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New Delhi

CLAWS Journal is published by the Centre for Land Warfare Studies (CLAWS), New Delhi. CLAWS is an independent think-tank dealing with national security and conceptual aspects of land warfare, including conventional and sub-conventional conflict and terrorism. CLAWS conducts research that is futuristic in outlook and policy oriented in approach.

For submission of articles, commentaries, review articles and book reviews, please see "Notes for Contributors" given at the end of the Journal.

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Note from the Editor

Transformation is a process that shapes the changing nature of military competition and cooperation through new combinations of concepts, capabilities, people and organisations. This exploits the nation's advantage and protects against asymmetric vulnerabilities to sustain its strategic position, which therein helps to underpin peace and stability in the world. Transformation anticipates and creates the future and deals with the co-evolution of concepts, processes, organisation and technology.

The Indian armed forces, as an important element of national power, need to remain in consonance with our national aspirations and, thus, have to transform transactional means and be ready to face future challenges. Hence, transformation would entail transactional methodology to include a change in the mindset/thought process, review of doctrines, strategy, war-fighting concept, organisational structures, human resource optimisation, training methodology and logistics concepts to meet the operational challenges of the future.

The present *CLAWS Journal* has been composed with a variety of articles, opinion pieces, commentaries and book reviews to theoretically understand why the Indian Army Chief has initiated four major studies for the transformation of the Indian Army into a "more agile fighting force" to face current and emerging threats and challenges. The Indian Army is, hence, looking to implement transformational leadership to achieve the stated goals and objectives through transactional management. The purpose of management as understood is the attainment of organisational goals in an effective and efficient manner through "planning, organising, staffing, directing, and controlling organisational resources". Managers seek stability in an organised environment in order to control the organisation's bottom line. The motivation for management is power and

profit which, in the case, of the Indian Army is to transform to a more agile fighting force. Transformational leadership is different because it is "an influence of relationships among leaders and followers who intend real changes and outcomes that reflect their shared purposes".

The contributors have addressed a bouquet of issues, starting with the contribution of the armed forces in nation building, imperatives of transformation, conceptualising jointness and other key issues. In essence, this issue of the *Journal* is a topical assemblage of key perspectives significant for the Indian armed forces in the current times. This makes it a veritable and timely read for researchers, academics, policy-makers and practitioners in India as well as abroad.

Gautam Sen
Editor-in-Chief
CLAWS Journal

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India's Armed Forces' Contribution to Nation Building

V P Malik

What constitutes a nation is not speaking the same tongue or belonging to the same ethnic group, but having accomplished great things in common in the past and the wish to accomplish them in future.

— Ernest Rennan

Introduction

No nation state can be built without first creating and inculcating nationalism. The Indian paradox is that we are an old society and civilisation but we are a new nation state in the modern political sense. In its long history, India can be considered to have been a 'nation state' only a few times: during the Mauryan Empire (321-185 BC), in the Gupta Age (320-500 AD), the Mughal period (1527-1857 AD), and as the British India colonial empire (1857-1947 AD). The dynamics of these near whole or complete Indian nation states has been that each time, it has risen out of a hotbed of internecine quarrels and fighting among small states: a tendency which is sometimes felt even today.

General **V P Malik** (Retd) is former Chief of India's Army Staff.

As a nation state, India comprises a myriad streams of culture; 22 scheduled languages, 200 dialects, a dozen ethnic groups, seven religious communities with several sects and sub-sects, and 68 socio-cultural sub-regions. That makes us a great as well as complex society and nation. This very paradox also poses challenges in building India as a nation.

Nation Building

What is nation building? Is it economic development and industrialisation? Is it building large metros, roads, schools and hospitals? Is it ensuring social equality and harmony? Or is it shaping a national identity based on our core values so as to mature as a strong and vibrant nation, proud and confident, backed by comprehensive national power to assume its rightful role in international affairs? In my opinion, nation building is a combination of all facets of progress. The last part stated by me is the ultimate goal in nation building. This is also stated in the Preamble to our Constitution.

In addressing the contribution of India's armed forces in nation building, the starting point lies in understanding India's military legacy. Military life, in its outlook and purpose, is heavily dependent on traditions of service imbibed over years of blood-stained history. These traditions, almost sacred to soldiers, can be traced upwards to patriotism and downwards to self-pride. These traditions are not only from the British Indian Army but also date back to the *Mahabharat* days. The *Bhagwad Gita* says, *"Considering your own duty, you should not waver"*, or as Guru Gobind Singh says, *"Deh shiva war mohe ehse shubh karman te kabhu na taru. Na darro arr seo jab jaye larun nishchay kar apni jit karun"*. Similarly, the Chetwode credo states: "The safety, honour and welfare of your country come first, always and every time. The honour, welfare and comfort of the men you command come next. Your own ease, comfort and safety come last, always and every time." An oath is the bedrock of the true military profession which differentiates it from all

other professions. Earlier, the oath was based on the concept of "Naam–Namak–Nishan: Be Honourable–True to your Salt–Uphold the Flag." Today this oath is to the Constitution of democratic India.

The armed forces are a true reflection of the basic national concept of unity in diversity. In an exemplary role model for the rest of our countrymen, soldiers of all classes, castes, creeds and religions are able to serve the nation with total dedication; living together in barracks, eating from the same kitchen, speaking the same language, and observing each other's religious festivals. Secularism, discipline, integrity, loyalty, *espirit-de-corps*—these are essential values inculcated among our men. Such motivated people not only make efficient and dedicated soldiers in service, but even after leaving the Services, continue as nation building role models for others.

An important legacy of the Indian armed forces has been its totally apolitical outlook. As I have stated earlier, a soldier's oath is to the Constitution of India and to the constitutionally elected central government. The ideology of the political parties or their hue and colour does not concern the armed forces. Our armed forces, unlike those of some neighbouring countries, have stuck to the concept of loyalty to the constitutionally elected government. They have, thus, contributed to the political stability of the nation and enabled it to develop its unique democratic political ambience. Even in the insurgency-affected states of the nation, the Army has ensured an adequately secure atmosphere wherein India's autonomous Election Commission can conduct free and fair elections. I am glad that for the upcoming parliamentary elections, the Election Commission has asked the political parties, in a stronger and more comprehensive way, not to politicise the armed forces.

Consolidation of Nation State

The Indian armed forces have played an important role in national consolidation from the day India became independent. Few political

leaders foresaw the mayhem that could result amongst the innocent people who had lived together for generations in the undivided India. The communal frenzy that was unleashed by the artificial boundaries of partition was at that time beyond the control of the police. In 1947, the police was insufficient: neither well trained, nor well equipped and suffering from the trauma of communal fighting. The armed forces, led by Indian as well as some British Service officers, had to control the furious rioting and enforce civil order.

It is generally believed that the British left India with a bloodless legal transfer of power. But the birth of the nation state that we see today was not such a smooth affair. Hyderabad and Junagadh had to be coerced to integrate with India by what came to be known as police actions. In October 1947, when Maharaja Hari Singh of Jammu and Kashmir (J&K) signed the Instrument of Accession to join India, the armed forces were swiftly inducted into Kashmir Valley and other parts of the state to thwart Pakistan's design of capturing it by force. Later, the liberation of Goa, Daman and Diu carried forward the consolidation of our territorial frontiers.

Integration of Geographic Area and People

India is a vast country. Some of its people are living in remote border areas, far from the Indian heartland. The armed forces have played a significant role in integrating people of these areas and border states into the national mainstream. Many a times, a soldier was the first Indian to reach out to these areas and make the locals realise that they were Indians. Deployment of the armed forces enabled governmental infrastructure to follow in the remote areas of Arunachal Pradesh (erstwhile North-Eastern Frontier Agency), Mizoram, Manipur, Nagaland, border areas of Uttarakhand, Himachal Pradesh and some parts of Jammu and Kashmir. Till the late 1950s, the important Buddhist town of Tawang had very limited administrative links with India. The civil government representative was

located many miles short, at Bomdi La. Even today, most Indians do not know where places like Mon, Moreh, Giagong, Chushul or Sumdo are located. The credit for initiating the feeling of nationalism in such areas goes to the armed forces. The very establishment of a military station generates a certain amount of business and developmental activities in and around the station. This is how the government's developmental infrastructure like roads, electricity and tele-communication could reach out to remote and undeveloped areas.

The armed forces have also improved the ecology of the areas wherever they are located. The greening of the cantonments and the forestation undertaken by the Ecology Territorial Army (TA) battalions in Uttarakhand, Rajasthan, Madhya Pradesh and some other states has set a healthy trend for others to follow.

What about integration of the people? As stated earlier, there is no better example of unity in diversity than the armed forces. Unaffected by divisive politics or casteist social activities, military stations have always been, and are, totally cosmopolitan: oases of national unity.

Security of the Nation State

The primary role of the armed forces is to defend the territorial integrity of the nation state against external and internal threats. Strong and well-trained armed forces are deterrence to our potential adversaries. If this is achieved, developmental activities and nation building can be progressed without external hindrance. This is central to the concept of national security and paramount for all nation building activities. Territorial disputes with China and Pakistan require India's armed forces to remain alert and deployed along disputed borders round the years.

History is witness to the fact that whenever a nation has neglected its armed forces and their capacity, external powers have been quick to exploit it. In the 1950s, we overlooked this important lesson of history

and allowed the security apparatus to drift till the Chinese shook us up in 1962. We had to relearn this lesson through an ignominious experience. Post 1962, we have had several skirmishes against the Chinese: at Nathu La in Sikkim in 1967, Wangdung in 1986 and Doklam in 2017. The outcomes have made it clear that the Indian armed forces are alert and determined to defend national territory. I do believe that this feedback has helped the Chinese and our leaders to pursue agreements for maintaining peace and tranquillity along the Line of Actual Control (LAC) and several other confidence building measures to improve relations.

Pakistan attempted to annex part of India's territories in major attacks in 1965, 1971 and 1999. In all these conflicts, it was effectively defeated. In 1984, the armed forces preempted the Pakistan Army's effort to illegally occupy the Siachen Glacier. Its many other minor intrusions and skirmishes along the Line of Control (LOC) too have been effectively foiled.

Internal Security

Nation building is hardly possible when we fight and kill each other. I am referring to internal security and stability. Imagine a riot torn Mumbai of 1992, when the economic capital of India came to a standstill. Communal and inter-caste riots, Naxalites, secessionist groups, militants and other anti-social elements, aided and abetted by foreign countries: internal security has always been a serious challenge to our national security. The demand or the need to use the armed forces, particularly the Army, for internal tasks which are primarily a police and Home Department domain, has been increasing year after year. At a higher level of violence, we have fought, and continue to fight, full-fledged insurgency and terrorism in many states. The armed forces have not allowed, nor shall allow, any attempt by any state, or even a section of the state, to secede from the Republic of India.

The positive impartiality of the Indian soldier in such situations—odd aberrations notwithstanding—is legendary. By and large, the Indian soldier is looked upon as a source of confidence amongst the people, not only in India but even abroad. During such operations, the military not only fights militants and anti-national elements but also reassures innocent people feeling insecure or neglected due to inadequate civil administration. Large-scale civic action programmes are undertaken by the military alongwith anti-terrorist operations. At places we have formed an Army Development Group for this purpose.

Disaster Relief

The nation has always counted on the military in every disaster-affected situation. If it is not an earthquake in some state, it is floods somewhere or a cyclone in a coastal area. India has seen earthquakes, cyclones, landslides and heavy floods almost every year. Despite the raising of disaster management organisations and forces, the armed forces are acknowledged as the most dependable rescue and relief organisation in such circumstances. They are effectively the nation's chief rescue and relief forces.

Image Abroad

The armed forces have also enhanced India's image abroad. Our forces, in support of the foreign policy of the government, have projected military power in Sri Lanka and Maldives when requested by these neighbours. Since the mid-1950s, the armed forces have been deployed in a large number of UN peace-keeping missions all over the world. They have worked in Korea, Congo, Gaza, Cambodia, Angola, Somalia, Rwanda, Namibia, Sudan and many other countries and done the nation proud by their impartiality, efficiency and dedication. This aspect has received international recognition.

Conclusion

A nation comprises not just its economic assets. A nation consists of its people, national character and core values, its culture, its unity, and its stature in the world community. We need to build India as a nation on the basis of a common ideology, high character and stable institutions so as to help create a strong and powerful nation which can improve the quality of its people.

The armed forces of India have established and sustained their credibility through dedication, sacrifice, professional competence, operational effectiveness. Besides being defenders of the nation, they are the people's armed forces, with recruitment from all parts of the country. The people of India, the most important element in our nation, have looked at them as secular, positive and impartial. The armed forces are proud of this achievement and image, and I am certain that they will carry this spirit in the future too.

India's National Defence-2024 and Beyond

Deepak Kapoor

National security has been a prominent issue in the just concluded elections. In the course of intense electioneering, almost all the major parties have used it as a means to secure electoral gains. Be that as it may, the reality is that national security has not been given the importance it deserves by successive governments. No wonder, we do not have a comprehensive national security strategy document in place even 72 years after independence. However, thanks to the focus during the elections, some pertinent and relevant aspects pertaining to national defence have been raised which need to be deliberated upon by the new government on priority.

The new government has a five-year window up to 2024 in which it needs to deliver on promises made during the elections on issues of national defence. While it would be difficult to achieve tangible improvements in this timeframe, considering the long gestation periods of defence projects, nevertheless, a suitable beginning can be made and a path charted out for the future, such as the 'Make in India' project. It is, indeed, a laudable initiative and extremely beneficial for India in the long run. However, 10-15 years is the minimum period required for setting up joint ventures, obtaining technological knowhow, trial production of equipment and, finally, mass production and absorption in the Services. However, there has been limited progress on this project during the last five years. But given such a step has been taken, it calls for significant changes in the future.

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Similarly, a reason for the long gestation period is that a number of useful recommendations on defence modernisation and reforms made by different committees from time to time have become the victims of bureaucratic apathy and manipulation. As a result, while, in some cases, the implementation has been far too delayed, in others, a diluted version has been put into effect. Still others have not ever been implemented. To add further, as a percentage of the Gross Domestic Product (GDP), the expenditure on defence has gradually been coming down during the last decade. Today, it stands at a paltry 1.52 per cent. Increase of salaries and pensions, based on the recommendations of the Sixth and Seventh Pay Commissions, has further resulted in a corresponding reduction of the resources available for keeping the defence forces modernised and relevant. Thus, unless annual budgetary allocations are drastically revised upwards, improvements in the national defence capabilities will be subject to corresponding delays.

In view of the foregoing, it would be appropriate to first assess the prevailing security environment by the year 2024 and beyond. This would help to identify the challenges that the defence forces would be expected to overcome to meet the nation's aspirations. Thence would emerge the roadmap for achieving the desired capabilities.

India's External Security Environment

China

Over the past two decades, China has had an average annual growth rate of 8-9 per cent. In the initial period of its growth, it followed Deng Xiaoping's dictum of 'hiding capabilities and biding time'. However, with China's meteoric rise, the world is witnessing a perceptive shift as a result of its assertive and aggressive policies in its neighbourhood and beyond. Though it still claims to be 'rising peacefully', Sun Tzu's maxim of 'winning wars without firing a bullet' is being skillfully applied to impose its will on its smaller neighbours with limited resources. The declaration

of the Air Defence Identification Zone (ADIZ) and forcible occupation of the disputed hitherto unoccupied islands like Scarborough Shoal and their conversion into military bases is indicative of the aggressive intent in dealing with Vietnam, Malaysia, Brunei, Philippines, Taiwan and others in the South China Sea (SCS). Likewise, in the East China Sea (ECS), China has laid claims to the Diaoyu/Senkaku Islands, which are part of Japan. Against India too, the Chinese stance is gradually getting more aggressive, as witnessed in case of the Doklam standoff. Non-resolution of the boundary issue, coupled with aggressive moves along the India-China border enables Beijing to keep New Delhi under pressure thereby, diverting its attention from economic growth.

It is often argued that there is ample space for both India and China to grow economically. Thus, there should be healthy competition between them for sources of raw materials and markets for the sale of finished products. However, the seeds of confrontation are inherent in any competition. When healthy competition tends to get fierce, the possibility of friction between the competing powers increases. With the strategic space being finite, the efforts by competing powers to garner a major share of it is bound to increase tensions between them. That is to suggest that in the backdrop of a festering boundary dispute, the possibility of a conflict between India and China increases manifold.

While outwardly maintaining a nonchalant stance, China is assiduously working to undermine India's growth story. Cultivating friendship with all of India's smaller neighbours, following a 'string of pearls' policy in the Indian Ocean Region (IOR) blocking India's membership in the Nuclear Suppliers Group (NSG) time and again, providing support to insurgencies in northeast India and developing a strong anti-India axis with Pakistan are veiled attempts to check India's progress. This, thereby, increases the possibility of a confrontation between India and China in the long run. That is, with China growing more powerful by the day, its aggressive tendencies are likely to find expression in more concrete ways in the future.

Pakistan

The friction that was generated between India and Pakistan at the time of partition in 1947 has never fully died down. While India may have moved on, Pakistan links its very survival to an anti-India stance. In view of this, an institution that has repeatedly fuelled this feeling among the average Pakistanis is the Pakistan Army. A perpetual anti-India stance has enabled the Army to maintain a stranglehold over the Pakistan polity. The Army has ruled Pakistan directly or indirectly since its creation and has dictated its foreign policy towards India. Resultantly, the government, judiciary and legislature are so weak that they can hardly withstand the Pakistan Army's dominance. In fact, it is often felt that even if the Kashmir issue was somehow resolved, the Army will invent other issues to retain an anti-India stance, thus, perpetuating its hold over the nation.

With this backdrop, the Kashmir issue is unlikely to be settled any time soon. Having failed in 1948, 1965, 1971 and the Kargil War in 1999, Pakistan's attempts at creating unrest in Jammu and Kashmir (J&K) through proxy war are likely to continue. This is to suggest that a confrontation between India and Pakistan cannot be ruled out in the long run.

Collusive Threat

Since the 1960s, China and Pakistan have built a strong relationship that has been described as "higher than the mountains and deeper than the oceans". With the passage of time, this relationship has only strengthened as witnessed in terms of the following: Shaksgam Valley, measuring 5,180 sq km, an area belonging to India and occupied by Pakistan, has already been ceded by the latter to China; under the Belt and Road Initiative (BRI), China has spent US$ 60 billion to develop the China-Pakistan Economic Corridor (CPEC), a project looked upon by Pakistan as its lifeline to economic prosperity; Gwadar port is being developed and operationalised by China with the ultimate possibility of a strong Chinese

military base to dominate the Indian Ocean; and, lastly, China today is the biggest supplier of military hardware to Pakistan.

