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The DPRK's War Dividend in Ukraine: Capabilities Gained, Trajectory Shifted, and the Long-Term Strategic Impact

Niklas Swanström, Bastian Szepanski, and Mathilde Huard

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The DPRK's support to Russia in its invasion of Ukraine has shifted from a denied but documented relationship into a tacitly acknowledged partnership. While this cooperation has helped sustain Russian firepower and battlefield operations, it has also generated significant strategic gains for Pyongyang. This includes battlefield learning at scale, accelerated weapons development cycles, political legitimation through a formal treaty with Moscow, and sanctions relief through flows of fuel, food, and knowhow. The scope of cooperation extends well beyond Ukrainian battlefields. Documented progress covers electronic warfare, counter-UAV systems, airborne early warning, radar capabilities, acquisition of fighter aircraft, and artillery modernization across rockets and missiles. The war has effectively provided the DPRK with an unprecedented live combat laboratory for testing its munitions, missiles, and personnel under modern wartime conditions. The result is a DPRK better at fighting, better at building, and better at concealing how to do both. Yet, significant structural constraints remain, including limited force wide integration, uneven pilot proficiency and challenges in sustaining high-end technologies. This issue brief examines both the strategic benefits and enduring limitations of the Russia–DPRK partnership and assesses the implications for Japan, the Republic of Korea, the United States, and European states.

Introduction

The Democratic Republic of Korea (DPRK)'s multifaceted support for Russia, spanning millions of artillery shells, hundreds of missiles, and the unprecedented deployment of Korean People's Army (KPA) personnel, has delivered to Pyongyang a rare combination of strategic benefits and battlefield learning at scale. This includes, but is not limited to, accelerated weapons development cycles, political legitimation through a formal treaty with Moscow, and sanctions relief through flows of fuel, food, and knowhow. The 2024

Treaty on Comprehensive Strategic Partnership with Russia codifies mutual military assistance and effectively resurrects an alliance framework that Pyongyang can leverage to shield and accelerate its programs. Unless countered by sustained multilateral pressure and targeted denial strategies, these interactions will reshape the DPRK's near-term military posture and could enable major capability gains, particularly in solid-fuel rocketry, precision strike, drone warfare, and rudimentary space-based Intelligence, Surveillance, and Reconnaissance (ISR).

At the operational level, multiple independent streams of evidence confirm the scale of the DPRKs material support. Open-source shipping analysis and Russian unit reports indicate movements of approximately 16,000 containers equating to 4-6 million shells from Rajin to Russia, resulting in some Russian artillery units firing predominantly DPRK-supplied ammunition by early 2025. As Ukrainian deep strike campaigns disrupted Russia's energy nodes and logistics, this supply line prevented a collapse in the Russian rate of fire, magnifying Pyongyang's leverage over Moscow.[1]

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The most consequential dividend of this partnership is the unprecedented operational intelligence the DPRK is gaining through its direct involvement in the conflict. The Multilateral Sanctions Monitoring Team's (MSMT) first report and subsequent analyses describe DPRK personnel training with Russian forces and fighting in the Kursk sector since late 2024.[2] Additionally, western intelligence tallies suggest casualty figures in the thousands, implying extensive frontline exposure. This scale of casualties was later publicly verified by the DPRK itself. In April 2026, Kim Jong Un inaugurated a massive new military memorial complex in Pyongyang dedicated to soldiers killed fighting in Ukraine, featuring over 2,200 names of soldiers, thereby openly honoring those who died on the front lines.[3] For the KPA, that experience translates into doctrinal adaptation in an environment saturated by first-person view (FPV) drones, electronic warfare (EW), precision interdiction, and distributed command and control (C2), the very conditions that any future peninsula conflict would feature. The DPRK is systematically institutionalizing these operational insights into domestic training doctrine and procurement priorities, effectively bypassing years of theoretical simulations in favor of combat-proven experience.[4]

Technologically, the most worrisome vector is the potential two-way missile axis. The DPRKs KN23-family short-range ballistic missile (SRBM) used in Ukraine appear to have benefitted from Russian technical tuning, with reports of improved accuracy and new variants (e.g., Hwasong11M). Parallel progress in solid-fuel ICBM engines, heralded as completing their "final ground test" in September 2025, suggests accelerated maturation of long-range systems whose readiness and survivability already outstrip earlier liquid-fuel designs. Even absent incontrovertible proof of direct Russian transfer

in sensitive domains, the timing and character of DPRK advances are consistent with a technology feedback loop catalyzed by the war partnership.[5]

