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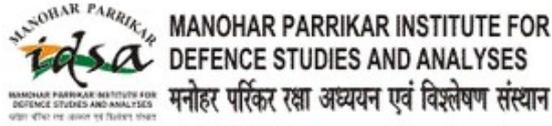
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Tue, 11 Aug 2020

Atma Nirbhar in Defence Technology

By Laxman Kumar Behera

Following Prime Minister Narendra Modi's "Vocal for Local" call and launch of *Atma Nirbhar Bharat Abhiyan* (Self-Reliant India Campaign), the Ministry of Defence (MoD) has tweaked its capital acquisition manual to promote greater self-reliance in defence production. On July 27, it released the draft Defence Acquisition Procedure 2020 (DAP-2020) for public comments.¹ The draft incorporates suggestions received from various stakeholders on a previous draft – the draft Defence Procurement Procedure (DPP-2020) – which was also put in the public domain.

Among other features, the draft DAP-2020 improvises upon Chapter III A of the draft DPP-2020, which was articulated with the intention to streamline para 72 of Chapter II of the existing DPP that facilitates the acquisition of systems designed and developed by the Defence Research and Development Organisation (DRDO), Defence Public Sector Undertakings (DPSUs) and the Ordnance Factory Board (OFB).

Will the Chapter-III A make a difference in realising Prime Minister Modi's call for an *Atma Nirbhar Bharat*? The answer lies in understanding the issues surrounding the indigenous development of defence equipment by the Indian entities, particularly the DRDO, and then juxtaposing them with the procedures articulated in Chapter III A.

Since its creation in 1958, the DRDO has been at the forefront of indigenous design and development of defence equipment. The organisation, which has 24,700 employees, including 7,300 scientists, and a budget of Rs 19,327 crore (or four per cent of the MoD's budget for 2020-21), is known for many remarkable achievements in strategic programmes, a glimpse of which was the recent successful conduct of Mission Shakti, an anti-satellite (ASAT) missile test.

However, in regard to conventional arms, there has been a deep-rooted perception that the DRDO has not been so successful, even though the organisation, with all its human resource and budgetary constraints, has designed and developed a range of complex systems including Light Combat Aircraft (LCA), Main Battle Tank Arjun, Pinaka multi-barrel rocket system, advanced towed artillery gun, and myriad other weapons and sensors. In terms of value, the DRDO-designed products (other than strategic systems), whether inducted or in the process of induction, amount to Rs 2,65,007 crore, as of 2017.²

Notwithstanding these achievements, the ultimate users, i.e., the armed forces, often complain about time and cost overruns and performance shortfall of the equipment designed and developed by the DRDO.

It is important to note that unlike strategic systems in which the DRDO has greater freedom in the developmental process, in conventional weapon systems, most of which are developed through the Mission Mode, the DRDO has to navigate through a complex web of stakeholders and labyrinthine bureaucratic processes which often work as a stumbling block.

The involvement of various stakeholders, which include armed forces and production and quality assurance agencies, brings an element of diffused accountability as agencies involved are accountable to different administrative heads. The lack of synergy among stakeholders has been commented upon by various authorities, including the Comptroller and Auditor General (CAG) of India, for its adverse impact on timely completion of projects.

More significantly, the lack of synergy has sometimes generated rigid institutional biases, leading to undue delay in placement of orders even after projects have gone through the rigorous process of development and testing. This not only demotivates scientists and the industry involved in the project but directly affects India's self-reliance as the budget which could have been utilised to procure home-grown technologies is ultimately spent on importing arms from external sources.

The Chapter III A of the draft DAP-2020 has attempted to address some of the abovementioned constraints by articulating detailed step-by-step procedures to enable smooth acquisition of systems indigenously designed by the DRDO and other MoD-owned/controlled design houses. The chapter has identified 12 steps to be followed, ranging from identification of projects for the DRDO and others to award of contract and post-contract management. The chapter also provides for the spiral development of weapons and platform so as allow quick induction of developed products and continuous capability enhancement of the inducted system through incremental technological improvements.

Significantly also, the chapter provides for Joint Project Management Team (JPMT) to bring a semblance of synergy among various stakeholders. Comprising representatives from the concerned armed force, design house, quality assurance and maintenance agencies and the Acquisition Wing of the MoD, the JPMT is intended to facilitate smooth progress of projects.

While the abovementioned steps stipulated in the chapter are a move in the right direction, they need to be strengthened further to make procedures more robust and conducive for timely completion of projects. One key area which needs improvement pertains to the power of the JPMT. In its present form, the JPMT can, at best, discuss issues arising during the developmental process without any power to take decisions on its own to facilitate timely completion of the project. The real power is vested with higher authorities who are not directly involved in the project's day-to-day execution. In short, the JPMT is not empowered to be responsible to deliver projects on time and to the budget.

In comparison to the suggested JPMT in Chapter III A, similar institutions in other advanced defence manufacturing countries such as the United States (US), the United Kingdom (UK) and France are real drivers of the indigenous projects with necessary powers vested with the team to take decisions in the projects' interest. Such an empowered arrangement would be desirable to promote R&D in Indian defence

Another area that needs refinement pertains to trial and testing of the equipment. The draft chapter in the present form lays emphasis on a multi-layered trial evaluation – developmental trials, user assisted technical trials, field evaluation trials, staff evaluation, and acceptance trials - before a product is finally inducted. Such a multi-layered trial provision does not necessarily add value; rather, they consume time and money and not necessarily in the best interest of product development. An empowered JPMT with the responsibility to undertake trial evaluation in its entirety would shorten the process, quicken the developmental pace, and enable India to become *Atma Nirbhar* in defence technology.

(Views expressed are of the author and do not necessarily reflect the views of the Manohar Parrikar IDSA or of the Government of India.)

1. ["Amended Draft DAP-2020"](#), Ministry of Defence, Government of India, July 27, 2020.

2. ["Demands for Grants 2018-19"](#), Standing Committee on Defence (2017-18), 16th Lok Sabha, 43rd Report, Lok Sabha Secretariat, March 2018, p. 83.

<https://idsa.in/idsacomments/atma-nirbhar-in-defence-technology-lkbehera-100820>

Business Standard

Tue, 11 Aug 2020

Import ban on 101 defence items: Embargo formalises existing reality

The Air force has for decades been building its fighter and trainer aircraft in India, with the recent exception of the Rafale

By Ajau Shukla

New Delhi: The last fortnight has seen the Ministry of Defence (MoD) release three major documents relating to defence acquisition, manufacture and exports. These include drafts of two new policies for public comment – the Defence Production and Export Promotion Policy 2020 (DPEPP 2020) and the Defence Acquisition Procedure of 2020 (DAP 2020). Finally, on Sunday, the MoD issued a list of 101 defence weapons and equipment that will be progressively embargoed for import between now and 2025.

Some items on import-embargo list

<u>Year of Import Embargo</u>	<u>Name of weapon platform/equipment</u>
December 2020	Tracked self-propelled howitzer (155 mm, 52 calibre)
	Towed artillery gun (155 mm, 52 calibre)
	Multi-barrelled rocket launcher (Pinaka variant)
	Various kinds of warships
	Shipborne medium range gun
	Integrated ship's bridge system
	Tejas Mark 1A – enhanced indigenized content
	Light Combat Helicopters
	Transport aircraft (light)
	Military trucks, 4x4, 6x6, 8x8, 10x10, 12x12
	Fixed wing mini-Unmanned Aerial Vehicles (UAVs)
December 2021	Software defined radio (SDR) for Indian Navy
	Various kinds of simulators
	Wheeled armoured fighting vehicle (AFV)
	Assault rifle 7.62 x 39mm and Light machine gun (LMG)
December 2022	Various types of mines and ammunition
	Conventional submarines
December 2023	155 mm artillery ammunition
	Electronic warfare (EW) systems
	Satellites GSAT-7C and GSAT-7R
December 2024	Basic trainer aircraft (BTA)
	Astra Mark1 beyond visual range air-to-air missile
December 2025	Electronic fuse & bi-modular charge for artillery ammunition
	Light low-level terrain radar (LLLTR)
December 2025	Long range land attack cruise missile (LR LACM)

From December onward, the army, navy and air force will not be permitted to import 69 categories of defence equipment. The army will have to rely on Indian suppliers for tracked, self-propelled and towed artillery guns, multi-barrelled rocket launchers of the Pinaka class, sniper rifles and bulletproof jackets and helmets. The navy will have to indigenously build several categories of warships, such as missile destroyers, next-generation missile vessels, anti-submarine craft, offshore patrol vessels and sonar systems and weaponry. The air force will have to build in India its requirement of light combat fighter (LCA) aircraft and helicopters, light transport aircraft, and parachute delivery systems for air-dropping a range of stores and equipment.

A year later, from December 2021 onwards, 11 more equipment categories, including wheeled tanks, light machine guns, assault rifles and ammunition for tanks would have to be sourced from Indian manufacturers. In addition, conventional submarines, such as the six being acquired under Project 75-I, would have to be built in India.

From December 2022, import would be banned of medium artillery ammunition, electronic warfare systems and two other categories. From December 2023, eight more equipment types would face import embargoes, including basic trainer aircraft, communications and reconnaissance satellites and Astra air-to-air missiles. Another eight categories – including artillery ammunition fuses and charge – would have to be indigenised from December 2024. Finally, the MoD has banned the import of long-range cruise missiles from December 2025.

The MoD states this import embargo is intended to assure Indian defence firms they can “manufacture the items in the negative list by using their own design and development capabilities or adopting the technologies designed and developed by Defence R&D Organisation (DRDO).”

In the past, defence industry, especially private firms, have expended money and research effort on developing a defence product, only to see the MoD import it from the global market instead. An import embargo on specific products would provide assurance against such an eventuality.

A layer of assurance is already provided in the Defence Procurement Procedure of 2016 (and proposed in DAP-2020), through the stipulation that a product that is “India designed, developed and manufactured” would be prioritised for acquisition over any other category.

The MoD states this thrust on import substitution has its roots in “Prime Minister Narendra Modi’s address to the nation on May 12 [wherein he] had given a clarion call for a self-reliant India based on five pillars, i.e. economy, infrastructure, system, demography and demand; and announced a special economic package for Self-Reliant India named Atmanirbhar Bharat.”

Since Modi’s election in 2014, he has regarded defence manufacturing as a vehicle for employment generation. Inaugurating Aero India show in February 2015, he stated: “Studies show that even a 20-25 per cent reduction in imports could directly create an additional 100,000-120,000 highly skilled jobs in India. If we could raise the percentage of domestic procurement from 40 per cent to 70 per cent in the next five years, we would double the output in our defence industry.”

Five years down the line, that aim is far from being met. However, last week’s draft DPEPP-2020 sets a similar target for India’s aerospace and defence industry to more than double in size “from the current Rs 70,000 crore to Rs 140,000 crore by 2025.”

Elsewhere in the draft DPEPP-2020, indigenous defence production is estimated at Rs 80,000 crore. “While the contribution of public sector is estimated to be Rs 63,000 crores, the share of private sector has steadily grown to Rs 17,000 crores over the years,” states the document.

While most defence industry executives have welcomed the import embargo list, many point out that it only stipulates what is already the reality – banning the import of equipment that is already being procured, or about to be procured, from indigenous suppliers.

They point out that, in the category of tracked, self-propelled guns, the army is already procuring the K9 Vajra system that Larsen & Toubro (L&T) builds under a South Korean licence outside Pune. The DRDO is collaborating with private firms Kalyani Group and Tata Advanced Systems Ltd (TASL) in developing towed artillery guns and Pinaka multi-barrelled rocket launchers. The army’s entire requirement of tanks has long been built at Chennai and its infantry combat vehicles at Medak.

Similarly, the embargo on the import of naval warships would change little, since most of its warships are already built in Indian shipyards. The navy's vice chief, Vice Admiral G Ashok Kumar, says that, of 48 warships under construction, 46 are being built in India; only two frigates are being constructed in Russia. The MoD's Sunday announcement that six conventional submarines would be built in India for Rs 45,000 crore only repeated what had been decided as far back as 1999 under the navy's 30-year Submarine Building Plan.

The air force, meanwhile, has for decades been building its fighter and trainer aircraft in India, with the recent exception of the Rafale. Placing import embargoes on the Tejas Mark 1A and the Light Combat Helicopter are superfluous, since these are indigenously designed and manufactured aircraft, as is the HTT-40 basic trainer aircraft.

The MoD clarified this issue on Monday: "Such systems are also available in the international market [so they] have been included in the negative list of imports to ensure that the defence services do not go in for procurement of similar systems ex-import."

The ministry has also highlighted that a product would be considered indigenous only if there is a "minimum laid down" indigenous content – presumably 50 per cent, going by DPP-2016. Placing that equipment category on the import embargo list would force indigenous manufacturers "to ensure indigenisation and decrease import content to the permissible limits."

https://www.business-standard.com/article/economy-policy/import-ban-on-101-defence-items-embargo-formalises-existing-reality-120081001667_1.html



Tue, 11 Aug 2020

Indian Army to buy 6 indigenous weapon-locating Swathi radars for over ₹400cr

- ***In a boost to Make in India in the defence sector, six more Swathi weapon-locating radars developed by Defence Research and Development Organisation are likely to be procured for Indian Army***

In a boost to Make in India in the defence sector, six more Swathi weapon-locating radars developed by Defence Research and Development Organisation (DRDO) are likely to be procured for Indian Army.