These factors exemplify that the China-Pakistan axis is sustained basically by an anti-India stance. There are strong indications of a synchronised anti-India approach by the two during most of the interactions at international fora. This raises the possibility of a collusive military threat for India, thus, exposing India to a resultant two-front war that it may be constrained to face to defend itself.

Internal Security Environment

J&K

Pakistan's efforts to destabilise J&K by providing active support to the proxy war are likely to continue unabated. The two challenges for the Indian security forces are: firstly, to eliminate cross-border infiltration; and, secondly, to liquidate the terrorists causing death and destruction within the state. Simultaneously, there is a need for improving the governance, increasing the connectivity of the state with the rest of the country, and reducing the perceived grievances of the alienated population.

The commitment of the military in the state is likely to continue till the local police, aided by the central police forces, is in a position to restore law and order on its own. The firm stance adopted by the Centre in dealing with the separatists and overground workers, on the one hand, and exposing the channels of illegitimate funding of the insurgency, on the other, are steps in the right direction and seem to be paying dividends.

Insurgencies in the Northeastern States

With continuous efforts over a prolonged period of time, the security forces have been able to bring down the levels of insurgency in a number of states in the northeast. However, Manipur, and, to a lesser extent, Assam, are still affected but it is hoped that sustained operations will reduce the

intensity further. The greater challenge is to ensure that such insurgencies do not sprout up again. To avoid such a resurgence, better governance and development have to be combined with the continued presence of the security forces to improve the situation. Hence, the commitment of the military in the northeastern states is likely to continue in the foreseeable future.

Left Wing Extremism (LWE)

Large swathes of central India are affected by LWE, a phenomenon which threatens to spread further unless checked resolutely. Lack of development, poor governance, unemployment and illiteracy are major causes responsible for this scourge. The insurgents are adept at striking and shifting across state boundaries to avoid police action. Law and order, being a state subject, the responsibility to tackle the problem rests primarily with the states. However, political alignments make meaningful inter-state and Centre coordination difficult. Of late, the situation has improved, thus, bringing in a degree of stability in an otherwise turbulent situation. However, a lot more needs to be done.

To summarise, the current external and internal security environments indicate challenging times ahead for the nation as it attempts to grow and claim its rightful place in the world order. This underscores the necessity of a relevant military capable of overcoming challenges and acting as an enabler of national growth.

In order to deal with the external-internal security matrix, in certain aspects, India's defence Services need to make significant progress by 2024 and beyond. The issues that need attention are as given below.

Jointness

Jointness implies cohesiveness among the Army, Navy and Air Force. Battlefield transparency, precision targeting, mobility, rapid concentration and dispersal of resources and excellent night fighting capability will be essential in a future battlefield. Integration of all available resources in a

seamless manner to exploit fleeting opportunities and ensure success is, therefore, of prime importance. This highlights the necessity for jointness among the three Services, the Army, Navy and Air Force.

Today, most modern militaries have moved towards integration of available resources to achieve optimum results. The US, UK, Russia and even China have instituted a system of integrated commands wherein, all the resources are placed at the disposal of a commander for accomplishing the tasks assigned by employing the right resource at the right time. However, in the case of India, jointness has suffered because of its resistance to change and its emphasis on retaining and sustaining separate Service identities. In this process, there is duplication of effort, frittering away of precious resources and less chances of success in battle.

Conceptual Framework of Higher Defence Organisation

The political authority must, first of all, lay down national objectives which would form the basis of a National Security Strategy (NSS). Unfortunately, there is no single document wherein India's national security objectives have been clearly spelt out. Rather, what exists is a series of pronouncements made by the political authority from time to time, in different contexts and circumstances, depending on the prevailing situation in the country. This caveat has thereby led to arguments, of which, most noted is George Tanham remark that "India has no strategic culture".

Having spelt out the national objectives, the political authority needs to undertake a strategic defence review which would then form the basis of the NSS. Once finalised, after incorporating the viewpoints of all stakeholders, it must be approved by the Parliament to give it the necessary sanctity for implementation. The NSS, so promulgated, would also act as a benchmark for the government of the day and Service Headquarters to work towards.

Higher Defence Management

Unlike in a number of modern countries, the exposure of our political leadership and bureaucracy to national security, warfare, military strategy, insurgencies and others is limited. Barring an odd exception, none among the political class has been exposed to military service. The bureaucratic advice available to the political class on defence and military matters is based on the limited experience a bureaucrat may have gained serving in the Ministry of Defence (MoD). Consequently, decision-making at the political level tends to be flawed.

The Kargil Review Committee (KRC), set up post the Kargil conflict, in its wisdom, had recommended the creation of the post of Chief of Defence Staff (CDS) to act as a single point adviser to the government on strategic and military matters. Eighteen years down the line, the CDS is still to be appointed. Likewise, the KRC had also recommended closer integration of the MoD and Service Headquarters by inter-posting of Service officers and bureaucrats in the two organisations for improvement in decision-making. Here too, there is little to show for progress.

There is a requirement to institutionalise mechanisms involving the structured interaction of the Service Chiefs with the Prime Minister, Defence Minister and Cabinet Committee on Security (CCS) on a regular basis. Currently, the CCS meets more to tackle crisis situations than on an ongoing basis to review national security. The Service Chiefs are expected to join its deliberations only by invitation, which happens rarely. Furthermore, the National Security Council (NSC) which is expected to function regularly to implement the CCS directions, consequently, has also not met often, making it almost defunct. Finally, the weekly interaction among the Defence Minister, the Service Chiefs and the Defence Secretary is not formalised, its deliberations are not recorded and, what is more, it may not take place for as long as a month at times. If structured interaction takes place regularly, perhaps crisis situations will not occur or will be resolved immediately.

On aspects of national security, professional military advice must be made available to the political authority in the earliest possible timeframe. The appointment of a CDS needs to be hastened. The bureaucratic side needs to concentrate more on meeting the logistic and provisioning requirements of the Services. Strategic aspects are better handled by professionals, as is the practice in all advanced countries of the world.

Modernisation of the Services

Given India's limited defence budgets and lack of indigenous defence industrial base, the hollowness within all three Services is gradually increasing. This can have serious security consequences for the nation in the long run. China, which is gradually getting more assertive all along the Line of Actual Control (LAC) has a defence budget which is almost four times that of India. Besides, the edge in conventional forces that India enjoyed over Pakistan 10 years ago is gradually diminishing.

Army

The Army has a shortage of artillery guns, air defence weapon systems and night fighting capability. The infantry has not been able to successfully push its INSAS (Infantry Soldier as a System) project so far. State-of-the-art rifles and carbines are urgently required for the frontline soldiers. The tank fleet lacks full-fledged night fighting capability, with a number of tanks reaching obsolescence levels. The mechanised infantry lacks matching mobility and night fighting capability to function side by side with the tanks. Finally, the artillery is just starting the process of state-of-the-art gun systems.

Navy

The Indian Navy has had major accidents onboard the submarines INS *Sindhurakshak* and INS *Sindhuratna*. Its project involving indigenous

production of 6 Scorpene submarines has been delayed by about five years. The INS *Arihant*, the indigenously manufactured nuclear submarine, has just been operationalised. The Navy is also looking at suitable twin engine aircraft for its aircraft carrier. In essence, its efforts at acquiring a blue water capability stand considerably delayed. This is worrisome in view of increasing footprint of the People's Liberation Army Navy (PLAN) in the Indian Ocean.

Air Force

Against an operational requirement of 45 fighter squadrons, the Indian Air Force (IAF) is currently down to 32-33. The present rate of obsolescence of fighter aircraft like the MiG-21 and MiG-27 is greater than the rate of induction of new aircraft. The worry is that the IAF may be down to 25-27 squadrons in the next five years before new accretions start taking place. The indigenous Tejas has not been able to fully meet the aspirations of the IAF. The IAF is also looking out for the Airborne Warning and Control System (AWACS), transport aircraft and medium lift helicopters. Additionally, it needs to urgently acquire Surface-to-Air Missile (SAM) systems for the defence of vital installations.

Only if the defence budget is enhanced immediately to 3 per cent and is sustained for the next 10 years, would we be in a position to develop capabilities for facing a two-front threat by 2030. It also must be clear that the process of keeping the military relevant requires continuous funding, and shortfalls cannot be made up by one-time infusion of funds at the time of a crisis. That would be a case of too little too late.

Infrastructure Development

While we have undertaken expansion of force levels to improve our defensive capability along our borders, a process started by me in 2008, unfortunately, we have not developed matching infrastructure in our forward areas to maintain and sustain those force levels. In most of the

sensitive forward areas, we are dependent on a single road axis which is invariably exposed to the vagaries of the weather and enemy action. Resultantly, our ability to logistically maintain enhanced troop levels is suspect, thus, negating the very purpose of improving force levels.

In the past two decades, the Chinese have developed excellent infrastructure in Tibet with the Gormo-Lhasa rail and fuel lines, road connectivity to forward most posts all along the Sino-Indian LAC, development of five all weather international airfields in close proximity of the LAC, and stocking and storage facilities for sustained conflict in important forward areas. As opposed to this, in the same period, we have barely completed 27 of the 73 strategic roads identified all along the LAC. Rail connectivity to forward areas still remains a pipe dream with no progress on even one of the nine rail lines so far identified for construction.

Immediate revamp of the Border Roads Development Organisation (BRDO) to undertake road construction on a war-footing, ensuring the necessary environmental clearances in the national interest from the courts and infusion of funding for this effort are essential first steps.

Defence Research and Development Organisation (DRDO)

Importing military hardware for modernising the defence forces is an extremely expensive proposition. This problem becomes more acute with a diminishing budgetary allocation annually, thus, giving rise to 'hollowness' which can have disastrous consequences for national security. This reflects that even after 70 years of independence, despite having a huge industrial base, India has failed to develop capabilities for indigenous manufacture of military hardware.

The DRDO has not delivered on its promises. Its resources have been frittered away in non-core areas like producing organic vegetables and undertaking construction projects rather than concentrating on modernising weaponry. Resultantly, even for basic items like rifles and carbines, we have to look outside the country for expensive imports.

The DRDO needs to give an impetus to the Prime Minister's 'Make in India' initiative by developing competencies in the core areas of concern to the Services and passing on the knowhow to the indigenous private sector for mass production. Rather than 'reinventing the wheel', it could build on the transfer of technology route to produce state-of-the-art equipment for use by the Services as well as for export.

Conclusion

As India approaches 2024 and beyond, it is expected to grow at a healthy rate of 7-8 per cent annually. However, sustained growth is only possible in a stable and peaceful environment. For this, India needs a strong and relevant military to safeguard its interests. More specifically, a hostile neighbourhood further underlines the necessity for India to develop its military capabilities to defend itself. A lot needs to be done to remove the existing 'hollowness' in the defence Services and adopt concepts and practices which would ensure optimum utilisation of limited resources, on one end, and enable the Services to discharge their responsibilities in a befitting manner, on the other. This article has identified a number of important areas that need attention for improvement in the coming decade. The list is not exhaustive and a deeper analysis would identify additional aspects requiring attention.

Finally, every nation has to take care of its own national security. Dependence on others for security would be a big mistake, as history has shown to us many a time in the past. No wonder, Europe and Japan are reconsidering their dependence on the US for security afresh.

India would do well to view its security as an asset to nation-building the long run.

Imperatives of Transformation: Changing Character of Conflict in the Emerging World Order

V K Ahluwalia

The character of war in the 21st century has changed, and if we fail to keep pace with the speed of war, we will lose the ability to compete.

— General Joe Dunford, 19th Chairman of the US Joint Chiefs of Staff, 2017[1]

Introduction

It is extremely difficult to crystal-gaze and predict the future with certainty. In hindsight, one can say that the rapid changes in the geo-political, economic, social, cultural and technological domains have had a profound impact on the emerging geo-strategic environment. With a plethora of disruptive technologies, the unknown effects of emerging technologies, asymmetric threats and the revolution in autonomous systems and communications, the global environment has been in a state of continuous change and flux. Resultantly, the envisaged threats and challenges to national security, both traditional and non-traditional, have also undergone significant change. The complexities of which need to be analysed in order to formulate the future course of action. Factors such as external security threats, religious and ethnic extremism, population growth and unemployment, societal tensions, severe competition for natural resources, climate change and environmental degradation are likely to ensure that

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armed conflicts will persist, perhaps with greater intensity. To say so, in a large number of cases, trans-national neighbouring forces and non-state actors have been indulging in abetting insurgencies, terrorism, violence and organised crime, thus, perpetuating instability and conflicts.

The great powers such as the United States (US), China and Russia, continue to compete fiercely for gaining advantage in the political, economic, technological and strategic domains, causing a spillover effect on the stability and security of regions and countries at large. Therefore, the affected regional groups and countries must certainly review the threats and challenges to their national security.

Given this context, although it is difficult to predict the future, it becomes imperative to determine the future course of action for the Indian armed forces. Wherein, prudence lies in examining the envisaged threats and challenges. In doing so, the article seeks to examine the emerging strategic environment under three aspects: first, the emerging world order; second, the changing character of conflict which is closely associated with the nature of war/conflict; and, third, the internal, external and hybrid threats and challenges to national security in the Indian context. This three-fold assessment will then help provide possible answers to whether India needs to carry out some reforms in terms of modernisation or transformation of the armed forces and its security apparatus.

Balance of Power and Concept of Polarity

The concept of polarity is an important aspect of the emerging world order. It is a key determinant of the balance of power, which enables us to analyse the influence of a state at the global as well as regional level. In simple terms, polarity refers to the ways in which 'power' is distributed in the international system, that defines the balance of power as being unipolar, bipolar or multipolar in nature. Fundamentally, it refers to the influence of a nation over others because of its economic, military, political, cultural and diplomatic power. In the current environment, it

may be prudent to add factors such as technological advancement and culture of innovations that provide extra leverage and influence over other nations. To add, the geo-strategic location of a country and its natural resources are also argued to exert influence on others. On balance, it may perhaps be correct to say that the status of the Comprehensive National Power (CNP) of a country would be a major factor that provides extra leverage to influence other nation(s).[2]

In International Relations (IR), the concept of polarity remains highly debated. Kenneth Waltz, in his seminal work *Theory of International Politics* specifies that a "stable world precludes unipolarity" (Waltz, 1979).[3] However, Waltz's theory was proved wrong within 12 years when a unipolar world came into effect. Similarly, in assessing a bipolar world, a number of scholars agree that a bipolar world is likely to be more stable, wherein, the nation states tend to align themselves with a bigger power, for reasons like ideology, survival, appeasement and taking care of their national interests. Madeleine Albright, former US Secretary of State had posited that the economic integration of the world was already leading to a multipolar world.

Subsequently, according to reports published by the US intelligence in 2008, it was reiterated that the world is likely to head towards multipolarity in the next two decades. However, it is well established that the economy alone, though a vital component, does not have the power to influence other nations. Recently, Shiv Shankar Menon, former Foreign Secretary of India, suggested "strategic autonomy" as the way forward for India, and that we should adjust to the fast changing balance of power and correlation of forces around us.[4] While considering our threats and capabilities, we must remember that India, as on date, is heavily dependent on energy (hydrocarbons), high technology and defence equipment from other countries. This makes it imperative for India to achieve self-reliance mainly in the latter two fields, to emerge as an undisputed regional power.

Whether the world moves to a unipolar or bipolar or to a multipolar order, the transition would certainly witness a certain amount of flux and instability. It does not refer only to geo-political volatility but also instability in the economy, investment and trade. Likewise, violent non-state actors and state-sponsored terrorism may become more active, leading to further volatility. As the 2019 World Economic Forum suggested, a new multipolar order, with the US and China at its centre, is the new reality, however, with this shift from a unipolar to a multipolar reality, the international system itself would be exposed to profound instability.[5]

Emerging New World Order

> *No truly global "World Order" has ever existed.*
>
> — Henry Kissenger, World Order, 2014[6]

To analyse the emerging world order, it becomes imperative to understand the changing dynamics in the regional and global environments—particularly the developments in West Asia and North Africa (WANA), North Korea, South Asia, China and Russia—as also the security threats and the flashpoints in different regions. Some of the recent events that bear testimony to an uncertain and complex global environment are; the US pullout from the multi-layered Iranian nuclear deal called Joint Comprehensive Plan of Action (JCPOA) and reimposition of sanctions on Iran; the US sanctions on Russia; the US-China trade war and China's efforts to offset the trade imbalance; the US pull-out from the Paris climate change agreement, and threats to move out of the World Trade Organisation (WTO); and the expected turmoil due to Brexit. West Asia has remained unstable due to the rivalry for regional dominance, intra-regional armed conflicts, civil wars, sectarian and ethnic conflicts, religious fundamentalism, criminal networks and drug trafficking—making the region highly volatile.

In addition, the world has also witnessed large fluctuations in oil prices, and the financial crises in Venezuela, Turkey, Iran and Pakistan. Venezuela, with the largest proven oil reserves, has been affected by economic and political crises. Two important events relating to Saudi Arabia—the assassination of journalist Jamal Khashoggi and the colossal humanitarian crisis in Yemen post the Saudi-led offensives—have affected the stability in the region. President Trump's announcement to pull out US troops from Afghanistan and Syria, followed by another statement that he agreed "100 per cent" with maintaining a small troop presence in Syria, has added to the complexity of the situation. The US has made an all-out effort to bring the Afghan Taliban to the negotiating table, to stabilise the situation and to pull out its troops.

However, amongst all this is China's Belt and Road Initiative (BRI), covering different sectors and regions, and its likely impact has caught the attention of all stakeholders—political leaders, economists, political scientists and the strategic communities at large. In response to the US "terrorism designation" of Iran's Revolutionary Guards, Iran's Parliament overwhelmingly approved a Bill labelling the US forces in West Asia as terrorists.[7] However, the positive trends in 2017-19 were the success against the Islamic State (IS) in Iraq and Syria (especially the March 22, 2019, victory against the IS in Baghouz, Syria), and the two rounds of talks—though unsuccessful—on the Korean peninsula peace process. These developments in the global scenario reflect the emerging unstable world.

Major Global Trends

It is a noted fact that the end of World Wars I and II had brought in innovative-cum-revolutionary power shifts at the global level. However, in the present time, given that the states are equipped with nuclear weapons, the world is less likely to witness any such major shifts—suggesting that the probability of total wars between the great powers in the future is rather

low. However, one cannot dismiss the power shifts that are happening at various levels, even without indulging in wars or conflicts.