Russia's provision of energy, grain, and diplomatic cover at the UN, combined with tacit technical support, effectively immunizes Pyongyang against traditional sanctions. This partnership has blunted the impact of international pressure, especially as the ad hoc MSMT lacks the full investigative reach of the disbanded UN Panel of Experts. The resulting strategic equilibrium favors DPRK risk-taking, more frequent missile and space tests, and a normalized narrative of expeditionary KPA involvement abroad. To contain this trajectory, stakeholders will require a multilayered approach. This must include industrial-scale interdiction of the Rajin–Vostochny logistics loop, export control alliances that specifically target dual-use inputs to DPRK missiles, drones, EW, and escalated counter-UAS and missile defense.[6]

From Barter to Alliance — How the War in Ukraine Repositioned DPRK

What began in 2022 as covert DPRK shipments of ammunition has evolved into an overt, treaty-backed military alignment. The 2024 DPRK–Russia treaty commits both states to provide military assistance "without delay" if the other is attacked, while subsequent Russian maneuvers, specifically the veto of the UN'S 1718 Panel of Experts, have systematically undermined global sanction enforcement. The vacuum left behind has been filled in part by the MSMT, a coalition of eleven states, which reported in May 2025 on unlawful arms transfers, DPRK troop training, and petroleum deliveries above United Nations Security Council (UNSC) caps. Together, these steps signaled that the Kremlin sees the DPRK not merely as a sanctions evading arms dump but as a partner in a broader anti-Western alignment.

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Consequently, Pyongyang is now successfully leveraging its industrial-age firepower and manpower to secure 21st-century technological and strategic dividends.

Public and semipublic sources converge on the quantitative heft of the DPRK's support. Containerized transfers tracked by the UK-based Open Source Center (OSC) show 64 voyages shuttling nearly 16,000 containers in 20 months, consistent with 4.2 million to 5.8 million artillery shells across key calibers. Reuters' reporting on Russian unit documents indicates that some formations report a 75 to 100 percent reliance on DPRK ammunition. Ukrainian and Western officials argued that without Pyongyang's supply, Russia's artillery output would have been halved, underscoring how a sanctioned state can act as a swing producer of conflict-critical munitions. Even as stocks tightened in late 2025, forcing refurbishments of aging rounds, Kyiv estimated total DPRK shell deliveries at roughly 6.5 million by autumn, with deliveries resuming after brief pauses.[7]

The personnel dimension is unprecedented for the DPRK and is only second to the Cuban fighters that amount to 20,000 according to some estimates.[8] Analyses by the Atlantic Council and CFR described deployments of 12,000 DPRK troops to Russia, primarily Storm Corps elements tasked with supporting operations on the Kursk front, with casualties numbering in the thousands. Initially denied by Moscow and Pyongyang, the deployments were later acknowledged in softened terms, with "military construction workers" and engineers conducting demining and repair while also serving as assault echelons, an ambiguity that preserved political maneuvering space while maximizing battlefield utility and learning for the KPA. Ultimately, this narrative of plausible deniability was abandoned entirely by mid-2026, replaced by full public acknowledgement by Kim Jong Un.[9]

Capability Improvements: What DPRK has Gained

Artillery, rockets, and fires ecosystem: validation, refurbishment, and mass production learning

By pushing millions of rounds into a high-tempo theater, Pyongyang has learned two critical lessons: first, which of its legacy rounds, tubes, and launchers function reliably under sustained use; and second, how to prioritize refurbishment and production lines to correct endemic defects. Frontline reporting has long flagged erratic DPRK ammunition quality. Ukraine's field data, specifically metrics on failure rates, dispersion, and fuse reliability, deliver an empirical basis for triaging stockpiles and tweaking processes. Ukrainian intelligence and 38 North note that some shells were so obsolete they required Russian rework, but the scale of usage nonetheless validated enough inventory to keep Russian fires at mass. That feedback helps Pyongyang decide where to invest scarce inputs (propellants, explosives, fuse components) and which calibers and rocket types to scale.[10]

