

Modi's arms export ambitions depend on unblocking policy bottlenecks

Slow decision-making and production inhibit defense sector's embrace of 'Make in India'

By Yuji Kuronuma

India -- Prime Minister Narendra Modi aims to turn his country into a major weapons exporter by attracting foreign investment and expertise, but India's lumbering bureaucracy and a complex procurement process stand in the way.

"India will not just manufacture for the purposes of import substitution, but will also boost defense production to export Indian-made defense products to countries around the world," Defense Minister Nirmala Sitharaman said April 11 at DefExpo, a biennial defense exhibition that opened in the city of Chennai on the same day.

But she later expressed doubts over pushing homemade equipment. "I can't for a moment imagine that I will prevail upon them that they necessarily buy what is Indian," she said. India has the fifth-largest defense budget in the world, yet buys 60% of its arms from overseas.

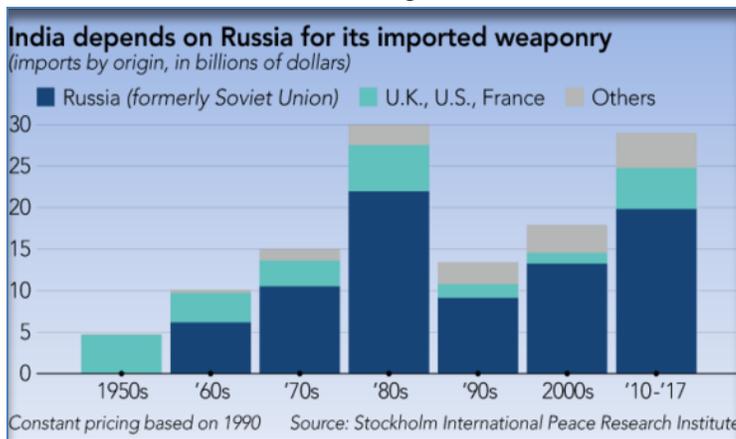


The Defense Research and Development Organization works on Indian-made products, but frequent delays usually render the equipment outdated by the time it comes off the production lines.

The Akash surface-to-air missile defense system is one such example. The DRDO spent roughly three decades developing the weapons, only to end up with rockets that lacked the latest tracking technology. India's army in 2016 said it would order no additional Akash missiles.

Modi reportedly was deeply disappointed by the DRDO after the Akash debacle. The defense ministry's research and development budget stayed mostly flat in fiscal 2015 and fiscal 2016.

India's reliance on foreign arms dates back to when it gained independence in 1947. The country

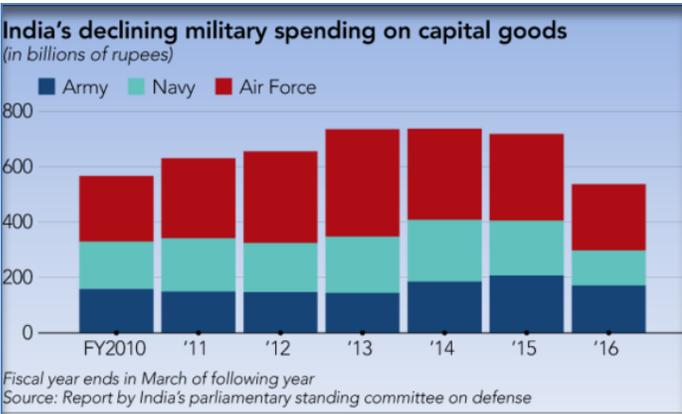


bought more than half of its defense equipment from former colonial ruler Britain almost every year until 1961, according to data from the Stockholm International Peace Research Institute. As military assistance from the U.K. and the U.S. began to fade, New Delhi turned to Russia, then known as the Soviet Union, which has supplied the majority of India's arms for more than 50 years. India has been the world's largest arms importer for much of the past 10 years. It spends \$3 billion to \$5 billion annually on equipment from Russia and elsewhere -- as much money as it would take to create 2 million to 3 million jobs

at home, based on the nation's per capita gross domestic product. The country exports only \$40 million to \$60 million worth of arms yearly.

Modi has promoted domestic industries under his "Make in India" campaign since taking office in 2014. Eager to attract overseas investment and knowledge in the military sector as with regular manufacturing, he raised the cap for foreign ownership in defense-related businesses to 49% in 2014 from the previous 26%.

