Recalibrating Defence Indigenisation

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Abstract

The 'Make in India' initiative was launched by the Indian government to make India self-reliant in major weapon platforms. A number of enabling provisions were rolled out to provide the desired traction to Atma Nirbhar Bharat. An analysis of the ground covered indicates that systems reaching a stage of maturity are primarily those on which Defence Research and Development Organisation (DRDO) has put in sustained effort over a period. Platforms that are at various stages of induction are those having substantial, at times more than 50 per cent import content. This is bound to create critical vulnerabilities in any prolonged conflict. In pursuit of new acquisitions, the Do Nothing Syndrome for legacy systems aggravates conventional readiness, ushers hollowness, and puts the defence budget into a tailspin. The army ends up possessing thousands of platforms but only a fraction is truly fully mission capable.

The grave consequences of employing such legacy platforms in the war in Ukraine are there to see and have thrown up important lessons. In 1973, during the Yom Kippur war too, initial setbacks suffered were a big learning experience for Israel which set out to achieve self-reliance. Half a century later, it figures amongst the top 10 exporters of arms in the world. India too needs to evolve a strategy to accelerate self-reliance. Achieving technological parity with China by 2045, or earlier, should be the under pinning philosophy of this strategy. Such a goal can provide technology security to India besides enhancing strategic assurance and influence amongst friendly foreign nations. The article gives out a road map to accelerate self-reliance, making the 'Make in India', a truly global brand in the stride.

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Background

It has been a while since the Make in India policy was launched by the govt to make India self-reliant in major weapon systems. A number of initiatives were rolled out to provide the desired traction to Atma Nirbhar Bharat; the promulgation of the Indigenisation Lists, Innovation for Defence Excellence (IDEX), supporting pole-vaulting in Research & Development (R&D) through Innovations for Defence Excellence for Developing Niche Technologies. There is also the provision of Technology Development Fund (TDF) under DRDO for upgrades, incubating game changing technologies and providing a firm base for self-reliance in weapon platforms. However, an analysis of the ground covered indicates that systems reaching a stage of maturity are primarily those on which DRDO has put in sustained efforts over a period ; like missiles, helicopters, marine vessels, fighter aircraft, combat bridges, towed gun system, etc. Nothing concrete seems to have emerged from the industry, either in niche or foundational technologies or conventional hardware. Whatever platforms are at various stages of induction, incorporate substantial, at times more than 50 per cent import content at hardware and software level. This is bound to create critical vulnerabilities in any prolonged conflict.

Stockholm International Peace Research Institute has ranked India as the largest importer in the world for the period 2018-2022, accounting for 11 per cent of the imports, followed by Saudi Arabia at 9.6 per cent.[1] Russia, France, and the US are the largest suppliers to India, accounting for 85 per cent of the imports. The implication of this large import dependence on structural readiness and military effectiveness is not difficult to visualise; a huge outflow of capital for life cycle sustainment, the absence of which will push the military towards hollowness i.e., tanks, guns, missiles, radars, and soldier systems without skilled personnel and spare parts to keep them running, giving appearance of readiness when in fact the capability is really not there. Add to this, the large scale battlefield attrition seen in the war in east Europe and one can visualise the rapid degradation of combat power with each passing day of wars in the future. Responsive industrial and maintenance surge will be essential for operational effectiveness. Traditionally, sustainment readiness issues find few takers in the army where

the thrust is more on acquisition of new gadgets. Engineering support remains firmly positioned on the back burners, a third class activity behind logistics (rations, general stores, ammunition). Lately, emergency procurement has kicked in, adding to complexity and diversity of equipment. Its impact on operational effectiveness remains a moot question.

Speaking at the India Today Conclave, the Chief of Army Staff (COAS), when asked about the major lessons that have emerged from the ongoing conflict in east Europe, stated that the significance of hard power has been reinforced and land warfare remains the decisive domain in our context. The duration of wars will no longer be short and swift as war could be prolonged by the adversary, spanning multiple domains. Hence the importance of self-reliance to support the war effort. These observations from the COAS should initiate a rejig in the manner the army handles its acquisition to turbocharge army's capability development initiatives and consolidate strategic readiness. Traditionally, acquisitions have been based on first-past-the-post principle. Given the complex acquisition procedure and stringent QRs, new acquisitions often get delayed, inservice platforms await reset and backlogs spiral.