> ***A gradual integration and modernization of MiG-29 and Su-27 aircraft within the KPAF could significantly enhance the DPRK's air defense and air superiority capabilities. A critical challenge, however, lies in pilot training and technical maintenance expertise, gaps that could substantially limit the country's operational effectiveness.***

Equally important, the logistics of moving 16,000 containers through Rajin and on to Danube/Vostochny taught Pyongyang how to build resilient maritime rail pipelines under sanctions. Modeling loadouts, optimizing concealment, and coordinating with Russian port, rail, and customs authorities have created a repeatable template. The OSC methodology, counting containers via satellite and modeling ship capacity, shows DPRK logisticians what external eyes can see and how to adapt. The net result is a DPRK more confident in covert bulk logistics at scale, a key enabler for future arms trade or wartime sustainment.[11]

Shortrange missiles: accuracy, trajectories, and seeker/guidance tuning

Open-source assessments contend that KN23family SRBMs supplied to Russia have been used in Ukraine, with Russian technical specialists reportedly helping refine accuracy and maneuver profiles. An upgrade to KN23 derivatives has

raised performance and variants like Hwasong-11M showcase lift-glide behaviors that stress air defenses. This two-way axis, missiles sent to Russia, enhancements returning to the DPRK, helps the DPRK solve for terminal guidance, inertial drift, and quasi-ballistic maneuvering against Patriot class interceptors. In a peninsula contingency, this translates into more accurate strikes on airbases, C2 nodes, and logistics hubs in the ROK and possibly Japan, compressing engagement windows for the Korean Air and Missile Defense (KAMD) and the Aegis Combat System.[12]

Solid-fuel ICBMs: propulsion maturation and readiness

State media claims in September 2025 that the "final ground test" of a high thrust solid-fuel ICBM engine had been completed, following months of iterative trials, which fits a pattern of maturing solid propellant competencies. Solid-fuels reduce launch preparation time from hours to minutes, increase survivability, and enable dispersed TEL operations. Images and claims cannot be independently verified, and headline thrust numbers are likely inflated, but multiple outlets (AP, DW, Al Jazeera) captured the significance, a transition from concept to a testable, deployable system.

Combined with DPRK displays of "Hwasong 18" variants and talk of a "Hwasong 20," Pyongyang is narrowing the gap between rhetoric and a credible, quick-firing ICBM force with improved reload and launch-on-warning potential. Russia's constellation of engineers and the DPRK–Russia political shield plausibly shortens troubleshooting cycles on grain, case bonding, and nozzle control, areas where sanctions had previously slowed progress.[13] Indicators of full range tests, depressed trajectories, and improved bus control would mark a step change in threat credibility.

> ***"The DPRK conducted test flights of its new airborne early warning and control (AEW&C) aircraft in March 2025. The transfer of Russian data-link technology would be the final step in allowing the AEW&C to pass real-time target coordinates directly to KPAF cockpits, turning a surveillance platform into an active battlefield management system.***

Space based ISR and kill chain integration

The DPRK's reconnaissance satellite program remains inconsistent, marked by a successful 2023 launch followed by several failed attempts and design pivots through 2025. Despite these setbacks, steady improvements in satellite bus reliability, downlink stability, and tasking protocols, when fused with commercial imagery, will provide the KPA with significantly enhanced targeting data for its missile and long-range artillery units. Conversely, Seoul's completion of the five-satellite Project 425 SAR constellation in November 2025 creates a sharper asymmetry in the South's favor. For Pyongyang, the takeaway is that even imperfect eyes in space tighten the kill chain for SRBMs and cruise missiles. For Seoul, it shows that the DPRK will double down on satellite launches both for military utility and political theater, especially while Moscow offers diplomatic and technical cover.[14]

Recent Modernization of Fighter Jets

The Korean People's Army Air Force (KPAF) is

dominated by Cold War-era platforms[15] such as the MiG-15, MiG-17, MiG-19, and MiG-21, with only the MiG-23 and the MiG-29 representing more recent yet still dated, Soviet-era acquisitions. All these models are legacies of previous exchanges with the USSR. In 2024, however, Admiral Samuel Paparo, commander of the United States Indo-Pacific Command, reported that the DPRK was set to receive Russian MiG-29 and Sukhoi Su-27 fourth-generation fighters. More recently, a study conducted by the Friedrich Naumann Foundation for Freedom stated that between 8 and 22 fighter jets were already transferred to or were currently being transferred to the DPRK, suggesting a potential value of these transfers between $210 million and $880 million.[16]

