



# Being Hi-Tech Pays

Defence preparedness should focus on new technological developments and skills and not just budget allocations

POST-INDEPENDENCE, INDIA OPTED for an autonomous path of development, which was at the core of its concept of independence — economic and political sovereignty. Learning from the brutal experience of colonisation which killed our skills and technology in every sphere, including in shipbuilding and rocketry, we understood that our best interests would only be served by our own priorities and innovations to bridge the wide gap in science, industry, technology and living standards.

However, this did not mean that we had decided to shut out the world; we kept our windows open to all scientific and technological developments, civil and military, with the potential of assisting in the technological progress of our country, in consonance with our human, material and economic resources, determining at every step what was best suited for us, including what was efficient and cost effective to bridge the gap.

The policy adopted emphasised that military technology must serve diverse purposes and benefit all disciplines that strengthen the areas of science and technology to build a versatile, vibrant, and dynamic society, and serve civil and scientific objectives, not only what is normally perceived as 'military'. This must be emphasised, because it is not adequately understood today that almost all indigenous research and progress in technology and science contribute to a nation's defence potential and to a country's human capital and institutions; that the entire chain of activities that we generate in these areas, add to human skills increasing the creativity of our people. Without these up-to-date technological abilities, a country can find itself limping.

Unfortunately, the present day public discourse on defence is centred on mere budgetary allocations, or by lobbies tout-ing for acquisitions of weapon systems or counterproductive singling out of countries for 'pot shots' in our strategic environment, designating some countries as adversaries or others as newfound friends. What is missing from the perspective is how to develop technological and advanced skills in the country as a whole. Any planning for defence in-

volves taking stock of our overall capacities and national interests, not forgetting that our military establishment is concerned with 'capabilities' and reflecting on the adage that a nation with a navy is really a neighbour to all. In contemporary times, any nation with capabilities in 'Space' also becomes a neighbour in the sky! Strength cannot be equated with indiscriminate sabre-rattling which does not substitute for serious planning, technological advance, training, and increasing practical knowledge in design and research across the board and not only in revamping outfits related to military research and development, which have created their own scientific bureaucracy and not progressed or contributed with the same outstanding commitment as Indian Space Research Organisation (ISRO) and the Department of Atomic Energy (DAE).

Budgetary allocations, subject to a minimum threshold, are not the be all or a pre-condition for military/ defence preparedness of the nation, provided there exists a sound understanding and grasp of the principle that the whole nation participates in the nation's defence and contributes to it in kind. For example, the erstwhile predominant 'superpower', and its military arm is usually referred to as 'pre-eminent', with bipartisan political support for its annual ever-increasing budget, now topping USD700 billion, not counting the financial allocation for its intelligence and surveillance agencies and nuclear R&D, the largest in the world. Estimates project China as spending about USD170 billion, Saudi Arabia with nothing to show except showpiece expensive acquisitions, spends about USD60 billion.

On the other hand, Russia with the largest land mass, stretching across 11 time zones, faced by an aggressive NATO led by the United States on the European front along with its allies in the Pacific, has an annual defence expenditure of about USD50 billion, with President Vladimir Putin announcing a reduction to USD46 billion in 2018-19; though Russia once again faced an existential threat; this is unprecedented in a period of escalating defence expendi-

ture, even among emerging countries, proving that it is not the financial outlay which determines a country's ability to defend its sovereignty and the quality of its weapon systems. A critical role is played by the kind of technological advance and commitment by all state agencies involved in decision-making and motivation of the armed forces to innovate and train, dependent on the quality of the country's leadership not only in the political sphere but in all institutions linked to this chain.

Russia, the successor state of the USSR (which in retrospect probably over insured itself due to the 'siege' imposed by the West on a different political system, which enhanced its insecurities particularly after World War II), learnt from its past that it is not the quantitative arms race which is vital to security but the quality and technological updating of its weapon systems to resist forces steadily threatening its existence as a nation state. Russia's political leadership, under President Putin, applied itself to studying its past, the lessons of the dismantling of the USSR, the stripping of Russia's premier scientific institutions, the consequent brain drain and abysmal condition to which its scientific manpower had been reduced.