The Capability Problem

In the never ending race for new acquisitions, budgetary support for Maintenance, Repair and Organisation infrastructure and resources has become scarce, so much that serious equipment capability gaps surface due to technological obsolescence. Operationally, these gaps need to be plugged immediately through technology insertion. Absence of indigenous innovation,and dependance on foreign supply chains for upgrades and spare parts leads to cost and time overruns. Such defence thinking results in a 'Do Nothing Syndrome', which aggravates conventional readiness, ushers hollowness, and puts defence budget into a tailspin. The army ends up possessing a fleet of thousands of platforms but only a fraction are mission capable. Figure 1 illustrates the expanding capability gap with time.

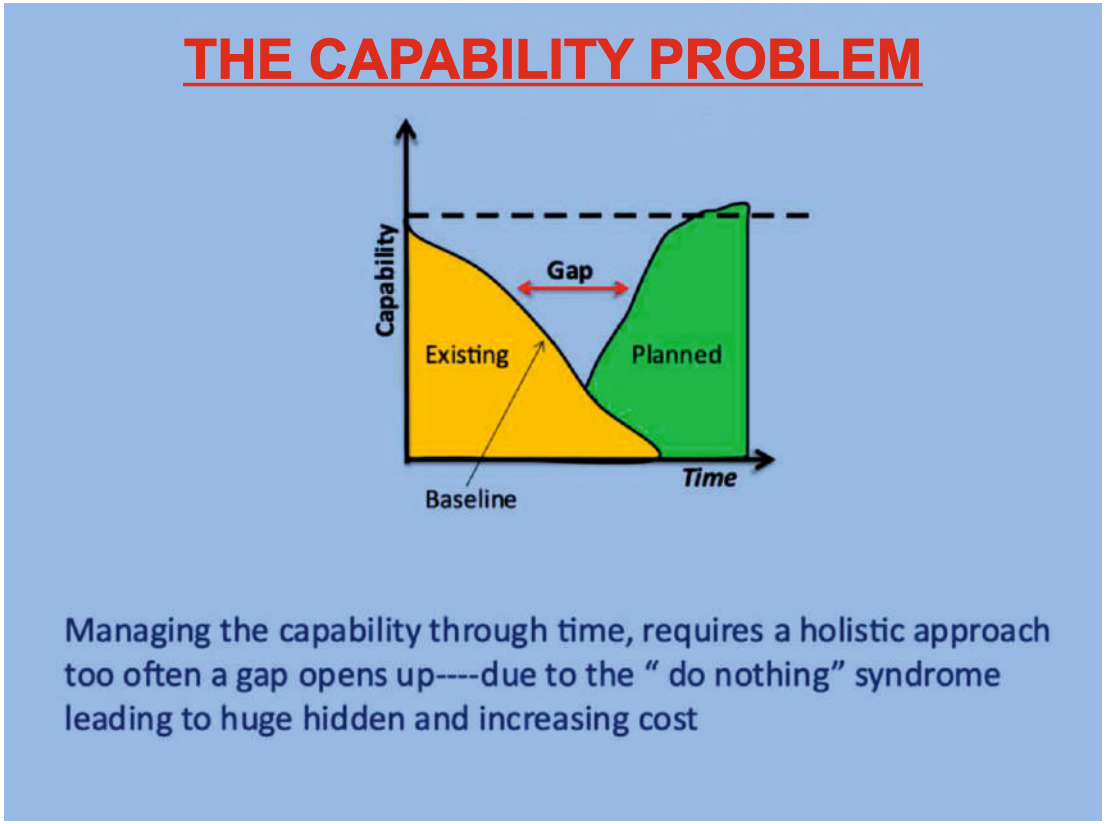
THE CAPABILITY PROBLEM
Capability
Gap
Existing
Planned
Time
Baseline
Managing the capability through time, requires a holistic approach
too often a gap opens up----due to the " do nothing" syndrome
leading to huge hidden and increasing cost