A gradual integration and modernization of MiG-29 and Su-27 aircraft within the KPAF could significantly enhance the DPRK's air defense and air superiority capabilities. A critical challenge, however, lies in pilot training and technical maintenance expertise, gaps that could substantially limit the country's operational effectiveness. Notably, some reports suggest that DPRK pilots may currently be present in Ukraine.[17] While these fourth-generation planes are still outperformed by ROK F-35s, they represent a significant boost in air-defense capability. Rather than a total shift in the balance of power on the Korean Peninsula, these newfound capabilities could complicate a possible allied air campaign.[18]

> ***"The most decisive learning for the DPRK occurs where it has the least modern combat experience i.e., drone-saturated, sensor rich, EW-contested battlefields. The KPA's exposure, both directly through deployed units and indirectly through weapon performance feedback, is sharpening its understanding of camouflage, deception, dispersion and mesh communication under jamming.***

Radars and Airborne Early Warning and Control Aircraft

The recent acquisition of fighter jets introduces a qualitative leap in the DPRK's aerial detection capabilities. Both the MiG-29 and the Su-27 are equipped with Phazotron pulse-Doppler radars, which provide the KPAF with its first reliable look-down/shoot-down capabilities.[19]

In addition, the DPRK conducted test flights of its new airborne early warning and control (AEW&C) aircraft in March 2025. AEW&C aircraft are crucial for aerial surveillance and battlefield management, significantly extending radar-detection ranges. The DPRK's AEW&C aircraft is adapted from an Il-76 airframe, the same transport aircraft used as the base for Russia's A-50,[20] therefore demonstrating a clear resemblance, indicating a possible sensitive military technology exchange. Additionally, similarities between the system and known Chinese designs were confirmed after the release of satellite views in March 2025.[21] Although developing an Il-76-based AEW&C platform could offer some benefits to the KPAF, especially improved monitoring of ballistic and cruise missile tests and valuable hands-on experience with such systems, the lim-

ited air-to-air capabilities of the current fleet significantly undermine the value of this possession. Extracting meaningful operational utility from it would ultimately require the procurement or development of modern fighters equipped with compatible sensors, missiles, and data-sharing capabilities. Crucially the transfer of Russian data-link technology would be the final step in allowing the AEW&C to pass real-time target coordinates directly to KPAF cockpits, turning a surveillance platform into an active battlefield management system.[22]

The Nuclear Submarine Leap

The Korean People's Navy (KPN) recently unveiled a massive new SSBN submarine at the Sinpo Shipyard.[23] Displacing an estimated 8,000 tons, this vessel marks a decisive break from the DPRK's reliance on aging, Cold War-era Soviet designs.[24] The platform features a rather unusual configuration of ten SLBM silos mounted directly in the sail, a design choice not seen on any other active SSBN globally.[25]

The rapid appearance of a nearly completed hull after years of stagnation has led analysts to conclude that the wartime partnership with Moscow is likely the primary catalyst. The completion of the hull indicates that core internal components, such as the engine and reactor, may already be integrated as submarines are usually constructed from the inside out.[26] While some experts argue against a direct hardware transfer, noting that fitting a secondhand Russian reactor into a new DPRK hull is technically almost impossible, the consensus is that Russia has provided the blueprints and the technical expertise.[27] This allows Pyongyang to bypass decades of trial and error in naval-reactor design.

The transition to nuclear propulsion fundamentally alters the balance of power. Unlike conventional submarines, a nuclear-propelled submarine can remain submerged for months, nearly eliminating the "indiscretion rate", making it exceptionally difficult to track. For the DPRK, this could lead to a credible second-strike capability within a timeframe of one to two years, a nuclear deterrent that can retaliate even if land-based launch sites are destroyed. On a global scale, this elevates the DPRK's maritime reach into the North Pacific, allowing it to hold the U.S. mainland at risk and forcing a complete overhaul of regional anti-submarine warfare (ASW) and international deterrence models.[28] The ramifications of these newfound capabilities underscore the unprecedented depth of the bilateral partnership and the extent to which Moscow is prepared to strengthen the DPRK's strategic reach in the years ahead.[29]