The case for acquisition of six Swathi weapon-locating radars worth over ₹400 crore is scheduled to be taken up in a defence ministry meeting likely to be held tomorrow, defence sources told ANI.

The weapon-locating radars developed by the DRDO and built by Bharat Electronics Limited had achieved a major success as they were supplied to a foreign country also.

The Swathi weapon-locating radars will provide fast, automatic and accurate location of enemy weapons like mortars, shells and rockets in 50-kilometre range. The radar can simultaneously detect multiple projectiles fired from different weapons at different locations.

The Indian Army has been using the radars for its operations along the Line of Control in Jammu and Kashmir. The system was given for trial to Army in 2018.

Indian Army has been giving a major push to the indigenisation and has given orders for many equipment like self-propelled artillery guns to Indian vendors.

(This story has been published from a wire agency feed without modifications to the text.)

<https://www.livemint.com/news/india/indian-army-to-buy-6-indigenous-weapon-locating-swathi-radars-for-over-rs-400cr-11597070967072.html>

Tue, 11 Aug 2020

Indian Army to get six weapon locating radars indigenously built by DRDO

The six Swathi Weapon Locating Radars (WLRS), which are being acquired at a cost of around Rs 400 crore, will help the force to know the exact location of artillery guns fired by the enemy

By Manjeet Singh Negi

New Delhi: In a major success for 'Make in India' in the defence sector, the Indian Army is set to get six Swathi Weapon Locating Radars (WLRS), indigenously built by the Defence Research and Development Organisation (DRDO).

The six WLRS, which are being acquired at a cost of around Rs 400 crore, will help the force to know the exact location of artillery guns fired by the enemy, top government sources told India Today TV.

The proposal is expected to come up for approval by the Defence Acquisition Council at an important meeting which is slated to take place on Tuesday.

Discussions over the acquisition of several important weapon systems, including shipborne UAVs from Israel, are also likely to be held in the meeting.

<https://www.indiatoday.in/india/story/indian-army-to-get-six-weapon-locating-radars-build-indigenously-by-drdo-1709803-2020-08-10>



DEFENCE AVIATION POST

Your Connect To The World Of Defence And Aviation

Tue, 11 Aug 2020

Tejas Mk2 (MWF): India's Swadeshi MMRCA

With the Indian Air Force's (IAF's) MMRCA program getting serially delayed and recast more than once, there was a feeling in various quarters that the Tejas Mk2 design should perhaps evolve further than what was initially envisaged to provide an indigenous option for the IAF's requirements.

Thus, the IAF and the Aeronautical Development Agency (ADA) sat down to redefine the Tejas Mk2 with more elaborate modifications such that it could function as a medium weight fighter for ground attack roles while continuing to be nimble in the air to air (A2A) role. In fact, the version of the Tejas Mk2 currently envisaged has been rebadged as the Medium Weight Fighter or (MWF) and is being designed as a replacement for the Mirage 2000 with a view to surpassing its capabilities in almost every respect Tejas has always echoed with the emotions of Indians.

From the day it conducted its first flight in 2001, Tejas was always looked upon as the pride on Indian aerospace industry and its prowess. A lot of politics were played around Tejas from inside the country and from outside. Despite all the odds and delays in the development of various sub-systems and power plant, Tejas was finally inducted into the IAF in January 2015 with IOC (Initial Operational Clearance) into No.45 squadron IAF Flying Daggers.

With the receipt of FOC (Final Operational Clearance) in February 2019 during the Aero-India show, Tejas has become fully operational with a few short comings though, fulfilling the dreams of millions of Indians who wanted to see a desi bird defending our skies.

<https://www.defenceaviationpost.com/2020/08/tejas-mk2mwf-indias-swadeshi-mmrc/>

Defence stocks rally up to 13%. Here are the likely winners of govt's 'Make in India' move

Synopsis

Edelweiss has increased its target for BEL to Rs 140 from Rs 110 earlier, suggesting a 40 per cent upside. It has also raised its target on Bharat Forge to Rs 500 from Rs 370 earlier.

New Delhi: Shares of defence-related firms rallied up to 13 per cent on Monday morning after the Ministry of Defence said it has prepared a list of 101 items for which there would be an embargo on the import beyond the timeline indicated against them. Analysts see up to 40 per cent surge in select defence-related stocks going ahead.

The decision will offer an opportunity to the domestic defence industry to manufacture the items in the negative list by using their own design and development capabilities or adopting the technologies designed and developed by DRDO to meet the requirements of the Armed Forces.

Following the development, shares of Bharat Electronics (BEL) jumped 13.36 per cent to hit a high of Rs 112.45 on BSE. Sika Interplant Systems, an engineering-driven company focused on the Aerospace, Defence & Space (A&D) gained 10.74 per cent to Rs 179.90.

Bharat Dynamics rallied 7.91 per cent to Rs 452.20. Astra Microwave Products added 8.57 per cent to Rs 117.85. Apollo Micro Systems rose 4.6 per cent, Reliance Naval hit its 5 per cent upper circuit limit, Bharat Forge NSE 3.68 % added 4.66 per cent while BEML gained 4.37 per cent. Larsen & Toubro was up 3.43 per cent in early trade.

"We are positively surprised with the pace of policy announcement, which is far more specific and includes clear timelines. One could expect further announcements in days to come for a much greater clarity beyond what is already available. The list seems fairly exhaustive, but may expand in future and is based on comprehensive inputs from private/public sector stakeholders, which is a key highlight in our view," Edelweiss said in a note.

That said, the brokerage believes that for higher private sector commitment, decision making and execution with respect to the pace of ordering, funds availability and seamless-integration across value chains remain key to success.

It noted that many large private sector players committed huge investments upfront in the past, but clocked sub-optimal returns due to lack of clarity, the slow pace of activity and lack of integrated decision making.

"Companies like L&T, Bharat Electronics (BEL) and Cochin Shipyard (CSL) having strong indigenous capabilities and are likely to benefit from this policy in the long run. However, the intent on the paper is good but the execution on the ground in terms of rapid indigenisation, pick-up in orders, allocation of funds to defence capital expenditure would be key monitorables to achieve the desired objectives of the policy," said ICICI Securities NSE -0.31 %.

Ashika Institutional Research expects potentially new areas where BEL can throw surprise by reporting order wins including T-90 tank repairs and upgrades, LOS communication system, inertial navigation system and radar warning receiver). It sees smaller sub-systems order being made to BEL across various programs.

Edelweiss has increased its target for BEL to Rs 140 from Rs 110 earlier, suggesting a 40 per cent upside. It has also raised its target on Bharat Forge to Rs 500 from Rs 370 earlier.

ICICI Securities, in its short-term call, has increased Bharat Dynamics' six-month target to Rs 480 and Hindustan Aeronautics' target to Rs 850, suggesting 16 per cent upside for each stock.

<https://economictimes.indiatimes.com/markets/stocks/news/defence-stocks-rally-up-to-13-here-are-the-likely-winners-of-govts-make-in-india-move/articleshow/77456065.cms>

Govt to promote manufacturing of some products to boost market share: Gadkari

- *The government aims to attract foreign investments in pre-identified areas, promote joint ventures and support local businesses to expand India's share of global markets, says MSME Minister*

New Delhi: Indian government is planning to promote the manufacturing of selected products, especially in areas where China enjoys a big share in the global market, as part of efforts to reduce imports and push exports, said Minister Nitin Gadkari on Monday.

"The government aims to attract foreign investments in pre-identified areas, promote joint ventures and support local businesses to expand India's share of global markets," Gadkari said at a virtual conference, Reuters reported.

"There is an opportunity for India in sectors where China enjoys a big share in the global market," he said.

In the last few months, the government has announced production-linked incentives for manufacturing of electronics, medical devices and pharmaceutical products while putting restrictions on imports of Chinese products.

Gadkari's statement comes close on the heels of Ministry of Defence preparing a list of 101 items for which there would be an embargo on their import.

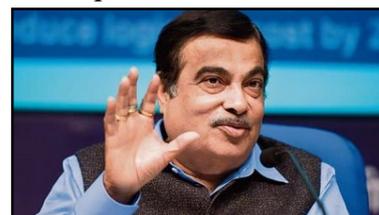
"This is a big step towards self-reliance in defence. It also offers a great opportunity to the Indian defence industry to rise to the occasion to manufacture the items in the negative list by using their own design and development capabilities or adopting the technologies designed and developed by Defence Research and Development Organisation (DRDO) to meet the requirements of the Armed Forces in the coming years," said Ministry of Defence on Sunday.

The list is prepared by MoD after several rounds of consultations with all stakeholders, including Army, Air Force, Navy, DRDO, Defence Public Sector Undertakings (DPSUs), Ordnance Factory Board (OFB) and private industry to assess current and future capabilities of the Indian industry for manufacturing various ammunition/weapons/platforms/equipment within India.

Almost 260 schemes of such items were contracted by the Tri-Services at an approximate cost of ₹3.5 lakh crore between April 2015 and August 2020. With latest embargo on import of 101 items, it is estimated that contracts worth almost ₹four lakh crore will be placed upon the domestic industry within the next five to seven years. Of these, items worth almost ₹1,30,000 crore each are anticipated for the Army and the Air Force while items worth almost ₹1,40,000 crore are anticipated by the Navy over the same period.

The list of 101 embargoed items comprises of not just simple parts but also some high technology weapon systems like artillery guns, assault rifles, corvettes, sonar systems, transport aircrafts, light combat helicopters (LCHs), radars and many other items to fulfil the needs of our Defence Services. The list also includes, wheeled armoured fighting vehicles (AFVs) with indicative import embargo date of December 2021, of which the Army is expected to contract almost 200 at an approximate cost of over ₹5,000 crore.

<https://www.livemint.com/news/india/govt-to-promote-manufacturing-of-some-products-to-boost-market-share-gadkari-11597050876604.html>



Union minister Nitin Gadkari said work on infrastructure creation will help India become a \$5 trillion economy. ht (MINT_PRINT)

Here's why India is banning imports of 101 different weapon systems

By Sebastien Roblin

On August 9, the Indian government released a list of 101 systems that would be progressively banned for importation between December 2020 and December 2025, affecting weapons ranging from sniper rifles to missile destroyers and space satellites.

The bans aren't the result of a sudden outbreak of pacifism. They're intended to ensure that India's military, the second largest on the planet with 1.44 million personnel, exclusively procures those weapons from factories in India.

Since 2015, India has spent more on arms imports than any other country save Saudi Arabia according to the *Times of India*. The goal, according to Prime Minister Narendra Modi, is "Atmanirbhar Bharat"—to make India a self-reliant nation.

Realistically, many of the bans apply to equipment already available from Indian manufacturers, and in several cases the "import ban" specifies systems like the Tejas jet fighter and Astra missiles *only* built in India. (Ostensibly, this is to ensure that components continue to be sourced indigenously.)

In other cases, the bans are phrased in a very specific manner (example: 155 millimeter howitzers of a specific barrel length) that would not disqualify slightly different weapons in the same general class.

This means that some may see the bans as a political stunt, reflecting domestic procurement decisions made well in advance. However, in a few cases the bans do seemingly lock out foreign competitors from ongoing procurement decision, and some later-imposed bans relate to domestic projects that may not yet have completed development.

Nonetheless, the bans primarily are arguably most instructive as a roadmap to requirements Indian government believes it can satisfy through domestic manufacturing, or will be able to do so in a few years. They also both reflect and reinforce India's growing preference to require foreign arms suppliers to establish production lines with India for both economic and security-related reasons.

India has long primarily relied on weapon systems imported from the Soviet Union/Russia, Western Europe and Israel, with U.S. systems gaining in importance in the last two decades.

Several early attempts to domestically design and manufacture weapons like the HF-24 Marut and the Arjun tank resulted in subpar outcomes. However, the terrain has shifted for India's defense industry in recent years.

The government's Make in India policy debuted in 2014 has compelled foreign companies in many cases to set up production lines on Indian soil. India's Defense Research and Development Organization (DRDO) has made significant strides in radar and jet and rocket propulsion technology, aided by tech transfers from Israel, Russia and the United States.

The new bans may clarify and expedite Indian defense procurement and help signal to the industry where to focus its efforts. But a potential downside may be that New Delhi could find itself unable to obtain key technologies if domestic development falls behind schedule, as is common in defense programs worldwide.

That said, supposedly the "negative list" of banned technologies will be periodically reviewed, expanded and updated.

It's also worth noting that many important Make in India projects involve foreign manufacturers opening factories on Indian soil. While this ensures defense dollars make their way Indian factory

workers and partner companies, foreign firms are still receiving a cut and may retain key proprietary technologies and design experience.

This may be even more true now the Modi administration raised the cap on Foreign Direct Investment (FDI) in defense from 49% to 74% in May to encourage more FDI.

In the remainder of this article, we'll look at how the bans affect and/or reflect different segments of India's defense sector, highlight domestic Indian technologies and foreign licensures linked to the bans, and also point out a few corners of Indian defense procurement notably unaffected by the import bans.

Note the discussions will be broad but by no means exhaustive. For the complete listing of all 101 banned items, check out this article.