Figure 1

The grave consequence of such hollowness is visible in the war in Ukraine which has thrown up important lessons. The most significant lesson is that readiness is a complex attribute that dissipates with time. It cannot be taken as a constant factor. Skills and competencies are lost due to move of personnel and early retirement while platforms become unreliable with age and usage. Even if platforms are taken out from deep freeze (preservation and mothballing), their performance cannot be assured, without painstaking engineering support before and during combat. Mechanical failures and heavy attrition grounded the Russian advance to Kiev. The Russian military lost its reputation as an invincible fighting machine, despite large no of platforms and huge stockpiles of ammunition. Malfunctioning platforms and attrition caused by drones, precision fires, and Special Forces denuded its combatpower. Ukraine has suffered heavily in terms of military hardware, destruction of powerand communication infrastructure, industrial base, roads, and human lives. This has seriously impacted its operational readiness for the long haul. Being short on industrial and maintenance surge, it has barely sustained a readiness rate of 50 per cent.

Since a large portion of the army's inventory specially the big four or five platforms is of Russian origin, it is important to review the performance of these weapons and identify critical vulnerabilities. This will enable a holistic assessment of equipment capability gaps and resilience of formations for long drawn operations. In this war in East Europe, demand for ammunition, complex platforms and spare parts has far outstripped the industrial capacity of both the warring sides, and their allies.

Equipment Performance and Force Regeneration

One factor that stands out clearly is that weapons designed to meet the doctrinal needs of any nation cannot be employed as such in any other operational environment. Knowledge of platform vulnerabilities by the adversary could enable exploitation of such gaps by launching a surprise, as was achieved by Ukraine in the destruction of Russian warship Moskva and large no of tanks, infantry fighting vehicles, Infantry Carrier Vehicles (ICVs), guns, and combat vehicles. This is the foremost reason for India to put defence self-reliance in the overdrive, since PLA has deep insights into the technologies behind Russian systems and has established

a versatile Defence Industrial Base (DIB) that has rolled out state of the art bespoke platforms using a mix of Russian and western technologies. It has emerged as the fourth largest arms exporter cornering 5.2 per cent of the global arms trade. It, thus, possesses the industrial capability to rapidly transform into a war economy to support long duration conflicts.

According to Oryx, a Dutch Open-Source Intelligence defence analysis website, and media reports, Russian forces have suffered very heavy attrition. Around 1500 tanks were destroyed and 440 captured of which approximately. 160 tanks were damaged or abandoned which could have been recycled with forward repairs. Around 60 per cent of artillery guns were damaged. Total losses of other combat vehicles were close to 4000. It is estimated that 50 per cent platforms could have been regenerated with close engineering support, as drone attacks, missiles and other shoulder fired weapons normally immobilise platforms. Despite these losses, Russia's investment in Strategic Readiness (SR) and industrial resilience has placed it in a relatively stronger position to thwart the Ukrainian counter offensive.[1] SR in military terms is the ability to architect, manufacture, maintain, and balance combat capabilities to provide an operational overreach to the military across multiple domains. It flows out of Comprehensive National Power (CNP) which is a composite measure of economic, demographic, military, diplomatic, industrial and technological capabilities.

An important finding is that performance benchmarks of equipment achieved during combat operations were sub par, leading to frequent malfunctions and low usage rates. This issue assumes critical importance in our context where platforms are being deployed in much harsher terrain and weather conditions that adversely impact residual useful life and performance. Hence the need to not only preserve equipment capability but also to evolve quantifiable metrics of performance for regular measurement of operational readiness rates. This will enable the army to be forearmed for intensive, long drawn combat operations. Akin to the feat accomplished by Israeli Defence Forces (IDF) during Yom Kippur War, force regeneration at the Line of Actual Control could emerge as a significant combat enabler, hence, the need for self-reliance and industrial resilience.

Israel's Shift to Self-Reliance

In 1973, IDF were struck by a massive strategic surprise which sent them scrambling to hold back the Arab military, both in Sinai and Golan Heights. Israeli armour, that moved out to launch counter attacks, was met with swarms of infantry operated anti-tank guided missiles. Israeli losses were so staggering and it shook its military to the core. In first three day of the war IDF had lost 400 tanks and 44 aircraft that rose to 109 by the end of the war. All in all, IDF had 840 damaged tanks. Half of these were fixed and returned back into action. Of the 236 aircraft that were damaged, 215 were repaired and returned in a week. Such rapid was the dissipation of combat power that Israel had to turn to the US for supply of fighters, tanks, armoured personnel carrier and artillery pieces.[2]