> ***By sending workers and engineers to Russia's Yelabuga drone factory, Pyongyang has secured the industrial know-how to mass-produce suicide systems at domestic sites like the Bangyon Aircraft Factory. This "drone-for-knowhow" exchange allows the DPRK to supply Russia's front lines while simultaneously building capacities capable of saturating South Korean air defenses.***

Counterdrone, EW, and Combined Arms Tactics

The most decisive learning for the DPRK occurs

where it has the least modern combat experience i.e., drone-saturated, sensor rich, EW-contested battlefields. As digital transparency increasingly replaces the "fog of war", the DPRK'S traditional reliance on massed artillery and large formations is becoming a liability. Persistent drone surveillance by commercial off-the-shelf (COTS) systems, linked to a shortened kill-chain for FPV drones, suggest a trend toward a "Transparent Kill-Zone" where movement without overhead cover or signature management invites immediate attrition.[30]

Furthermore, darkness and heavy foliage previously viewed as primary defensive shields for infiltration, are increasingly serving as high-contrast backgrounds for thermal-equipped drones. Combined with the six degrees of freedom inherent to FPV systems, this suggests that projectiles can now spatially bypass horizontal cover by flying directly into bunker openings, trenches and small structural gaps, mandating immediate adaptation within DPRK's training cycles and combat doctrine.[31]

> ***"The strategic dividends Pyongyang has gained from its involvement in Ukraine, ranging from battlefield intelligence to sanctioned material relief, have established a successful blueprint that the DPRK could apply to the escalating conflict in Iran— thereby transforming itself from a regional outcast into a central pillar of a global, anti-Western supply axis.***

The KPA's exposure, both directly through deployed units and indirectly through weapon performance feedback, is sharpening its understanding of camouflage, deception, dispersion and mesh communication under jamming. Crucially, it highlights a revolution in innovation cycles, which have been reduced to days or weeks rather than years and[32] a shift toward a "micro-combined arms" model, where small, dismounted units organically integrate their own reconnaissance and precision-strike "pocket artillery" rather than relying solely on top-down, battalion-level synchronization.[33] This learning is already surfacing in DPRK training rhetoric and officer conferences focused on "qualitative change" as noted by analysts tracking KPA training cycles. In a future peninsula contingency, these lessons may translate into a more elusive and technologically integrated KPA, shortening a learning curve that previously hinged on simulators and exercises rather than active battlefield exposure.

Loitering Munitions and the Strategic Calculus of Attrition

The prolonged deployment of low-cost loitering munitions, such as the Shahed, has demonstrated a transformative impact on the battlefields of Ukraine and the Middle East, signaling a trend where more nations seek to adopt similar systems. By sending an estimated 12,000 workers and engineers to Russia's Yelabuga drone factory,[34] Pyongyang has secured the industrial know-how to mass-produce suicide systems at domestic sites like the Bangyon Aircraft Factory.[35] This "drone-for-knowhow" exchange allows the DPRK to supply Russia's front lines while simultaneously building capacities capable of saturating South Korean air defenses. For South Korea, the implications are severe. The current conflict in the Middle East shows that even highly established missile defense architectures, such as the Iron Dome or the Patriot system, face significant challenges when confronted by massed drone swarms. The

strategic utility of these low-cost systems lies in their ability to be deployed in massive swarms, which can saturate the defensive perimeter and create openings for more sophisticated precision missiles. Furthermore, the asymmetric cost of intercepting targets can lead to a financial disaster for the defender, highlighted by the gap between a Patriot interceptor costing roughly $1-4 million, whereas a Shahed-class munition is estimated at between $20,000 and $50,000.[36] Consequently, the ROK must prioritize the development of specialized interceptor drones and energy-based defense systems to restore a favorable cost-exchange ratio against this emerging threat.

The current conflict in Iran underscores the strategic advantage gained from direct battlefield experience in drone-centric warfare, as evidenced by the expertise exchange between Ukraine and the U.S. to counter these weapon systems more effectively.[37] The ROK would likewise need to draw upon Ukrainian operational insights to counter the Russian-DPRK knowledge exchange.