Aviation

Imports banned by December 2020:

General purpose bombs, Fixed-wing Mini-UAVs, Light combat helicopters, Light transport aircraft, GSAT-6 (international) satellite terminals, Tejas LCA systems, short-range maritime reconnaissance aircraft

Imports banned December 2023:

Astra Mark I air-to-air missiles, basic trainer aircraft, GSAT-7C and GSAT-7R Communications Satellites

Imports banned by 2024:

Expendable aerial target (drones), 264-jet engines, Long-range Land-Attack Cruise Missiles

Despite the advent into service of the domestic Tejas Light Combat Aircraft single-engine jet fighter, produced by Hindustan Aeronautics Limited (HAL), India will continue to depend on overseas manufacturers for more advanced jet fighters, heavy transport and attack helicopters and large patrol and cargo planes.

However, India's aeronautical sector can fulfill military requirements for lighter aircraft and helicopters. For example, HAL has developed two types of armed scout chopper entering service: the HAL Rudra and the more advanced Light Combat Helicopter, though both await integration of anti-tank and anti-air missiles.

Meanwhile, India is spending \$4 billion to build 140 Russian Kamov Ka-226T helicopters in Tumkuru (with another 60 delivered from Russia). These will be more suitable for high altitude operations in the Himalayas.

The ban to imports of Basic Trainer aircraft by December 2021 seemingly guarantees an order of at least 70 HAL HTT-40 two-seat turboprop trainers. This already appeared likely after the IAF declined to order additional Swiss Pilatus PC-7 trainers.

An intermediate jet trainer spinoff of the Tejas, the HJT-36 Sitara, is also making a bid for orders but its future is uncertain, and that niche is not "protected" by a ban.

A ban on procuring fixed-wing mini-drones seems to reflect a nudge from the Indian government towards a domestic product over U.S. or Israeli imports, depending on how broadly it is interpreted.

Of course, the big (if unsurprising) news is what's not on the ban list: jet fighters, large unmanned systems, and other high-end military aircraft. Russia, France and the United States for now remain essential suppliers of these, and are competing (along with the UK and Sweden) to furnish the Indian Air Force with 114 multi-role jet fighters, and the Indian Navy with 57 carrier-based jets.

Long term, the Indian Navy want a separate order of twin-engine naval jets and India's DRDO is working with HAL on a fifth-generation AMCA stealth fighter, but New Delhi may still be interested in American F-35 or mature Russian Su-57 stealth jets.

Infantry Combat Systems

Imports banned by December 2020:

7.62x51mm sniper rifles, various weapons and vehicle simulators, bullet proof jacket and ballistic helmets, nuclear/bio/chemical detection and decontamination equipment, military trucks ranging from 4x4 to 12x12 wheels

Imports banned by December 2021:

7.62x39mm assault rifles, light machineguns, all kinds of land mines, multi-purpose grenades

Imports banned December 2022:

lightweight rocket launchers, 40mm under-barrel grenade launchers

The Indian Army remains infantry-heavy with 34 infantry divisions of various types, and those soldiers need *lots* of guns. New Delhi is planning that by 2021 all of its standard-issue 7.62-millimeter assault and sniper rifles will come from domestic factories.

In fact, India is moving to withdraw its defective domestic INSAS rifles, and has struck a deal to have a Russian Kalashnikov factory built in Uttar Pradesh (a 50.5 to 49.5 India-Russia split) to churn out 750,000 AK-203s assault rifles, a modernized AK-74 variant chambered for 7.62x39 millimeter rounds.

However, the specificity of the ban seemingly allows the Indian Army to continue procuring other small arms using different ammunition, such as 7.62x51-millimeter cartridge-using SiG-716 G2 rifles issued to Indian frontline troops (a situation which has elicited complaints from Kalashnikov).

The Indian government is less specific in banning imports of domestic grenades, body armor, light machineguns, light rocket launchers, under-barrel grenade launchers, automatic 30-millimeter grenade launchers, and land mines of various stripes (as India is not a signatory to the Mine Ban Treaty and still produces them).

These more broadly-worded bans could conceivably complicate small-scale procurements favored by less standardized units such as India's diverse special operations community. For example, India recently ordered 16,000 Negev NG7 light machineguns from Israel, but future orders may require working out a license-production arrangement.

Stipulated bans of numerous trainer/simulator systems also reflect that India has developed a wide array of land warfare training simulators for everything from infantry tactics to tank driving.

Armored Vehicles

Imports banned by December 2020:

120mm sabot shells (for Arjun tank)

Imports banned by December 2021:

125mm sabot shells (for T-72 & T-90 tanks), wheeled armored fighting vehicles

Imports banned by December 2023:

30mm shells (for BMP-2 main gun)

India's armored forces are primarily composed of thousands of Russian-origin T-72 and T-90 main battle tanks, and upgraded BMP-2 *Sarath* infantry fighting vehicles. (There are also around 124 indigenous Arjun main battle tanks, with 118 of an improved model on order). These will remain in service for a while yet, and in 2019 India paid Russia \$1.2 billion to license-build 464 more T-90s in India.

However, the new rules do ban imports of 120-, 125- and 30-millimeter shells used by the main guns of Indian Army tanks and fighting vehicles, suggesting confidence in the domestic manufacturing capacity for these munitions.

While a BMP replacement called the Future Infantry Combat Vehicle is many years away, a ban on "wheeled armored fighting vehicle" seems carved out for a more proximate rising star: Tata's Wheeled Armored Protection (WhAP) vehicle mating the hull of the 8X8 Kestrel APC with the turret of a BMP-2 fighting vehicle.

Initially, the Indian Army was reportedly looking to procure 198 such vehicles outfitted with anti-tank missile launchers for service on the border with Pakistan, though new reports indicate it may also want troop-carrier models for deployment in Ladakh, facing China.

India has also investigated purchases of the Stryker infantry combat vehicle or even Humvees used by the U.S. Army, though the ban implies the Indian Army's selection process may be simplified.

Artillery

Imports banned by December 2020:

tracked 152mm/52cal self-propelled guns, 155mm/52cal towed guns, 155mm/39 lightweight howitzers, 6x6 artillery tractors, Pinaka multiple-rocket launcher systems

Imports banned by December 2022:

155mm artillery ammunitions, 122mm Grad rockets

Imports banned by December 2024:

electronic artillery fuses and bi-modular charge systems

Towed 130- and 155-millimeter field artillery systems still predominate in the Indian Army. The new law bans import of 39 and 52 caliber 155-millimeter towed pieces, the 6x6 tractors used to tow them, and (between 2022-2024) the shells and component electronic fuses and bi-modular charges.

In fact, -39 caliber howitzers refer to BAE M777 ultralight howitzers being license-built by Mahindra Systems Ltd. in India. The 52-caliber gun appears to be a reference to the advanced 20-ton ATAG field gun developed by the DRDO with a range of 30 miles.

The Indian Army is lacking in modern self-propelled artillery, ie. artillery vehicles with basic armor protection against small arms and shrapnel. That only changed when it arranged for licensed production of South Korea's advanced K9 Thunder self-propelled howitzer, known as the Vajra-T in India.

Later bans indicates India plans to rely on domestic manufacturers to build Russian 122-millimeter Grad artillery rockets and light 23-millimeter anti-aircraft shells by December 2022 and 2024 respectively.

Air Defense, Sensors, Electronic Warfare Etc.

Imports banned December 2020:

Ground-based mobile ELINT, Low-level transportable radars, High Power Radars, Short-Range Surface-to-Air Missiles

Imports banned December 2022:

“electronic warfare systems”

Imports banned December 2024:

Land-based close-in-weapon systems (CIWS), 23-millimeter anti-aircraft shells, light low-level terrain radar

India can boast to having developed its own indigenous missile defense system including several types of domestic missile interceptors. These are supported by imported radars and powerful indigenously developed HPRSs now protected by an import ban.

However, its non-strategic air defense units rely on a variety of Soviet-era air defense systems, plus a few more modern imports from Israel (Barak-8) and Russia (S-400 and man-portable SA-18s).

India plans to field a surface-launched variant of its Astra air-to-air missile to serve as a truck-mobile Short Range SAM (SR-SAM) for service with the Army and Navy. Thus a ban on mobile Short-Range SAM systems may be aimed at carving a niche for the surface-launched Astra, which may have a range of up 30 miles initially, and eventually out to 50 miles with the Astra Mark II model. This seemingly dovetails with the Indian Air Force's expressed disinterest in the US/Norwegian NASAM-II's air defense systems.

The Indian government appears confident it can produce its own software-defined radios and ground-based mobile electronic snooping capabilities (ELINT), given a ban due on December 2020. A seemingly far-reaching ban on all “Electronic Warfare systems” is set to kick in December 2022.

Naval Systems

Imports banned December 2020:

Naval cruise missiles, naval close-in weapon systems (CIWS) for self-defense, missile destroyers and “next-generation” missile vessels, shallow-water anti-submarine craft, water jet fast attack craft, 50-ton tugs, ammunition barges, floating docks, Next-Generation Maritime Coastal Battery (Brahmos), anti-submarine rockets and launchers, depth charges, medium-range naval guns, lightweight torpedo launchers, chaff decoy rockets and launchers, integrated ship’s bridge system, large ship and submarine sonars

Imports banned December 2021:

Conventional submarines, naval inertial navigation systems

Imports banned December 2022:

electronic artillery fuses and bi-modular charge systems

Imports banned December 2025:

long-range land-attack cruise missiles (could be naval-, air- or land-based)

Many Indian Navy warships are locally designed and built, and right off the bat the Indian government is banning imports of missile destroyers, non-nuclear powered submarines (by 2021), and various smaller littoral patrol craft.

India also co-developed with Russia a supersonic cruise missile with Russia with Brahmos, which undoubtedly explains New Delhi’s willingness to ban naval cruise missile imports. As importing long-range cruise missiles was already politically quite difficult, the ban likely reflects India’s intent to continue evolving the Brahmos or other long-range cruise missiles for anti-ship and land-attack roles on its own. Indeed, a coastal defense Brahmos platform—the Next-Generation maritime Mobile Coastal Battery—is protected with its own “ban.”

A diverse array of naval weapon systems are also banned (see above).

The restriction on conventional submarines may inform India’s Project 75(I) competition, involving two domestic and five foreign designs for a new class of six conventional submarines for construction in India.

Russia is seeking to lease Kilo-class submarines to India due to the delays in the Project 75(i) program, and its unclear whether the ban could affect that.

However there are also important omissions, such as carrier-based technologies or frigates. Russia is furnishing India with Talwar-class missile frigates, though Indian shipyards will eventually build at least a few domestically.

Nuclear-powered submarines, which India has historically leased from Russia, also remained unbanned. India is building its own fleet of nuclear-powered ballistic missile submarines and planning to follow up with nuclear-powered attack submarines, but likely appreciates the experience it gains from operating the Russian boats.

<https://www.forbes.com/sites/sebastienroblin/2020/08/10/heres-why-india-is-banning-imports-of-101-different-weapons/#33f5e3fd94dc>

Upgraded facility at BEL inaugurated by Defence Minister

Bengaluru: The upgraded state-of-the-art Maareech Integration Facility at the Bharat Electronics Limited (BEL) was inaugurated by Defence Minister Rajnath Singh on Monday. It was BEL which produced the Maareech advanced torpedo defence system (ATDS), fully indigenous system involving sensors and decoys, a statement from the company said here.

The ATDS was developed jointly by DRDO (Defence Research and Development Organisation) labs, Naval Physical & Oceanographic Laboratory (NPOL) and Naval Science and Technological Laboratory (NSTL), the statement said. Two production grade systems manufactured by BEL have been installed and trial evaluated on-board INS Gomati and INS Ganga.

The Indian Navy has awarded BEL a contract for Maareech systems, it said. Prior to the induction of Maareech ATDS, the Navy had imported the system for 12 platforms. But now with the indigenous development of this system, BEL has upgraded its existing facilities with capacity to manufacture and deliver 12 ATDS Maareech systems every year.

This facility enables BEL to provide a reliable defence mechanism for surface ships of the Indian Navy against possible torpedo attacks, the statement said. The upgraded ATDS facilities include test bays for electronic cabinets, expendable decoy manufacturing and towed array integration and testing facility, it said. BEL has constructed a new building for ATDS manufacturing at a cost of around Rs 12 crore.

The indigenously developed Maareech System is a big step towards Atmanirbhar Bharat, as it saves the country around USD 4 million in foreign exchange per system, the statement said. The upgraded facility of BEL was inaugurated through a video-link.

(Disclaimer: This story has not been edited by Outlook staff and is auto-generated from news agency feeds. Source: PTI)

<https://www.outlookindia.com/newscroll/upgraded-facility-at-bel-inaugurated-by-defence-minister/1913303>

hindustantimes

Tue, 11 Aug 2020

Andaman and Nicobar's development crucial for India's 'Act East' policy: PM Modi

The Prime Minister made the comments after virtually inaugurating the 2,300-km undersea cable project connecting Chennai in Tamil Nadu and Port Blair

Edited By Meenakshi Ray

New Delhi: Prime Minister Narendra Modi said on Monday the importance of the strategic Andaman and Nicobar Islands has increased in the light of India's 'Act East' policy as he launched the submarine optical fibre cable (OFC), which will give a major boost to the local economy and tourism among other sectors.

