitted numerous non-targeted Russian commercial firms to continue importing materials and components and supplying them to the defense sector. In other words, as an international security expert underscores, by focusing on big corporate entities, Western countries are "*ignoring the broader industrial network that sustains production*".[11] Flaws in coordination and information-sharing among sanctioning countries are also noted, often stemming from the "*overclassification of relatively low-level intelligence*", which restricts both the exchange of information and the provision of adequate guidance to private-sector economic actors.[12] According to a RUSI report, there is a "*failure to transform intent into effect*" due to "*a lack of methodologically rigorous targeting, coordination and collaboration, both within and between governments*"; as a result, "*in some instances, access to specific components has increased*" rather than decreased.[13] Illicit networks and dubious front companies can eventually be uncovered, disrupting the Russian OPK's supply chains. Yet prior to this largely reactive detection, Russian defense firms typically have sufficient time to stockpile components and materials.[14]

Russian OPK companies have naturally benefited from the inherent limitation associated with the unilateral nature of Western sanctions. Overall, according to CEPII experts, a third of sanctioned products and two thirds of strategic products have been fully compensated by imports from non-sanctioning countries.[15] Even countries that have condemned Russia's aggression of Ukraine have actively reexported restricted Western technology to entities

[11] Mariya Chukhnova, « How fragmented sanctions prolong the war and empower Russia's defense industry", *The Kyiv Independent*, 3 December 2025.
[12] Jack Watling, Gary Somerville, "A Methodology for Degrading the Arms of the Russian Federation", *Occasional Paper*, RUSI, 2024.
[13] *Ibid.*, p. 4.
[14] *Ibid.*
[15] Charlotte Emlinger, Kevin Lefebvre, "Working Around Sanctions. What Cost to Russia?", *Policy Brief*, CEPII, n° 50, February 2025.

connected to the Russian military-industrial complex, or have proposed alternatives, including for industrial equipment. Western pressure on some of these countries has not been enough to stem the flow of Western-produced electronic components, chemicals and other raw materials to Russia through non-sanctioning third countries from Central Asia, the Caucasus, the Middle East, Asia... China has been a particularly zealous partner of Russia's war production effort – not only as a conduit for reexporting Western goods but also, and increasingly, as an exporter of alternative Chinese-made systems, components (including bearings, semiconductors, lithium-ion batteries, explosives, engine parts, carbon fiber, aluminum alloys…), and industrial equipment. This dimension of Russia-China cooperation has been a key factor in the notable rise in trade between the two countries over the past three years.

Among the factors supporting the Russian OPK's relative resilience to sanctions, the strengthening of ties with Iran and North Korea deserves particular attention. Both countries helped mitigate Russia's shortages of drones and ammunition during the first eighteen months of the war. Accustomed to producing weapons under long-standing sanctions regimes, Iran and North Korea may also have offered Russia valuable expertise in maintaining access to essential supplies and navigating loopholes and gray areas in the international trade system. In the case of Iran, the positive impact of its sharing of technologies and know-how with Russia in drone production has been evident.

Between sanctions resilience and erosion

That said, sanctions have not been without impact on the Russian defense industrial base. Weapons producers have to work with more volatile, less reliable supply chains. Disruptions to these supply chains can affect production planning and sequencing, cause delays, and modify the operational performance or use of weapons assembled with alternative components. Quality issues are frequent, as OPK companies receive counterfeit components or items of lower quality than Western equivalents – at comparable or even higher prices.[16] Chinese electronic components used in the production of satellites apparently do not match Western ones. While industrial equipment, components and parts remain accessible through third countries, the problem with cross-border payments due to the financial part of Western sanctions remains a separate and significant challenge.