This setback was a big learning experience for Israel, which set out to achieve self-reliance from the very next year. Half a century later, it has not only secured itself with an Iron Dome but also figures amongst the top 10 exporters of arms in the world. A remarkable achievement! This impressive journey has been made possible due to consistent support of government and effective technical leadership of the IDF. Growth of defence industry was achieved by a blend of imported technology and Israeli innovation courtesy domestic and foreign firms. A well planned and efficient government intervention facilitated establishment of a versatile DIB and emergence of government-owned conglomerates like Israel Military Industries, Israeli Aerospace Industries, Rafael Advanced Defence Systems, along with a host of private companies. A focussed R&D funding programme providing up to 66 per cent match by government for innovative projects, with no repayment requirements, accelerating the process. Former IDF members provided knowledge leadershipin pushing innovations into the development pipeline. Israel's trailblazing of this difficult course has created the Tel Aviv Haifa Information And Communication Technology (ICT) Corridor (Figure 2); an outstanding example of how government support, hand holding by the military, and a collaborative culture can make the dream of self-reliance a reality.[3]

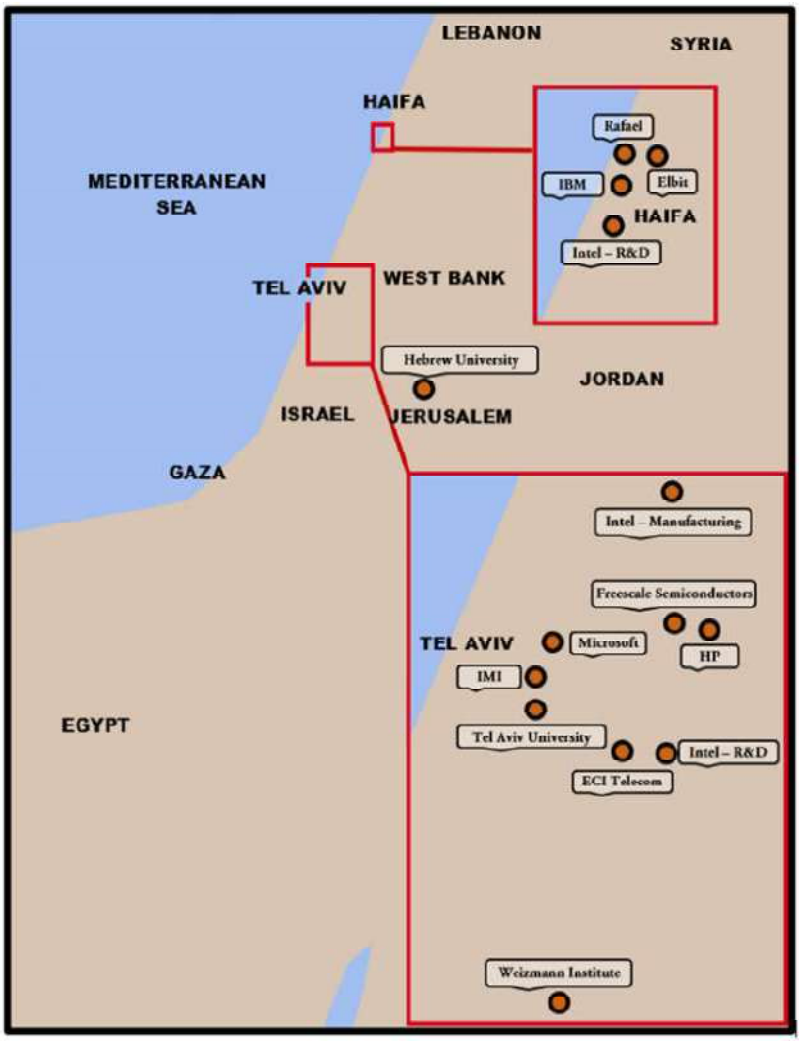

Figure 2 : Tel Aviv Haifa ICT Corridor

Indian Defence Industrial Base

A unique advantage of the Indian industry is that it is modern, matching global standards of manufacturing with adequate availability of local talent. However, indigenous innovation and creativity leaves much to be desired. Supply chains too are dependent on foreign sources for materials and lack capability and capacity. A host of in service platforms, rolled out under Transfer of Technology (TOT) from the government owned DIB

are still dependant on foreign Original Equipment Manufacturers for critical spare parts. This can put the military on backfoot in case of hostilities. The country has capabilities to design and manufacture complex platforms like fighters, helicopters, howitzers, and aircraft carriers. Some very niche industrial capabilities have been created in private sector like low earth orbit satellites, unmanned systems, payloads and munitions. However, the performance has been achieved mostly using foreign foundational systems like propulsion, navigation, sensors, aviation suite, weapons, etc. This is a vital industrial capability gap. Localisation of 4000 odd components has reduced imports from 46 per cent to 36 per cent, but serious efforts have to be made beyond these lists towards generic, foundational and game changing technologies. It can be done by providing conditions that enable our youth to innovate ahead of the world.