The Prime Minister made the comments after virtually inaugurating the 2,300-km undersea cable project connecting Chennai in Tamil Nadu and Port Blair.

"The Indian Ocean has been the centre of India's trade and strategic prowess for thousands of years. Now that India is following the new policy and practice of trade and cooperation in the Indo-Pacific, the importance of our islands including Andaman and Nicobar has increased," PM Modi said.

"Under the Act East policy, Andaman and Nicobar's role in India's strong relations with East Asian countries and other countries associated with the sea is very important and it is going to increase," he said.

The Act East policy, a key foreign policy approach, is India's effort aimed at bolstering extensive strategic and economic ties with southeast Asian countries that would possibly act a counterweight to the influence of China in the region.

The Andaman and Nicobar Islands are also home to India's only tri-services command, the Andaman and Nicobar Command (ANC), which has become strategically important amid the Chinese aggression in the region.

"This optical fibre cable project, connecting Andaman and Nicobar with rest of the country, is a symbol of our commitment towards the ease of living. Be it online classes, tourism, banking, shopping or telemedicine, thousands of families in Andaman and Nicobar will now get its access," he said.

"The completion of the work of laying 2,300 km long cable undersea before the scheduled time is praiseworthy. Deep-sea surveys, maintaining cable quality and laying cable using special ships is not easy," PM Modi said.

PM Modi had said earlier in the day that the inauguration of the submarine optical fibre cable in Andaman and Nicobar Islands will ensure high-speed broadband connectivity, fast and reliable mobile and landline telecom services and delivery of e-governance platforms to the islands, crucial for India's security.

"Today, 10th August is a special day for my sisters & brothers of Andaman and Nicobar Islands. At 10:30 this morning, the submarine Optical Fibre Cable (OFC) connecting Chennai and Port Blair will be inaugurated," PM Modi had tweeted.

The cable will enhance broadband and telecom facilities on the islands, according to a release by the Prime Minister's Office. The foundation stone for the project was laid by PM Modi on December 30, 2018, at Port Blair.

<https://www.hindustantimes.com/india-news/andaman-and-nicobar-s-development-crucial-for-india-s-east-policy-pm-modi/story-KOpRQ0t0xRil7bqiuuU16hL.html>

Business Standard

Tue, 11 Aug 2020

More items to be included in list of banned defence imports: Rajnath Singh

The Atmanirbharta Saptah (self-reliance week) will be a witness to initiatives pertaining to modernisation & up-gradation of facilities by DPSUs & OFB

Kolkata: Defence Minister Rajnath Singh Monday asserted the ban on import of 101 types of military equipment is a big step towards making India self-reliant in defence production and more items will be added to the list soon.

Singh, who digitally inaugurated two new projects at Garden Reach Shipbuilders and Engineers (GRSE) in Kolkata as part of 'Atmanirbhar Bharat Week' celebrations, said in a Facebook post later that the "week of self-reliance" will witness initiatives for modernisation and up-gradation of defence facilities.

The ban on import of 101 items is a big step towards an Atma Nirbhar Bharat (self-reliant India). This list of negative items contains not only small items but weapon systems of high and critical technology. More such items will be added to this list shortly which will save crores of rupees in imports, he said in a Facebook post after the webinar.

Singh said the central government has made several "timely and thoughtful" interventions during Covid-19 times like issuing negative list for import, increasing FDI limits and a separate budget for domestic capital procurement.

The Atmanirbharta Saptah (self-reliance week) will be a witness to initiatives pertaining to modernisation & up-gradation of facilities by DPSUs & OFB. As part of Atmanirbharta Saptah, the DPSUs & OFB are also organising a series of webinars covering all relevant topics including all stakeholders, he said.

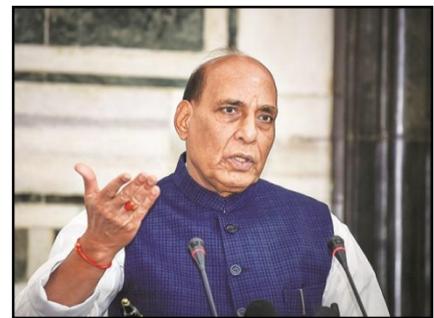
The Defence Public Sector Undertakings (DPSUs) and Ordnance Factory Board (OFB) are key to India's pursuit of enhancement of military capabilities.

In a major reform initiative to boost the domestic defence industry, Singh on Sunday announced restrictions on import of 101 weapons and military platforms including artillery guns, assault rifles and transport aircraft.

A state-of-the-art indigenous underwater CNC Plasma Cutting Machine and a Modern Hull Block Fabrication Complex were digitally inaugurated by Singh at GRSE, a press statement said.

The CNC Plasma Cutting facility set up at a cost of Rs 4.14 crore will enhance the plate cutting capacity by 30% and the complex constructed at a cost of Rs 19 crore for hull block fabrication will enable concurrent construction of large-sized (40 Ton) hull blocks in a covered environment, it said.

Both these facilities will go a long way in enhancing the production capacity of the shipyard, especially during the execution of the three major warship building projects comprising of 15 warships that GRSE is presently handling for the Indian Navy.



The Defence Public Sector Undertakings (DPSUs) and Ordnance Factory Board (OFB) are key to India's pursuit of enhancement of military capabilities.

These include P17A Stealth Frigates, the ASW Shallow Water Craft and the Survey Vessels (Large), the statement said.

https://www.business-standard.com/article/economy-policy/more-items-to-be-included-in-list-of-banned-defence-imports-rajnath-singh-120081001551_1.html

live**mint**

Tue, 11 Aug 2020

Defence Ministry to add weapons systems procured from Indian vendors: Rajnath Singh

By Elizebeth Roche

- **Defence Minister Rajnath Singh on Monday said that his ministry would soon add more defence hardware to a list of 101 platforms whose acquisition from abroad is to be phased out and is to be procured domestically**

New Delhi: Defence Minister Rajnath Singh on Monday said that his ministry would soon add more defence hardware to a list of 101 platforms whose acquisition from abroad is to be phased out and is to be procured domestically.

Speaking at an event in New Delhi Singh said the move by his ministry of unveiling a list of 101 weapons systems, platforms and components needed by the three services that was to be procured from Indian vendors and banned for import, was a step towards making India self reliant.

"The ban on imports of 101 items is a big step towards an Atma Nirbhar Bharat. This list of negative items contains not only small items but weapon systems of high and critical technology. More such items will be added to this list shortly which will save crores of rupees in imports," the minister said according to a statement by the defence ministry.

India is one of the biggest military spenders in the world with a large defence equipment import bill. The US, China and India were the world's three biggest military spenders in 2019, followed by Russia and Saudi Arabia, the Stockholm International Peace Research Institute (SIPRI) said in a report in April. India's spending grew by 6.8 % and touching \$71.1 billion, the report said.

The 101 items on the list banned for imports includes submarines and trainer aircraft besides light combat helicopters. The move is seen as boost to indigenous manufacture of military hardware. With this, the defence ministry estimates that contracts worth almost ₹4 lakh crore will be given to domestic industry in the next five to seven years. It has also bifurcated capital procurement budget for 2020-21 between domestic and foreign capital procurement routes. A separate budget head has been created with about ₹52,000 crore for procurement from domestic firms this year, a move hailed by Indian industry.

The announcement comes a few days after India brought out a new Defence Production and Export Promotion Policy 2020 (DPEPP 2020) which identified defence manufacturing as a key part of a strategy to kickstart the overall economy, emerging from one of the strictest lockdowns in the world due to the covid-19 pandemic.

Of the ₹4 lakh crore worth of contracts Indian private companies are to get, "almost ₹1,30,000 crore each are anticipated for the Army and the Air Force while items worth almost ₹1,40,000 crore are anticipated by the Navy over the same period," defence minister Rajnath Singh said in a series of tweets on Sunday.



Speaking at an event in New Delhi Singh said the move by his ministry of unveiling a list of 101 weapons systems, platforms and components needed by the three services that was to be procured from Indian vendors and banned for import, was a step towards making India self reliant (ANI Photo)

The list includes "not just simple parts but also some high technology weapon systems like artillery guns, assault rifles, corvettes, sonar systems, LCHs (light combat helicopters) transport aircrafts, radars and many other items to fulfil the needs of our defence services," Singh said.

A separate statement from the defence ministry on Sunday said the Indian Navy is to place orders for six submarines at an approximate cost of almost ₹42,000 crore. This is to be produced by an Indian company along with a foreign technology partner under the strategic partnership model. The Indian Air Force is also looking at placing orders for 123 LCA (Light Combat Aircraft) MK 1A worth an over ₹85,000 crore from Hindustan Aeronautics Limited. The Indian army is also expected to place an order for 200 wheeled armoured fighting vehicles (AFVs) at an approximate cost of over ₹5,000 crore, it said.

<https://www.livemint.com/news/india/defence-ministry-to-add-weapons-systems-procured-from-indian-vendors-rajnath-singh-11597070171440.html>



Tue, 11 Aug 2020

Air Marshal Gurcharan Singh Bedi takes charge senior Air Staff Officer of Eastern Air Command

Air Marshal Gurcharan Singh Bedi took charge as Senior Air Staff Officer of Indian Air Force's Eastern Air Command (EAC) on Monday (August 10)

Edited By Tanweer Azam

Highlights

- ***Air Marshal Gurcharan Singh Bedi took charge as Senior Air Staff Officer of Indian Air Force's Eastern Air Command (EAC) on Monday (August 10).***
- ***Air Marshal Bedi was commissioned into IAF's Fighter stream in June 1984 as a Fighter Pilot.***
- ***He has a flying experience of more than 3700 hours including operational flying on MiG 21 and Mirage-2000 fighter aircraft.***

Air Marshal Gurcharan Singh Bedi took charge as Senior Air Staff Officer of Indian Air Force's Eastern Air Command (EAC) on Monday (August 10).

Air Marshal Bedi was commissioned into IAF's Fighter stream in June 1984 as a Fighter Pilot. He has a flying experience of more than 3700 hours including operational flying on MiG 21 and Mirage-2000 fighter aircraft.

During his illustrious career in the IAF, Air Marshal Bedi has held numerous important appointments. He has commanded a Fighter Squadron and a front line Fighter Base. As an Air Vice Marshal, he has held the coveted appointments of Air Officer Commanding Jammu and Kashmir, Assistant Chief of the Air Staff Ops (Offensive) and the Assistant Chief of the Air Staff (Personnel Officers). Prior to assuming the present appointment he was Senior Air Staff Officer, Southern Air Command. Air Marshal Bedi is an alumnus of Defence Services Staff College and National Defence College.



In recognition of his distinguished service, the Air Marshal was awarded Vayu Sena Medal (Gallantry) in Aug 1999, Vishist Seva Medal in January 2010 and Ati Vishist Seva Medal in January 2020.

<https://zeenews.india.com/india/air-marshal-gurcharan-singh-bedi-takes-charge-senior-air-staff-officer-of-eastern-air-command-2301812.html>

The Indian Army and private military companies: The way forward

It was in 1986 that I wrote an approach paper on the need for our Defence Production, Simulation Techniques for training, Indoor Shooting Ranges and Creation of training areas with a clear objective of saving as well as generating funds
By Brig Pradeep Sharma

It was in 1986 that I wrote an approach paper on the need for our Defence Production, Simulation Techniques for training, Indoor Shooting Ranges and Creation of training areas with a clear objective of saving as well as generating funds. In the same approach paper, I brought out the need for generating revenue through an increased participation in UN Missions, training of friendly forces, setting up training facilities in friendly foreign countries, hiring space for parking equipment and so forth.

The total effect of this approach paper was “Baffle Ranges” and it remained so for a very long time. All this while built up areas in Cantonments, field firing ranges and encroached upon military facilities, short, long ranges and many field firing ranges were closed for reasons of safety due to these encroachments. Costs of training kept increasing in the absence of simulation techniques while the expansion of cultivation reduced space for collective training. Clamour over budget reduction reached a crescendo and began to tell upon modernisation programs, debates pitched for reduction of manpower, sale of defence land and reduction of pension bills rather than looking at ways to increase our income while gainfully utilising the large numbers of disciplined and well trained/skilled manpower of the Armed Forces.

The effort at Make in India to my way of thinking has come only about 40 years too late! The reasons for this are not difficult to find and rest squarely on our policies and approach to National Security, the Armed forces and if I may say so a conflict of interests amongst and within stake holders.

Experience Post Superannuation: An eye opener

My first exposure to how the western world operates with reference to the Defence Forces & Industry came when the National Security Guard (NSG) were raised in 1984, this gave me a brief exposure on the involvement of Private Military Corporations(PMC) and Defence Industry in cost cutting as well as generation of revenue.

Many Nations like Israel, USA, France, UK, Russia, Sweden and even Switzerland have such a powerful world presence in production and sale of defence equipment, in many cases they almost drive not only the economy but also policy!

Training facilities for the Armed Forces, Security of Camps, Supplies of essential items and much more was being outsourced to PMCs to reduce the costs and also provide employment to Veterans who were found to have vast experience in warfare and use of equipment.

