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> Defence Logistics Reform in India: Lessons from Russia-Ukraine War

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Abstract

A well-developed logistics infrastructure that is in tune with the operational requirements of a nation is vital for staying power, stamina and reach of any military. India, with its varied terrain, vast geographical expanse and complex security environment, poses major challenges with respect to its defence logistics system. With the nature of warfare undergoing a major change owing to development of technologies in the domains of AI, robotics, cyber and space systems & applications, drone and counter drone systems, miniaturisation of electronics, and precision technology have led to increased speed & tempo of operations, increased lethality and accuracy of mentions, dense information environment, blurring of lines between conventional and unconventional warfare (leading to emergence of hybrid warfare) and possibility of tech parity between state and non-state actors. The logistics system required in such an environment needs to be robust, endowed with a high degree of endurance, survivable, cost effective and highly flexible. Keeping in mind the logistic stamina required for any future war, true civil military fusion is the need of the day which would ensure economy of effort and a high degree of scalability. These brief major operational logistic lessons that emerged during the Russia Ukraine war, analyse their applicability in the Indian context and suggest reforms needed by the defence forces to adapt to modern warfare demands. This would call for doctrinal shifts, technological integration and structural changes required to create a robust, agile, and integrated logistics system capable of supporting India's defence forces in the 21st century.

Introduction

India's defence logistics infrastructure has evolved over the years to cater to the operational logistic requirements of its defence forces. While the current system has served us well so far, the requirements of current and future operational environment dictate that a review of the present Operational Logistics System be carried out in the right earnest. Evolution and infusion of cutting edge technology and its revolutionary impact on the nature of warfighting calls for a comprehensive overhaul of the current system.

The current Logistics system is ridden with inefficient and outdated practices, duplication of effort, lack of integration, endurance and meaningful automation and an antiquated infrastructure incapable of supporting fast paced and dynamic military operations of today. This brief aims to review the current state of defence logistics

b Lessons from the Russia-Ukraine War.

 \checkmark The Russia-Ukraine war has provided crucial insights into the centrality of logistics in high-intensity and protracted warfare. In the initial stages of war severe shortcomings in the Logistics System of the Russian Army precluded early success. So much so that long mechanised columns stuck on the road to Kiev became easy targets for the Artillery and drones of Ukraine and had to fall back ending Russia's Kiev offensive in an ignominious failure. In the subsequent phases of operations Russia got its act together and was able to make slow but steady advances in other theatre of operations. There is a need to study the Operational Logistic Lessons of this path breaking war so as to derive relevant lessons for the Indian defence logistics system.

\succ **Vulnerability of Static and Road-Based Logistics**

 \checkmark In the Russia - Ukraine war, long Russian columns especially during the Kiev offensive, became easy targets for Ukrainian drones and artillery. (Seth Jones, June 1, 2022). The reason for this was the inability of Russians to ensure supply of FOL (Fuel Oil and Lubricants), as also repair out of action tanks and other platforms.

 \checkmark Reliance on a single logistics system, especially in mountainous and border areas causes susceptibility to attacks, disruptions, and surveillance. There is a need for multimodal logistics that includes ground, air, and even autonomous systems to reduce risk.

\geq **Decentralized Vs Centralized System of Logistics**

The debate over whether to centralize logistics or to decentralize it has been endless. \checkmark Proponents of the Pull System, which represents a decentralized system where the lower echelons demand logistics based on expenditure and requirement vis-a-vis the Push System which represents a centralized system of supply of logistics and where logistics are pushed forward based on assessed consumption patterns. Pull system is flexible and push system by its very configuration is flexible and the push system by contrast, rigid. Push system works well where consumption happens as per laid down norms. Russian defense forces being highly centralized follow the Push system of supply of logistics, which did not work in this war as consumption figures outstripped assessed figures by a wide margin. The tendency to consider the Push System to be the panacea for all logistic problems needs to be avoided and a right mix of the two systems needs to be adopted.