The alternative routes for procuring Western components often come with higher costs. A CEPII report, which highlights that Russia has experienced particularly sharp increases in import prices for strategic products since 2022, attributes this to several factors, including higher transportation and insurance costs for Russian imports, due partly to the war context. In addition, the supply routes imply many intermediaries that need to be paid for. And the bargaining power of the new trading partners of Russian companies and of re-exporting agents in non-sanctioning countries accounts for the bulk of the increase in Russian import unit costs, as these actors have taken advantage of Russia's constrained situation, including a less competitive market following the exit of Western agents, to drive prices up. The Russian military admitted that one consequence of the sanctions has been a 30 percent increase in the price of microelectronic components.[17] All this has exacerbated the pre-existing financial

[16] *Ibid.*

[17] Jack Watling, Gary Somerville, 2024, *op. cit.*, p. 9.

difficulties within the defense industrial sector, where many OPK firms are heavily indebted and have problematic financial relations with the MoD, including low advance payments and delays in final settlement of orders.[18] Rising input costs and wages have eroded the profitability of state contracts, forcing more defense firms to rely on borrowing to finance production. The resulting accumulation of debt, even with the preferential credit terms extended to the sector, poses a serious challenge, as a significant portion will likely need to be restructured or, in some cases, written off.[19]

While these accumulated challenges have not entailed a collapse of production within the defense sector, they are likely to undermine its ability to produce advanced, sophisticated weapons systems, and to bring about reliability issues. Shortages of specific components have led to observable problems in aircraft manufacturing, the space program, the production of precision targeting instruments, shipbuilding and machine tooling.

It remains to be seen whether the Russian defense industry can reduce its external dependence – and with it its vulnerability to sanctions and to shifts in the policies or geopolitical calculations of its partners that could decide to limit the supply of components and tooling essential for weapons production. A key issue concerns Russia's capacity to produce domestically the components it currently imports. Ukrainian authorities recently reported that an increasing number of Russian and Belarusian electronic components have been found in the wreckage of missiles fired by the Russian military. These components were described as lower in quality than their Western equivalents, though not to the extent of rendering the missiles nonfunctional.[20] It is difficult to determine whether this reflects the growing effectiveness of sanctions in limiting the Russian OPK's access to Western technologies, or whether this illustrates an accelerated Russian effort to reduce external dependencies in strategic sectors, or both. While the domestic production of industrial equipment has also increased in the context of the war, this provides no indication about its quality.

Another aspect to monitor, in assessing Russia's potential to gradually reduce its dependence on foreign supplies, is the emergence of new developments within the defense industrial system in the context of the war in Ukraine. The appointment of economist Andrei Belousov as Defense minister in May 2024 was intended, among other objectives, to better integrate the "traditional", state-dominated defense industrial complex with tech start-ups working as subcontractors to OPK companies and with the so-called "popular OPK",[21] with the aim of

[18] "Did Russia's Defense-Sector Boom Peak in 2025?", *op. cit.*

[19] The designation, in 2018, of Promsvyazbank as the OPK's primary bank, responsible for servicing the state defense order and major government contracts, aimed to absorb problematic debts by removing them from commercial banks' balance sheets. As a rule, the Russian state has focused on protecting the defense sector from defaults (another path followed has often been the absorption of indebted firms by bigger firms or corporations).

[20] Max Hunder, "Ukraine increasingly finds Russian and Belarusian electronics in missiles", Reuters, 12 September 2025.

[21] Aleksej Anpilogov, "Kak Belousov menjaet rossijskuju voennuju mašinu" [How Belousov is changing Russia's military machine], *Vzgljad*, 6 January 2025. The "popular OPK" (*narodnyj oboronno-promyshlennyj kompleks*) is the term used in Russia since 2022 to designate the web of actors – individuals, frontline military personnel and volunteers, engineers, technical specialists, small businesses, and crowdfunding initiatives – engaged in the production of FPV drones, UAVs, electronic devices, 3D-printed components, and other items for the Russian armed forces. Operating outside the classical military procurement system and financed primarily through

fostering innovation and ultimately enhancing technological independence for Russia and its defense industry. It will also be necessary to examine the impact of Russia scaling up the practice of sending industry engineers and workers to the front lines to test, adjust, and repair military equipment and weapons, and to consider how this could contribute to the modernization and structural transformation of the Russian defense industry.

An additional avenue for future research is to examine the potential synergies arising from economic, industrial, and technological cooperation between Russia, China, Iran, and North Korea in the defense sector.[22]

Conclusion

After four full years of war in Ukraine, one might have expected Western sanctions to amplify the OPK's structural weaknesses, accelerate the signs of decay already visible before 2022, and hamper its production. And to some extent, they certainly have. Yet the OPK appears to have found ways to exploit both the conceptual and practical flaws of Western sanctions, as well as their key limitation: their unilateral nature. Input shortages of the kind that plagued the Soviet economy are unlikely, as twenty-first-century Russia does not face the level of systemic isolation that characterized the USSR.