Visits to USA, UK, France, Sweden, Israel on invitation post 26/11 to see various facilities were an eye opener. There was so much being done by PMCs and Industry! To quote a few examples:-

DCI Group: Perhaps the best example, the French government has a 49.90% stake in the DCI group based out of Paris with several sites all over the national territory. It has permanent offices abroad, in particular in the Middle East with Qatar, Kuwait, United Arab Emirates and Saudi Arabia, and in Asia with Brunei, India, Malaysia and Singapore. DCI continues to expand internationally with innovative, high value- added services through the development of new partnerships. With a workforce of nearly 1000 employees, they generated a turnover of 240.7 million euro in 2018. DCI of France has been a reference operator of the ministry of the armed forces for the international transfer of the French military know-how to friendly countries armed

forces; DCI group has been operating across the entire defence and security spectrum for more than 45 years. Holding the “French Armed Forces Training” label, DCI is offers tailor-made services in the fields of consulting, training and technical assistance. (www.groupedci.com).

b) A private military company (PMC) on the other hand is a private company providing armed combat or security services for financial gain. PMCs refer to their business generally as the “private military industry” or “the circuit they refer to their staff as “security contractors” or “private military contractors”.

c) Another example could be that of the ‘Blackwater’ a US based mercenary force which employs ex servicemen with the required expertise in the field of operation. Blackwater has been known to support or even replace US forces in foreign countries .

In an effort to reduce costs and generate revenue, veterans need to be encouraged to form corporate , various services could then be out sourced to cut costs & generate employment in the areas mentioned below:-

- Take on the responsibility of supply chains
- Undertake stocking and manage Ordnance Depots
- Provide security to military establishments
- Take over and run Base Workshops being privatised
- Set up camps to include HAA shelters
- Take over and run Command Battle Schools
- Set up training establishments in friendly foreign countries
- Undertake joint training with friendly forces
- Increase participation in UN Peace Keeping
- Reduce civilian’s numbers in DRDO, Ordnance Factories, and MES by transferring human resources from concerned supporting arms/services
- Like the DCI , form Corporate to market Military Hardware, training and technology both within the Country and Internationally

Costs & Budgets: The Constant Tussle

The annual release of approximately 75,000 experienced, tried and tested, skilled manpower from the forces is something that needs to be reviewed and these individuals should be gainfully employed to cut costs as well as add value. It is this disciplined, experienced and motivated manpower aged between 35- 45 years, which finds itself out on the street looking for jobs! Surely, not a healthy or motivating sign. Can we expect this to encourage our youth to join the Armed Forces for a short term ‘Job’ fraught with risk of life and limb? Retiring at a prime age, some get a pittance as pension; others do without it and mingle with a society that does not even care to give you a fair chance to be a part of it. These are battle hardened leaders who can think on their feet, take decisions, and give directions, in situations where the consequence of error is loss of life and National Pride.

The policies for absorbing them in second careers have always been cloudy and unsure. Industry mostly considers such individuals suitable only for ‘Security or Administration ‘, ignoring the multi talents & skills that these individuals bring with them. Ministry of Defense and the three services have put in efforts towards resettlement albeit with limited success. The policies flip flop between SSC and others getting absorbed in CAPFs on Deputation to being re employed where possible or attempting to join the Corporate World. Director General Resettlement(DGR) ,the primary organization for training and re-employment, who have been dealing with Coal Transportation , Security Agencies and Licenses for Petrol Pumps for some time are looked upon by many, as a defunct organisation. Army Placement Agency is another organization for the three services that operate in a similar model as any hiring or recruitment firm. Zila Sanik Board serves as the grass-root touch point for JCO’s/ OR’s and help them in undertaking primary and secondary employment registrations.

A significant amount of money is spent in imparting courses with educational institutes towards creating job readiness for a career in the corporate world.

It is a deplorable sight to see is a soldier who has gone through thousands of hours of structured and experiential training, as a doorman at a five-star hotel or a factory gate for a pittance of a mere eight to ten thousand rupees. An Infantry Soldier is treated at par with a 'Semi Skilled' worker after having spent the better part of his youth, laying his life at risk on borders and insurgencies!

Most officers end up joining the corporate world in security, administration and facilities that don't use a small percent of what they are capable of, hence leaving them frustrated and unfulfilled for the rest of their lives. No wonder that the family tradition of joining the Armed Forces is dying.

Food for Thought: Next Step

War and Conflict have always been the backdoor for big businesses. Mega corporations manufacture weapons, vehicles, equipment and more under the government's payroll; pioneering innovation and advancement in this demand intensive market. Profiteering from war is also a subject of moral debate, but that's just capitalism.

The efforts of India's Government to 'downsize' the forces needs to read 'right size' and the financial burden needs to be turned around to a more or less self reliant organisation if not a profit generating one. It is my belief that this can be achieved if right 'policies' are adopted.

The answer lies in creating 'Private Military Corporations' (PMC) or Companies like those in the 'Western World'.

Private Military Companies are non-existent in India as of now. A report by FICCI suggested that private security firms are amongst the largest employers in India, employing more than 8 million people, with the potential to employ about 3 million more by 2022.

A booming industry where the manpower is dominated by ex-servicemen; Indian firms, are unable to stand shoulder-to-shoulder with PMCs ,mainly due to State supremacy which has had a tight grip on matters related to defence forces and industry.

Make in India should open doors for this. According to a recent report in the Tribune 04 August 2020, the Army has put out a RFI for ten years supply of ammunition, further the import of 101 items has been prohibited and additional funds provided for defence procurement, this can be seen as a way forward for Veterans to form PMCs and undertake to deliver the Army's requirements.

The DCI model of 'joint ownership' may just be the right answer? Perhaps it is time to experiment even on a small scale?

(The author is an Indian Army Veteran. Views expressed are personal).

<https://www.financialexpress.com/defence/the-indian-army-and-private-military-companies-the-way-forward/2050403/>

Indian Rafales practise mountain night flying for Ladakh in Himachal Pradesh

The first batch of Rafale fighter jets inducted in Indian Air Force's Golden Arrows squadron are 'fully operational'

By Shishir Gupta

New Delhi: India's newly-acquired five Rafale fighters are practising night flying in the mountainous terrain of Himachal Pradesh so that the Golden Arrows squadron with its Meteor beyond visual range air-to-air missile and SCALP air-to-ground stand-off weapon will be ready if the situation deteriorates on the 1,597 km-long Line of Actual Control (LAC) in the Ladakh sector, people familiar with the matter said.

The first batch of Rafale fighters, which landed at the Indian Air Force air base at Ambala on July 29, are "fully operational" with the first 18 platforms to be placed in Ambala and the next 18 fighters to be based in Hasimara air base near the border with Bhutan. India has contracted to purchase 36 jets made by Dassault Aviation, South Block officials said.

A government official said the top-of-the-line fighter jets are staying away from the LAC lest the People's Liberation Army (PLA) radars in occupied Aksai Chin identify their frequency signatures and use it to jam in the worst case scenario.

Military aviation experts, however, say that Rafales can also be used for training in Ladakh sector as all these fighters are equipped with programmable signal processors (PSP) or the capacity to change signal frequencies in the event of hostilities.

"Even though the Chinese PLA have placed their electronic intelligence radars on mountain tops in the occupied Aksai Chin area for a clear line of sight, the war-time signature of Rafale will be different from that in practise mode. The PLA aircraft detection radars are good as they have been manufactured keeping the US air force in mind," said an expert.

The Rafale jets are armed with Meteor beyond visual range air-to-air missiles, MICA multi-mission air-to-air missiles and Scalp deep-strike cruise missiles — weapons that will allow fighter pilots to attack air and ground targets from standoff ranges and fill a significant capability gap.

The Meteor missiles have a no-escape zone believed to be three times greater than that of current medium-range air-to-air missiles. The missile system, powered by a unique rocket-ramjet motor, has a range of over 120 kilometres.

The SCALP is a deep-strike cruise missile with pinpoint terminal accuracy through its highly accurate seeker and target recognition system.

Even though the India-China diplomatic and military interlocutors are in constant dialogue for total disengagement of troops in eastern Ladakh, the three services are not only focused on western sector but also the remaining part of the LAC as well as the high seas. Last week, Army Chief General MM Naravane made it clear to central and eastern army commanders that they should not be caught by surprise by the PLA on the LAC and should be in the highest state of military preparedness.

The Indian Navy has also been told to monitor the Arabian Sea, Bay of Bengal and Indian Ocean to ensure that Chinese PLA warships are kept at bay from the Indian seaboard and island territories. The surface and undersea assets are on operational alert with Chinese ships being monitored from Malacca Straits to Gulf of Aden.



A fully-loaded Rafale jet takes off on a test flight (Photo courtesy: Dassault Aviation/File photo)

Even though the Chinese PLA air activity has reduced in the Ladakh sector as compared to the first week of July post Galwan flare-up, the Indian Air Force is taking no chances and is tracking the air movements, particularly at Lhasa Gonggar airbase in the Tibet region and Hotan airbase in China's Xinjiang region.

<https://www.hindustantimes.com/india-news/indian-rafales-practise-mountain-night-flying-for-ladakh-in-himachal-pradesh/story-4pQA6tKKXDsgHYLYaKdq1H.html>

hindustantimes

Tue, 11 Aug 2020

Country needs innovators to promote self dependence in defence sector: Former IAF Chief Dhanoa

Chandigarh: Former Indian Air Force chief BS Dhanoa on Monday said the country needs innovators in all spheres to promote self dependence in the defence sector.

Air Chief Marshal Dhanoa (retd) was addressing a national webinar on 'Valour of Indian Air Force as a motivator for the young generation in times of Covid-19', organised by the department of psychology, Panjab University.

"The government's decision to ban import of 101 defence items is good for the domestic industry and will make them compete and excel," he said.

He added that information dominance and self-sustainability are of utmost importance to deal with threats to national security.

Dhanoa, who as the IAF chief presided over Balakot air strikes in Pakistan, said the motivation of armed personnel even in peacetime should be an example for citizens, particularly young generations, to tide over pandemic-induced adversities.

The need of the hour is to bring about behavioural change to courageously face the new normal, he added.

PU vice-chancellor Raj Kumar said the young generation has always looked up to armed forces as a motivational symbol of sacrifice and bravery.

<https://www.hindustantimes.com/chandigarh/country-needs-innovators-to-promote-self-dependence-in-defence-sector-bs-dhanoa/story-669PdzsXzDI.Sjb0teRNO8I.html>



Air Chief Marshal BS Dhanoa (retd) with Panjab University vice-chancellor Raj Kumar (right) during a webinar at PU, Chandigarh, on Monday. (HT PHOTO)

Satellite phones for Indian Army, BSF, and CRPF in over 1000 far-flung and border areas

Union Minister Ravi Shankar Prasad said that out of these 183 sites are already commissioned and remaining are in process, adding that the Army personnel can talk to their families from their post of duty

Edited By Ananya Das

Highlights

- **The Centre on Monday asserted that satellite-based phones are being provided for connectivity in 1347 far-flung areas for the Army, and BSF among others.**
- **The Satellite-based DSPTs is also being provided for the BRO, CRPF, ITBP, and SSB, etc.**
- **Centre said that out of these 183 sites are already commissioned and remaining are in process.**

The Centre on Monday asserted that satellite-based phones are being provided for connectivity in 1347 far-flung, difficult and border areas of strategic importance for the Indian Army, and Border Security Force (BSF) among others.

The Satellite-based DSPTs (Digital Satellite Phone Terminal) is also being provided for the Border Roads Organisation (BRO), Central Reserve Police Force (CRPF), Indo-Tibetan Border Police (ITBP), and Sashastra Seema Bal (SSB), etc.

Union Minister Ravi Shankar Prasad said that out of these 183 sites are already commissioned and remaining are in process, adding that the Army personnel can talk to their families from their post of duty. "Satellite-based DSPTs (Digital Satellite Phone Terminal) are also being provided at 1347 sites for Army, BRO, BSF, CRPF, ITBP, SSB etc. Out of which 183 sites are already commissioned and remaining are in process," read an official statement.



The government has been taking measures on priority to provide connectivity in the far-flung areas so as to ensure a better quality of life to the people as well as to those who are working in these areas. Prime Minister Narendra Modi inaugurated a submarine Optical Fiber Cable of the length of 2300 km between Chennai and Andaman Nicobar at a cost of Rs 1,224 crores.

Elaborating the various projects being implemented by Department of Telecommunications Prasad informed that a tender for 354 uncovered villages in the strategic, remote and border areas of the country has been finalised and is under implementation in Jammu and Kashmir and Ladakh, in 144 villages of Bihar, Rajasthan, Uttarakhand, Himachal Pradesh and other priority areas of Gujarat.

These villages have been strategically chosen to cover border area connectivity on the mobile. After commissioning of these villages, there will be no uncovered villages in UTs of J&K, Ladakh for mobile connectivity.

The Union Minister further told that Department of Telecommunications is also working on providing mobile connectivity in villages of 24 aspirational districts of Bihar, Uttar Pradesh, Rajasthan and Madhya Pradesh and remaining 44 aspirational districts for 7287 uncovered villages in Chhatisgarh, Odisha, Jharkhand, Andhra Pradesh will also be covered for which government approval is under submission.