In the context of an existential challenge, it chose to carefully focus on and prioritise a select number of technologically advanced critical projects, concentrating on R&D/ factory modernisation, balancing its Space/Air, Ground and Sea-based advanced technologies, supported by a jump in Electronic/ Radio Warfare programmes which now are reported to neutralise with advanced software algorithms the 'hardware' fielded in great numbers at enormous cost across the whole spectrum. The achievements can only be understood in the context of the statement made to me in the course of a conversation in 1998 while on my return from Russia, by a German Admiral (adviser to the late President Helmut Kohl) who overconfidently asserted during a dialogue that Russia was 'finished', its education, scientific and other institutions in terminal decay, implying that what could not be achieved during World War

It was now an accomplished fact. Though this assessment was alarming, my conclusion was that Russia would find a way, as it had done before with its historical memories of being overrun, overcoming all odds.

Russia has successfully off-balanced the threat, jumped steps ahead forcing the opposite side to a tail chase. It has achieved this stealthily over the last two decades, carefully reviewing its force-mix, force architecture, reviewing its nuclear war doctrine, taking risks and achieving a clear lead essentially in manoeuvring ballistic missiles via waypoints, leaving the other side guessing where each specially endowed Multiple Independent Re-entry Vehicles (MIRV) is targeted/ heading in the terminal trajectory phase. This advance is easy to describe in words; in reality the achievement was preceded by a gruelling and superlative effort of scientific teams and the general staff in unison, overseen by its apex political head, with unparalleled determination considering that Russia was written off post-1991 as an independent geopolitical military power, with its once lethal capacities steadily eroded.

Whereas we in India have been steadily building our nuclear capabilities (Agni series), and our 'Third Leg of the Triad' is slowly coming into shape and form with our technological advances. This still involves sustained, singular and continuous effort to maintain the arm in a state of readiness, directly dependent on the training, morale and investment in manpower and thereafter in motivating and retaining specialists and the other complementary human resources necessary which cannot be done without an overall inspiring political, military and scientific leadership. There is absolutely no room for complacency when major military powers continue to fracture and restructure nation states, based on their economic and political interests which political scientists refer to as 'Imperialism' and 're-colonisation'. The extraordinary example before us is of the Peoples' Democratic Republic of Korea, threatened daily by the 'big button', a small nation determined to survive, recently tested a 11,000 kilometre ICBM, complementing it with subtle, dexterous and courageous diplomacy, finally marching in the Pyeongchang Winter Olympics with 'One

Korea Flag'. Whereas we have not exhibited the same sagacity to achieve the cooperation necessary for our onward economic progress and trade relations, though we were once one people with a shared culture and the same historical memories. This short-sighted viewpoint to drag on differences by more than one government in the sub-continent for internal political propaganda does not serve the interests of either country and of its peoples.

Nuclear deterrence, if played in a steady, carefully calibrated, sober and balanced game, is a useful card, as it gives us time to improve on our conventional strengths, provided we invest in Special Forces, electronic warfare, software and the necessary connectivity to our Command, Control, Communications, Surveillance and Deception/ Surprise sub-systems, to re-configure them with speed. This requires genius, which as we all know is 99 per cent dedication and sweat.

To complement our development efforts and military preparedness, we need to work on the easing of tensions, by diplomatic risk-taking, aligned with



**NATIONAL PRIDE**  
*BRAHMOS during the  
Republic Day parade*



the spirit of the 'Peace & Tranquillity' agreement, which China also needs. This is in our mutual interest. Doklam and incidents in Ladakh do not spell 'China in aggression'. China too has development and trade as priorities besides other global objectives. Issues like Doklam are quite irrelevant to their national and international goals and priorities. The reality is that both sides have their 'hot-heads', and probably special interests influenced by powers external to the region, who would be happy to roll back two former colonies poised with effort to regain the economic and trading importance which was theirs in the pre-colonial period. The incorporation of a new principle in the constitution of China in March 2018, 'Building a community with a shared future for humanity', is of significance as it signals that China understands the importance of restoring harmony in its relations with other nations. These developments must be carefully reflected upon as we continue our political level dialogue with China, while not lowering our overall level of defence preparedness.