To achieve this, private enterprises need to join not as competitors but as partners. If more than 50 per cent of the sub systems for Tejas or Arjun or Vikrant are ex-import, it is important to shift focus to indigenisation of sub systems alongside components, using the enormous intellectual firepower of our youth and Non-Resident Indians. TDF/IDEX initiative should provide mission oriented funding for projects that seek to address technological capability gaps. Government backed venture funds and recruitment of overseas talent could be considered. The aim should be to manufacture next generation platforms with locally developed foundational systems and generic technologies. A strong DIB can help achieve this. The US military has always been supported by very high levels of technology that has increased its mobilisation readiness and resilience. This has been possible because of its versatile Military Industrial Complex.

Eco System of DIB

A calibrated development of DIB is essential to achieve self-reliance. It cannot be left to evolve on market forces else the end result may be half baked as has happened with a number of free trades zones and high tech parks. It needs to be scripted according to a planwith pre-defined milestones.The DIB comprises:

- **Prime Contractor or Systems Integrator.** An entity with industrial capability to deliver a complex system or product like an armoured fighting vehicle, ship, or aircraft. It requires

high grade systems engineering skills, processes and tools to integrate a complex system and testing facilities to test and prove system functionalities.

- **Partial System Manufacturer.** These manufacture independent systems which can work in a standalone mode or become relevant when integrated to a platform e.g., air defence missile, radar.

- **Sub-System Manufacturer.** These are specialist's outfits that manufacture systems and foundational modules like mobility, fire power, survivability; which give a capability only when integrated with the platform e.g., a power pack, or aero engine.

- **Component and Aggregate Manufacturers.** These entities, generally Micro, Small & Medium Enterprises (MSMEs), provide finished assemblies/aggregates/Line Replaceable Units which form part of a sub-system/system e.g. engine parts, printed circuit board, power supplies, harnesses, etc.

- **Design Houses.** These are knowledge based organisations (Design Authority) with unique systems engineering skills, a suite of modern modelling & simulation processes and tools and facilities to test & prove at system/ sub-system level. They pick up sub-contracts from prime SIs for designing/testing of system and have specialists who have deep insights into all levels of engineering of the system as a whole.

- **Anchor Institutions.** These provide finance from research grants to promote technological innovation and collaboration. They provide consulting, mentoring, lab testing, and TOT to move an innovation into the manufacturing pipeline. Anchor institutions like Category A establishments of the military, IITs, NITs have to encourage a culture of collaboration between the military, industry, and research institutes to enable creation of technology incubators and accelerators.[4]

Underpinning Philosophy

In order to achieve self-reliance in defence – a massive but achievable objective, it is important to lay down a guiding philosophy. The fundamental approach has to be spelt out alongside the end state to be achieved and resources to be made available. China was in near similar condition as India during the 70s, dependant on vintage platforms being manufactured under technology transfer from the then Soviet Union. The Chinese adopted the strategy of Introduce, Digest, Absorb and Re-innovate (IDAR) by on-boarding current technologies into legacy systems and developing weapons de-novo. Technology gaps were filled through import and joint ventures. This enabled them to transform their military and become a leading exporter of arms. Besides an enduring military capability, a vibrant DIB offers a number of advantages like strategic assurance, and influence, and civilian spin offs of technology. In the light of the above, how does India embark on its journey of self-reliance? Achieving technological parity with China could be the kernel of this philosophy. It is time to recalibrate the entire approach to self-reliance focussing on this end state.