Given the preeminence of the US in the global order, it has continued to be the sole superpower for the last three decades, primarily because it is leading the world in the economy, military power, science, technology and innovations. Besides its advantageous size, location and an abundance of natural resources, it also controls the seas, air space and outer space. These attributes qualify it to be the sole superpower for a few more years, however, with the rise of Asia and the resurgence of Russia, US supremacy is likely to face major challenges in the future.

With the shift of the economic centre of gravity from the West to the East, there has been a corresponding increase in the strategic significance of Asia, the Indian Ocean Region (IOR) and the Indo-Pacific region. With the rise of China and India, the Asian region has experienced rapid changes in the geo-political and geo-economic landscapes. At the same time, this region faces a large number of challenges like the presence of nuclear armed states, territorial disputes on land as well on the seas, insurgencies, terrorism, piracy, security of the Sea Lanes of Communication (SLOCs), illegal migrations, demographic inversion, displacement of people, drug trafficking, etc. All these challenges could well be sources of conflicts in the future.

Of all, the most defining trend of the 21st century has been the rise of China, characterised by its rapid economic growth, replacing Japan as the second largest world economy in 2010. According to Arvind Subramanian, China is likely to become the largest economy of the world by 2030. Adding to China's changing profile is the transformation—not just the modernisation—of its armed forces. China is not only upgrading its weapon platforms, but is also examining the whole gamut of transformation, and streamlining jointness, command and control structures.

As noted, ever since the 18th National Congress of the Communist Party of China (CPC) in 2012 wherein Chinese President Hu Jintao called for China to become a "maritime power", Beijing has constantly reiterated

the same, as witnessed in the 2015 White Paper on "China's Military Strategy" and by President Xi Jinping in April 2018. China is engaged in modernising its maritime power, with greater focus on constructing the third aircraft carrier and developing ballistic missile submarines (SSBNs), the sea-based nuclear deterrent.[8] This quest is further strengthened with Xi Jinping's consolidation of power in the CPC, in the People's Liberation Army (PLA) and in the Central Military Commission (CMC), with an infinite tenure. This also explains that with China's growing ambitions of becoming a world power, it has become increasingly assertive in its actions, though not necessarily aggressive at the moment. However, there is a thin dividing line between being assertive and being aggressive.

Important issues that concern India are: first, the strategic encirclement of India, which has got a boost with China's BRI; second, the territorial and boundary disputes; third, the transgressions that take place on the Line of Actual Control (LAC) and the tension that builds up between the two countries (the positive aspect post Wuhan Summit in 2018 is that there has been a certain decline in the transgressions on the LAC); and fourth, the China-Pakistan Economic Corridor (CPEC). In developing the CPEC through Pakistan Occupied Jammu & Kashmir (PoJK), China has increased its presence by positioning its security personnel in Gilgit and Baltistan, and, as more recently reported, in the Thar region of Sindh province. This demands an analysis of its impact on the region as a whole and on India in particular.

During the last two decades, China and Russia have been resisting the US-led international order. In August 2008, Russia invaded Georgia,[9] and in March 2014, Russia annexed Crimea in Eastern Ukraine.[10] Similarly, China, over the years, has progressively continued to be more assertive in the South China Sea and East China Sea. To secure the SLOCs and for other strategic reasons, China has maintained the presence of at least six to eight ships in and around the Gulf of Aden (Indian Ocean) for over a decade. From 2013 onwards, China has had its submarines operating in the Indian

Ocean, ostensibly in an anti-piracy role. With such actions and development of ports and bases, China has made significant inroads into the Indian Ocean, Asia and Africa. In fact, in the past decade, both Russia and China have invested heavily in their armed forces, and have built effective Anti-Access/ Area Denial (A2AD) capabilities.[11] In the future, more countries may start adopting such measures to deny access to certain sensitive regions.

At the global level, another characteristic trend that has emerged is that of 'enhanced national interest'. It has been witnessed in expressions like 'America First', 'Make in India', and 'Chinese Dream', to name a few. Simultaneously, regional organisations are becoming far more predominant in their roles, functioning and effectiveness, in comparison to some of the international institutions. Most importantly, in the emerging world order, the economic security of a nation has become pivotal to the national interests and national security. Undisputedly, a strong economy is considered to be one of the most powerful weapons. Likewise, geo-economics is certainly driving the world over geo-politics, which is evident from the cooperation developing among the regional organisations. It is also a fact that economic sanctions, as a tool, have been used by countries to persuade/coerce a country to undertake, or desist from taking, a specific course of action, in order to achieve political and strategic objectives. Going by the current trends and greater focus on the economy, it appears that strategic rivalries will continue to revolve around the economy, investment, trade, innovation and technology.

Changing Character of Conflict

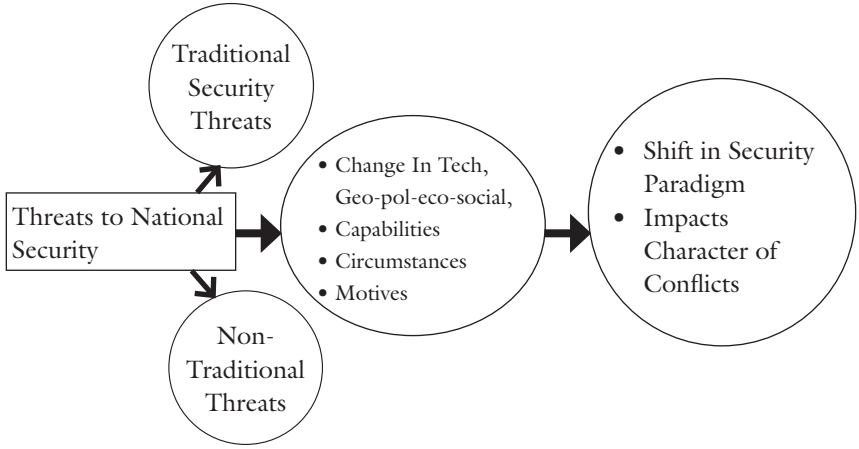
Since the end of the Cold War (1991), we have witnessed changes in the nature and character of conflict the world over due to changes in the technological, economic and geo-political landscapes, and the capabilities and motives of nation states. The terms 'nature of war' and the 'character of conflict' have often been used interchangeably. The salient difference between the two needs to be understood. Carl von Clausewitz, the

Prussian General wrote in his book, *On War*, that war is the continuation of politics by other means. Traditionally, war is an act of violence and destruction. The nature of war is considered to be enduring, destructive and interactive. Fundamentally, it is political in nature: wars are generally prosecuted at the national levels because of political aims and objectives. However, in today's environment, with disruptive technologies, network-centricity and hybrid warfare, non-contact wars, non-kinetic wars and economic wars are becoming predominant. Therefore, this particular definition of the nature of war is also undergoing a change.

The character of conflict, on the other hand, keeps evolving. It has evolved not only due to military factors, but based on the constant changes in technology, geo-political and geo-economic landscapes. The character of conflict has been evolving since the ancient times, from foot soldiers to elevated platforms in the form of horses and elephants. Kautilya, in his book *Arthashastra*, observes that during the Maurya period, the elephant was declared as a battle-winning offensive weapon owing to which, anyone who killed an elephant was awarded the death penalty. Later, in the medieval period, forts, castles, cannons and gunpowder remained at the centre-stage. During the 19th century, there were three important lessons that emerged from the Prussian War (1870), namely, quick mobilisation, quick and accurate artillery fire, and a focus on attack to bring the war to a decisive end in an early timeframe. However, the military historians were proved wrong four decades later during World War I, as trench warfare continued for more than four years.

World War I was also called the New Industrial Age Warfare as it gave rise to the defence industry for manufacturing aircraft, tanks, guns, rockets and other weapon systems. The perception that heavy bombing of cities by aircraft would bring the enemy to submission was proved wrong during World War II. The war came to an end with nuclear weapons being used in 1945. The advent of nuclear weapons introduced the doctrines of deterrence, Mutually Assured Destruction (MAD) and limited conflicts.

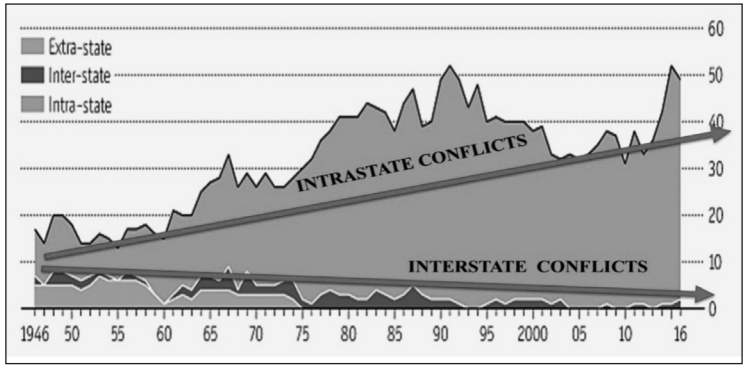
Chart 1: Changing Character of Conflict



Source: Prepared by the author.

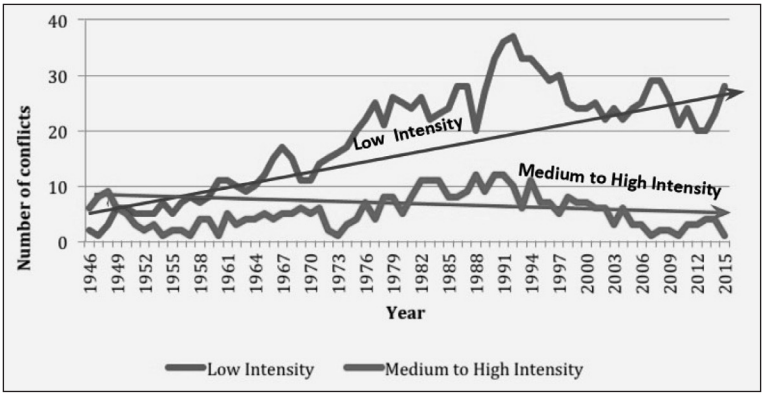
In the post-Cold War phase, non-traditional threats that impact human security have become predominant. Issues such as food security, water security, energy security, environmental security, cyber security, information security, economic security and others form a part of non-traditional security. When the traditional and non-traditional challenges are juxtaposed with changes in technology, and the political and economic landscape, it has a greater effect on the security paradigm and the character of conflict; as Carl von Clausewitz, in his seminal work, *On War*, suggests, capabilities, circumstances and motives too have an effect on the changing nature of conflict. In the current environment, hacking of the election process of another country or spreading of fake news with the aid of new technologies for political purposes or conducting influence operations by way of the internet and social media are examples of such non-contact warfare.

Fig 1: Types of Conflicts



Source: Prepared by the author with reference to *The Economist* (2018).[12]

Fig 2: Intra-State Conflicts 1946-2015



Source: Prepared by the author with reference to Pieter Van den Heede et al. (2018).[13]

Till 1945, the number of inter-state wars was far in excess of intra-state ones. A close look at the two graphs would suggest that post World War II, intra-state wars, also called small wars, accounted for a majority of internal armed conflicts. The Uppsala Conflict Data Programme has identified 280 conflicts between 1946 and 2016, a majority of which were intra-state conflicts. There was a spike in intra-state conflicts from the early 1980s, also referred to as the golden period of insurgencies. The graph of intra-state conflicts suggests that medium and high intensity conflicts have

shown a declining trend since 1994 (the year in which the genocide took place in Rwanda); whereas low intensity conflicts have maintained a slow declining trend, but have affected a large number of countries. Robin M Williams Jr, in his book *The Wars Within: People and States in Conflict*, suggests that more than 350 million people have been killed as a result of conventional battles and small wars. Matthew Symonds, editor of *The Economist* stated: "War is still a contest of wills but technology and geo-political competitions are changing its character".[14] To which, Gautam Sen, a specialist in the inter-disciplinary areas of strategic studies, international security and international relations, observes that the evolution of conflict is primarily related to two important facets: the aspirations of human beings to dominate over fellow human beings; and the crisis of identity, which has further given rise to the role of fundamentalism, terrorism and separatist movements.[15] Hence, it is to suggest that the world will continue to witness conflicts in different forms and manifestations.

In this context, to analyse the changing character of conflict, it would be interesting to study the broad profile of a few important conflicts in the last three decades: Gulf War I (1991), Kosovo conflict (1998-2000), Kargil War (1999), Gulf War II (2003), Lebanon War (2006), Russia's invasion of Georgia (2008), Sri Lanka–Liberation Tigers of Tamil Eelam (LTTE) conflict (2009), Russia–Ukraine conflict (2014), the battles of Mosul, Aleppo and Raqqa against the IS in West Asia (2016-18) and the conflict in the war-torn Afghanistan since 2001. Some of the prominent lessons of Gulf Wars I and II, as well as the Kosovo conflict, were the important roles played by air power (surgical use of air power), mechanised forces, special forces, airborne forces, Precision-Guided Munitions (PGMs), Intelligence Surveillance Reconnaissance (ISR), space-based technology and stealth technology. These wars confirmed major transformation in the character of warfare. In the Gulf Wars, the US-led coalition had a huge advantage over the Iraqi forces in terms of information and situational awareness.

One of the most important lessons was that 'information and technology' had become the key elements of warfare. In addition, these conflicts highlighted the importance of reducing the Observation, Orientation, Decision and Action (OODA) loop time, by placing emphasis on information, speed, range and precision. It led to timely decision-making. The objectives of high intensity conflicts have shifted from destruction and annihilation to disruption and destruction of the systems–cutting across the political, economic, trade, social, informational, psychological, and military domains. However, in the low intensity intra-state conflicts, protection of civilians has become a major area of concern, particularly in Africa.

The Chinese studied these conflicts with great care and took three important actions to improve the effectiveness of their armed forces, namely, mechanisation, informationisation (to win wars under conditions of informationisation) and the most recent one being theaterisation. China has restructured its seven Military Regions (MRs) into five Theaterised Commands (TCs) in 2015-16. In addition, it brought the People's Armed Police Force (PAPF) and Chinese Coast Guard directly under the CMC in 2018. Theaterisation and centralisation of certain elements, the PLA/CMC ensure unity of command and unity of effort to face the challenges of future conflicts. On the other hand, in 2014, the Pentagon announced its "Third Offset Strategy" to regain its military edge by harnessing a range of technologies, including robotics, autonomous systems and big data, and to do so faster and more effectively than potential adversaries.[16]

Future Challenges

The main highlights of the conflicts of the later part of the 20th century and early part of the 21st century suggest an increase in lethality, mobility, battlefield transparency, improved Intelligence, Surveillance, and Reconnaissance (ISR) capabilities, stealth technologies, cyber warfare, information warfare, militarisation of space, psychological warfare and other such technological changes. With advances in Artificial Intelligence

(AI) and robotics, we may see an increase in the security risks, by way of development and production of biological weapons. Therefore, adequate safeguards need to be put in place to prevent such futuristic developments. In addition to the development of new forms of weapon systems, a few countries have made significant efforts to improve their industries and have modernised their armed forces. The Prime Minister of Israel, in his address at the American Israel Public Affairs Committee (AIPAC) Policy Conference in Washington DC, on March 6, 2018, stated that Israel had revolutionised its industry by the confluence of three important technologies: artificial intelligence, big data and connectivity.[17] With emphasis on innovations, it has a robust and vibrant industrial base, and comprises one of the leading defence industries in the world. While India has done fairly well in Information Technology (IT), nuclear energy, missile and space technology, it is not yet a global leader in any one of them—calling for immediate attention.

A. Hybrid and Grey Zone Conflicts

Two terms—hybrid warfare and grey zone conflicts—have been added to the glossary of terms of IR. Hybrid warfare, also known as ambiguous warfare, is a blend of regular and irregular warfare. In other words, hybrid warfare is a blend of the economy, military, information, psychology and cyber, with a view to achieve political objectives, and gain economic advantage. Warfare has graduated to the fifth generation in the form of hybrid warfare. It has been used in the recent conflicts in West Asia and Afghanistan. Although the Indian subcontinent continues to face sub-conventional war in the form of proxy war and cross-border terrorism, it has not experienced the full dimension of hybrid war so far.

Grey zone conflicts are conflicts that oscillate between war and peace and are generally waged by the great powers that do not want to cross the threshold of an outright war due to the nuclear threat,[18] and yet aim to achieve their political and territorial objectives. In the grey zone,

the moves are carefully calibrated to ensure that the situation remains ambiguous and uncertain.[19] Mark Galeotti has described the 'grey zone' concept as "guerrilla geopolitics".[20] While looking at the future, grey zone conflicts between the great powers will remain relevant for both the domination of strategic space and heightened competition for fast diminishing natural resources.

To exemplify, two distinctive examples of grey zone conflicts are Russia's intervention in Ukraine in 2014 , and China's progressive, skillful increase in assertive actions in the South China Sea, by creating artificial islands to deploy Surface-to-Air Missiles (SAMs) and anti-ship missiles and establishing security posts on the reclaimed islands.[21] Subsequently, China has continued to conduct major naval and air exercises in the South China Sea, suggesting to America that any intervention would be "more risky and more costly".[22] With the transformation of China's PLA, improvement in its infrastructure and focus on technology for defence, the military capability gap between India and China is increasingly widening. To deal with which, India certainly needs to build asymmetric capabilities, particularly in the information, cyber, artificial intelligence, robotics, big data and media domains.

B. Urban Warfare

In WANA, the fight to reclaim Mosul in Iraq, with a population of 1.8 million, from the IS has been one of the most significant battles since World War II.[23] It took the Iraqi security forces, with the aid of the state-of-the art technology of the US, more than nine months to regain Mosul. Near similar difficulties were experienced in the cases of Aleppo, Raqqa, and Sadr, though at different times. It is also evident that the role of irregular forces and violent non-state actors has continued to increase in conventional conflicts.

There has been a progressive increase in conflicts in urban environments. One of the potent threats of the future would be conflicts

as a result of hyper-urbanisation: it has been predicted that by 2040, two-third of the world's population would live in urban areas.[24] Although migration to urban areas is an economic activity, lately, insurgents and terrorists have been building their bases in the urban areas, inhabiting with civil population and thereby, seeking a number of advantages to combat the conventional forces. By and large, while urban areas are important centres of political and economic power, they are also becoming the hubs of the communication and transport systems of a region. History has a number of examples where uncontrolled migration to urban areas in a short duration led to simmering discontent and people's movements against the establishments/governments.