Political Economy and Sanctions Evasion: Breathing Room and Bargaining Chips

Wartime cooperation with Moscow has diversified Pyongyang's lifelines. Reports and official statements indicate Russian provision of refined petroleum above UNSC caps, food shipments, and possibly limited air defense systems, in exchange for munitions, missiles, and labor. Estimates of economic gain vary widely; some South Korean analysis claimed windfalls in the tens of billions in 2025, while other studies argued that Pyongyang received far less direct value.[38] However, the key change is qualitative. Russia's political decision to ignore or hollow out sanctions enforcement and to create mechanisms, such as banking ties, shipping corridors, and labor placements, is systematically eroding pressure tools. With the UN Panel of Experts shuttered, the MSMT has documented violations but cannot impose enforcement, reducing reputational costs for potential facilitators.[39]

This environment increases Pyongyang's bargaining power, as it can now calibrate deliveries of shells, missiles, and manpower to extract specific concessions from Moscow, including assistance on satellite components, missile guidance, or air defense radars. The Kremlin, in turn, uses UN instruments to blunt scrutiny of DPRK violations and can signal that it will veto or water down punitive motions. The result is a "gray market alliance" where transactions are political acts, not just trades, and where each new transfer normalizes the last. For long-term sanctions strategy, this implies focusing less on headline embargoes and more on the firms, ports, insurers, and banks underpinning the Rajin–Vostochny logistics spine.[40]

Beyond the tactical exchange, the Russian-DPRK alignment is actively eroding the global non-proliferation regime, raising concerns primarily around the Treaty on the Non-Proliferation of Nuclear Weapons (NPT). Russia's signature of the Treaty in 1968 establishes its responsibility to maintain and protect its principles, as it is one of the five nuclear weapon states under the NPT. However, by allying itself with the DPRK, a country that withdrew from the NPT in 2003 and has since violated its norms, Russia has undermined the Treaty's credibility. By declaring in September 2024 that the denuclearization of the DPRK was "off the table," Russia openly challenged the global non-proliferation regime, ignored relevant UN Security Council resolutions, and exacerbated regional tensions. A NATO statement from September 2024 further condemned this behavior, emphasizing the impact of such collaboration on Euro-Atlantic security.[41]

The Second Front Catalyst

The strategic dividends Pyongyang has gained from its involvement in Ukraine, ranging from battlefield intelligence to sanctioned material relief, have established a successful blueprint that Pyongyang is now likely seeking to apply to the escalating conflict in Iran. By observing how its industrial age firepower has secured 21st-century technology dividends from Moscow, the DPRK may view the Middle Eastern theater as another live combat laboratory to further stress-test its systems and expand geopolitical leverage. Following Operation Epic Fury, the DPRK transitioned from passive backing to becoming more overtly aggressive in its support for Iran's new leadership.

The DPRK's Foreign Minister has described the U.S.-led actions as "gangster-like", while Kim Jong Un has stated that one DPRK missile is enough to erase Israel.[42] Nevertheless, DPRK support for Iran is delicately calibrated, ensuring it does not cross any redlines that could threaten its own national security interests. This alignment is underpinned by a shifting dependency in the Russian DPRK-Iran triangulation, where an Iran forced to redirect its own drone and missile production for domestic defense would create a supply gap that the DPRK is uniquely positioned to fill.[43]

Such a scenario would further enhance Pyongyang's leverage over Moscow, allowing it to extract more sensitive Russian technology in exchange for sustaining the war in Ukraine. Ultimately, this burgeoning axis provides the DPRK with a degree of strategic autonomy from Beijing, as diversifying its lifelines through Moscow and Tehran reduces its historic dependence on China as its sole economic and political guarantor.

What Are the Long-term Impacts on DPRK through 2030

Pathway A: "Embedded Arsenal State" with expeditionary options

In this trajectory, the DPRK stabilizes an alliance of convenience with Russia. Periodic bursts of arms shipments and specialized KPA rotations continue under the cover of the 2024 treaty, while Moscow reciprocates with energy, agricultural goods, and selective tech assistance. Solid-fuel ICBM deployment matures into a usable deterrent, SRBM accuracy and maneuver profiles complicate allied missile defense, and rudimentary satellites deliver enough tasking to improve targeting. The KPA institutionalizes counterdrone tactics and EW denial. Pyongyang markets "combat proven" munitions to other clients, using Ukraine as proof of concept. Diplomatically, the DPRK leverages its relevance to demand concessions in any future talks, while Russia shields it from meaningful UN censure. The risk to the peninsula is persistent; crisis thresholds lower, test cycles intensify, and the cost to restore meaningful sanctions rises.[44]