Rationally and realistically, 2.7 billion people, nearly 45 per cent of the world's population, cannot militarily confront each other without both losing out when they have much to gain from normal relations. Though in recent decades recurring tensions have sometimes been used by both countries for internal political purposes, yet from time to time the political leadership have seen the futility of this path and once again called for a dialogue. President Xi, in particular, has reiterated this several times that both China and India have space to develop and grow to their full potential in cooperation and peace. We do not adequately

appreciate that China equally needs time to attend to its economy and external challenges, and so do we.

Historically, for thousands of years there had never been a clash of civilisations between the two countries nor a military confrontation, scholars from China travelled to India to monasteries which were also renowned universities seeking answers to philosophical questions. Those with intentions of military overreach in our country ignore our own gaps and weaknesses, which we need to urgently rectify. These weaknesses are both military and political. Without a cost effective and qualitative focus in weapons acquisitions, economy of effort in 'defence', a strengthening of our overall moral resolve to commit ourselves to

the inclusive development of our nation, we cannot forget even as we try to catch up and to strengthen our national security that United Nations human development figures of our progress in some important social sector indices is better than in small countries of South Asia such as Sri Lanka and Bangladesh.

The hype that surrounds QUAD is a non-starter when scrutinised from the ground realities. While the US and all its western allies need trade ties with China; Australia, Japan, South Korea, Taiwan and Singapore are the largest trade partners of China and consequently dependent on it. Given this, will India be the only member of the proposed QUAD who will man the frontlines and 'contain' China? Apart from routine annual exercises can this be the basis of a serious strategic alliance?

It is this very gullibility which left us in the lurch in the meetings on the Belt and Road Initiative (BRI) last year even as the United States, Australia and Japan enthusiastically participated in it. China and India, with their history of colonisation, need to understand that their destiny is bound together. If both countries intend to restore the position which historically they enjoyed, they would be advised to strive to build a relationship which is productive, creative, harmonious and mutually beneficial.

While focusing on key principles for an alternative approach to decision-making on 'Design, Development and Manufacture', I have to reiterate that civilian and defence technological and human ca-



**IRON HAND** Russian President Vladimir Putin addressing the Federal Assembly



pabilities are complementary. Military capability by itself means nothing and simply cannot be progressed without concurrent and simultaneous progress in what is commonly referred to as 'civilian' technologies.

### **Design Collaboration**

Since we do not have a sufficient number of design engineers and are not able to retain them or attract them from where they are presently, we have to insist that our civil-military R&D and D&D institutes and navy (Directorate General of Naval Design), select the most talented human material, preferably below 30 years of age. We also need to put in place a retention system for those who demonstrate merit, based on time-lines for advanced projects, as in Defense Advanced Research Projects Agency (of the US), to go well beyond existing pay scales and ages of retirement. I am told that nearly half the hi-tech algorithm writers in the Silicon Valley hail from the state of Bihar! Yet, we cannot get them to return home!

The selection of systems, at this stage of our development with the exceptions of Indian Space Research Organisation (ISRO) and Bhabha Atomic Research Centre (BARC), and a few others, means

giving ourselves a lead time. We may have to swallow our national pride and go in for design collaboration in addition to a 'Make in India' approach. There is no way that even a good friend will part with its latest civilian-military technology inducted onto its frontline. However, what is inducted about five to 10 years ago, but has the advantage of being proven in the war zone, gone past the 'Bath-Tub' cycle or its teething phase, is a probable area for agreement at the highest political levels of both governments and is in the realm of the real. A techno-military analysis will show that such a system is likely to remain a 'deterrent' for at least over a decade from the time of induction into our military. Government to government agreements as have recently been believed to be favoured by the ministry of defence (India) are a welcome sign.

Systems that destabilise/ off-balance a potential adversary's military investments are needed in our induction plans. Relative immunity to satellite and electronic surveillance of our own assets, like submarines in tropical waters which have shallow negative temperature gradients and inversion causing thermal layers wherein submarines are able to prevent their being detected give a distinct tactical advantage to these assets.

Other merits of competing systems being nearly equal stealth features that is low radar cross-section and infra-red signatures are an obvious advantage to air, sea platforms and missiles. Unmanned Aerial Vehicles and drones in certain scenarios, especially short of war, are gaining ground over manned platforms.