Still, "we have not actually seen anything happening since then," an executive from Mahindra Defense Systems admitted to the Nikkei Asian Review at DefExpo. The company, a unit of leading Indian conglomerate Mahindra Group, signed a deal with Boeing and Hindustan Aeronautics, India's state-owned aircraft manufacturer, at the expo to make fighter jets in India. Mahindra Defense also announced a partnership with Japan's ShinMaywa Industries to produce parts for the latter's US-2 search and rescue aircraft.



But the Mahindra Defense executive was skeptical when asked whether easing restrictions on overseas players would boost foreign direct investment. "If there are orders [from the defense ministry], FDI will increase. If there are no orders, even if 100% FDI is allowed, nothing will happen," the executive said.

Total orders for defense equipment are shrinking by value, with even orders from foreign players declining since a peak in fiscal 2013. Complex decision-making mechanisms inside the defense ministry, combined with Modi weighing his options from a diplomatic perspective before giving approval, slow the process.

India's air force takes part in a drill at the DefExpo trade show in Chennai. (Photo by Yuji Kuronuma) The push for domestic production might also be delaying orders. India increased the ministry's research and development spending by double digits in fiscal 2017. The army is now looking to order additional Akash missiles, despite having previously discarded the idea.



If successful, "Make in India" will bolster both the country's economy and military. "It is not just on the battlefields, but also on the factory floors of defense manufacturing enterprises that strategic decisions are made," Modi said at DefExpo on April 12.

But he might need to smooth this process by addressing the bottleneck in policy decision-making. <https://asia.nikkei.com/Politics/Modi-s-arms-export-ambitions-depend-on-unblocking-policy-bottlenecks2>



Fri, 27, April, 2018

India displays big missiles at defense show

By Vladimir Karnozov

Two significant long-range missile programs were showcased at India's DefExpo2018 event held in Chennai from April 11 to 14. India's defense ministry and its Defense Research and Development Organization (DRDO) displayed a full-scale mockup of the ground-launched Nirbhay cruise missile. The Indo-Russian BrahMos Aerospace joint venture showed the "Next Generation" version of its supersonic missile.

The Nirbhay is similar in size and performance to the U.S. Tomahawk and Russia's Caliber 3M54/3M14 cruise missiles. It is six meters (19.7 feet) long and has a cylindrical body with diameter of 0.52 m (67 inches). According to local sources, the Nirbhay can carry a conventional or nuclear warhead over a distance of 1,500 km/808 nm. Its production should have commenced last year. Separately, the DRDO put on display an indigenously developed "Small Turbofan Engine" that might power the Nirbhay.

Clearly, this missile is a strategic weapon that will supplement ballistic missiles already in the Indian service. These include the K-15/B-05 series with a range of 750 km/405 nm developed for the S73 Arihant nuclear-powered submarine that was commissioned in 2016. The follow-on K-4, now in the testing, has a range boosted to 3,500 km/1,890 nm. According to local sources, this missile is larger, at 12 m (39.4 ft) long and 1.3 m (51 in) in diameter, and weighs 17 tons. Between these two naval systems there is the Dhanush intended for launch from a mobile land platform. Weighing 5,600 kg (12,346 lb), this missile has a length of 8.56 m (28 ft) and a body diameter of 1 m (39.4 in).

The Dhanush's reported maximum range is 300 km/162 nm, which is similar to the original cruise missile from the BrahMos joint venture, which is designated PJ-10. The BrahMos-NG that is now in



The Nirbhay is a cruise missile that is being developed by India's DRDO. (Photo: Vladimir Karnozov)

development is smaller in diameter and length than the PJ-10, and can therefore fit the standard 533mm torpedo tubes in widespread use on submarines and surface warships. It is primarily intended for submarines, although an air-launched version is also planned. The Brahmos-NG seems to have replaced the hypersonic Brahmos-II that was previously a focus of development by the joint venture.

However, the Brahmos-NG is still faster than the PJ-10 (Mach 3.5 versus Mach 2.8) and has a longer range (more than 300 km/162 nm versus a maximum 290/157 nm km).

Moreover, the BrahMos-NG will have a newly developed AESA radar seeker in place of the mechanically scanned one on the PJ-10. The Indian air force would benefit from adopting the Brahmos-NG, since three of them could be carried by its Su-30MKI multirole fighters, instead of one PJ-10. Besides, the aircraft would be able to land with one or two missiles on wing pylons, whereas landing safely with a standard missile attached to the center fuselage pylon is not possible. Meanwhile, flight-testing of the air-launched Brahmos is being conducted using a pair of specially modified Su-30MKI. The first midair firing was successfully accomplished in November 2017.