Pathway B: "Overreach and Blowback"

A more aggressive DPRK, emboldened by learning and shielded by Moscow, oversteps with extended missile and satellite test series, cyber enabled thefts, and maritime provocations that generate a coordinated U.S.–Japan–ROK response that re-internationalizes sanctions enforcement outside the UN framework. Minilateral coalitions target the shipping firms, insurers, and banks facilitating the Rajin pipeline. Export control regimes tighten the flow of dual-use chips, composites, and energetics precursors. As interdictions bite, Moscow prioritizes its own war sustainment and trims costly tech transfers. The DPRK still benefits from past gains, but sustaining and scaling them gets harder, leading to a plateau rather than a breakout. The peninsula remains tense, but deterrence stabilizes at a higher level of day-to-day friction.[45]

Pathway C: "Strategic Diversification via Beijing"

China, wary of losing influence in Pyongyang to Moscow, offers targeted economic relief and political theater to reclaim leverage while nudging restraint on the most escalatory DPRK acts. Beijing tolerates the Russia–DPRK pipeline but insists on deniability and guardrails. For the DPRK, this triangulation diversifies support and reduces reliance on Russia's wartime economy. Capability growth slows, but the regime's survival tools strengthen. For the region, this creates a more complex diplomatic landscape, where deterring specific DPRK behaviors requires synchronizing messages to both Moscow and Beijing.[46]

Implications for Stakeholders: What this Means Beyond Pyongyang?

For the ROK and Japan, the net effect is a more survivable, more accurate DPRK strike complex backed by a learning adversary that has rehearsed modern EW-heavy combat. Defense planners should assume higher SRBM hit probabilities against key nodes, greater use of depressed, maneuvering trajectories to defeat missile defense, and more persistent drone harassment of rear-area logistics. Civil resilience, the ability to ride out long range harassment of energy and transport infrastructure, must be treated as a first-line deterrent asset, not an afterthought. Trilateral mechanisms born at Camp David must translate into co-produced munitions, shared stockpiles, and common counter UAS/EW architectures that cut detection to intercept latency.[47]

For the United States and Europe, the DPRK experience in Ukraine is a case study in how sanctioned states exploit alliance gaps. Future assistance to Ukraine should prioritize munitions volume (artillery and air defenses) to deny Russia the benefits of DPRK shells. Sanctions should shift to the maritime, insurance, and rail nodes that move DPRK goods, and export controls should home in on composite materials, guidance components, and energetics. Supporting the MSMT with data, naming and shaming, and synchronized national designations can rebuild some of the enforcement lost at the UN.[48]

For multilateral institutions, the lesson is that process without enforcement is performative. Sustained container flows above 2024 peaks signal that sanctions friction is insufficient and cannot reach significant DPRK stock depletion.[49] The MSMT's first report demonstrates that a coalition can document and attribute, the next step is to operationalize consequences through coordinated customs actions, insurer blacklists, and seizures. Replicating this model for other sanction busting corridors (e.g., Iran–Russia) would raise the global cost of illicit arms pipelines and shrink the diplomatic safe harbor that the DPRK currently enjoys.[50]

Overcoming Structural Limits: Indicators to Watch

The evolution of the KPA since its deployment into Ukraine can be understood best as one of optimization rather than a sudden strategic revolution. Whereas the lessons of combat serve to yield important insights, there remain numerous structural limitations within the KPA that may limit both the pace and scope of its modernization process. The transition of knowledge from special-purpose units into full-scale force readiness will require that the DPRK overcome key systemic limitations associated with training, integration, and sustainment capabilities. Certain key indicators can be used to track such development.

Scaling Drone Integration. The primary structural limit at the tactical level is the gap between the elite Storm Corps and the broader KPA infantry.

While specialized units have integrated micro-combined arms and drone warfare, scaling these lessons across a million-man force is an immense logistical and training hurdle. Indicators to watch are the inclusion of squad-level FPV drone integration and the local production of OWA systems based on the Russian Geran model.