In India, according to the census conducted by the government, the urban population has increased by 74 per cent in 20 years between 1991 and 2011, from 217 million to 377 million. India is in the midst of a geographical transition, wherein the rural population is migrating to the urban areas to seek better job opportunities, security, quality of life—education, health care, houses, potable water, sanitation, infrastructure, etc. Considering the increase in India's urban population, the unemployment, and that the governance system may not be able to provide the essential services and facilities, we can expect conflicts that may manifest in the form of movements which would have an impact on 'human security' in more ways than one. Therefore, the Indian armed forces also need to review their urban fighting policies and doctrines, in both conventional and sub-conventional domains.

Conflicts in the Indian Context

According to the 2018 Global Peace Index (GPI), as published by the Institute of Economics and Peace, out of the nine regions of the world, South Asia ranks as the second least peaceful region of the world.[25] Out of the 163 countries evaluated in South Asia and neighbouring countries, the ranks are: Afghanistan 162nd (least peaceful), Pakistan 151st, India

136th, China 112nd, Bangladesh 93rd, Nepal 84th, Sri Lanka 67th and Bhutan 19th.[26] What is noteworthy is that India's ranking was rather low, despite reduction in the levels of violence in the northeast region and in areas affected by Left Wing Extremism (LWE), in 2017 and 2018. However, there has been an increase in violence in J&K since 2016. The GPI report also mentions that the cost of preventing and containing violence in India is very high. It is 9 per cent of India's Gross Domestic Product (GDP), which, when seen in absolute terms, is very high.[27] This very factor makes it imperative to take mission oriented actions to resolve India's internal conflicts on priority and likewise divert the resources to improve health care, education, job opportunities, housing and provision of potable water , among many others.

In the Indian context, given the challenges of the intra-state conflicts, proxy war, state sponsored terrorism, unsettled borders with our adversaries, and obsession among all the stakeholders 'not to lose an inch of territory', land warfare is likely to dominate the battlefield in the foreseeable future, with support from other elements of national power. Cross-border terrorism from Pakistan will be one of the important factors that could result in a limited conflict, meshed with information (especially propaganda and psychological) warfare. Michael E O'Hanlon, Research Director for the Foreign Policy Programme at Brookings, reinforces the likely nature of conflicts in South Asia in his book, *The Future of Land Warfare*, wherein he writes: "On balance, it is hard to escape the conclusion that South Asia contains major potential for large scale operations by ground forces, whether in the context of interstate conflict, severe internal violence, or complex humanitarian catastrophe in which the effects of natural disasters are compounded by weak governance and political instability."[28]

It is assumed that India, in another 10-15 years, will face an ultra-high technology adversary in the north, with hybrid warfare as the key feature, or a low to medium technology adversary in the west, with greater

focus on the sub-conventional threats, including proxy war, cross-border terrorism and information warfare, or a combination of both against a nuclear backdrop. Therefore, the spectrum of conflict will be seen between nation states (inter-state) and proxy-cum-internal armed conflicts. India is facing both. The major complement of the war or the conflict would be in land warfare, which will progressively increase the fighting in urban terrains. We should, therefore, be prepared to effectively fight both the emerging internal and external threats.

While looking at India's security environment in particular, it is important to understand the external, internal and hybrid threats. While traditionally, territorial integrity (no loss of territory) has been one of the prime concerns of every Indian, we have to be equally concerned to address the non-traditional and non-military threats to our country. Given the degree of difficulty of terrains along the borders and inadequate ISR capabilities, boots on the ground will continue to remain important for India. With the changes in technologies and character of conflict, it is operationally exigent to develop indigenous ISR capabilities and achieve a high level of battlefield transparency and network-centricity to reduce boots on the ground. Given India's boundary disputes, it should be fully prepared against the initiation of a conflict in the disputed mountainous areas, and a collusive threat from both the adversaries which could then spill over to other areas. In fact, India needs to look at the Command, Control, Communications, Computers, Intelligence, Information, Surveillance, and Reconnaissance (C4I2SR) capabilities to enhance its operational preparedness, and develop indigenous capabilities to disrupt and destroy the networks of the adversaries, thus, targeting its 'will to fight' and to destroy its war-waging potential. The emphasis thereby needs to be on innovations and development of indigenous capabilities to seek significant advantages.

Given India's diversity on socio-economic-demographic counts, and the external support to insurgents/terrorists, it is likely to continue to face internal armed conflicts in the future as well. In addition, lack of social

cohesion and harmony, polarisation of people, non-inclusive growth, a huge youth population and large scale unemployment will always be sources of conflict in the future. Social and communal violence has shown an increase in the recent years. Therefore, India's internal security apparatus requires a comprehensive review of our strategy for the future.

Furthermore, as technology is one of the most important factors based on which the wars of the 21st century will be fought, this domain needs significant attention. Although these would be under the shadow of nuclear armed states, the enabling technologies that would have an impact on the character of conflict are: AI, big data analytics, connectivity, nano-technology, shock-hardened sensors, Internet of Things (IoT) and fibre laser technology. These technologies then would usher in militarisation of space, Lethal Autonomous Weapon Systems (LAWS), cyber warfare, robotics and AI-enabled systems, information warfare, autonomous unmanned systems, C4I2SR, and swarms of miniaturised drones. Given the technological advances, AI with big data analytics, and autonomous weapon systems, will revolutionise the nature of warfare faster than we can imagine. These factors further make it imperative for India to think ahead and factor these into its national security policies.

Way Ahead

> *The Chinese have a saying that 'Change is a Dragon.'*
> *If you try to ignore him or control him, it will eat you but if you ride the dragon of change, you can survive, even prosper. I commit…. that we are going to ride the dragon.*
>
> — General Charles G Krulak, Commandant US Marines Corps

The above quote is attributed to General Krulak during the period when the US Marine Corps was debating doctrinal and organisational changes in the 1990s. After the formation of theaterised commands in

1986, the US Marine Corps was examining the feasibility of changes to build on the strategic need for amphibious assault and allied capabilities.[29]

In conventional operations, the centre of gravity would perhaps be the paralysis of the enemy's networks, but in sub-conventional operations, psychological warfare would aim to influence the minds of the people. Ideally, in an insurgency, the rebels would aim to control the territory and mind space of the population. Hence, influence operations would always play a predominant role in a conflict situation. We will continue to have conflicts, but the character of conflict would be different. Therefore, besides resolution of territorial disputes, India, as an emerging power, must prepare itself to look at multiple challenges beyond the horizon: such as the presence of extra-regional and potentially hostile powers in its spheres of influence, development of military capabilities of its adversaries' space, cyber and information warfare domains, internal security and disaster relief operations. Though there is not much change in the principles and concepts of sub-conventional conflicts, the tactics, techniques, stakeholders and supporting technologies have changed. The basic question, therefore, is whether we are prepared to face the challenges of the future threats—external, internal and hybrid—on the Indian subcontinent.

Considering the scale and pace of changes in the future warfare, we need to analyse our response, both conceptually and from the capabilities point of view. It is evident that we have to look at the transformation of our current systems with due seriousness, and urgency. While military modernisation is an essential subset of transformation, it requires a change in the thought process, a review of our doctrines, strategy, war-fighting concepts, organisational and force structures, training concepts and logistics periodically, and, most importantly, preparedness of the strategic leadership to drive the change.

Having stated the operational necessity and the transformational requirements, India needs to broadly examine the likely challenges to transformation, both from within and outside the armed forces.

Transformation is a long-term, continuous process. It should be sustainable. Therefore, the Indian armed forces would require the support of the political leaders, bureaucratic set-up, industrial support especially from the defence industrial base, Defence Research and Development Organisation (DRDO) and the armed forces themselves. In doing so, first, we need to address the fundamental issue of achieving 'interoperability and integration' within and among the three Services. Second, even if we are able to bridge the technological gap by introducing state-of-the-art technologies, absorption of technology is an equally important part which must be planned for in a deliberate manner. That is, military leaders have to not only keep themselves abreast with the latest changes in technologies, but also the geo-politico-economic-strategic environment to drive the change.

Conclusion

In an overall assessment, it is a known fact that there is resistance to change and one needs to be conscious of that and fight that inherent resistance. The nature and character of conflicts will continue to change with significant shifts in the use of technology and the geo-politico-economic-social environment, and likewise, changes in the capabilities, circumstances and motives of the countries. In this backdrop, India needs to assess its inadequacies in its operational preparedness against external, internal and hybrid threats—the call for the future. It still suffers from a dilemma on the issues of jointness, theaterisation and integration in its defence forces, and integration with the Ministry of Defence (MoD). It is time to find an answer to these challenges pertaining to interoperability and integration, management of borders, maritime and air space security, development of C4I2SR capabilities, battlefield transparency, and indigenisation of major components of the defence industry at the earliest. All these require transformation! Unless there is an understanding of the dynamics of change, and proactive actions taken, India will find itself unprepared to face the operational challenges of the 21st century.

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Transformation of the Indian Army in the New World Order

P M Hariz

Introduction

The security strategy of a nation is based on harnessing the cumulative strength of its various instruments of national power. These, amongst others, include the economy, diplomacy, information and military. Nations periodically undertake the necessary transformation of their armed forces in order to optimise their potential. "Transformation is a process that shapes the changing nature of military competition and cooperation through a new combination of concepts, capabilities, people, and organisations that exploits the nation's advantage and protects against asymmetric vulnerabilities to sustain the strategic position, which helps underpin peace and stability in the world. Transformation anticipates and creates the future and deals with the co-evolution of concepts, processes, organisation, and technology." It is, however, important that "military transformation" should simply be understood to mean "profound change" in military affairs.[1] It need not imply rapid or across-the-board change, nor the discarding of that which continues to work well. The changes, however, should be dramatic rather than mere improvements on the margins to existing military hardware or processes.

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The study of 'transformation' undertaken by world militaries has lessons for us. Their transformation has been due to change in their security environment, and, thus, their National Security Strategy (NSS), necessitating a change in the doctrine, organisation, and capabilities. It has also been driven by technological advances and budget constraints. The United States (US), in particular, which has participated in 14 major and around 300 minor military operations around the world after 1945, has undertaken major transformations, with many lessons to be learnt.

The Indian armed forces have their roots in the organisation, structure, and capability they inherited in 1947. In the transformation into the Indian armed forces, they imbibed the Service and institutional ethos of the British armed forces.[2] Transformation in our strategy, doctrines and military capability has come about each time we have been to war. However, it has not been at the desired pace and intensity, primarily due to limited fiscal support, and also due to the lack of an integrated government approach. As the world and our neighbourhood are witnessing a changing world order and security environment, it is imperative that we study the transformations already undertaken, identify new transformation goals, and recommend the required capabilities. This article will identify the lessons from the US transformation process, examine the transformation already undertaken by the Indian Army and recommend the way ahead, including the future capabilities required in the Army.

Lessons from Transformation: US Army

Since 1970, the US Army underwent two major transformations. The first, in the aftermath of the Vietnam War, paved the way for the American Army's new role in Europe with the military's focus on the North Atlantic Treaty Organisation (NATO) and mechanised warfare. The second, at the end of the Cold War era, shifted the focus of the military from large mechanised operations in Europe against the Soviet Union to conduct of expeditionary operations around the world, based on US interests.

Till late 1990, such transformations were guided by various commissions and committees which laid down the overall strategy,[3] and orientation for transformation for the next 20 years, with major emphasis on technological development. The 1989 Base Force concept proposed a minimum force structure, with cuts in the budget.[4] In 1995, the Commission on Roles and Missions of the Armed Forces made its recommendations for increased privatisation, use of the reserve component and mandated the publication of a Quadrennial Defence Review (QDR), all of which were adopted. The Army Training and Doctrine Command (TRADOC) was established and Army modernisation focussed on the important and critical equipment.

In 1986, the Goldwater-Nichols Act, resulted in the creation of unified combatant commands under unified, geographically organised command structures.[5] In 1994, RAND research on defence planning recommended adoption of "capabilities-based planning", force restructuring based on smaller unit building blocks, the requirement of expeditionary forces and development of asymmetric capabilities.[6] One of the reports also urged "preparation for the possibility of a catastrophic terrorist attack on the homeland,"[7] although it did not predict one. Doctrines were also suitably modified/evolved to meet the transformation. After the Vietnam War, the U.S. Army updated its main operational doctrine publication, *Field Manual 3-0*, seven times.[8] Transformation had its share of vociferous supporters and sceptics.

After the first QDR 1997, subsequent QDRs were issued in 2001, 2005, 2010 and the last one in 2014. In 2018, Donald Trump replaced the QDR with a National Defence Strategy (NDS). Each of the QDRs articulated the NSS, priority areas and transformation goals. These documents served as guidelines to all the stakeholders involved in ensuring the security of the nation and became the reference point for all transformation. QDR 2001 elaborated on the new role for the Special Operations Force (SOF) and the support it would require. QDR 2005 highlighted four distinct areas of priority: defeating extremism and the terrorism that it spawns; in-

depth defence of the homeland; shaping the actions of states at crossroad points; and, dissuading or preventing hostile states and non-state actors from gaining Weapons of Mass Destruction (WMD).[9]

The Joint Defence Capabilities Study of March 2003 highlighted the importance of joint needs and joint capability assessments and that the capabilities must be "born joint" wherever possible. QDR 2010, a war-time document, provided a strategy aimed at rebalancing US military capabilities, reforms, defence processes and institutions in order to prevail in the ongoing wars; prevent and deter future conflicts; and defeat adversaries in a wide range of contingencies.[10] It acknowledged issues related to a rising China and the importance of ties with India. This was followed by the Defence Strategic Guidance (DSG) 2012.[11] The government concluded that the most important elements of transformation would be organisational and managerial. It, therefore, brought in the necessary changes in the matter of governance and management in the Department of Defence (DoD) to makes transformation successful.

The NDS issued in 2018 was classified and only an unclassified summary was released in the public domain.[12] The NDS aimed at sharpening the American military's competitive edge. It reiterated that the US should remain the preeminent military power in the world, ensure a favourable balance of power, and advance an international order that would be most conducive to US security and prosperity. It elaborated on the five major challenges faced by the US military: China, Russia, North Korea, Iran, and terrorists.[13] The preeminent theme and priority were to counter China and Russia across the entire spectrum of conflict, including the 'grey zone'. The NDS also subtly conveyed that these two challenges were different, with China being the first among equals.

The concept of Revolution in Military Affairs (RMA) was introduced with the publication of the 1992 Military Technical Revolution (MTR) Assessment. It concluded that new technologies would make the current forces better in fighting with existing operational concepts and

organisations and that it would also revolutionise the conduct of war itself. In 1993, the term "military technical revolution" was replaced with "revolution in military affairs" and it was elaborated that while technological advances made the revolution possible, the revolution itself would only be realised when new supporting operational concepts and military organisations were created. RMA was amplified as, "An RMA is what occurs when the application of new technologies into a significant number of military systems combines with innovative operational concepts and organizational adaptation in a way that fundamentally alters the character and conduct of conflict ... by producing a dramatic increase—often an order of magnitude or greater—in the combat potential and military effectiveness of armed forces".[14]

The modular force transformational project has many useful lessons. In 2003, the US Army began implementing force restructuring to address the challenges of waging war and conducting extended stabilisation operations. One of the changes involved transforming the Army from its traditional, division-based force into a brigade-based force, through the concept of "modularity".[15] TRADOC Pamphlet 525-5 defines modularity as "a force design methodology that establishes a means to provide interchangeable, expandable, and tailorable force elements".[16] Modularity entailed replacing the division-centric force structure with a force whose constituent building blocks are brigades and Brigade Combat Teams (BCTs). BCTs were rebuilt by making proportionate combat, combat support, and combat service support, formerly provided by the host division, organic to the BCTs' organisation. In the process, the Army reduced the number of combat brigade types from 17 to three: infantry BCTs, heavy BCTs, and Stryker BCTs. The move to modularity provided the Army with a greater number of smaller, very capable force packages, making it easier to sustain the protracted operations in Iraq and Afghanistan. Combat support and combat service support units and force structure were also redesigned to make the entire force more modular.

A study by the RAND Corporation on the efficacy of the restructuring concluded that the modular force structure was superior to the earlier force structure in terms of its ability to contribute land power to current and reasonably foreseeable joint operations.[17] It had flexibility and versatility across the range of military operations and associated risks. The analysis also established that the modular force structure produced a larger tactical force with a larger number of more aggregated capabilities than the previous force structure.

The US Special Operations Command (USSOCOM) was established in April 1987 and had its origin in the aftermath of Operation Eagle Claw, the disastrous hostage rescue attempted at the American Embassy in Iran in 1980. Since 2001, USSOCOM had doubled its manpower, tripled its budget, and quadrupled its overseas deployments.[18] Despite the increase in size over the last decade, the SOF consists of only 60,000 personnel. Given its ability to operate in a wide range of environments and undertake tactical actions that produce disproportionate strategic effects, the SOF is increasingly relied on to help address national security threats and challenges on a global scale.

The study of the transformation process of the US Army has many lessons for us. Importantly, it is a whole of government process and is primarily driven by the NSS of the country, which is formally issued by the government, thus, signalling its importance and ownership. Amongst other issues, the NSS normally includes guidelines on employment of the military, the force structure, the capabilities to be developed and the transformation to be achieved. In planning the transformation, capability-based planning is preferred to threat-based planning. The desired and approved transformation can be undertaken successfully, only if the government provides the necessary fiscal support. Whenever the security environment improves, governments have a tendency to downsize the armed forces and save on cost. The process of transformation, including capability development, must be open to review and modification as

the security environment changes. Adopting technology is critical to enhancing war-fighting capability as it revolutionises the conduct of war itself. However, for the RMA to be truly realised, technological advancement has to be accompanied by a new doctrine and new structures where required. Doctrinal changes must be undertaken to suit the transformation.

In view of the increasing importance of joint operations and inter-Service integration, identifying joint needs and undertaking joint assessments need to be the norm based on a realistic appreciation. In order to support major transformation, the Ministry of Defence (MoD) too needs to be correctly organised, oriented and business rules suitably modified; management support has to be seamless. Investing in Special Forces pays rich dividends. While developing capabilities, it is important to ensure that the planned technologies can be enmeshed. It is important to have a central agency with adequate authority to implement transformation. The element being transformed, the military, must be convinced of the need and process, for which the senior military leadership must lead the way.

Transformations in the Indian Army

The Indian Army underwent two major transformations: one in the aftermath of the 1962 Sino-India War and the second based on the recommendations of the General KV Krishna Rao Committee of 1975. The Higher Defence Organisation (HDO) too underwent a limited transformation based on the recommendations of the Kargil Review Committee, Group of Ministers and Naresh Chandra Committee.