BrahMos Aerospace believes it can develop, test and put the Brahmos-NG into production as follow-on to the PJ-10. By that time, the number of surface warships in service with the Indian navy and armed with these missiles would rise from the current 11 to 20.

Production for the Indian army, of the version that fits in mobile transporter-erector-launchers, would also have been completed by that time. Also at the test-firing stage is the BrahMos-ER, suffix for "Extended Range," which is reportedly increased to 450 km/243 nm. The first launch was in March of last year.

<https://www.ainonline.com/aviation-news/defense/2018-04-19/india-displays-big-missiles-defense-show>



Fri, 27 April, 2018

India: world intellectual property day 2018: powering change: women in innovation and creativity

"Life is not easy for any of us. But what of that? We must have perseverance and above all confidence in ourselves. We must believe that we are gifted for something and that this thing must be attained."

By Marie Curie

So exhorted Madame Marie Curie, the first woman scientist to win noble prize in two different scientific disciplines and who is popularly known as "mother of modern physics" because of her pioneer work

in research on radioactivity, where she established the nature of radiation and beta rays. She also discovered and isolated polonium and radium elements. It was the first time a woman inspired other women to help them innovate through their creative ideas and scientific inventions.

Innovation is not just about a creative idea, but it is the implementation of creative ideas in such a way that they can be mass marketed to better the lives of other people. Innovation and women empowerment go hand in hand. A 2017 report on Gender Equality found that the number of women in the science, technology and innovation fields was low in the world's leading economies. Women's long been fight to be recognized at par with men, though has brought about some balance amongst genders in some ways but gender equality is still a far cry. Women still struggle for equal opportunities in certain disciplines.

In her famous book - Nobel Prize Women in Science, author Sharon Bertsch McGrayne has written about 10 women and their struggles on their way to achieving the Nobel Prize. In this book, the women Nobel Prize winners have talked about how they made their way forward amidst difficulties when no one was in favor of women education. They have spoken about even crawling behind furniture to attend classes. They have shared how Science was considered hard and rigorous whereas women were considered fragile. Hence, they were excluded from serious science and innovative works. Women scientists were even considered unnatural beings. No sooner did these women overcome one barrier and another cropped up.¹

Breaking the barriers to women's creativity and helping to nurture their innovative ideas is the first step towards powering change in the field of innovation and creativity. Women need opportunities to innovate. They need education, finances, time and most of all inspiration.

In the past two decades several women scientists have come up with life changing innovations. Their contributions cannot be ignored. Women scientists match and even supersede male scientists at times. Karthik Ramaswamy, visiting scientist at the Indian Institute of Science (IISc) and a participant in the edit-a-thon, told The Hindu, "Science in India has a 'diversity problem' with Indian women and minorities represented inadequately.² There are many women scientist who contributed to science and innovation but they are forgotten heroes".

The world of inventions worships male heroes. We all know inventors like Charles Babbage, the famous English mathematician who invented the world's first automatic digital computer, Alexander Graham Bell, inventor of telephone, Thomas Alva Edison, inventor of electric bulb, Benjamin Franklin inventor of bifocal glasses. But how many of us know the person who invented computer programming without which computers wouldn't be as efficient as they are - Computer programming was invented by a woman scientist - Grace Hoper. Stephanie Kwolek, another woman scientist, invented Kevlar, a material five times stronger than steel and which is used the world over to protect people from bullets. Men have always been hailed as posterboys for achievements in the field of inventions. Most success stories related to showcase inventions are about male inventors, propagating the myth that women do not invent.

Unfortunately, this perception has propelled forward even in twenty first century and third technological revolution. Such perceptions have historically denied women's contribution towards production of knowledge and their recognition as inventors. Since the 1800's, women have been fighting with determination to create equality between genders. Women's achievements are often overlooked when it comes to handing out praise. Ignoring the gender typecasts and prejudiced barriers that stood at every turn, female inventors have displayed a strong will and untiring perseverance.

The list of such female inventors is endless, however, on the occasion of **World Intellectual Property Day 2018** with the theme – **Powering Change: Women in Innovation and Creativity**, we are delighted to present here, an introduction to a handful of unsung female scientists and inventors, whose ingenuity has helped shape the world as we know it over the last couple of centuries.

Asima Chatterjee

Asima Chatterjee, a chemist, is well known for her contributions in the development of cancer medicine, anti-epileptic and anti-malarial drugs. Her contributions in the field of organic chemistry and phytomedicine are remarkable. She was the first woman to be named a Doctor of Science by an Indian University. She was nominated as a member of the Rajya Sabha by the President of India. She has inspired many women to follow in her footsteps and pursue careers that are not normally expected of women.