Indian Development Strategy

I propose a development strategy centred on system effectiveness i.e., capability of platforms to accomplish stipulated missions in our operational environment. Development of new platforms may take several years. Hence, to retain military effectiveness; on-boarding of new technologies in legacy platforms to make this future ready and coverinterim risks, is indispensable. Such Capability Enhancement Programmes also fuel innovation and invigorate MSMEs. The corner stone of this strategy has to be a commitment by all stakeholders to the self-reliance call by the Prime Minister, hand holding of the industry, giving access to current technologies and platforms, experimentation, testing, course correction and retesting. A large portion of Israel's ICT achievements have been attributed to its hi–tech Unit 8200 that played a key role in providing advanced training and high quality technical support. DRDO and technical establishments of the military could provide the much needed facilitation to the industry to build up foundational know how to innovate and rebuild. This is the crux of what ails the indigenous innovation system –

knowledge sharing; a reluctance of government entities to share tacit and pragmatic knowledge and assist industry in experimentation and trials. It is only through a collaborative stance that local platforms will achieve system maturity to enable the military to out manoeuvre the adversary.

Strategic Planfor Self-Reliance

In order to achieve self-reliance and technological parity with the adversary, a long term view encompassing two to three decades becomes necessary. We should aim to achieve comprehensive technology security in the region by 2045. All activities have to take place under an overarching national strategy to optimise resources. The tremendous potential of game-changing technologies requires long term investment and consistent support by the government with a robust collaboration between the military and leading edge innovators. The following action plan could help channelize the nation's strengths towards this goal.

Short Term (2023- 2035). This could be a decade of knowledge consolidation, creativity, and collaboration to achieve self-sufficiency in foundational systems, generic technologies, and energetics that are essential to build platforms and munitions ground up. It could be through indigenous innovation and foreign collaboration using the technology insertion route. The US-India initiative on critical and emerging technologies can assist in the development of generic and radical technologies. Concomitantly, we need to establish world class system architecting, system engineering and life cycle system management skills and competencies. This will facilitate design and development of bespoke weapon platforms optimised for our operational requirements. Like the Production Linked Incentive scheme in manufacturing, the government could consider technology linked incentives for companies coming forward to develop foundational and game changing technologies.

Long Term (upto 2045). Aim at building ground up next generation combat systems for the military and export market, powered by indigenous innovation and foundational systems. Our weapon platforms should be able to out perform foreign designs and be affordable. A sustainable military capability resting on technological parity and technological dominance in some domains like cyber, electronic warfare, space, directed energy, energetics and munitions, advanced materials, etc. is sine qua non for India to be truly secure from external threats. End state 2045 should aim at

providing all-encompassing technology security to Mother India and a distinctive rise in our CNP. This would ramp up strategic readiness in all domains.

Conclusion

To become truly self-reliant in defence manufacturing, it is essential to recalibrate our gunsights, aim long term and stage forward in a calibrated, surefooted manner. The war in Ukraine has placed mass and technology on equal footing. The emerging threats in the sub-continent where war could open up on multiple fronts and domains, military effectiveness requires the military to be ready for operations over long durations. This will be feasible only if major platforms are designed and manufactured within the country, alongside a localised supply chain that canguarantee the depth to absorb losses and continue combat operations. Industrial and maintenance surge will provide the staying power and resilience and inhibit fighting forces from degenerating and fighting employing technological capital of World War II. We have to look at a fine the balance between combat usefulness, cost, and complexity of technologies. As we approach 100 years of Independence, it would be a befitting tribute to our freedom fighters if the goal of self-reliance is not only achieved but recognized worldwide by making the proud 'Make in India' brand, a truly globalbrand.

Endnotes

[1] India world's top arms importer in 2018-2022: SIPRI,https://imrmedia.in/india-worlds-top-arms-importer-in-2018-2022-sipri/

[2] https://www.oryxspioenkop.com/2022/02/attack-on-europe-documenting-equipment.html

[3] "Taking a Look under the Hood… The October War and What Maintenance Approaches Reveal about Military Operations", Colonel James S. Powell, U.S. Army LAND WARFARE PAPER 128 / August 2019

[4] "Creating an Innovation System for Knowledge City", Shanthi Nataraj, Howard J. Shatz, Keith Crane, Steven W. Popper, Xiao Wang, Chaoling Feng, RAND technical report series 2012

[5] "Engineering an Innovation System for Defence Industrial Corridors", Lt Gen N B Singh, South Asia Defence Strategic Review, Sep- Oct 2021