<https://zeenews.india.com/india/satellite-phones-for-indian-army-bsf-and-crpf-in-over-1000-far-flung-and-border-areas-2301956.html>

UAVs, high speed boats, All Terrain Vehicles — what Army's Ladakh corps wants amid LAC row

The corps, which takes care of the northern part of the LoC with Pakistan besides the LAC, has also sought for Israeli Spike Anti-Tank Guided Missiles & long-range surveillance cameras

By Amrita Nayak Dutta

New Delhi: The Army's 14 Corps is looking at procuring different types of UAVs, fast interceptor boats and All Terrain Vehicles (ATVs), besides wheeled armoured personnel carriers, among a host of other items, amid the stand-off with China along the Line of Actual Control (LAC) in Ladakh, ThePrint has learnt.

The 14 Corps, which takes care of the northern part of the Line of Control with Pakistan and the Siachen Glacier besides the LAC, has also sought the Israeli Spike Anti-Tank Guided Missiles (ATGM), long-range surveillance cameras and small-bodied ambulances, said a top defence source.

The corps is looking at procuring at least 10 to 15 long-range Heron UAVs and 20-25 multi-copters for close-range surveillance, besides 10 high speed interceptor boats to be used in the disputed Pangong Lake, the source added.

The 14 Corps' list projects a requirement of around 40 Spike ATGM launchers with an undisclosed number of missiles and more than 50 wheeled armoured personnel carriers.

Additionally, the corps would need anywhere between 20 to 30 anti-material rifles and 20 to 25 ATVs, the source said.

List to be vetted by northern command

As part of its winter preparedness, the 14 Corps also plans to procure waterproof chest waders and boots, vehicle-based snow cutters and extra wide bridges, though their numbers are currently not known.

In Galwan, the Chinese soldiers came with waterproof boots, while the Indian troops had none.

As reported by ThePrint, the Army is busy planning the logistics to equip the 30,000 additional soldiers with the right gear and adequate rations to deal with the tough conditions ushered in by the six-month cold season.

A second source said that the list will be vetted by the Northern Command — which may also add certain items for 15 and 16 Corps covering Jammu and Kashmir regions — and would be procured under the emergency powers delegated to the vice-chief of Army Staff under Schedule 23.

“Procuring these equipment would enhance the operational capability substantially, particularly because there hasn't been any progress on ground and the forces need to be prepared,” a second source said.

As reported earlier, the situation at eastern Ladakh continues to remain tense, particularly at Pangong Tso and Depsang plains, despite five corps commander-level talks in which both sides agreed for the need for disengagement.

At Pangong Tso, the Chinese are yet to vacate Finger 4 completely, while at Depsang plains they continue to block Indian patrols at Patrol Points 10 to 13, and have access to a large tract of land, which India considers its own.



A Heron 1 UAV in flight. The 14 corps is looking at procuring at least 10 to 15 long-range Heron UAVs | Representational image | Commons

This was also discussed at the Major-General level talks between the two sides Saturday and will be the subject of further discussions to be held at the diplomatic level.

<https://theprint.in/defence/uavs-high-speed-boats-all-terrain-vehicles-what-armys-ladakh-corps-wants-amid-lac-row/478816/>



Tue, 11 Aug 2020

INS Vishal or more submarine, what's best for Indian Navy? The way forward!

The Indian Navy is once again pushing its case for INS Vishal, even though recently CDS has said that India should move forward with more submarines than a huge capital intensive ship like a super carrier. Yet the navy is determined that it wants a third carrier so that it can operate two carriers simultaneously on both eastern and western seaboard even if a carrier is undergoing refit or repairs.

It all comes down to this debate- whether India wants to pursue the strategy of Sea Denial or of Sea Control?

Let's understand both strategies –

Sea Denial – The strategy involves procurement of platforms like submarines and missile boats, so as to deter enemy warship from entering your area of interest. The strategy follows a kind of harassment tactics to make the cost of venturing into your seas by enemy warships high. However, this tactics don't provide you complete authority over the waters but it just focus on keeping your enemy away from you but that doesn't guarantee that enemy won't try to venture into your waters.



Sea Control – This strategy involves a group of capital warships centred around an Aircraft carrier or a Landing Helicopter Dock (LHD). The aim of this strategy is to establish absolute control over large part of sea so as to be in dictating terms on what goes through that area. This helps in creating naval blockade which chokes your enemy of essential supplies. Sea denial is also part of sea control strategy. Sea control also ensure that your trade routes are secured while you deny your enemy of the same.

Which strategy is best for India?

Indian Navy has always considered Indian Ocean Region (IOR) as its own backyard, a playground which India navy will always want to dominate considering the fact that for all three countries i.e. India, China and Pakistan, Indian ocean is the main supply route of most of the essential commodities, most important of it being oil. In such a case, the strategy you would want to follow is not Sea Denial but Sea Control. As you would not only want to restrict movement of enemy navy, but create a total blockade to stop any movement of naval or other vessels like oil containers etc. of your enemy and would also want safe passage for your shipping as it is important for your war fighting effort. Now question is- can submarine and missile boats provide you with such capabilities? Well the answer is NO! Submarines at best can be used to harass your enemy but they are quite prone to enemy air activity. When China brings in its super carrier along with an LHD, your submarine will find it very difficult to get close to carrier group due to multiple ASW helicopter available on those ships. But movement of those helos restricts when you have your own fighter jets patrolling the area. As enemy first has to achieve air superiority prior to launching unrestricted ASW patrol. In fact, even for your own ASW platforms like P8 and MH60 Romeo, you will need an immediate air cover, which only an aircraft carrier can provide.

Why INS Vishal when we already have 2 Carriers?

Since it is clear that Indian Navy would prefer a sea domination over sneak attacks, question which people ask is why another carrier when we already have two. Well to answer this question, we will have to take into consideration many factors, of which most important is what your enemy can muster against you.

Now it is well known to world that China plans to have 5 to 6 carriers by next decade i.e.2030. While it is most likely that they will keep atleast 3 carriers around South China sea, East China sea and Pacific ocean to challenge US and Japanese Navy. They can very well permanently deploy atleast a carrier in Indian Ocean Region operating from their naval base in Djibouti or potential naval base which can come up either on their owned island Maldives or Coco island.

It is also possible that after 2030 when China builds more carriers, it can transfer it's refurbished carrier a.k.a. Liaoning to Pakistan Navy just to make India uncomfortable. They anyways don't plan to keep it in service with themselves for long, as they are not happy with its performance. This means, in future there can be atleast two hostile aircraft carriers permanently operating in Indian Ocean Region(IOR). While more can join too, so to dominate them you too need to have carriers available at all times. And that's what Indian Navy strategy is to have atleast 1 carrier group operational on its each flank if the third one is in refit or maintenance. Another factor always pulled in is high cost to build a carrier. Building of Vishal can easily cost Indian navy around \$4-5 billion along with its air group of fighter jet, AWACS and Multirole helicopters which may cost another \$7-8 billion. i.e a total cost of \$11-13 billion. But this cost will be divided over a period of around 7-8 years or so. Current year capital allocation for Navy is \$3.56 billion and if we take a moderate growth rate of 10% per annum, Indian Navy will have some \$55-60 billion to spend in just next 10 years. So it is quite possible to start construction towards late 2020s. **Aircraft Carrier**

Aircraft carriers are not obsolete. The US operates ten and is building a new class of carriers, first of which is undergoing trials. The UK after pondering over the need for carriers went ahead and commissioned two. China has two and plans to operate at least six. Threatened by China's increasing naval muscle, pacifist Japan announced to convert its two Izumo class of helicopter carriers into aircraft carriers. France operates the only nuclear powered carrier apart from the US.

An aircraft carrier is not a sitting duck as it is made out to be. It is escorted by destroyers, frigates and corvettes and submarines. For India, these are armed with the 290km range Brahmos supersonic anti ship cruise missiles which can take out enemy warships at that distance in about five minutes, travelling at 3,700 kmph. The sea skimming Brahmos will not be picked up by enemy ships until it's too late. India is working on a longer range Brahmos that can strike up to 600 kms. These combatants including the carrier carry air defence systems to counter incoming missiles. A carrier is not easy to sink even if a missile hits it.

The carrier's fighter jets, currently the MiG-29K on India's INS Vikramaditya with a combat range of 850kms on fleet defence mission will be able to neutralise enemy combatants at long distances before they get close to the carrier. In the future, the carriers will be armed with even more advanced and potent fighter jets with Boeing's F-18 Super Hornet and Dassault's Rafale competing for the 57 jet program. India plans indigenous carrier borne fighter jets which will reduce acquisition costs.

There are anti submarine helicopters onboard and the Indian Navy has the advanced P-8 surveillance, anti-submarine and anti-surface warship aircrafts – armed with anti-ship missiles and torpedoes. In the future there will be directed energy based defence systems.

<https://www.defenceaviationpost.com/2020/08/ins-vishal-or-more-submarine-whats-best-for-indian-navy-the-way-forward/>

Theoretical study shows that matter tends to be ordered at low temperatures

By Jose Tadeu Arantes

Classical phase transitions are governed by temperature. One of the most familiar examples is the phase transitions of water from solid to liquid to gas. However, other parameters govern phase transitions when temperatures approach absolute zero, including pressure, the magnetic field, and doping, which introduce disorder into the molecular structure of a material.

This topic is treated from the theoretical standpoint in the article "Unveiling the physics of the mutual interactions in paramagnets," published in *Scientific Reports*.

The paper resulted from discussions held in the laboratory in the context of the doctoral research of the two main authors, Lucas Squillante and Isys Mello, supervised by the last author, Mariano de Souza, a professor in the

Physics Department of São Paulo State University's Institute of Geosciences and Exact Sciences (IGCE-UNESP) in Rio Claro, Brazil.

The other coauthors are Roberto Eugenio Lagos Mônico and Antonio Carlos Seridonio, also professors at UNESP, and Harry Eugene Stanley, a professor at Boston University (USA).

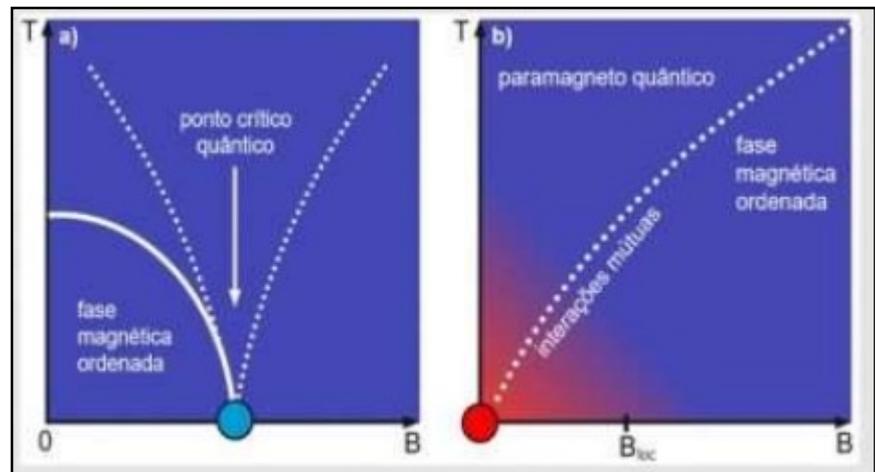
The study was supported by São Paulo Research Foundation—FAPESP via a grant awarded to the project "Exploring thermodynamic and transport properties of strongly correlated electron systems," for which Souza was the principal investigator.

"In paramagnetic materials, there's always a subtle many-body contribution to the system's energy. This contribution can be considered a small effective local magnetic field. It's usually overlooked, given the very small amount of energy associated with it compared to the energy associated with thermal fluctuations or external magnetic fields.

Nevertheless, when the temperature and external magnetic field approach zero, such many-body contributions become significant," Souza told.

The study showed that matter always tends to be ordered at low temperatures owing to many-body interactions. The noninteracting spin gas model therefore does not occur in the real world because a many-body interaction between the spins in the system would impose order.

"We found that in actual materials, there's no such thing as a critical point at which a quantum phase transition occurs in a genuine zero field because of the persistence of the residual magnetic field created by the many-body interaction. In a broader context, ideal Bose-Einstein condensation can't be obtained because of this interaction," Souza said.



A Bose-Einstein condensate, often referred to as the "fifth state of matter" (the others being solid, liquid, gas and plasma), is a group of atoms cooled to within a hair of absolute zero. When they reach that temperature, the atoms have no free energy to move relative to each other and fall into the same quantum states, behaving as a single particle.

Bose-Einstein condensates were first predicted and calculated theoretically by Satyendra Nath Bose (1894-1974) and Albert Einstein (1879-1955) in 1924, but it was not until 1995 that Eric A. Cornell, Carl E. Wieman and Wolfgang Ketterle managed to make one using ultracold rubidium gas, for which all three were awarded the 2001 Nobel Prize in Physics.

"What our study showed was that although a nonideal Bose-Einstein condensate can be obtained experimentally, the ideal condition for condensation can't be achieved because it presupposes that particles don't perceive or interact with each other, whereas residual interaction always occurs, even in the vicinity of absolute zero," Souza said.

"Another discovery was that matter can be magnetized adiabatically [without heat loss or gain] via these mutual interactions alone."