However, Russia's continued reliance on foreign-supplied components and advanced machinery has undermined Vladimir Putin's narrative about the country's technological sovereignty in strategic sectors and highlighted the failure of domestic import substitution programs to decisively overcome the structural limitations of Russian production in key technological fields. In addition, not everything in Russia's success in producing more weapons for the frontline is related to success with sanctions circumvention. It is also very much rooted in factors related to the country's tradition of militarism. One factor has been the state's decision to unleash the OPK's so-called mobilization capacities inherited from the Soviet times, which defense industry firms have been compelled to maintain "just in case" Russia faced a conflict. In October 2023, they were authorized to use these cocooned industrial capacities, which has helped raise production volumes.[23] Another element to be accounted for is the fact that the Russian military had kept huge storage of Soviet equipment. The impressive production figures of the OPK since 2023 have included output that is not entirely new: much of it consists of refurbished, repaired, or upgraded older equipment drawn from storage. By early 2025, most experts agreed that Russia's reserves of such stockpiled equipment were running low.

With the West's continued effort to fine-tune sectoral sanctions and the Russian state's reduced financial margins, a scenario for the defense industry, faced with increased costs for foreign-produced components – sometimes of inferior quality – and with disruption in

private donations, these initiatives are widely seen as compensating for the lack of reactivity and bureaucratic inertia of the formal military-industrial system. They have also helped Russia respond to the agility of the Ukrainian war ecosystem, particularly in the field of drone development and production. Belousov has established a technical council between the Ministry of Defense and the "popular OPK" to support the most useful achievements, scale their development when relevant, and introduce more coordination among all contributors to the war effort.

[22] Bonny Lin *et al.*, "CRINK Security Ties: Growing Cooperation, Anchored by China and Russia", *CSIS Briefs*, September 2025.

[23] Aleksandr Sergeev, "V RF razrešili oboronnym predprijatijam ispol'zovat' vse rezervy" [Russian defense firms are authorized to use all reserves], gazeta.ru, 17 October 2023.

production planning is slow degradation, reduced reliability of the weapons and military systems produced, and more dependence on non-Western suppliers. Anyone familiar with the structural inertia within the Russian OPK would be skeptical of any significant innovation or modernization gains emerging from expanded state-private interaction in the context of the war. Historical experience suggests that, particularly in the defense sector, state actors tend to absorb or subsume successful private initiatives – a pattern that has rarely fostered meaningful development or innovation.

According to some sources, in late 2025, there were signs that the growth in the production in the military sector and military-related industries (metal products, electronics, optical goods…) was slowing down.[24] One should be cautious about how to interpret this apparent slowdown, if confirmed, and overall negative trends within the OPK. The Russian defense industry is accustomed to operating under challenging conditions, and to functioning at a technological level that often falls short of high-end standards, regardless of the Russian leadership's frequent claims about the excellence of national military products. It often relies on creative, ad hoc, simple and most of the time inexpensive technical solutions (for example swarm of drones combined with expandable and cheap-to-produce decoys, wired drones to circumvent electronic warfare, loading larger explosive charges onto drones to economize on missiles…). An aviation expert noted that the database of electronic components recovered by Ukrainians from Russian military equipment revealed "*a great conservatism in the use of electronic components in military equipment*", many being "*literally 25 years old*" (the supply of such components is massive on the secondary market, and almost impossible to control with sanctions).[25] In this regard, a comment by an international security observer seems to be highly relevant to thinking through the potential trajectory of the Russian OPK and the possible ways of improving the performance of sanctions: the Russian system, she writes, is one "*where survival replaces innovation and quantity substitutes for quality. In that context, partial pressure is not deterrence, it is adaptation fuel*", which, in her view, means that sanctions must move towards increased "*strategic precision*".[26] It is for decision-makers to determine how to act on this recommendation, but the underlying diagnosis is, quite likely, rather sound.

[24] "Did Russia's Defense-Sector Boom Peak in 2025?", *op. cit.*

[25] Maxim Starchak, "Russia's maxed-out arms makers face labor, tech shortages", *Defense News*, 22 February 2024.

[26] Mariya Chukhnova, *op. cit.*