Rajeshwari Chatterjee

Rajeshwari Chatterjee was the first woman engineer from Karnataka. In 1946, she was given a scholarship to study abroad, and studied at the University of Michigan where she obtained her master's degree from the Department of Electrical Engineering. After obtaining a Ph.D degree, she returned to India and joined the Department of Electrical Communication Engineering at IISc as a faculty member where she, along with her husband, set up a microwave research laboratory where they did pioneering work on Microwave Engineering.

Darshan Ranganathan

She was an organic chemist from India who is known for her work in bio-organic chemistry, including "work in protein folding" and "supramolecular assemblies, molecular design, chemical simulation of key biological processes, synthesis of functional hybrid peptides and synthesis of nanotubes". She joined IICT, Hyderabad, in 1998, where she became the Deputy Director. After her death due to breast cancer in 2001, her husband instituted the biennial "Professor Darshan Ranganathan Memorial Lecture", which is "delivered by a woman scientist who has made outstanding contributions in any field of Science and Technology".

Maharani Chakravorty

Maharani Chakravorty is a molecular biologist. She organized the first laboratory course on recombinant DNA techniques in Asia and the Far East in 1981. After her post-doctoral studies in the USA, she returned to the Bose Institute in Kolkata. Among her many accolades, she also received the Professor Darshan Ranganathan Memorial Award in 2007.

Tessy Thomas

Known as the missile woman of India, she is one of the world's leading experts in ballistic missiles. She is the first woman to lead a missile team in India. She worked on Agni missile right from its inception and designed the guidance scheme for long range missiles. She is now a project director and technology director for Long Range Agni v missile and Mission Design and System analysis group of advanced systems laboratory, respectively.

Stephanie Kwolek

Stephanie Louise Kwolek was an American chemist, whose career at the DuPont Company covered over forty years. She is best known for inventing the first of a family of synthetic fibres of exceptional strength and stiffness: poly-paraphenylene terephthalamide—better known as Kevlar. For her discovery, Kwolek was awarded the DuPont Company's Lavoisier Medal for outstanding technical achievement. As of February 2015, she was the only female employee to have received that honor. In 1995, she became the fourth woman to be added to the National Inventors Hall of Fame. Kwolek won numerous awards for her work in polymer chemistry, including the National Medal of Technology, the IRI Achievement.³

Bette Nesmith Graham

Bette Nesmith Graham, in 1950's while using one of the new electric typewriters in the office, felt the need of something that could allow her to correct the mistakes when the highly sensitive keys of typewriter resulted in typing unwanted letters. She discovered a quick drying paint that can be applied over the mistake and the paint so invented become famous as liquid paper. In 1979 she sold her company to Gillette Co. for \$47.5 million.

Margaret Knight

Margaret Knight was an exceptionally prolific inventor in the late 19th century; journalists occasionally compared her to her better-known male contemporary Thomas Edison by nicknaming her "the lady Edison" or "a woman Edison." Knight was born in York, Maine and was still a young girl when she began working in a textile mill in New Hampshire. After seeing a fellow worker injured by a faulty piece of equipment, Knight came up with her first invention: a safety device for textile looms. She was awarded her first patent in 1871, for a machine that cut, folded and glued flat-bottomed paper shopping bags, thus eliminating the need for workers to assemble them slowly by hand. Knight received 27 patents in her lifetime, for inventions including shoe-manufacturing machines, a "dress shield" to protect garments from perspiration stains, a rotary engine and an internal combustion engine.⁴

Maria Telkes

In 1947, the Hungarian scientist invented the thermoelectric power generator to provide heat for Dover House, a wedge-shaped structure she conceived with architect Eleanor Raymond. Girl power, indeed!

From PoW to DRDO scientist: Meet the 95-year-old Mangalurean World War II veteran

He was recruited as part of the two-and-a-half million soldiers Britain sourced from India during the war.

By Harsha Raj Gatty

From deceiving death, paraded as a Prisoner of War across prison facilities in Europe and being ‘mourned’ by a family who assumed he was gone, the life of World War II veteran Mark Rodrigues is anything but ordinary.

World War II was fought between the Allied and the Axis forces that consumed the lives of over 60 million people and ultimately sowed the seeds of the present world order, and 95-year-old Mark Rodrigues is among the few who live to tell the tale.