More information: Lucas Squillante et al, Unveiling the Physics of the Mutual Interactions in Paramagnets, *Scientific Reports* (2020). DOI: [10.1038/s41598-020-64632-x](https://doi.org/10.1038/s41598-020-64632-x)

Journal information: [Scientific Reports](https://www.nature.com/scientificreports/)
<https://phys.org/news/2020-08-theoretical-temperatures.html>

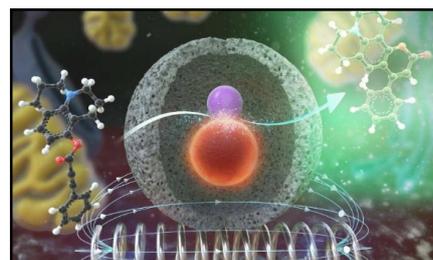


Tue, 11 Aug 2020

Nanocatalysts that remotely control chemical reactions inside living cells

The enzymes responsible for catalytic reactions in our body's biological reactions are difficult to use for diagnosis or treatment as they react only to certain molecules or have low stability. Many researchers anticipate that if these issues are ameliorated or if artificial catalysts are developed to create a synergetic effect by meeting the enzymes in the body, there will be new ways to diagnose and treat diseases. In particular, if artificial catalysts that respond to external stimuli such as magnetic fields are developed, new treatment methods that remotely control bioreactions from outside the body can become a reality.

The research team led by Professor In Su Lee of the Department of Chemistry at POSTECH has developed a remote magnetic-sensitive artificial catalyst called MAG-NER, which shows high catalytic efficiency within living cells. The study was published as the supplementary cover paper for *Nano Letters*, an international journal on nanotechnology.



Credit: Pohang University of Science & Technology (POSTECH)

The research team mimicked the structure of vesicles, an organelle within a cell, and synthesized a magnetic-catalyst-combined nanoreactor with iron-oxide nanoparticles and palladium catalysts inside a hollow silica nanoshell.

When MAG-NER encounters an alternating magnetic field, iron-oxide nanoparticles inside cause magnetic field-induced heat and activate only the palladium catalyst without raising the exterior temperature. The research team succeeded in implementing the catalytic reaction with high efficiency, which transforms non-fluorescent reactants into fluorescent products through implanting MAG-NER into living cells then applying alternating magnetic fields. The research team also confirmed that the catalyst of MAG-NER can remain active for long periods of time without being contaminated by biomolecules in cells and does not affect the cells' survival.

Using MAG-NER, it is anticipated that diagnosis and treatment methods, that can artificially remote control the cell's functions, can be developed as artificial molecules can be synthesized or chemical reactions can be induced within cells using magnetic fields that are harmless to the body.

Professor In Su Lee who led the research explained, "This research is a result of utilizing the hollow nanoreactor materials that our lab has been developing over the years and is valued as an innovative chemical tool that will advance biomedical and biological research."

More information: Jihwan Lee et al, Magnetothermia-Induced Catalytic Hollow Nanoreactor for Bioorthogonal Organic Synthesis in Living Cells, *Nano Letters* (2020). [DOI: 10.1021/acs.nanolett.0c01507](https://doi.org/10.1021/acs.nanolett.0c01507)

Journal information: [Nano Letters](https://phys.org/news/2020-08-nanocatalysts-remotely-chemical-reactions-cells.html)
<https://phys.org/news/2020-08-nanocatalysts-remotely-chemical-reactions-cells.html>



Tue, 11 Aug 2020

New research reveals previously hidden features of plant genomes

An international team led by the Plant Phenotyping and Imaging Research Centre (P2IRC) at the University of Saskatchewan (USask) and researchers at Agriculture and Agri-Food Canada (AAFC) has decoded the full genome for the black mustard plant—research that will advance breeding of oilseed mustard crops and provide a foundation for improved breeding of wheat, canola and lentils.

The team, co-led by P2IRC researchers Andrew Sharpe and Isobel Parkin, used a new genome sequencing technology (Nanopore) that results in very long "reads" of DNA and RNA sequences, providing information for crop breeding that was previously not available. The results are published today in *Nature Plants*.



P2IRC researcher Andrew Sharpe with the PromethION high throughput DNA and RNA sequencing device at GIFS. Credit: David Stobbe

"This work provides a new model for building other genome assemblies for crops such as wheat, canola and lentils. Essentially, it's a recipe for generating a genome sequence that works for any crop," said Sharpe, director of P2IRC.

"We now know that we can get the same quality of genomic data and level of information about genetic variation for these important national and international crops. This means we can make breeding more efficient because we can more easily select genes for specific desired traits."

Sharpe said his team is already using this software platform in the Omics and Precision Agriculture Lab (OPAL) at the USask Global Institute for Food Security (GIFS) to sequence larger and more complex crop genomes.

Black mustard (*Brassica nigra*), commonly used in seed form as a cooking spice, is grown on the Indian sub-continent and is closely related to mustard and canola crops grown in Canada. The research provides a clearer, "higher resolution" view of the plant's genes and gives researchers and breeders a more defined view of which genes are responsible for which traits.

The resulting gene assembly for black mustard also helps explain how the black mustard genome differs from those of its close crop relatives—such as cabbage, turnip and canola.

The team also uncovered the first direct evidence of functional centromeres, structures on chromosomes essential for plant fertility, and detected other previously hard to identify regions of the genome. This knowledge provides a foundation for improving crop production.

Parkin, a USask adjunct professor and P2IRC member, said the use of long-read sequence data has enabled unprecedented access to previously hidden features of plant genomes.

"This provides not only insights into how crops evolve but enables the identification of novel structural variation—now known to play an important role in the control of many key agronomic traits," said Parkin, also the lead research scientist with AAFC Saskatoon Research Centre.

They also found in the sequence multiple copies of certain genes that express specific traits. This could mean that certain traits, such as fungal resistance, could be expressed more strongly through several genes.

Other USask members of the team include GIFS researcher Zahra-Katy Navabi and bioinformatics specialist Chu Shin Koh. Other team members include Sampath Perumal, a post-doctoral fellow with Parkin, as well as others from the University of Ottawa, Thompson River University, the National Research Council, and researchers from the United Kingdom and China.

"The genome assembly for black mustard that we have developed is a great example of how new Nanopore sequencing technology quickly reveals important genome biology," Sharpe said, noting that this advanced sequencing technology and capability is available to public and private plant breeding organizations through the OPAL at GIFS.

More information: Perumal, S., Koh, C.S., Jin, L. et al. A high-contiguity *Brassica nigra* genome localizes active centromeres and defines the ancestral *Brassica* genome. *Nat. Plants* 6, 929–941 (2020). doi.org/10.1038/s41477-020-0735-y

Journal information: *Nature Plants*
<https://phys.org/news/2020-08-reveals-previously-hidden-features-genomes.html>



Tue, 11 Aug 2020

How to get more cancer-fighting nanoparticles to where they are needed

University of Toronto Engineering researchers have discovered a dose threshold that greatly increases the delivery of cancer-fighting drugs into a tumor.

Determining this threshold provides a potentially universal method for gauging nanoparticle dosage and could help advance a new generation of cancer therapy, imaging and diagnostics.

"It's a very simple solution, adjusting the dosage, but the results are very powerful," says MD/Ph.D. candidate Ben Ouyang, who led the research under the supervision of Professor Warren Chan.

Their findings were published today in *Nature Materials*, providing solutions to a drug-delivery problem previously raised by Chan and researchers four years ago in *Nature Reviews Materials*.

Nanotechnology carriers are used to deliver drugs to cancer sites, which in turn can help a patient's response to treatment and reduce adverse side effects, such as hair loss and vomiting. However, in practice, few injected particles reach the tumor site.

In the *Nature Reviews Materials* paper, the team surveyed literature from the past decade and found that on median, only 0.7 percent of the chemotherapeutic nanoparticles make it into a targeted tumor.

"The promise of emerging therapeutics is dependent upon our ability to deliver them to the target site," explains Chan. "We have discovered a new principle of enhancing the delivery process. This could be important for nanotechnology, genome editors, immunotherapy, and other technologies."



Credit: CC0 Public Domain

Chan's team saw the liver, which filters the blood, as the biggest barrier to nanoparticle drug delivery. They hypothesized that the liver would have an uptake rate threshold—in other words, once the organ becomes saturated with nanoparticles, it wouldn't be able to keep up with higher doses. Their solution was to manipulate the dose to overwhelm the organ's filtering Kupffer cells, which line the liver channels.

The researchers discovered that injecting a baseline of 1 trillion nanoparticles in mice, in vivo, was enough to overwhelm the cells so that they couldn't take up particles quick enough to keep up with the increased doses. The result is a 12 percent delivery efficiency to the tumor.

"There's still lots of work to do to increase the 12 percent but it's a big step from 0.7," says Ouyang. The researchers also extensively tested whether overwhelming Kupffer cells led to any risk of toxicity in the liver, heart or blood.

"We tested gold, silica, and liposomes," says Ouyang. "In all of our studies, no matter how high we pushed the dosage, we never saw any signs of toxicity."

The team used this threshold principle to improve the effectiveness of a clinically used and chemotherapy-loaded nanoparticle called Caelyx. Their strategy shrank tumors 60 percent more when compared to Caelyx on its own at a set dose of the chemotherapy drug, doxorubicin.

Because the researchers' solution is a simple one, they hope to see the threshold having positive implications in even current nanoparticle-dosing conventions for human clinical trials. They calculate that the human threshold would be about 1.5 quadrillion nanoparticles.

"There's a simplicity to this method and reveals that we don't have to redesign the nanoparticles to improve delivery," says Chan. "This could overcome a major delivery problem."

More information: Ben Ouyang et al, The dose threshold for nanoparticle tumor delivery, *Nature Materials* (2020). DOI: [10.1038/s41563-020-0755-z](https://doi.org/10.1038/s41563-020-0755-z)

Journal information: [Nature Materials](https://www.nature.com/articles/s41563-020-0755-z)
<https://phys.org/news/2020-08-cancer-fighting-nanoparticles.html>

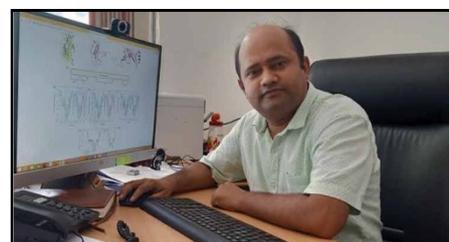
IIT Mandi team publishes research study on COVID-19 proteome

Research of protein structure and non-structure essential to understand virus pathogenesis and for biologists involved in high throughput and structure-based screening for drug development

A team from the Indian Institute of Technology Mandi, in collaboration with researchers from Virginia Commonwealth University and the University of South Florida, USA, has used computational tools to understand an important part of the viral proteome called Intrinsically Disordered Protein Regions (IDPRs).

The research team is headed by Dr Rajanish Giri, Assistant Professor, School of Basic Sciences, IIT Mandi. The results of this work were recently published in the journal, *Cellular and Molecular Life Sciences*.

The research paper is co-authored by Dr Rajanish Giri, his research scholars – Taniya Bhardwaj, Meenakshi Shegane, Bhuvaneshwari R. Gehi, Prateek Kumar and Kundlik Gadhave, and American scientists, Dr Christopher J. Oldfield, Virginia Commonwealth University, and Dr Vladimir N. Uversky, University of South Florida.



Dr. Rajanish Giri, Assistant Professor, School of Basic Sciences, IIT Mandi

“In COVID–19, the RNA is translated first into proteins which perform a wide range of functions. Since protein functions depends both on ordered and disordered regions, it is important to understand the whole proteome considering both ordered and disordered proteins”, explains Dr Giri. The set of proteins or proteome comprises both ordered regions and disordered regions in proteins.

Explaining the research, Dr Giri, said, “Intrinsically Disordered Proteins (IDPs), and Intrinsically Disordered Protein Regions (IDPRs) are gaining attention in recent times because they have been discovered to play vital roles in various biological processes”.

The IDP and IDPRs have been strongly correlated with the virulence of viruses, and understanding their structure and functions in COVID–19 can help in finding ways to mitigate the effects of the infection.

Both the protein structure and non-structure are fundamental things and their knowledge is paramount to understand the virus pathogenesis. Using computational tools it’s possible to investigate the propensities of the proteins and regions that may or may not form the structure.

“We have investigated the disordered side of SARS-CoV-2 proteome using a complementary set of computational approaches to check the prevalence of IDPRs in its proteins and to shed some light on their disorder-related functions and also their disorder-based binding motifs, known as molecular recognition features”, says Dr. Giri.

The studies have shown the crucial role of IDPRs in the maturation of individual proteins. The team found that many of these proteins contain disorder-based binding motifs.

Speaking of the implication of their finding, Dr. Giri, said, “Since many IDPs/IDPRs undergo structural changes upon association with their physiological partners, our study generates important grounds for better understanding of the functionality of these proteins, their interactions with other viral proteins, as well as interaction with host proteins in different physiological conditions”.

He further adds, “The process of rational drug design is currently limited, since it mostly ignores the presence of intrinsic disorder in target proteins. The understanding of the structure of these regions in the COVID–19 proteome is valuable to structural biologists involved in high throughput and structure-based screening for drug development”.

The IIT Mandi team has also compared IDPRs among the closely related viruses, human SARS and bat SARS-like CoVs. Such comparisons enable a better understanding of the sequence and structural peculiarities of the evolution of the virus and their virulence.