After the 1962 War, an accretion of 3.25 lakh troops enabled raising of four new mountain divisions, HQ Central Command, and conversion of a standard division into a mountain division. Some 9,000 officers were granted emergency commission.[19] Training in mountain and high-altitude warfare was given renewed impetus. Coupled with major upgradation of

weapons, equipment, and vehicles, these changes improved the overall defensive capability. This transformation also enjoyed the requisite financial support with the defence budget being over 3 per cent of the Gross Domestic Product (GDP), the highest being 3.84 in 1963-64.

The 1971 Indo-Pak War was a resounding victory for India. It saw the liberation of Bangladesh and surrender of 93,000 Pakistani troops. Operations on the western front established the necessity of mechanised forces for operations in the obstacle ridden terrain of the plains and the open deserts in the south. In 1975, the government appointed an expert panel under then Lieutenant General KV Krishna Rao, with Major Generals ML Chibber and K Sunderji as members, and Brigadier AJM Homji as Secretary. The recommendations of this panel set the stage for the major mechanisation in the Indian Army. Mechanisation received a major impetus once General K Sunderji later became the Chief of the Army Staff (COAS). The Mechanised Infantry Regiment was raised on April 2, 1979, with General K Sunderji as its first Colonel of the Regiment. The Reorganised Army Plains Infantry Division (RAPID), with an enhanced mechanised component, was introduced. General K Sunderji provided the strategic mooring for the employment of the mechanised forces which today consist of 65 armoured regiments, 48 mechanised infantry battalions, and the requisite mechanised combat support elements. They form the decisive strategic force of the Indian military. Mechanisation also ushered in a welcome change from defensive operations to the current doctrine of proactive offensive operations.

The increased Pakistan sponsored insurgency in the Kashmir Valley in the 1990s necessitated the raising of the Rashtriya Rifles (RR), a dedicated special Counter-Insurgency (CI) force for the Valley. A total of 64 battalions were raised and are currently deployed in the Valley and northeast. With prolonged CI operations in the Valley, a need was also felt for additional Special Forces (SFs). This was met by converting the regular parachute battalions into SF battalions and raising a few additional SF units.

Numerous organisational changes were made to enhance the operational efficiency of the Army. Immediately after the 1971 War, the Northern Command was reformed under Lieutenant General PS Bhagat. The Army Training Command (ARTRAC) was raised in 1993. In 1999, 14 Corps was raised, with operational responsibility along the Line of Actual Control (LAC) and the Siachen Glacier. After Operation Parakram, the Southwest Command was raised in April 2005, and in September 2005, 9 Corps was raised. These changes enabled better synergy and availability of reserves, which enhanced the offensive defence capability. Subsequently, in January 2014, 17 Corps, the new mountain strike corps, was raised to meet the emerging operational requirements along the northern borders with China. In addition, many new initiatives were taken to improve the overall Professional Military Education (PME) and institutional training. Commencing 1993, women were inducted into the Army, in other than medical services. Their induction into combat arms is yet to commence.[20]

Consequent to the Kargil conflict of 1999, a major review of national security management was undertaken by the Kargil Review Committee (KRC), headed by the late Shri K. Subrahmanyam.[21] The Cabinet Committee on Security (CCS) appointed a Group of Ministers (GoM) headed by Deputy Prime Minister and Home Minister L.K. Advani to study the KRC Report and recommend measures for implementation. The CCS accepted the GoM's recommendations entirely except for the creation of the post of Chief of Defence Staff (CDS). This review resulted in the establishment of Headquarters Integrated Defence Staff (HQ IDS); Andaman & Nicobar and Strategic Forces Commands; Defence Intelligence Agency (DIA); National Technical Research Organisation (NTRO) and National Defence University (NDU). It also resulted in the promulgation of the Defence Procurement Procedure (DPP); constitution of the Defence Acquisition Council and Defence Technology Board, and a policy on border management: "one border one force".

The various modernisation programmes undertaken by the Army over the last few decades have improved its firepower, lethality, mobility, surveillance and reconnaissance capability, communications and aviation. Coupled with improved logistic infrastructure and operational logistic capacities, the Army is today capable of rapid mobilisation and undertaking relentless offensive action over protracted periods, in various types of terrain. Intelligence operations too have seen a quantum jump, with major improvements in signals, electronic and imagery intelligence capabilities. This has been realised through major developments in the country's satellite programmes.[22] The Defence Communication Network set up in 2016 is the backbone for efficient and secure tri-Service communication. It is a strategic, secure and a scalable system with a pan-India reach.

The present COAS, General Bipin Rawat, has initiated a major transformation programme[23] for the Army which aims at a reduction of 50,000 uniformed personnel. This is to be in addition to the reduction of 57,000 personnel, including 30,000 civilian employees, being initiated by the MoD, based on the recommendations of the Shekatkar Committee. The proposal also includes downsizing of Army HQ; merging the Directorate of Military Training under ARTRAC; limited force restructuring to form Integrated Brigade Groups (IBGs), reducing certain higher HQ; reduction of officer appointments earlier granted by the AV Singh Committee; reducing authorisation of officers and enhancing officer intake from the ranks.

The basic driver for the current proposal is the fact that the 1.25 million-strong Army continues to expand and consumes 83 per cent of the Army's budget for revenue expenditure, leaving a mere 17 per cent for modernisation. Troop reduction has, thus, become imperative to ensure the availability of money for modernisation.

Current Security Environment

Pakistan and China continue to be our major security concerns. India's military threats and challenges emanate from the historically inherited

territorial disputes involving these two nuclear armed neighbours, over which five wars have already been fought.[24] Our borders with both these countries remain constantly challenged, necessitating a robust defence mechanism. China's unprecedented economic growth, military modernisation, recent transformation, and the One Belt One Road Initiative are issues of concern. China's development of blue water naval capabilities and its increasing presence in the Indian Ocean Region (IOR) remains a cause of worry. With the development of facilities in Myanmar, Sri Lanka, Pakistan and in many other Indian Ocean Rim countries, the proverbial string of pearls seems to be transforming into a noose. Ensuring freedom of movement in the IOR remains a major requirement. Our unsettled borders with China, its recent efforts at Doklam, and the South China Sea situation are all indicative of its intentions. Despite the world's efforts, Pakistan continues to use terror as an instrument of national power, in addition to frequent nuclear sabre rattling. The China-Pakistan collusion has increased and Pakistan continues to benefit from the economic, military and development support provided by China. Thus, in the future, we are likely to face a 'two-front threat', for which we need to be prepared. The China-Pakistan Economic Corridor (CPEC), including development of Gwadar port, impacts the security of our country. The ongoing situation in Afghanistan too impacts our security. With Pakistan continuing to maintain a role in the ongoing mediation, its efforts to have a proxy in Afghanistan is a matter of concern. It is possible that with the drawdown of US troops and a successful power sharing agreement, the *jihadi* elements will invariably be directed into Kashmir as before. Thus, Kashmir Valley, with its ongoing strife, continues to be an area of serious concern internally.

On the world stage, on one end, India stands confident in balancing its relationship with the US, China, and Russia based on its national priorities and interests. Given its energy security and large diaspora, India has now enlarged its engagement with the Middle East positively.

With the shift of the pivot from Europe to the Asia-Pacific, India has successfully enlarged its interaction with Southeast Asia. While, on the other end, as a national policy, India has fastidiously stayed away from deploying its military beyond its shores, except under the United Nations (UN) missions. However, in its quest to become a major regional power, India must develop the necessary capabilities for regional intervention and support when sought by any nation.

The recent conflicts in Iraq, Syria and Afghanistan have highlighted the changing nature of conflicts. We now need to be prepared for hybrid warfare which involves a combination of conventional, irregular, asymmetric, unconventional, informational and 'non-contact' warfare.[25] The world is witnessing the era of 'grey zone' conflict, where often the commencement of hostilities is in the cyber and digital domain. In India's context, such a hybrid war will be under the nuclear overhang, especially with respect to Pakistan. Thus, the Indian Army has to develop capabilities for a 'two-front' full spectrum conflict.

Envisaged Transformation

The primary role of the Indian Army is to ensure the territorial integrity of the nation through deterrence, or by waging war. Its secondary role includes the provision of aid to civil authorities, undertaking counter-insurgency/terrorist operations, undertaking humanitarian and disaster relief operations, and participating in UN operations when called to do so.

Presently, all three Services operate through their respective Theatre Commands. As a result, we have a total of 12 operational theatres; six in the Army, two in the Navy and four in the Air Force. Each Service has its own Training Command and the IAF has a Maintenance Command. In addition, we have two tri-Service operational commands. The necessity of restructuring our theatres into integrated theatres has been debated for long with no result in sight. Since this is unlikely to find acceptance with the three Services, it is essential for the government to steer this important

transformation. Integrated Theatre Commands can be effective only once the CDS is appointed.

In defending our borders, the Army is required to undertake defensive and offensive operations in a variety of terrains ranging from the glaciated region to the open deserts. In pursuance of our regional aspirations, we now need to develop the capability of undertaking robust out of area operations beyond our shores, when required. Given our concern in the IOR, and the need to ensure the security of our island territories, we need to develop a potent amphibious capability. While we currently have a designated amphibious brigade, we have not invested adequately in its capacity building. Therefore, it is imperative that we raise two amphibious brigades, one each for the western and eastern seaboards.

Presently, as part of our force matrix for a two-front war, designated dual tasked formations are moved from one front to the other, based on the progress of operations. While the availability of independent capabilities on both fronts is most desirable, a practical option is for both fronts to have their basic force levels *in situ*, and hold a central strategic reserve, to be employed as strategic accretions in either or both fronts. We may consider placing these reserves under a Strategic Reserve Command. The Indian Air Force must augment its existing strategic move capability to support this transformation.

In the mountains, because of the limited communication network, one of the major problems is the move of troops and switching of acclimatised reserves. To this end, it is important that forces are suitably located so that acclimatised reserves are readily available. We need to develop adequate rotary wing heavy lift capability at the corps/sector level. The current introduction of the Chinook helicopters is a welcome step in this direction. Innovative logistic support will be required to sustain forces over protracted periods in such harsh terrain.

In the plains, the vital areas are defended by occupying positional defence, supported by reserves, for various contingencies. Considering

the increasing lethality on the battlefield and speed of operations, it is important that all infantry operating in the plains has mobility and protection. Occupation of positional defence in the deserts, however, needs a review. With the increase in mechanised forces, and by providing mobility and protection to infantry, it will be expedient to hold mobile defences in the deserts.

Offensive operations consist of a combination of penetrative and outflanking manoeuvres spearheaded by mechanised forces. In order to ensure simultaneity of operations and availability of the requisite troops for depth battles, we need to build the capability of air/helicopter landed troops in addition to our airborne capacities. Ideally, all the three theatres in the western front must have such intrinsic capability of a division sized force. Such a capability will pay rich dividends when theatre synergetic operations are launched. This will also necessitate a doctrinal change in the employment of forces.

We are becoming increasingly dependent on national space capabilities for navigation, communication, and intelligence. Our space assets must be survivable and replaceable. Our recent Anti-Satellite (ASAT) test on March 27 from Kalam Island in Odisha is a step in the right direction. With this, India joins the exclusive group[26] of space-faring nations. Since the military will continue to be a major user of space, it is imperative that we establish a Space Division under the CDS which can coordinate the military requirements with the Indian Space Research Organisation (ISRO) and other agencies.

As the world and our country moves into the digital era, armed forces the world over have harnessed the power of information and computer technology, culminating in network-centric warfare capabilities. Most countries rely on automated computer networks for various daily functions. The security of such networks, in both the public and military domains is critical. We have had many instances where our networks have been attacked and breached in some cases. Defensive and offensive cyber

warfare capability is the need of the hour and the future. It is, therefore, imperative that the armed forces have an integrated cyber warfare organisation under the CDS.

The three Services have their own Special Forces (SFs). Currently, the Army SF units are employed in Counter-Insurgency/Counter-Terrorism (CI/CT) operations, along with a few SF personnel from the other Services. During conventional operations, they are employed for tactical and operational level tasks. We have, unfortunately, not harnessed their capability for executing strategic tasks. In order to ensure that this critical resource is optimally employed, it is imperative that the SFs of all the three Services are reorganised into an independent SF Division, under the CDS.

The cumulative effect of the proposed transformation will be a qualitative jump in our deterrence quotient. This, in turn, will facilitate us to ensure punitive deterrence against Pakistan and credible deterrence against China. It is pertinent to state that the realisation of this transformation entails major capability enhancement in the Navy and Air Force too, issues which are not discussed here.

There is a need to identify the enabling technologies and harness them to facilitate our soldiers to fight better and fight smart. Technology needs to be harnessed to improve situational awareness, Intelligence, Surveillance, Reconnaissance (ISR) capabilities, sighting systems, smart munition, trauma care in the field, individual stealth, camouflage and concealment, and improved personal kits, including protection jackets. At the armed forces level, there are major technologies that need to be harnessed. This must be a whole of nation process involving the academia, the private sector, and the Defence and Research and Development Organisation (DRDO). The government's Technology Perspective and Capability Roadmap provides focus in this regard.[27]

Major Challenges to Transformation

Over the last 72 years, the Army, along with the other Services, has undergone a major transformation. However, we face a number of challenges which impede the process. The absence of a clearly articulated National Security Strategy document has precluded an integrated capability assessment and transformation strategy.[28] The current process is less than optimal due to pulls from the respective Services and the fact that the Indian government does not have direct ownership.[29] This is further aggravated by the absence of a CDS. While the three tiered defence planning and procurement process is well laid out, transformational changes are a one-off requirement which will have to be dealt with separately. Thus, in the case of Service driven transformation, it will be prudent to obtain prior approval of the government in order to successfully implement it.

Budgetary support has been a major constraint. Regrettably, the capital funds available each year are insufficient for meaningful capability development and modernisation. For the year 2018-19, the revenue to capital ratio of the Army budget was 83:17.[30] In the interim budget of 2019-20, the ratio is 82:18, leaving a mere 29,508 crore for capital acquisition.[31] The ever-increasing revenue requirement is a matter of concern. Of the meagre funds available for capital acquisition, there is little left for modernisation once the committed liabilities are paid. Overall, the defence budget at 1.44 per cent of the Gross Domestic Product (GDP) has been one of the lowest.[32] Thus, with the Army pushed to bridge the existing critical gap, if a major transformation has to be undertaken, the government will have to increase the defence budget to ideally 3 per cent of the GDP.

Any transformation or RMA is accompanied with the attendant requirement of appropriate hardware, including niche technology systems. Due to our limited indigenous defence production capability, critical technology systems invariably have to be imported. Even the Foreign Direct Investment (FDI) having been increased to 49 per cent has not provided the

desired impetus for investment in the defence sector. Of the top ten sectors which attracted FDI during the period April 2016 to December 2018, the services sector was at the top, with 17 per cent of the total investment and the power sector was tenth, with 3 per cent.[33] Inefficiency and lack of accountability of various organs of the Defence Ministry responsible for indigenous design and manufacture of weapons, equipment, and ammunition for the Army, has resulted in poor quality products and cost overruns too. Thus, India's domestic capability does not support any major transformation which involves harnessing of new technology and systems. Even the absorption of Transfer of Technology (ToT) has left much to be desired, resulting in poor quality of weapons, equipment, and ammunition, and thereby, in loss of lives and equipment. The 'Make in India' project was aimed at shifting India's reliance from foreign to indigenously produced material. However, the initiative is yet to make a major impact. Though the defence sector is part of the initiative, there have been only isolated cases of success. It is, therefore, imperative that India has a well-developed defence research, innovation and production base, duly incorporating the vibrant private sector.

Often, when major changes are envisaged, there is stiff resistance from within the organisation. Thus, managing change successfully becomes a key leadership challenge. It is important that the end user is convinced of the necessity of change and the manner in which it is going to be implemented. The senior military leadership needs to take proactive steps to prepare the rank and file for the transformation and get them to take ownership of the change. It is important to set a clear vision for the transformation, explain why the programme is necessary and outline a journey over the coming years that resonates within the organisation.

Recommendations

Based on the transformation envisaged, the following recommendations may be implemented for effective realisation. Implementation of the

existing recommendations for a vibrant, responsive and accountable HDO including the appointment of the CDS. The government should formulate and articulate the NSS, and issue a formal document, to be available in the public domain. Should the government continue to be reluctant to issue it in the public domain, it could issue a classified document to the various stakeholders. Based on the NSS, the CDS needs to identify the joint needs and capabilities, in consultation with the Services. This exercise should also include the specific individual Service requirements by identifying the respective transformation goals and strategy for implementation.

Based on the inputs from the CDS, the government needs to formulate and issue the necessary transformation guidelines, along with the requisite budgetary support. For which, the military modernisation and transformation programmes, along with their budgetary support, must find a mention in the annual budget speech, made by the Indian Finance Minister each year. The respective Services should then prepare their vision document and roadmap for transformation. The lead agency for joint capability development, to be notified by the CDS. A central agency with authority to be notified to steer the transformation. The MoD to undertake the necessary internal restructuring to ensure optimal management of transformation and its execution. Joint planning and execution must be the norm rather than an exception.

The concept of Integrated Theatre Commands to be implemented by the Indian government through an Act of Parliament. A right sized force to ensure punitive deterrence against Pakistan and credible deterrence against China. The Army, including the RR to be capable of executing a simultaneous 'two and a half front' war. Development of niche technology indigenously and enhancement of self-reliance in defence production. Enhancement of the capacities and capability of the Andaman & Nicobar Command to act as a formidable firm base for any operations in the Bay of Bengal and further east. Raising of the Special Forces Division under the

CDS by integrating the Special Forces of all the Services. Enhancement of their skill sets to facilitate execution of strategic tasks. And the raising of a Cyber Operations Division and Space Operations Division under the CDS.

Execution of transformation initiatives currently under consideration and initiation of action to bridge the existing capability gap. Development of the amphibious capability of two brigade sized forces, one each for the western and eastern seaboards. Development of capability for executing three simultaneous divisional sized air landed/heliborne/ airborne operations. Enhancement of rotary lift capability to support a brigade sized force, both in the mountains and plains. The capability to be nested at the corp level. Review of the organisation of the IBG currently proposed and enhancement of its flexibility and versatility by suitable augmentation of capabilities. In particular, theatre based combat rotary forces to be apportioned. Once the IBG concept is fully stabilised in the defensive formations, strike formations to adopt the concept, with appropriate modifications and capability enhancements. Adoption of mobile defence with suitably augmented IBGs in the open desert sectors, and release of the regular infantry for employment in the mountains. Enhancement of mobility and protection for all infantry employed in the plains. Platforms to be held and operated by a separate organisation at the corps level. Identification of joint logistic needs and capabilities; removal of duplication of effort. Establishment of integrated logistic nodes to support the three Services in any station. Improving the existing PME and increasing the capacities for PME of junior leaders. Enhancement of language skills across the board. Improvement in the care and welfare of troops and their families, to include housing, education, and medical support. Ensuring a uniform and equitable Human Resource (HR) policy for all ranks. Revision of the existing Joint Doctrine and Service doctrines accordingly.