Between two or more nuclear powers who are mutually check-mated, investments in quick response Special Forces may give an advantage to a side subject to frequent cross border terror attacks, rather than any major mobilisation as 'coercive diplomacy' as in Operation Parakram which caused us serious losses even as we mobilised.

A decision made to collaborate in design should invariably include a 'clause' to ensure that a 'continuous improvement in performance' in the system is part of the contract/ agreement.

In our arriving at a decision point to sign an agreement for design/ build, the growth potential and growth reserve of the basic design should be a part of the qualitative/ quantitative matrix and should have adequate weightage in the final decision. Seamless integration with our national/ theatre command centres and the entire C4ISR architecture is an a priori necessity.



**ON ITS WAY** General  
Atomics' Sea  
Guardian assembly

We are presently wedded to the practice of 'One to One' replacement as this approach is easier to get administrative and financial approvals. Moreover, it is comforting for all within the Service Headquarters and the MoD/ finance ministry) to deal with one to one replacement of tanks, guns, ships and aircraft as it lies in their past experience and the precedence of government files. New thinking compelled by changing geopolitical developments, global/ regional alignments, induction and emergence of major technological developments do not have to be discussed on file. The circuitous routing /mechanism of the file system do not encourage it either.

Once in a while, deeply studied and analysed service papers do force raising the level of discussions in other forums or simply because the induction of new systems/ technologies becomes too visible and/ or reaches our door-steps. Though not conceded by the civil-military bureaucracy, these 'reforms' and 'initiatives' all too often have come to us from the highest political leadership in the past!

While India is in a different stage of development than Russia, the challenges and opportunities are not that dissimilar. The recent 'State of the Nation' address by President Putin on 1 March 2018 is relevant in the context of alternative policies, choices, decision-making and importantly the implementation of our national projects in the months and years ahead. Before I briefly enumerate the military technologies/ systems that have helped Russia seize the initiative

to take independent political, economic and social sector decisions, let me quote President Putin's words before the Duma and a cross-section of Russia's society which included young people, both girls and boys. Attributing Russia's emerging power to its designers, scientists, engineers, builders and the military, he said, "The biggest threat (to Russia) lies in lagging behind". The technologies that have enabled Russia to operationalise and test unmatched military systems include:

- i) New super-heavy ICBM, all-reaching, globally routed and manoeuvring 'Sarmat' missiles with hypersonic MIRVs (war-heads), out manoeuvres defence systems.
- ii) A miniaturised nuclear-powered reactor for cruise missile with an almost unlimited range.
- iii) More capable nuclear submarines with very long ranges, and new capabilities making it faster, deeper diving and ultra-silent operations.
- iv) Unmanned nuclear submarines (drones), capable of travelling between continents at a speed several times higher than that of a manned submarine and with the capacity of attacking an Aircraft Carrier Group and shore targets. The nuclear reactor powering this drone submarine is one hundred times smaller than the nuclear reactor used in existing nuclear submarines.
- iv) Hypersonic missiles with a speed of Mach 10, named 'Khinjar' (Dagger) with a range of more than 2,000 km which present defence systems

cannot intercept.

v) Combat Laser Systems.

vi) A new strategic missile system, not yet given a name, with a wing guiding block and intercontinental range, many times the speed of sound, i.e., Mach 20.

The algorithms created for these unmatched systems were embedded in the micro, high speed advanced computing sub-systems (that were the brains and the central nervous system of these systems of systems). They were the creative products of highly gifted and dedicated people in mathematics and the first principles of the sciences. These algorithms had applicability across the civilian areas and will benefit the economy and the people in their entirety, including new light-weight and high strength materials with direct benefit to hi-tech civilian applications.

One would like to believe that this State of the Nation address, one of the most significant of the new geopolitical world order, would be read by the civil-military intelligentsia leading to a constructive discourse.

In conclusion, it is necessary to reiterate that comprehensive national security embraces the well-being and safety of all the people so that each one contributes to the progress and strength of our society and the nation. Our unity is the most durable foundation of our future progress. ||

*(The writer was Chief of Naval Staff)*