The IIT Mandi researchers plan to conduct more in-depth studies to establish structure-function relationships for a better understanding of the functioning of SARS-CoV-2 proteins. ‘Currently, we are also performing experiments to further investigate the disordered proteins in SARS-CoV-2’, says Dr Giri.

<https://www.expresshealthcare.in/news/iit-mandi-team-publishes-research-study-on-covid-19-proteome/424045/>

TIMESNOWNEWS.COM

Tue, 11 Aug 2020

Will do clinical research of highest standards to produce best quality COVID-19 vaccine: Bharat Biotech CMD

Dr Krishna Ella says Bharat Biotech is in no rush to launch COVAXIN, India's first indigenous coronavirus vaccine, as safety is paramount

Key Highlights

- **COVAXIN is India's first indigenously developed vaccine against novel coronavirus**
- **Bharat Biotech has completed the phase 1 clinical trials for its COVID-19 vaccine candidate**
- **The inactivated vaccine was developed in collaboration with the Indian Council of Medical Research and National Institute of Virology**

Chennai: Dr Krishna Ella, Chairman and Managing Director, Bharat Biotech, said that the Indian biotechnology company will not rush to launch COVAXIN, India’s first indigenous vaccine candidate against novel coronavirus, as safety and quality are more important than anything else. The Hyderabad-based company has completed the phase 1 trials for its COVID-19 vaccine candidate developed on a Vero-cell platform.

A report by *Business Standard*, citing Dr Ella, said that there is a tremendous pressure on the company to develop a vaccine quickly amid rising cases of coronavirus disease across the country.

“There is a tremendous pressure on us to develop the vaccine. But for us, safety and quality are paramount. We don’t want to kill more people with the wrong vaccine,” Ella was quoted as saying during an interaction with members of the Chennai International Centre on ‘Covid-19 Endgame Scenarios’ on Saturday.

The chairman of Hyderabad-based firm also revealed that the firm wants to do clinical research of the highest standards and will produce the best quality vaccine. Earlier, Dr Ella, had told Times Now Digital that he is hopeful that COVAXIN will work against the SARS-CoV-2, the virus that causes COVID-19, considering that inactivated vaccines have a well-proven and accepted track record.



Will do clinical research of highest standards to produce best quality COVID-19 vaccine: Bharat Biotech CMD
| Photo Credit: iStock Images

“We have been monitored by international agencies and communities. It’s a matter of prestige for the country and for us. We won’t be shortsighted on research and will produce the best quality vaccine,” said Dr Ella.

Dr Ella also said that the Indian vaccine industry isn’t inferior to the MNCs of Europe and the US and is far ahead of the Chinese in technology and clinical research, said the report.

“We are not less than GSK or Sanofi (the global majors),” he said, adding that a few years back, Bharat Biotech launched a rotavirus vaccine for \$1, when global major GSK supplied it for \$85, with the same parameters and quality.

Dr Ella also said that the company will ensure that COVAXIN is very affordable and accessible to everyone. COVAXIN is an inactivated vaccine and derived from a strain of SARS-CoV-2 virus isolated from the National Institute of Virology (NIV), Pune, and was later transferred to Bharat Biotech to develop into a vaccine.

<https://www.timesnownews.com/health/article/will-do-clinical-research-of-highest-standards-to-produce-best-quality-covid-19-vaccine-bharat-biotech-cmd/635000>

TIMESNOWNEWS.COM

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India should have a COVID-19 vaccine by December: Serum Institute CEO Adar Poonawalla

SII CEO Adar Poonawalla says India should have a coronavirus vaccine by the end of this year

Key Highlights

- *SII has partnered with AstraZeneca for manufacturing the Oxford COVID-19 vaccine candidate*
- *Drugs Controller General of India granted permission to SII to conduct phase 2 and 3 human clinical trials of ChAdOx1 nCoV-19*
- *Early trial data shows the vaccine appears safe and triggers strong immune response*

New Delhi: Serum Institute of India (SII) CEO Adar Poonawalla has said that the country should have a vaccine against the novel coronavirus by December. The Pune-based firm, which is the world’s largest vaccine manufacturer by volume, is expected to start trials of the Oxford/AstraZeneca COVID-19 vaccine candidate ChAdOx1 nCoV-19 soon in India in partnership with the Indian Council of Medical Research (ICMR).

SII had said that the Oxford vaccine - called Covishield in India - will be priced at maximum US\$ 3 (around Rs 225) per dose in low- and middle-income countries. Last week, the company entered a landmark deal with the Bill & Melinda Gates Foundation and Gavi, The Vaccine Alliance, to advance the manufacturing and delivery of up to 100 million doses of future COVID vaccines for India and low- and middle-income countries in 2021.

“We should have a vaccine by the end of this year. We will conduct trials in India on a few thousand patients in partnership with the ICMR, Poonawalla told CNBC-TV18. He added the final pricing for Covishield vaccine will be announced in two months. Earlier, Poonawalla had said the company plans to manufacture 300 million to 400 million doses by the end of the year.

The firm had earlier revealed that between 4,000 to 5,000 people in Pune and Mumbai will be injected with the ChAdOx1 nCoV-19 vaccine by the end of August as part of trials scheduled to last over two months.



India should have a COVID-19 vaccine by December: Serum Institute CEO Adar Poonawalla | Photo Credit: iStock Images

Serum Institute had also signed a license deal with American company Novavax for the development and commercialisation of NVX-CoV2373 (Novavax' COVID-19 vaccine candidate) in India and low- and middle-income countries.

<https://www.timesnownews.com/health/article/india-should-have-a-covid-19-vaccine-by-december-serum-institute-ceo-adar-poonawalla/635033>



Tue, 11 Aug 2020

Utilizing agtech plant labs for human testing could help fight pandemic, study says

Just as redeploying a fleet of small British fishing boats helped during the Battle of Dunkirk, marshalling the research equipment and expertise of the many agtech labs around the world could help combat pandemics, say the authors of a just-published article in *Nature Biotechnology*.

Sophisticated agtech labs and equipment used for crop and animal breeding, seed testing, and monitoring of plant and animal diseases could easily be adapted for diagnostic testing and tracing in a human pandemic or epidemic, the article states.

"If there is anything this current pandemic has shown us, it is that we need to mobilize efforts on a large scale to ramp up diagnostics," said lead author Steven Webb, chief executive officer of the Global Institute for Food Security (GIFS) at the University of Saskatchewan (USask).

"We must mobilize 'large ships' to fight pandemics by exploiting and adapting the screening capacity of high-throughput plant breeding laboratories which can rapidly analyze hundreds of thousands of samples."

The authors urge a national or international effort to co-ordinate rapid redeployment of digital agriculture infrastructure for pandemic preparedness. This approach would relieve the pressure on limited testing tools in the health sector and speed up the ability to respond with treatment and measures to contain the spread and occurrence of disease.

"Agtech has the infrastructure and capacity to support this need through its versatile equipment that can be used for very large-scale and automated applications including genetic testing and sequencing, virus detection, protein analysis, and gene expression," Webb said.

For instance, automated analysis of new plant varieties could be quickly switched to the automated detection of viral RNA or proteins, as well as detection of neutralizing antibodies, in humans. Selection of the fittest plant cultivars for breeding could be replaced by confirmation of patient diagnose of infectious diseases.

"As an example, the Omics and Precision Agriculture Laboratory (OPAL) at GIFS combines the digital data analysis of plant genes and traits with the latest precision agriculture technologies, and can provide a complete profile and data analysis of 3,000 plant samples per day," said Webb.

"Appropriate quality control measures would guide OPAL's switch from plant sample testing and analysis to human sample diagnostics during a pandemic, complying with regulation and using processes personnel are trained to employ."

GIFS has already lent equipment to enable expanded testing of COVID-19 blood samples and has donated materials and supplies to the Saskatchewan Health Authority.

The article notes that pandemics also affect animals and plants, with severe consequences for human food security, the economy, the environment, and society. For instance, the Great Famine in



GIFS' liquid handling robot used to automate the dispensing of specific amounts of liquids to containers in the lab. Credit: Pierre-Luc Pradier.

Ireland caused by the potato blight in the 1800s led to one million deaths and the spread of the blight in Europe claimed another 100,000 lives.

The article stresses the need to be able to adapt available agtech infrastructure from 'peacetime' applications to emergency use for diagnostic testing. This requires development of contingency protocols at national and international levels.

"There needs to be comprehensive quality control, standardizing the process and outcomes of this high-capacity testing of pandemic diagnostic samples," Webb said.

As well, there's a need to invest in agricultural technologies that can easily be adapted for medical use during pandemics.

"We need to be proactive to fight the next one. A proactive approach on all fronts will ensure the world is more prepared with the infrastructure and resources needed to respond to a pandemic," said Webb.

More information: Steven R. Webb et al, Agtech infrastructure for pandemic preparedness, *Nature Biotechnology* (2020). [DOI: 10.1038/s41587-020-0654-5](https://doi.org/10.1038/s41587-020-0654-5)

Journal information: [Nature Biotechnology](https://www.nature.com/news/2020-08-agtech-labs-human-pandemic.html)
<https://phys.org/news/2020-08-agtech-labs-human-pandemic.html>

The Indian EXPRESS

Tue, 11 Aug 2020

Covid-19 vaccine tracker, August 10: WHO renews call for countries to join its COVAX platform

Coronavirus (COVID-19) vaccine tracker: The countries who join the initiative are also assured supply of vaccines whenever they become successful. The countries will get assured supplies to protect at least 20 per cent of their populations

Pune: Covid-19 vaccine tracker: The World Health Organisation has renewed its invite to countries to join its COVAX facility, an international alliance aimed at accelerating the development and manufacture of novel Coronavirus vaccines, and ensuring equitable access to all. The COVAX facility, launched in the last week of April, is stitching together agreements with developers and manufacturers of vaccine candidates it thinks are most likely to succeed.

The facility is trying to raise funds to support the rapid development of promising candidates, and the quick expansion of manufacturing capacities, so that the vaccines once approved, could be produced on mass scale. According to its initial estimates, US\$ 18.1 billion were required to cover the costs of research and development, manufacturing, and delivery of vaccines to different countries. The facility aims to procure at least two billion doses of a novel Coronavirus vaccine by the end of next year, for deployment and distribution mainly in the low and middle income countries.

The latest announcement does not say how many countries had already joined the initiative. But in a July 15 statement, the WHO had said that 75 countries had submitted their expressions of interest in joining the COVAX facility, and had shown willingness to help raise the requisite funds.



The COVAX facility, launched in the last week of April, is stitching together agreements with developers and manufacturers of vaccine candidates it thinks are most likely to succeed. (Getty Image)

The countries who join the initiative are also assured supply of vaccines whenever they become successful. The countries will get assured supplies to protect at least 20 per cent of their populations.

The WHO has been saying the COVAX facility, by backing multiple vaccine candidates, would ensure that it would have access to whichever vaccine candidate is finally approved for use. At the same time, countries that do not have the resources of the United States to get into individual bilateral agreements with multiple vaccine developers for securing supplies in advance, can still hope to get access to the vaccines by joining this facility.

Last week's agreement between the Pune-based Serum Institute of India and Bill and Melinda Gates Foundation for production of 100 million doses of the vaccine for low and middle-income countries was part of the COVAX mechanism. Bill and Melinda Gates Foundation, along with GAVI (previously called Global Alliance for Vaccines and Immunisation, now just GAVI), and CEPI (Coalition for Epidemic Preparedness Innovations) are working together with WHO in executing the COVAX mechanism. These 100 million doses would be provided to the eligible countries at a price of US\$ 3 per doses. Bill and Melinda Gates Foundation agreed to provide US\$ 150 million to Serum to quickly increase its manufacturing capacity.

Russian vaccine could be approved this week

Going by Russia's previous announcements, a Coronavirus vaccine candidate, being developed by Moscow's Gamaleya Institute, is expected to win regulatory approval this week. It would become the first novel Coronavirus vaccine to get approval for public use, though a Chinese vaccine has already been approved for "limited use". The Chinese vaccine is being used only on army personnel right now.

Russia has previously said that the vaccine being developed by Gamaleya Institute in collaboration with the country's defence ministry would be approved by August 12, and that it would be made available for public use by September. The country plans to start mass vaccinations starting October.

The superfast speed at which it has been produced — other candidates are unlikely to appear on the horizon before at least the end of the year — has led to scepticism regarding the safety and effectiveness of the Russian vaccine. Especially so, since the human trials for the vaccine, which takes several years in normal circumstances, have been completed in less than two months.

Russia claims that this was made possible due to the fact that the Coronavirus vaccine under development very closely resembles a vaccine for Middle East Respiratory Syndrome (MERS) disease, caused by another coronavirus, that has already been tested extensively.

But at least Britain, according to a news report in London's Telegraph newspaper, has decided against using the Russian vaccine on its people.

HUNT FOR CORONAVIRUS VACCINE: THE STORY SO FAR

- More than 160 vaccine candidates in pre-clinical or clinical trials
- 23 of them in clinical trials
- Six in final stages, phase-III of human trials
- At least eight candidate vaccines being developed in India. Two of these have entered phase-II trials after completing phase-I.

<https://indianexpress.com/article/explained/covid-19-vaccine-tracker-updates-august-10-6548138/>