Conclusion

Transformation is a profound change that is implemented to give the military a competitive edge in view of a country's changing security environment and threat. The US Army, with its vast operational commitment, has undergone major transformations which have lessons for us. In the US system, the process of transformation flows from the NSS which is articulated by the government. It is a whole of government approach with the requisite financial support. The Indian Army too has undergone major transformations, especially in the aftermath of the wars that it had to fight. Our capability development has been hampered by the lack of a government articulated NSS, a limited defence budget, and lack of a sound indigenous defence production base. Our major threat continues to be from Pakistan and China, with hybrid warfare being the norm; thus, the Army has to be prepared to fight a two-front war across the complete spectrum. In order to enhance India's operational efficiency and ensure a decisive victory in future conflicts, certain transformational changes have to be implemented. These include appointing a CDS, establishing integrated Theatre Commands, the government articulating an NSS with guidelines for transformation, ensuring the requisite budgetary support, providing enhanced rotary support for operations in the mountains, enhancing vertical capability in all the theatres on the western front and developing amphibious capability on both seaboards. Developing indigenous technology capability in niche fields and defence production are critical requirements. In order for any transformation to succeed, it is imperative that it is led by our senior military leaders, establishing ownership for the change in the organisation.

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Modernisation and Transformation in the Armed Forces

Anuraag Singh Rawat

Introduction

Armed forces worldwide face an epic challenge in keeping pace with the emerging regional and global threats and the changing battlefield milieu. The global security environment is marked by regional conflicts, asymmetric threats, terrorism and the rise of fundamentalism, as well as rapid progress in technology. The armed forces of any nation are, thus, constantly trying to evolve, to stay abreast in dealing with the myriad challenges being faced by them. The commonly used parlance for demonstrating the will to meet these challenges is to modernise/transform. However, the terms modernisation and transformation, especially when referring to the armed forces, are often misused, misapplied and used interchangeably even though they mean different things and have very different connotations.

Modernisation and its Drivers

The Oxford Dictionary defines modernisation as "to adapt (something) to modern needs or habits, typically by installing modern equipment or adopting modern ideas or methods." It has also been defined as

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"the process of starting to use the most recent methods, ideas, equipment, etc. so that something becomes or seems more modern."[1] The modernisation process, thus, has a start point which identifies the present system/process/equipment as having become old and needing change to stay relevant, and would encompass a solution involving the intentional improvement or enhancement of the current capabilities. Modernisation in the armed forces is the practice of upgrading or adopting new technology systems/platforms to counter the emerging challenges.

Modernisation of the armed forces is a complex process, which includes fundamental changes of the capacities in order to accomplish the stated objectives. Modernisation requirements in the armed forces would amongst others, be driven by changes in the threat perception, technology, need for enhancing own capability, budgetary support, and need for cost and manpower cutting. In a dynamic and ever changing battlefield milieu, the threats are constantly changing, and manifesting themselves in different forms. The capabilities of adversaries would also change over a period, further impacting the threat perception, thus, compounding the operational challenges. To deal with these evolving challenges, the armed forces of a nation would be driven to modernise and, thus, stay current with, if not one step ahead of, these challenges.

The rising comprehensive national power of a country, actual or perceived, would increase its desire/ambition to play a greater role in regional/global matters.[2] Such a state must take into consideration the changing geo-strategic environment and emerging security challenges which entail expanding its sphere of influence to protect and further its strategic interests. Thus, sometimes, the requirement to modernise the armed forces may be driven by the growing ambition/stature of a country.

Technology, by far, would be one of the greatest factors pushing for change, as with time, newer technology becomes available and the technological landscape becomes flatter even for the technologically advanced nations. This, in turn, pushes nations to exploit fully the rewards

of technological development to remain dominant, and fuels the need to change and modernise. Evolving technology, thus, helps in enhancing capabilities and stimulates the requirement to modernise.

Availability of budgetary support is a big driver of any modernisation programme. The lack of it, as is usually the case, leads to priortisation of requirements and, thus, a slowdown in the modernisation process. Modernisation in some facets may also lead to cost cuts in the long run and could prove to be less manpower intensive, thus, generating further traction for the modernisation process.

Transformation and its Pillars

Transformation is defined as "a complete change in the appearance or character of something or someone, especially so that that thing or person is improved" by the Cambridge Dictionary, and the underlying difference from modernisation is that it is a complete change and not an adaption to modern needs. While, on the other hand, "military transformation can be understood in common parlance as a profound change in military affairs",[3] and the armed forces need to transform and be equipped for, and trained to, meet the emerging challenges. Military transformation is not an end in itself, but it is needed for reasons of both opportunity and necessity.[4] A quantum increase in technology and the revolution in military affairs have ensured that the opportunity exists to exploit modern technology and garner an ability to overmatch opponents. The changing face of conflict has created a necessity for the armed forces to transform or perish as conflicts in the future cannot be fought in the manner, or with the tools, of yesteryears. Thus, remaining restricted to traditional forces will no longer be viable and the armed forces must cater for the same.

The development of transformational capabilities, processes, and force structures needs to be built using certain key pillars which would ensure that the complete process of transformation is a success. Having a clear cut transformational strategy would be one of the pillars of

any transformation process since the transformation process needs to have a clear, laid down strategy and needs to be given strategic focus to cater for emerging challenges. The keys to a transformation strategy include providing appropriate vision, defining suitable organisational responsibilities and providing specific objectives and requirements. In addition, there is a need to lay down a timeframe for the implementation of the transformational process.[5]

Transformation of the armed forces has to be an integrated approach at both governmental and forces levels. Thus, it would need to be driven top down and would encompass changes even in the functioning of the ministry looking after the armed forces, for example, in India's case, it would be the Ministry of Defence. At the Services level, integration would be the key for transformation and an integrated application would encompass integration and jointness in the operational, logistics, training as well as human resource development aspects.

Amongst the many factors driving the transformation of the forces, technology is going to be at the forefront, with information technology being harnessed to optimise the transformation process. In the years ahead, artificial intelligence will revolutionise warfare and change the nature and character of warfare. There will be a requirement of innovative application of technologies which would also necessitate changes in the military doctrines and operational concepts and, thus, fundamentally alter the character and conduct of operations.

Transformation of the armed forces would naturally be possible only with adequate budgetary support. Optimising technology may result in cost and resource saving in the long run; however, modernising and obtaining niche technologies would require enhanced budgetary support.

Elements of Transformation

To keep pace with the emerging global threats, the armed forces must ensure they are ready to respond rapidly to prevent conflict, shape the

security environment, and win the war. Transformation is generally a function of operational necessity and opportunities available by way of budgetary support, resources, research and development facilities, and, above all, political will.

To be able to transform, at the foremost, there has to be a transformation in the thought process. While transformation in certain areas like equipment, concepts, training and others is relatively easier to achieve and easily quantifiable, transformation of the mind/thought process is more difficult to accomplish, but equally important. In today's technology driven age, we need to think differently to be able to tackle the various asymmetric and non-traditional security threats. The tackling of multifarious threats would not be by a conventional use of force on force but would require more innovative, out-of-the box solutions which would leverage the prevalent technology.

Conceptual changes would be an integral part of the transformative process. Many of the most fundamental changes require to be organisational and conceptual; primarily driven by information technology. Joint operations needs to transcend new boundaries, with theaterisation being a key aspect. Force structuring need a relook with a requirement to redefine the building blocks of the forces. Integration in the employment of space, special forces and cyber space and effective employment of information systems for information operations must be developed.

Any transformative process would encompass modernisation of equipment. The armed forces need to exploit within reach technology for opportunities and problem solving, and must keep in mind an integrated approach by all components of the three Services, to the futuristic challenges. Transformation of the armed forces would be spread over a period of time and, thus, must cater for technological advancements be it autonomous weapon systems or information technology. Modernisation should generate platforms, weapon systems, and command-and-control

systems that are designed from the outset with the expectation of frequent and sometimes massive changes, leaving room for experimental systems and iteration.

Training/human resource development would be key elements during the transformation process. The armed forces of the future are going to be technology driven, with equipment constantly evolving and developing. This would necessitate a tech savvy force with increased specialisation. The prohibitive cost of ammunition and lack of training areas would increase the reliance on simulators, requiring a complete change in the approach to training. Joint training for integrated application in operations would also be a core necessity.

Last, but not the least, would be the transformation in logistics. There is a requirement to have an integrated approach to execute logistics at the national and armed forces levels. In addition, stand-alone packages implemented by the Army, Navy and Air Force need to be integrated into a single system, which would, in turn, ensure seamless integration across and between processes, especially in the case of the Indian armed forces. The armed forces needs to transform the logistic systems by the infusion of technology, especially in the fields of inventory tracking, inventory management and energising procurement.[6]

Modernisation and Transformation

Modernisation and transformation processes, as discussed above, are driven by different sets of drivers, albeit with some overlap, and impact the armed forces in different ways. A modernisation process could entail upgrading of a weapon system or using technology to improve an existing system or procedure and, depending on the quantum of modernisation being carried out, the impact could be limited or quite large. Transformation in the armed forces, on the other hand, would require a greater number of changes and would, thus, be more holistic in nature. The scale and quantum of change being carried out

during a transformative process vis-à-vis a modernisation effort would necessarily be much larger. Borrowing from the digital lexicon about the differences between digital modernisation and transformation, we see striking similarities as, "Digital transformation requires viewing the business through a holistic lens that factors in all variables. It's what we call the 4Ps, that includes—People, Process, Policy, and Platform. It involves developing a new set of core values that thrive on change."[7] These variables when applied to the armed forces would hold true for any transformative process being carried out.

Cost and, thus, the budgetary support required is a major difference between modernisation and transformation. Transformation in the armed forces, due to its holistic approach and larger scale, naturally, requires a much larger budget. Thus, at times, it may be more effective to carry out modernisation, keeping the amount of money available in mind and work at linking various modernisation projects. However, whether this would lead to a transformational change, is debatable.

Transformation in the armed forces should result in a fundamentally different manner of achieving strategic goals, which would encompass changes in the working organisation, weapon systems/platforms, policies and plans. If this is not achieved post-transformation, then it's simply a modernisation effort and cannot be classified as transformation. A case in point being the efforts being made by Pakistan to modernise its defence forces by upgrading/refurbishing/purchasing equipment, and though they have raised a few units, they have not actually transformed but are attempting to modernise.

Any transformative effort is also likely to have a modernising effect, however, the reverse is not always true. Thus, any transformation can be seen as levels of improvement. Modernisation in segments or if not done holistically, on the other hand, does not lead to transformation and, if not planned properly, may need to be reworked when transformation is being carried out.

The process of transformation of the armed forces is a continuous one, with no fixed end state. It is a process of continuous evolution and the goals and objectives may get modified with time, though not radically changed. Modernisation, on the other hand is a relatively simpler process with clear-cut objectives which can be met in a shorter timeframe.

When we examine the modernisation being carried out by the People's Liberation Army (PLA), the query that demands attention is: is it modernising or transforming? The present modernisation programme of the PLA is to be implemented in three steps as per China's 2006 White Paper on National Defence and the third step is to complete informationisation, including national defence modernisation, by 2050. The modernisation is focussed on doctrinal changes, structural reforms, induction of state-of-the-art equipment/technology as well as reduction of forces.[8] The Chinese may be calling it military modernisation, thus, underplaying the scope and impact of change, however, what in effect they are carrying out is nothing short of transformation of their armed forces.

Modernisation or Transformation: Approach for the Armed Forces

The question which vexes military planners and governments alike is: which approach to take? Should the armed forces go for modernisation with its advantage of being less cost prohibitive and easier to implement or should a transformational approach be undertaken, with the inherent dangers of being halted mid-way due to lack of funds, a change in focus or even a change in the geo-political balance, resulting in a revised threat appreciation? However, a transformational approach would ensure that the armed forces are correctly poised to take on the challenges of the future in line with the country's growing regional/global role. There are, after all, no clear-cut solutions, and based on a set of factors, may differ for different nations. However, some basics parameters which would hold good are discussed below.

While choosing an approach for the armed forces, one of the underpinning rules has to be: 'don't fix something which is not broken', thus, correctly identifying the requirement or necessity becomes very important. Will modernising a weapon platform or some systems be enough or would it require a completely new structure and way of doing things? In a transformational approach, the changes would be dramatic rather than mere improvement and, thus, their requirement has to be correctly assessed.

Correct threat analysis is crucial for selecting the right approach. One needs to have a multifaceted vision of the future threats and type of warfare, a view that does not bet unduly on a particular type of war and, thus, is able to better analyse the future challenges. This would help in correctly choosing between a transformational or modernisation approach. While visualising the threats, the country's growing aspirations also need to be factored in as well as the role of the armed forces in them. After all, the armed forces are the hard power component in a nation's Comprehensive National Power (CNP) and a strategic resource and their future role in meeting the aspirational goals of the country would also help in deciding about the approach to be taken.

Financial outlay is an important constraining component in deciding whether to modernise or transform the armed forces. Ideally speaking, it should not be a dictating factor, however, it often becomes an overarching one. Phased modernisation, leading ultimately to a transformation of the armed forces is one manner of working around the budgetary constraints and ensuring that the objective of transformation is achieved.

Modernisation in the armed forces may not necessarily require an integrated approach, however, for any transformation of the armed forces, an all embracing principle would be the inter-Service integration and an equal level of integration with the government/ministry responsible for

the armed forces. Attempting to carry out transformation without the same would be a recipe for disaster and, thus, would be one of the factors to be considered before deciding on whether to carry out modernisation or transformation.

Military transformations are time consuming, not always successful; and sometimes can even be counter-productive. Thus, before embarking on the path of transformation for the armed forces, one should be very clear about the impact that the transformation may have and what our end state objective is. If ambiguity prevails about the same, then it may be better to follow the modernisation approach rather than the transformational one.

Conclusion

Future security challenges are becoming more and more complex, multi-dimensional and non-traditional in both kinetic and non-kinetic forms. The armed forces of countries need to prepare to meet the rapidly changing, diverse and unpredictable threats which demand innovation and adaptability in military forces at all levels. Military modernisation and transformation are two paths that can be adopted to meet the futuristic challenges. Military transformation is a process with no simple end point and could be considered an evolving process.

While transformation does not mean across the board changes or changing things which are working well and do not need to be changed, the changes should be striking rather than mere improvements. However, since technology and concepts will keep evolving, course correction is a basic ingredient of a successful transformation. Military modernisation, on the other hand, achieves its objective with minimal course correction, in a faster timeframe and at less cost. Thus, both paths offer their own opportunities and challenges and need to be carefully chosen by a nation based on its correctly identified requirements as well as capabilities.

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‘Jointness’ in the Armed Forces: An Assessment

P K Chakravorty

Introduction

Jointness is a military term, as explained by the Collins Dictionary, which refers to “the cooperation and integration of different branches of the military”.[1] India has the fourth largest military in the world and each operates independently. The cooperation among the three Services is according to the priorities as visualised by each Service, with coordination by the Ministry of Defence (MoD). In April 2017, the three Service Chiefs released the latest Joint Doctrine for the Indian armed forces.[2] It is important to note that the first doctrine was written in 2006 and was a classified version which was not released to the public. The current document has very little depth and would not be able to integrate the various branches of the Indian armed forces. There would be no joint response to a military situation. Currently, there are more than 32 countries with joint Services set-ups.[3]

Issues regarding jointness have been discussed in India right from the time of independence. As is reported, the last Viceroy, Lord Mountbatten was keen to appoint a Chief of Defence Staff and repeatedly argued for a Joint Staff. At that point of time, there was resistance from the political leaders and the bureaucratic class who were fearful of an empowered military. Later, as the three Services became stronger, the senior officers

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found greater privileges in being autonomous rather than getting joint. It is pertinent to note that it was after the defence reforms were instituted in 2001 post the Kargil War and the Headquarters Integrated Defence Staff (HQ IDS) was introduced, that the absence of the post of the Chief of Defence Staff (CDS) was prominently felt. Gradually, the Army and Navy have agreed to the concept of joint Theatre Commands. But the Indian Air Force (IAF) feels that it has a lot to lose and is still resisting the Theatre Command concept. It states that Theatre Commands would hamper its flexibility.

It is in this context that the Joint Services Doctrine does not offer anything which alters the status quo. Jointness is a holistic concept whereas the document speaks of joint operations which comprise a component of the concept. The doctrine makes no reference to the Andaman and Nicobar Command, the only Joint Command apart from the Strategic Forces Command, which has a unique role. It is obvious that there is a need for the entire document to be enlarged to include the required details of jointness in the present Indian context.[4] Accordingly, there is a need for the three Services and the government to understand the need of jointness. In view of this, the paper seeks to look into the historical aspects of this factor of 'jointness' and, thereby, provide a solution.

Historical Aspects

Military operations have currently been impacted by two issues. The first is nuclear weapons and the second is pressure from the international environment. These issues narrow the time window available for undertaking conventional operations. Accordingly, the time available for attaining strategic goals is extremely limited. Further, precision weapons being fired from aircraft, and missiles and artillery guns have enabled depth engagement of targets. The recent engagement of the Jaish camp at Balakot by the Indian Air Force on February 26, 2019, bears testimony to the fact. In conjunction with this aspect is the networking of forces.

This leads to a quick sensor-to-shooter link. The sensor or the shooter could belong to the most appropriate Service. In such eventualities, there is a need for synergised action among the Services. The current system of the three Services trying to find a solution to the problem of which should be the sensor or the shooter is unsuited and not effective in the current environment. Often, it is stated that this would be needed by powers having a global outreach and not by the Indian armed forces. This is certainly incorrect as the armed forces, with their headquarters located in New Delhi, would have to respond to situations in the Bay of Bengal or operations being undertaken by the Special Forces in Arunachal Pradesh or in Pakistan Occupied Kashmir (POK). As brought out earlier, 32 countries have integrated their forces due to the current operational needs.

It would be pertinent to understand what happened after independence. Major General Lionel Ismay, who was the Chief of Staff to the Viceroy, proposed a Chiefs of Staff Committee (COSC) comprising the three Service Chiefs. The position of Chairman was to be held by the Service Chief who had served the longest in the chair. Thus, it was a position by rotation. This was similar to what existed in Great Britain after World War II. However, two great Commanders, General Douglas MacArthur and General Eisenhower, who conducted very large scale tri-Service operations, found that the Higher Defence Organisation (HDO) had many flaws and this resulted in the subsequent integration of the Services in the United States (US). The US has a Chairman Joint Chief of Staff who is the principal military adviser. All operational responsibility was vested in the integrated Theatre Commands which had components from the three Services subordinated to them. The Chiefs of Staff were a part of the Joint Chief of Staff but had no direct operational involvement in their commands.