Importance of Tail to Tooth ratio. \succ

While the proverbial Tooth is vital for any army and the Tooth to tail ratio (T3R) is an important determinant of combat efficiency, Tail too is no less important and its ratio visa-vis the teeth must not go down below a certain threshold. Russian army was handicapped with extremely low manning levels of logistics personnel as compared to combat personnel. (Berkowitz, Bonnie; Galocha Berkowitz and Galocha 2022), (Vershinin A 2021) (Ti Ronald 2022). In the western militaries T3R is low (Us army has a T3R of 0.1, meaning that for every combat soldier there are 10 support soldiers), in contrast Russian army has a much higher T3R of 6 which translates to one support soldier for every six combat soldiers. This is clearly not sustainable, and the impact was reflected in the poor logistic support within the Russian Army during the war.

\geq **Standardization and Interoperability**

Traditionally, Ukraine's armed forces used soviet / Russian origin equipment with much of it being produced in-house. Post 2014, a large amount of Western equipment from various sources was inducted into the Ukrainian army. This increased diversity would have created major problems for its logistics system in areas pertaining to inventory management, difference in procurement procedures and timelines, maintenance philosophies and operational usage. It is also likely to have impacted on the interoperability of various units and formations owing to differences in equipment.

Stockpiling.

✓ The obsession with economizing the defense expenditure has led to defense experts questioning large stockpiles of ammunition and spares. India was mandated to hold 60 days of war reserves (30 days Intense, 30 days normal, equaling 40 days Intense). Over time, we became obsessed with the concept of a short and intense war of about 20 to 25 days, which led to calls to further reduce the stocks from the currently mandated levels. With the recent wars like Russia – Ukraine and Israel – Hamas wars carrying on much beyond the periods which experts had contended that wars were supposed to last, there is a need to look at our stocking policies. Besides the above, there is a need to have a clear plan to achieve a capability to ramp up wartime production.

> Re-imagining Logistics for Contested Environments.

 \checkmark The conflict has brought forth a new paradigm of planning logistics for contested environments. Gen Landrum in his conversation with Air Marshal Stringer propagates a concept distributed logistics capable of rapid aggregation and thereafter equally rapid dispersal. key issues in this regard are given below.

• Disaggregated logistics networks: The distribution of supply nodes and capabilities enhances survivability against precision strikes.

• Command and control of dispersed assets: There is a need to have an appropriate command and control mechanism to manage widely dispersed logistics infrastructure and stocks for their efficient handling fast and appropriate decision making.

• Rapid Aggregation capability: The ability to concentrate logistics resources from widely dispersed locations is vital as timely availability of logistics resources at the

• Importance of Holding Adequate Stocks: Given that conflicts may be protracted and the fact that logistic movements are susceptible to disruption, need for holding adequate stocks as per a well laid operational logistics planning, debunking the popular "just-in-time" paradigm.

Questionable Medical Care.

✓ A vital aspect of military planning is how best to treat and transport wounded soldiers, ideally within the first hour after a trauma, there have been reports of inadequate medical support for Russian troops. Russia was not prepared to adequately support their soldiers in terms of their medical needs. Russia has sustained about 189,500 to 223,000 casualties, including up to 43,000 killed in action, The British Def ministry said Russia was hiring soldiers from the pro-Kremlin mercenary group Wagner.

Digital/ Real-Time Logistics Coordination.

 \checkmark During the conflict Ukraine leveraged digital tools, often of the Commercial off the Shelf (COTS) variety which resulted in efficient and dynamic management of logistics under fire (Kofman et al., 2022). In contrast, India still uses largely paper-based or semi-automated systems in the field. Using technological innovations like GPS tracking, AI enabled forecasting, and use of live dashboards are important for enhancing responsive and efficient logistics.

> Need for Integrated Tri-Service Logistics

 \checkmark The lack of coordination between Russian military branches hindered their supply lines.

✓ Conversely, Ukraine's joint logistics command improved efficiency (CSIS, 2023).

 \checkmark Separate logistics systems for the three services leads to inefficiency, hence joint logistics is a need of the hour.