Sensors and Datalinks. In the aerial domain, the new acquisition of fourth-generation fighters and the development of the AEW&C platforms represent significant hardware gains. However, the structural deficit in pilot training and the absence of a modern datalink architecture currently limit the operational effectiveness of these platforms. A crucial indicator of maturation would be coordinated sorties between the AEW&C aircraft and fighter jets, specifically demonstrating real-time datalink exchanges and sensor fusion between the two.

ICBM Technology. The transition to a credible multi-warhead (MIRV) ICBM force in combination with solid fuel technology would significantly enhance the DPRK's second-strike capability. To achieve this, Pyongyang must overcome challenges in grain case-bonding, heat-resistant nozzle control and precise bus separation. A full range flight test of a solid-fuel ICBM following the successful March 2026 ground trials of the 2,500 kN engine would serve as a definitive indicator of these capability improvements.[51]

Maritime Capabilities. While the unveiling of a large-scale SSBN at Sinpo suggests a leap in maritime reach, the KPN faces structural challenges related to naval reactor safety and hull integrity under operational pressure. It is unlikely that decades of engineering experience can be bypassed through knowledge exchange alone without technical complications. A sustained deep-water sea trial would signal that the reactor and propulsion systems have reached operational maturity, indicating a credible second-strike capability and a permanent shift in regional maritime deterrence.

Concluding Thoughts

The Ukraine war has given the DPRK something it has never had, namely a live, extended, modern combat laboratory for its munitions, missiles, and soldiers, coupled to a major power ally willing to pay in technology, fuel, food, and political cover. The result is a DPRK that is better at fighting, better at building, and better at hiding how it builds and fights. By establishing a successful blueprint in Ukraine, the DPRK could apply it to the escalating conflict in Iran, thereby transforming itself from a regional outcast into a central pillar of a global, anti-Western supply axis.

This development carries a multifaceted risk profile that challenges existing deterrence models. First is the danger of capability inflation, where DPRK leaders may over-infer from their successes in Ukraine, and possibly Iran, that their SRBM maneuvering will consistently defeat allied defenses, making them more aggressive in their crisis signaling, thereby increasing the risk of unintended escalation.

Conversely, if stakeholders overestimate Russia's willingness to share high-end technologies, they may underinvest in basic resilience, leaving societies vulnerable to low-end harassment that has proven strategically potent. A second risk is the normalization of expeditionary KPA deployments. If Pyongyang concludes that it can rotate units abroad without meaningful penalty, it may do so in other theaters, creating leverage points that complicate diplomacy and expose troops to additional modern combat lessons. Lastly, this opens the possibility of sanctions fatigue. Without visible enforcement wins, private sector com-

pliance could degrade, widening the gray zone that sustains DPRK programs.

Without a coordinated strategy to sever the logistics fueling this learning loop and a concerted effort to out-innovate the DPRK in counter-drone and EW, these technological leaps will permanently shift the regional balance of power. The DPRK's transformation is defined by a process of cumulative optimization rather than a leap to total superiority. By addressing its structural limits through iterative learning in Ukraine, Pyongyang is building a more resilient and decisive capability that remains largely insulated from the effects of conventional sanction regimes. Failure to deny Pyongyang these battlefield dividends will lock the Korean Peninsula into a state of enduring and unpredictable insecurity, where traditional tools of deterrence and sanctions are increasingly rendered obsolete by the new realities of expeditionary warfare.

Authors –

Dr. Niklas Swanström *is the Executive Director of the Institute for Security and Development Policy, Stockholm, and one of its co-founders. He is a Fellow at the Foreign Policy Institute of the Paul H. Nitze School of Advanced International Studies (SAIS) and a Senior Associate Research Fellow at the Italian Institute for International Political Studies (ISPI).*

Bastian Szepanski *is an intern for the Asia Program and the Stockholm Centre for Research and Innovation Security (SCRIS) at ISDP. He specializes in multilateral defense structures (NATO/EU) and the impact of emerging technologies on the modern battlefield, with a specific focus on drone warfare.*

Mathilde Huard *is an intern at the Asia Program and the Center for Research and Innovation Security (SCRIS) at ISDP. She holds a Bachelor's Degree in Political Science with a focus on History, Economic and Law from SciencesPo in Lille, France.*

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