Likewise, the United Kingdom changed to a joint system in 1963. It was known as the Joint Forces Headquarters (JF HQ). The Chief of Defence Staff (CDS) heads the organisation. He exercises command

over all operations in which the Services are involved. Since then, Russia, Australia, France and Germany have switched over to the integrated system with a principal military adviser.[5] Xi Jinping, the Chinese President, has announced a set of military reforms which are currently being implemented. This has the entire People's Liberation Army (PLA) placed under the Central Military Commission (CMC) and there are five Joint Theatre Commands which have all the three Services under the Joint Theatre Commander, along with two others Services, the PLA Rocket Force (PLARF) and the PLA Strategic Support Force (PLASSF). Thereby, it is imperative that the Indian armed forces synergise for optimisation of national resources.

Journey of Jointness

In the case of India, the journey of 'jointness' commenced soon after independence. The two institutions that started on a joint note were the National Defence Academy (NDA) at Kharakvasla (originally started as the Joint Services Wing at Clementown, Dehradun) and the Defence Services Staff College (DSSC) at Wellington, Tamil Nadu. The NDA was to train officer cadets of the three Services and develop a sense of camaraderie and friendship. The institution has, over a period of time, garnered immense spirit amongst its alumni. The DSSC is another institution where officers with about 12 years' service attend a year-long course. This has separate courses for the Army, Navy and Air Force. However, jointness only comes for a few discussions and tri-Service exercises. There is a need to streamline the syllabus to have more than 50 per cent on a joint mode to enhance the integration between the officers. In 1960, the National Defence College was established, for enabling officers of the three Services, along with a few representatives from the civil services. Here they are pitched with issues at the national level. The course has strategic games which lucidly deal with all aspects of India's problems. The College of Defence Management (CDM) at

Secundrabad was opened later and officers who have commanded units are put through a pragmatic Management Course. Recently, the Higher Command Course of the three Services began a Joint Capsule which is run at the Army War College, Mhow. All this assists the officers from the three Services in understanding the nuances of their functioning and brings about inter-Service camaraderie.

Moving on to the battlefield, India's first experience of jointness was during the first war with Pakistan in 1947-48. The war essentially involved the Army but the Air Force was used for transporting troops and equipment. Later, in 1961, Goa was liberated in a two-day operation by the three Services. This was a simple task, with no resistance. This was followed by the Sino-Indian War of 1962. The war was a wake-up call to the nation and its armed forces. The Indian Army was outwitted in the state of Arunachal and Ladakh. The Air Force, despite being a credible force, was not used and this made it easy for the Chinese forces to operate with less resistance. The three Services were put to test again in the 1965 War and this time, as the Chief of the Air Staff stated on many occasions, that there was no plan which was conceived before the operations. As a matter of fact, the Air Force was directed to provide air support once the Pakistani offensive was on in the Akhnoor sector. It is pertinent to note that operations had commenced prior to this in the area of Kashmir and the Hajipir Pass was captured by the Indian Army. Similarly, the Indian Navy was on its own and its contribution did not form a part of the overall plan.

The 1971 War was a major operation in which all the Services were employed. The Chief of the Army Staff wanted time to prepare and also ensure that operations were launched after the monsoons, and when winter had set in to ensure that the mountain passes were blocked with snow. There was a seven-month preparatory time but there was no integrated plan. However, during the war, each Service was on its own and there was little coordination. This has been substantiated by the Chief of the Air Staff

and Chief of the Naval Staff.[6] In his book *My Years with the IAF*, Air Chief Marshal P C Lal clearly talks about the differences with the Army Chief on critical issues. Admiral S M Nanda also states many issues of the 1971 War, including Prime Minister Indira Gandhi asking him whether the US would go to war against India. This occurred when the USS *Enterprise* reached the Malacca Strait. Admiral Nanda replied that he would order the captains of the Indian ships, that if they came across American vessels, "they should exchange identities and invite them for a drink".[7] It is interesting to note that both the Indian Navy and Indian Air Force planned separate attacks on Karachi port but there was little coordination among the three Services, with each fighting its own war.

The year 1987 witnessed the three Services undertaking operations in Sri Lanka. The operation christened "Op Pawan" brought out explicitly the need for jointness. The contingent sent by India was a peace-keeping force and was termed as the Indian Peace-Keeping Force (IPKF). On this occasion, the Chiefs of Staff Committee (COSC) appointed the General Officer Commanding-in-Chief (GOC-in-C) Southern Command as the Overall Force Commander (OFC). He had component Commanders from the three Services. Further, task forces from the Eastern Naval Command and Southern Air Command were subordinated to him. Initially, things seemed to be getting along fine till the Naval and Air Force Commands refused to allocate their forces to the component Commanders. They treated them like liaison officers and all allotment of effort was done by the respective Command Headquarters. The OFC lacked authority and was at best responsible for the Army component, with the other two Services cooperating but not coming under command. Thus, there was lack of command and control. This aspect added to other inconsistencies which made Op Pawan an operation which did not achieve its objectives.

The next conflict was "Op Vijay" which India fought against Pakistan at Kargil in 1999. The operations were fought to recapture areas which

Pakistan had occupied during the winter months. Essentially, it was an Army operation which needed air support. The Navy decided to concentrate the bulk of its ships on the western seaboard on the Arabian Sea. This did signal a naval challenge to Pakistan but the same was not postured politically. There were disagreements between the Army and the Air Force. The Army requested for air strikes which the Air Force stated needed political approval. Overall, the operations ended successfully with the capture of Tiger Hill and other important heights.[8]

The government in 1999 wanted to look seriously at this issue. Its constituted the Kargil Review Committee to look at the weaknesses which had an impact on national security. The committee came out with a comprehensive report which explained the infirmities in our system and also highlighted the weaknesses of our higher defence organisations. In response, the government established a Group of Ministers (GOM) to examine the weaknesses. The GOM constituted four task forces comprising eminent experts to analyse the issues and suggest suitable remedies. These task forces did their task with precision and submitted their reports in four months. The GOM submitted its report in one year. Wherein, Chapter VI of the Report on Management of Defence is extremely important. It clearly states that the functioning of the COSC has revealed serious weakness in its ability to provide single-point military advice to the government and resolve substantive inter-Service doctrinal, planning, policy and operational issues adequately. It strongly recommends the appointment of the Chief of Defence Staff which has not been implemented to date.[9] There have been the Naresh Chandra Committee and Shekatkar Committee that recommended joint Theatre Commands as also to start with a four-star General permanent COSC. The former Defence Minister often said it was on the way but it never happened. Of late, the Air Force has expressed its opposition to Joint Theatre Commands as it impacts the flexibility of the organisation.

Way Ahead

The Indian armed forces have reached a *cul-de-sac* with regard to the appointment of a CDS. While the Army and Navy are in agreement, the Air Force is not prepared to accept the concept of Theatre Commands as also the appointment of the CDS. Wherever the concept has been accepted, it has been due to a political decision by the civil authority in power. In the US, the Goldwater-Nichols Department of Defence Act of 1986, which was a landmark Bill, altered the organisation and operation of the US Department of Defence and the three Services. The Bill was signed into law by the then US President Ronald Reagan in 1986. It was as a result of almost five years of effort and analysis by Congress and the Pentagon. It has resulted in improvement of jointness amongst the four Services.[10] Similarly, a political solution to this aspect needs to be worked out by the political authority in India. This should happen very soon as the pot has been boiling for over 18 years.

Without jointness, the Indian armed forces are fighting the last war. The implementation of such a move normally takes three to five years as the current 19 Commands have to be reduced to about seven. The execution would involve coordination which can easily be achieved. The main issue is political consensus which is gradually building up.

However, in the present battlefield milieu, there is a need for jointness to attain success. The Services would have their differences which the political authority must overcome by consensus. Any operation is a dependent task and normally involves more than one Service. To survive in the current environment, 'jointness' is imperative and must be executed with speed and military precision.

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India and its Air Power: Transformational Challenges

Anil Chopra

Introduction

The Balakot air strikes and the air combat thereafter in which a MiG-21 Bison of the Indian Air Force (IAF) had to engage a much more modern F-16 of the Pakistan Air Force (PAF) has once again brought IAF modernisation back into focus. IAF Chief, Air Chief Marshal BS Dhanoa, has said that the IAF has hit an all-time low of 31 fighter squadrons vis-à-vis the government authorised 42.[1] He highlighted the convergence of strategic interests between China and Pakistan and their rapidly modernising Air Forces. The IAF, on the other hand has been slowly losing the combat edge that it had enjoyed over Pakistan in 1971 in terms of both quality and numbers. Technology intensive air power requires faster replacement of assets due to quicker obsolescence.

Geo-politically, India is the most threatened and war risk-prone region of the world. India has serious boundary disputes with its two militarily powerful nuclear armed neighbours. China's desire to dominate Asia and, in turn, the world has implications for India. Pakistan continues to be the epicentre of world terror. Pakistan has a clearly enunciated a 'first-use' nuclear policy against India. China has also helped Pakistan build up military strength to be able to counter India,

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including acquiring technologies for its nuclear weapons and missile programme. China has strategic interests in using Pakistani territory to reach West Asia and Africa for trade and geo-strategic positioning. It has invested in the China-Pakistan Economic Corridor (CPEC) that connects the Xinjiang region in west China to the China-built-and-operated Gwadar port near the Gulf of Hormuz. Simultaneously, China is investing in the Indian Ocean littoral countries to gain a foothold and extend its influence. Pakistan has not only stepped up the insurgency in Jammu and Kashmir (J&K), it openly boasts of collusive support from China in case of a war with India. India has to, thus, prepare for a possible two-front war.[2]

Too often, the region has been going through trigger incidents which could lead to a war, whether it was Doklam with China in 2017 or the more recent Pulwama terror attack by terrorist groups based in Pakistan, and to avenge which, India launched punitive air strikes. It is clear that the IAF must win the air war for the Army and Navy to win the surface war. Aerospace is, thus, the domain of the future and the one who controls it, will control the planet. Air power today is the dominant means of prosecuting war. It offers prompt multiple response options to the political leadership in times of national security crises. Rapidly evolving technologies are bringing transformational changes that are multiplying speed, range, accuracy, and lethality for achieving military effects. India has to ride this bandwagon to find a place for itself on the high table of the world order. The IAF had recently tested its operational plans in a two-front scenario, in the mother-of-all-exercises, 'Gagan Shakti'.[3] While the IAF has a plan 'B' to fight with what it has, if forced into conflict, the numbers are clearly not adequate to fully execute an air campaign in a two-front scenario. It is incumbent upon the nation to provide the IAF assets for the task it has been entrusted. It is imperative that the IAF quickly rebuilds its squadron strength.

Military Capability

The military power of a nation is an important constituent of its national power. Great powers need to achieve the ability to create, deploy and physically use military force.[4] India was once a Pakistan-centric regional power and now aspires for global influence and status. There is a need to constantly examine the type of war-fighting capabilities for employment of military force against the adversary to overwhelm his ability. The Indian armed forces are an important element of national power. In consonance with our national aspirations they need to transform through transactional means and prepare for future challenges.

Transformation includes a review of doctrines, strategy and tactics, organisational structures, human resource adaption and training, and maintenance and logistics concepts to meet the operational requirements. The resounding success of air power in many campaigns, from the Falklands to the Gulf War, showcased its ability to simultaneously interfere in, as well as influence, land/sea operations. This has presented ramifications for all the Indian armed Services, and, more so, the main repository of air power, the IAF.

Air Power Attributes

Air power, offers strategic flexibility in terms of ability to quickly reconfigure for different kinds of missions.[5] The overarching air operations give capability to project power at far distances without risking own motherland. Air power offers the political leadership strategic choices and alternatives for sustainable and easily scalable levels. Air campaigns can be executed against different target systems simultaneously. Air power has the inherent capability to provide both kinetic and non-kinetic options with pin-point accuracy. Air power can directly influence the outcomes and actions of the surface forces. It has the ability to simultaneously produce physical as well as psychological shock.

IAF's Doctrinal Shift

The IAF evolved initially primarily to support the surface and maritime wars, but post 1965, the IAF had clear stand-alone roles covering the entire spectrum of air operations, beyond just protecting Indian territories and safeguarding sea lines of communication. Its doctrine and acquisitions indicate strategic reach and conventional deterrence as major goals.[6] The IAF is still the world's fourth-largest air branch, albeit it has a depleting fighter squadron strength which stands at an all-time low of 30 vis-à-vis the authorised 42 squadrons. Despite reasonable war experience, since the Burma campaign and in the more recent 1965 and 1971 Indo-Pak Wars, the IAF initially did not have a well enunciated doctrine and only recently put in place a balanced force structure. The political masters have often shown reluctance to use air power due to the perceived fear of escalation of the conflict. The 1962 Indo-China War and 1999 Kargil conflict with Pakistan were cases in point. The ground reality in 1962 was that the IAF had relatively potent air power, with Western aircraft, vis-à-vis the old Russian aircraft with China. Air power actually helped turn the tide in the wars of 1965, 1971 and even Kargil.

The doctrine has now changed to take on a more offensive role against both adversaries. Introduction of combat enablers like the Airborne Warning and Control System (AWACS), flight refuellers, strategic transport aircraft has made a difference. In the recent so-called mother-of-all-exercises 'Gagan Shakti', the IAF tested out a possible two-front war and included inter-theatre movements of assets among practically all other domains of modern air power. Regional power projection and ability to take on China comprise the clear new doctrinal focus areas. The IAF's 2012 doctrine clearly brings out the intent to dominate the conflict and a greater role of air power in the full spectrum of national security and diplomacy. The IAF sees deterrence and control of the air as linked. Its control of the air may not be absolute, but it hopes to possess sufficient control in order to prosecute the campaign. A game-changer shift took place on February

26, 2019, when India decided to use offensive air power by carrying out deep strikes against targets in Pakistan, even beyond Pakistan occupied Kashmir (PoK). The Pakistani bogie of nuclear retaliation and over-hang even against a conventional strike was demolished.

Pakistan-Centric to China-Focussed Infrastructure

Till very recently, all major air bases and radars were positioned on the Pakistan border. The bulk of the IAF assets were looking west. The same was the case with the Indian Army and Navy. Airfields are high-value targets. Aircraft on the ground are highly vulnerable and require ballast protection. Most eastern air bases were bare runways, with no ballast protection shelters, and, at best, a few Operational Readiness Platforms (ORPs). They were mostly used for fighter training and air maintenance operations. Emerging economic strength, self-confidence and doctrinal maturity allowed the IAF to look beyond the borders and reach out into the seas beyond the Indian island territories.

China's focussed concentration on building air power also made India have a rethink on its air strategy. Even the political class and strategic think-tank circles realised the importance of the air as a decisive instrument of power projection. The lessons from Kargil also helped the IAF understand the real dimensions of fighting an air war at the Himalayan heights. The IAF's aerial reconnaissance assets helped it pin-point targets which the Army could not have detected. Despite the localised conflict, the IAF maintained combat air patrols across the entire border. Air operations were round the clock. Laser weapons employed by the IAF could take out small bunkers, and successful strikes on the Pakistani main administrative and logistics hub at Muntho Dhalo dealt a major blow, and changed the way the IAF will fight a possible war across the Himalayas. It was clear that the application of air power has to be precise and proportionate.

It was the first conventional conflict anywhere in the world between two nuclear powers, yet they prevented a nuclear escalation. It also gives

a reason for India to call the Pakistani nuclear bluff in the case of a limited conflict. The IAF's all new platform and weapon acquisitions require operating clearance of 6 km and higher. Successful employment of air power, clearly spelt out in the Kargil Review report, also helped, the IAF get a larger proportion of the capital acquisitions budget. The IAF has now deployed the frontline fighter aircraft, SU-30 MKI and the C-130 special operations aircraft, in the eastern sector while one Rafale squadron is also slated to be deployed in the east.

Strategic Effect and Conventional Deterrence

Air power is inherently strategic in nature. Paucity of defence funding has forced India to evolve the doctrine that air power must deliver strategic effects through basic conventional means. Only air power can achieve this. While control of the air remains a desirable state, the IAF has limits to which it can achieve against both the PAF and People's Liberation Army Air Force (PLAAF). India has also to defend itself against a possible sizeable Chinese Surface-to-Surface Missile (SSM) attack. U.S. think-tanks are closely evaluating the IAF doctrine because India is seen as a possible counter-balance against China. Sino-Indian military competition and distrust remain. China continues to create military posts around India. Chinese rapid reaction forces are also deployed close to the border. India cannot match China's numerical strength, but the IAF would provide a sufficiently strong "deterrent force".

The IAF now has credible "strategic reach", and, in turn, deterrence. The IAF is looking at reach from the Persian Gulf to the Strait of Malacca, using long range aircraft supported by the Flight Refuelling Aircraft (FRA) and AWACS. It is not only the range and weaponry, but the effect achieved that makes a mission strategic. Targeting of the leadership using air power, as was the case of the US' strike on Osama bin Laden, and later by the IAF during the Balakot strikes could actually deliver strategic effects. Strategic airlift is another

area of strategic reach and strategic effect. Inter-theatre movement of a large force to support a counter-offensive or reinforce defences can have strategic effect.

IAF: Struggling with Modernisation and Maintenance

The IAF has been struggling to phase-out many legacy platforms such as the MiG-21 and MiG-27. The IAF's modernisation programme to achieve 42 squadrons of modern 4th generation plus fighters continues to be elusive. At the current pace, that figure may not be achieved even in 2035. Critical to achieve the target are the acceleration of development and stepping up production of the indigenous Light Combat Aircraft (LCA) Tejas variants; the need to acquire critical technologies for the development of the indigenous 5th generation fighter, the Advanced Medium Combat Aircraft (AMCA); and hastening the process for acquiring 110 new fighters. In the case of expected delays in the AMCA, to choose between the SU-57 and the F-35 and acquire 3-4 squadrons as a stop-gap arrangement. In the meanwhile, procure the last remaining MiG-29s, Jaguars and Mirage-2000 to build up spares inventories through the reduce-to-build approach. The IAF cannot keep adding the SU-30 MKI beyond a point, lest it once again becomes fully dependent on the Russian basket. The IAF also needs to accelerate procurement of additional AWACS and FRA. AWACS and FRA will enhance the radius of action and weapon load carriage of air defence and offensive missions.