 Establishing an integrated logistics command would allow unified planning and streamlined resource use.

Dependency on Foreign Spare Parts

 \checkmark Ukraine's dependence on spares support from western countries for weapons provided by them was a major logistic bottleneck which had a major effect on its force regeneration capability. India, with about 60% of its defense equipment from abroad faces a similar threat (SIPRI, 2023). Proactive pursuit of indigenous production under Atmanirbhar Bharat is a must for reducing our dependency on foreign sources.

> Need for Agile and Decentralized Supply Chains

 \checkmark Resupply of troops & retrieval of equipment for repairs suffers from the problem that it can easily be disrupted and interfered with. Following adaptations were made by Ukraine to mitigate this problem.

 \checkmark Use of small, decentralized hubs closer to the frontline from where logistics including rations and ammunition can quickly move to the forward echelons with ease. (Watling & Reynolds, 2022).

 \checkmark Use of drones and protected vehicles for resupply.

✓ A more decentralized, mission-oriented supply structure would improve resilience.

> Cyber and EW Threats to Logistics Infrastructure

✓ Cyberattacks disrupted Russian logistics coordination, highlighting the vulnerability of digital infrastructure (Rid, 2022).

 \checkmark India's defense logistics networks are still not hardened against advanced cyber or electronic warfare (EW) attacks.

Prioritizing cybersecurity and EW resilience is vital to protect critical supply lines.
Lack of Civil-Military Logistics Integration

✓ Ukraine effectively mobilized civilian infrastructure—commercial transport, drone tech, and crowdsourced supplies—into its military logistics (Galeotti, 2022).

✓ India's logistics planning has minimal civilian integration.

 \checkmark A wartime logistics model should include partnerships with Indian Railways, private logistics firms, drone startups, and local industries.

> Force Regeneration and In-Situ Equipment Recovery Failures

 \checkmark One of the major factors behind the failure of Russia's Kyiv offensive was its inability to regenerate combat power quickly.

 \checkmark Russian forces left large quantities of unserviceable equipment on the battlefield due to poor maintenance infrastructure, lack of recovery vehicles, and absence of mobile repair units (Kofman & Lee, 2022).

 \checkmark These force regeneration failures prevented Russia from maintaining momentum, leading to withdrawal.

 \checkmark For India, this highlights the urgent need to invest in forward repair capabilities, mobile workshops, and modular logistics units that can restore vehicles and weapons in combat zones.

 \checkmark Without this, Indian forces may face similar degradation of combat effectiveness during sustained operations.

Summary of Lessons for India from the Russia-Ukraine War

 \checkmark Force Regeneration: India must enhance the speed and scale at which it can replenish combat units after attrition.

 \checkmark Strategic Reserves: Maintain fuel, ammunition, and spare parts stockpiles near likely theatres.

 \checkmark Industrial Base: Invest in dual-use industries and civil-military fusion to rapidly scale production.

✓ Cyber-Resilient Logistics: Protect digital logistics networks from interference.

 \checkmark Rail-Air-Highway Synergy: Develop multi-modal transport corridors with military application.

 \checkmark Modular Logistics Packages: Build adaptable, mission-specific logistics units that can be deployed quickly.

✓ Unified Logistics Command across services.

- \checkmark Pre-position Supplies in northern and North-eastern sectors.
- Need to incorporate I driven automated systems for better predictive planning.
- Strategic Infrastructure modernization in border regions.
- Joint Doctrine and Training for all logistics personnel.
- \checkmark Expand Strategic Lift Capabilities, especially air mobility.
- Cyber and Space Security for logistics systems. \checkmark

Conclusion.

Russia Ukraine war has underlined the need for all armies to take a hard look at their respective logistic systems. With various long held paradigms like the one concerning the duration of war getting shattered, there is a need to bring in reforms in the Defence Logistics. Many of the lessons that have been highlighted above are relevant for India and there is a need to study these lessons so that relevant changes and reforms can be made in our logistics systems and infrastructure. FOR LAND WAREA

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