Having suffered substantial losses in the early stages of World War II, the British Army looked to mass conscription. It was during that time that the then 18-year-old Mark was enlisted as part of the two-and-a-half



million soldiers that Britain sourced from India. “I was in my late teens. Therefore, I decided to forego my education and decided to join the British Armed forces,” he says.

Mark then had to undergo intensive training for three months in Pune, following which he was posted at the Mediterranean and Middle East Theatre to fight for the Allies on May 26, 1941. After three months of additional training at Cairo, Egypt, Mark was posted at the Egypt-Libya border to work for the 19th Indian Field Ambulances as a store sepoy.

Close save

To rescue a section of Allied Forces cornered in Tobruk in Libya, the British Army, under Commander-in-Chief (Middle East) Claude Auchinleck, drew up a daring action plan — to launch an offensive from Egypt-Libya border in November 1941.

“The Axis forces had aerial cover, so our 11th Brigade’s convoy faced severe bombardment by low-flying aircrafts during our advance to Tobruk. It was on one such occasion that I jumped off a running vehicle, severely injuring my left palm and dislocating my finger joints,” Mark says.

Though rescuers managed to pull Mark to safety, they were eventually surrounded by German forces in a counter-offensive which was launched by German Field Marshall Erwin Rommel (Desert Fox).

“It was during that moment I came across the horrors of war. I witnessed a supply truck that was severely bombed, with the driver’s dead body still in the seat with a missing head. Even now I am haunted by that vision,” he says quietly.

Mark was among the several soldiers who were designated as Prisoners of War (POW) and held captive by Germans for a month at Tobruk. Simultaneously, the British Army command wrote to his family in India that Mark was taken as a Prisoner of War, and his status was reported as ‘Missing’.

“My family lost all hope of seeing me and presumed I had died on the battlefield. Bells were rung and the 3rd day Requiem Mass was conducted at St Sebastian’s Church in Mangalore,” he adds. Meanwhile, the German forces attempted to transfer the PoWs to another detention camp in Europe.

“In the middle of our voyage, our prisoners’ cargo ship was torpedoed in the Mediterranean Sea. As the ship sank, the prisoners and the crew tried to stay afloat using a wooden plank. With no means of communication, we were stranded in the sea for over two hours when a passing Italian (Axis) escort ship rescued us. Other captives and I were contained in the ship’s cargo hold,” Mark says.

While PoWs were generally treated poorly, the Italian Navy personnel noticed a rosary around Mark’s neck. “He was surprised when he learnt I was Catholic and he escorted me away from the rest and I was fed the most delicious Italian meal. It was the first time I had such food and I still cannot forget its flavour,” he laughs. They docked in Greece, and the locals, who were encountering Indians for the first time, generously shared fruits and other edibles as the PoWs continued to be paraded on the streets. It was during the journey from Greece to Italy that Mark wrote back to his family in India saying he was safe, six months after he was first assumed missing.

PoW camp bombed

From Italy, Mark was against transferred to PoW camps in Venice, Annaberg and then to Epinal, France. In Epinal, the camp was mistakenly bombed by the friendly fire of an Allied bomber. “I scaled an 8-foot-high barbed fencing to escape the explosion and escaped the splinters by inches. I lost my hearing partially, but others were not so lucky. I saw a fellow detainee running around on having caught fire ... Many died on that day,” he says.

Mark was then flown to a PoW camp in Germany, and after a debriefing at another such camp in Munich, Mark was sent home from Heathrow Airport in London in 1945.

Life after war

On his return, Mark married Emiliana in 1955 and, in course of time, the couple had six daughters. A war hero, Mark was promoted as a store havildar. But due to his hearing loss, he failed the medical test and was de-rostered from the force. Mark continued his education, completed a DGRE course and earned his diploma in Draughtsmanship and Licentiate in Mechanical Engineering in Madras. The ex-serviceman was re-employed in the defence establishment, where he gained knowledge and experience through associate membership of the Institution of Automobile Engineers (India) and studied and did his research in the Defence Research and Development Organisation (DRDO). He served for over 30 years, and retired as a Senior Scientific Officer (DRDO Scientist). Even at this grand old age — and despite severe hearing loss — his memories of his glory days are still fresh. He has a few handwritten notes about his experience that tell the stories of other Indian soldiers who participated in the war. Mark, smiling mischievously, admits to having carried a diffused bombshell from World War II, which remains in his possession. He has set them up near the entrance of his house.

<https://www.thenewsminute.com/article/pow-drdo-scientist-meet-95-year-old-mangalorean-world-war-ii-veteran-80196>