Like many other Air Forces, the IAF must try reduce the multiple source fleets. The Russian SU 30-MKI, MiG-21, MiG-27 and MiG-29; French Rafale and Mirage 2000; British Jaguar; and indigenous LCA make many sources for the fighters. The USA and Sweden are also in the new fighter aircraft race. So many types of fighters also cause a training, logistics and maintenance nightmare. Maintaining the varied inventories of aircraft and weapon systems is a challenge. The life-cycle cost, long-term agreements for spares, digital orders for provisioning planning with

the Original Equipment Manufacturer (OEM) database are important issues. The USA is also putting pressure on India over its procurements from Russia. Despite being a balanced force, IAF modernisation continues to dither due to long delayed acquisitions and also low capital budgets. After the Kargil War, one area that required attention was the Command, Control, Communications, Computers, Intelligence, Information, Surveillance, and Reconnaissance (C4I2SR) system. Air power is normally a great source of intelligence for target selection and target prioritisation. High-definition imagery from satellites and unmanned aerial vehicles is a must. Better human intelligence in respect of Pakistan is important.

Capability-Based IAF

IAF transformation is being driven from being platform-based to becoming capability-based. Effects-based, network-centric operations are the new normal. The advantage of air power is its ability to exploit swing-role capabilities. Modern platforms are critical. As Air Chief NAK Browne said, "Our aim is to preserve and maintain, upgrade and improve, and replace and acquire. At the end of this process, the IAF force structure will be modern and potent, with new and upgraded fleets only".[7] This action plan is underway, albeit a little slowly because of the fund crunch. Induction of high technology assets is on and existing fleets are going through mid-life upgrades. Any modern Air Force must have at least 40 per cent of the combat fleet comprising high-tech all-weather multi-role platforms and the remaining 20 per cent under changeover but still giving strength through numbers. The heavy lift capability for both transport and helicopter fleets is crucial for inter/intra-theatre movements in war and sustaining troops and relief operations during peace-time.

IAF—a Key Element: Need for Genuine Jointmanship

Due to the multi-dimensional nature of conflict, increasing the levels of synergy amongst the armed forces and civil agencies is operationally critical.[8]

The IAF is going to be a key element in support of the surface, maritime and sub-surface wars. It has air assets to support such efforts. Lessons from peace-time joint exercises and also from past wars reveal that much more needs to be done on the jointmanship front. The Services continue to train and fight in compartments. Some level of Service upmanship exists. Elements such as Tactical Air Centres (TAC) and Maritime Element of Air Force (MEAF) are in place, however, often the Air Force is brought into the discussions when all the planning is already over. There is a need for the Services to have genuine respect for each other's capability and use it to achieve national objectives. The three Services need to train for joint work more regularly. During the Kargil conflict, the attacks on the Pakistani air logistics hub at Muntho Dhalo finished the Pakistanis' ability to sustain their campaign. The IAF and Indian Navy need more coordination for maritime strikes in view of larger and more aircraft carriers. The three new Tri-Service Commands for Special Ops, Cyber and Space would increase coordination and operational capability.

India's Proactive Policy Shift

India has chosen the proactive approach towards national security. Its diplomatic engagement with the USA, the Arab world and East Asian nations is already paying dividends. India has been able to find a foothold in the Organisation of Islamic Countries (OIC) and was invited as a guest of honour. India has successfully exposed Pakistan as the fountainhead of terror. The Uri strike was the first of its kind punitive military action in response to a terror incident. The Balakot air strike, nearly 60 km deep and well beyond PoK was the next level of the proactive policy shift. This indicates the self-confidence of the nation. The IAF has to be ready for combat and support the entire gamut of operations, from sub-conventional, conventional to out of area to nuclear operations. For such a proactive stance to be maintained, the cutting edge of the Indian armed forces would have to be kept sharp, with modernisation keeping pace.

Hybrid Threats: Air Power as Guarantor

Hybrid threats[9] take advantage of modern technologies for espionage, sabotage, data collection, attacks on people or infrastructure, or the achievement of media effects. Hybrid warfare exploits the vulnerabilities of the system. The air domain is being increasingly exploited to perpetrate illicit and terrorist attacks. Commercial-Off-The-Shelf (COTS) technologies have greatly improved the non-state actors' aerial warfare capabilities. For long, it was thought that air power could only support the land forces to counter hybrid threats. However, it is now clear that air power can act independently against hybrid threats. Air policing, air defence, and intervention against civilian aircraft or against a hybrid threat are evolving.

The Area Defence Commander is authorised to act against all terrorist, illegal, hazardous and dangerous acts in the air domain. National resilience and the nation's will to prevent and deny threats represent a strong deterrent in hybrid warfare. A new paradigm that transforms the traditional concept of Air Defence (AD) with the appropriate level of flexibility to manage the new aerial hybrid threats is required. Satellite and aerial surveillance, air traffic management, cyber space monitoring, low Radar Cross-Section (RCS) detection, multi-sensor fusion and tracking, and, finally, kinetic and less than kinetic engagement, using laser beams or directed energy weapons are some of the means.

IAF Backs Indigenisation

The IAF's transformation can never ignore the need to become independent from foreign defence supplies. For India to be a significant player, the local defence industry has to succeed. The vice-like hold of Defence Public Sector Undertakings (PSUs), especially Hindustan Aeronautics Ltd (HAL) has not helped indigenisation to succeed. Since 2001, India has been continuously refining its Defence Procurement Procedure (DPP) to support indigenisation and create a level playing

field for the private industry, but things have not changed much. The private industry still needs hand-holding. India continues to have the unfortunate distinction of being the world's biggest arms importer. India has not been able to leverage this, or its economic muscle, to get critical technologies transferred despite the offsets clauses in most contracts. The joint venture approach and public private partnerships have worked. The BrahMos is a good example. This needs to be explored further. India must take the leap beyond just licensed production. The IAF has been openly supporting all indigenous programmes by accommodating delays and allowing concessions. But India must remember that any fighting force requires equipment that should be as good as the adversary's or better.

Human Resource Development

The air action of February 27 in which Wing Commander Abhinandan Varthaman shot down a much superior F-16 indicates the level of operational flying training and aggressive intent required in an air warrior. Modern combat aircraft are at the front end of technology. Just mastering such technology is not sufficient, one should be able to use it optimally during split second combat conditions. The IAF crew must remain ahead of the technology employment curve. The IAF is already extensively using aircraft simulators. Joint training for integrated application in operations would also be a core area.

Transformational Leadership

A critical attribute for a force to succeed is the development and preparation of leaders at various levels. For military aviation, it could be at the section level, a combat formation leader, a Flight or Squadron Commander, an air base Commander or a Commander-in-Chief. A leader must have charisma, should be able to set an example and become a role model, and intellectually stimulate subordinates. He should project a sense of

urgency,[10] formulate a strong coalition, create and communicate the vision, and yet invite and support others' ideas. In the air, each formation member has a complementary role, and depending on the air situation, the control could physically shift among members, even though the overall command remains with the leader. Leaders can win or lose wars. Leaders must move with the changing times and adapt to technological changes. The IAF needs to nurture young leaders.

Budgetary Inadequacy: Unfortunate Reality

The 2019-20 defence budget at Rs 3,01,866 crore ($42.7 billion) is 1.44 per cent of the Gross Domestic Product (GDP). The capital budget for the entire Ministry of Defence (MoD) is Rs 1,03,380 crore. The budget for capital acquisition is Rs 81,422 crore. As per an Institute for Defence Studies and Analyses (IDSA) report by Laxman K Behera,[11] in 2018-19, as against Rs 1,10,044 crore required for committed liabilities, the total allocation for modernisation—which includes past liabilities—was Rs 74,116, leaving a gap of Rs 35,928 crore or 33 per cent. Against this shortage, the increase of a mere Rs 7,198 crore would only compound the problem for the MoD which would be in an extremely difficult situation to prioritise its payments for both the previously signed contracts and the contracts to be signed till the end of 2019-20.

The IAF's total budget share is Rs 68,949 crore—23 per cent of the total. The IAF's capital outlay is Rs 39,347 crore which is 57 per cent of its total allocation. In this count, the IAF has the highest percentage, more so when one compares with the manpower intensive Indian Army's 18 percent. Unfortunately, the bulk of the IAF's capital allocation will be used for committed liabilities of earlier purchases such as the Apache and Chinook helicopters, Rafale, LCA and S-400. The IAF is a technology intensive Service. Airborne systems reach obsolescence earlier. Also airborne systems have flight safety issues and cannot be stretched beyond a point. The IAF will need out of budget funds for new acquisitions.

The Way Ahead

The uncertainties that will accompany the drawdown of US forces from Afghanistan and its influence on the regional security dynamics is likely to have a negative impact on the regional security environment. India has to prepare for the geo-political shift to the Indo-Pacific region and the rise of China as a significant aerospace power. Future conflicts will be short, swift and intense engagements against a nuclear backdrop which may be followed by long stabilisation periods. A quantum jump in precision and lethality of weapon systems may result in non-linearity and increased tempo of operations. Often, as in the case of the Balakot strikes, operations could be in the ambiguous zone of 'neither peace nor at war'. Wars will increasingly be multi-domain, varying from non-contact to contact warfare. The IAF will have to build deterrence and have the ability to dominate the air. It will have to induct modern systems for situational awareness, intelligence and precision strike ability. It will require fixed and rotary wing tactical and strategic air transport assets.

The transformation would be spread over a period of time. The IAF is looking at a horizon of 15 years. Technological advancements and evolving changes would have to be factored in. Artificial Intelligence (AI) has great applications for air power. India must take an early lead. Future security challenges will be more and more complex, multi-dimensional and non-traditional in both kinetic and non-kinetic forms. The IAF would need to think differently to be able to tackle the various asymmetric and non-traditional security threats and would require more innovative, out-of-box solutions the which would leverage the prevalent technology. Seamless integration of the armed forces and the Ministry of Defence is critical for both capability building and focussed operations as, per the national political directives. It will help better visionary planning, and commitment of national resources. For India to be secure, the IAF must continue to touch the sky with glory.

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Public-Private Partnerships (PPPs) and the Road to Self-Reliance in Defence: A Perspective

Sushil Chander

Introduction

The Industrial Policy Resolution of 1956, under Schedule A, reserved 17 industries including arms and ammunition for the public sector.[1] Accordingly, the defence sector remained solely the domain of defence Public Sector Undertakings (PSUs), Ordnance Factory Board (OFB) and Defence Research and Development Organisation (DRDO) till 2001. However, the country had to resort to the import of ammunition for the Bofors artillery guns during the Kargil War from South Africa, amongst others, even though the country already had a large industrial base consisting of nine defence PSUs, 39 Ordnance Factories (OFs) and 52 laboratories of DRDO. The armed forces stared at the perils of dependence on imports during the war. On a positive note, post the Kargil War, the government decided to open the doors to the defence sector to the private industry. Thus, in May 2001, the government permitted 100 per cent participation by the Indian private sector, subject to licensing, with the aim to galvanise the country's defence industrial base for achieving self-reliance and indigenisation.[2]

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A strong defence industrial base assures enhanced security due to various valid reasons. Reduced dependence on foreign imports, the opportunity to create Intellectual Property (IP) and development of domestic technological capabilities which may have significant civil applications, are some of the obvious advantages of a strong defence industrial base. Besides, it encourages fair competition, promotes quality and provides a platform to tap export markets.

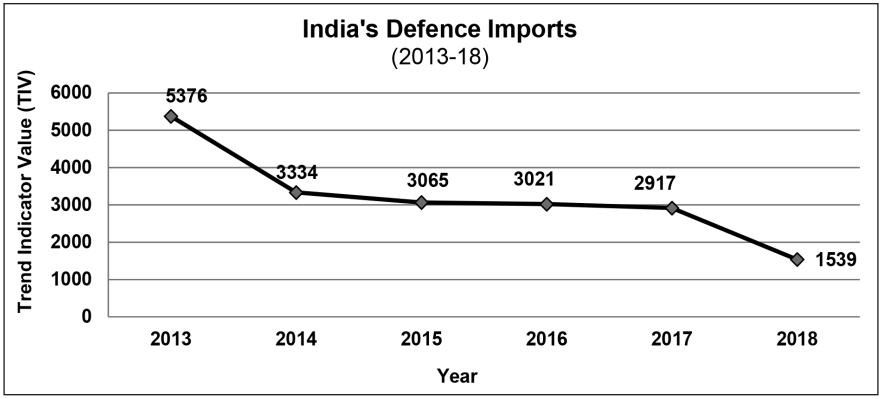
In view of this, the paper will discuss the following: the need to encourage Public Private Partnerships (PPPs); their advantages and disadvantages; the issues that remain to be tackled; the steps already taken by the government; and, finally, it will recommend measures to encourage the domestic private industry's participation in the defence sector in general and PPPs in particular.

How is India Meeting its Current Defence Arms/ Equipment Requirements?

Largest Arms Importer: India wore the unenvious crown of being the largest importer of weapons and equipment and accounted for 12 per cent (by value) of all global arms imports for the five-year period from 2013 to 2017.[3] The quantum of defence imports, however, has come down significantly, for the years 2017 and 2018. The latest report on "Arms Trade" by the Stockholm International Peace Research Institute (SIPRI), places India at 4th rank for the year 2018, behind Saudi Arabia, Australia and China, among the highest importers of arms. India's share in the overall global defence imports for the period 2014-18 is pegged at 9.5 per cent,[4] which is still not a desirable state. As per defence manufacturing statistics maintained by the Indian government, approximately 60 per cent of all capital procurements are ex-import.[5]

A chart depicting India's defence imports, based on Trend Indicator Values (TIVs) accorded by SIPRI, for the period from 2013-18, is as under:

Fig 1: India's Defence Imports (2013-18)



Source: SIPRI, 2018.[6]

Note: *The TIVs, used by SIPRI, are based on the known unit production costs of weapons and represent the transfer of military resources rather than the financial value of the arms transfers.

The industry is dominated by defence PSUs and OFs. These two together contribute about 90 per cent of the total domestic manufacturing output.[7] However, the production capacity of these public sector enterprises is not sufficient to meet the requirements of the armed forces in the contracted delivery timelines. Of the overall indigenous defence production, the private sector currently contributes a minor share, especially in the capital procurement. There is, thus, a strong case to further encourage Indian private industry to participate in the defence sector and enhance India's defence industrial base. PPPs in defence comprise one of the viable and credible options to provide a helping hand to the domestic private industry and enable it to contribute effectively in pursuit of India's stated goal to achieve self-reliance in defence.

What is a PPP?

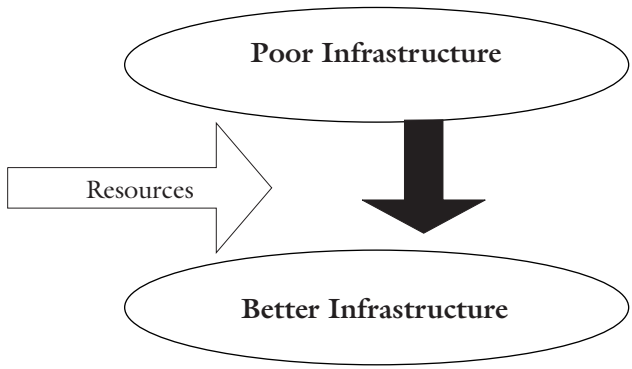
A PPP is a contract—often a long-term contract—between a government entity and a private entity(ies), most often a corporation(s). The goal of

the partnership is to provide public benefit, either an asset or a service. A key element of these contracts is that the private entity must make a certain amount of investment and take on a significant portion of the risk. The remuneration that the private entity receives for participation, as specified in the contract, would primarily depend on its overall performance.

Why are PPPs Required in the Defence Sector?

- **Requirement of Resources:** The defence sector needs an immense amount of resources. Herein lies the significance of the economics of PPPs in the defence sector. It is widely acknowledged that inadequate infrastructure reduces production capacity which, in turn, causes delays in meeting the required delivery timelines, raises per unit cost and makes product(s) less competitive. The resources that are required need substantial investments from private industry to build better infrastructure than what is feasible under an initiative that is wholly public or wholly private and improve upon existing capacities/ capabilities and sustain them.

Fig 2: Mapping the Relations



Source: Prepared by the author.

Positives of PPP: Some of the positives, in addition to the ones discussed above are as under:

- The PPP is a time-tested concept. It is widely acknowledged that the private industry brings with it investment, experience and dynamism. Besides, the inputs of the private entity during the consultation phase, may assist to keep the expectations from the proposed project, realistic.
- In the partnership, each participant is assigned the task that it does best. Hence, innovation and desired quality standards are likely to be achieved during the life-cycle of the project when the public and private entities work together. Speedy project completion is assured, as 'time-to-complete' the project would most likely be incorporated as a parameter for performance measurement.
- The project feasibility studies ensure that all related risks are analysed and deliberated upon in adequate detail. The operational and project execution risks may be shared between the entities, as agreeable to both parties.

Negatives of PPP: Some of the negatives are discussed as under:

- Every PPP involves a certain level of risk for the private entity and it logically expects to be compensated for accepting those risks. This may have an adverse impact, leading to cost escalation of the project, if the expected compensation is on the higher side.
- Reasonably accurate assessment of the proposed costs of the project may become a matter of debate, if the expertise for execution/ fructification lies with the private entity. Besides, in cases wherein, there are very few private entities that can perform the specified tasks, the lack of competition for cost-effective partnering is likely to hinder a better price discovery.
- The assessed benefits from the projects are likely to vary, depending on the risk, complexity, technology sought, competitive level and the size/volume of the project.

Major Projects Undertaken with Private Sector Participation

Indian industry, both public and private, has collaborated successfully and proved its ability to deliver the desired results, in spite of global sanctions imposed in the aftermath of the Pokhran nuclear tests conducted in May 1998, in the fields of missile technology, space explorations and some defence projects. Some of the notable projects undertaken for defence are briefly discussed as under:

- **Pinaka Multi-Barrel Rocket Launch (MBRL) System:** Development of the Pinaka MBRL commenced in 1986 at a DRDO facility known as the Armament Research and Development Establishment (ARDE) based in Pune. DRDO was responsible for the overall design and development. The sub-systems and components were developed by Tata Power Strategic Engineering Division (SED), Larsen & Toubro (L&T) and OFB.[8] The weapon system is already in service with the Indian Army and is a fine example of partnership between the public and private enterprises.
- **Advanced Towed Artillery Gun System (ATAGS):** The ATAGS (155 mm x 52 calibres) was started in 2013 by DRDO to replace the older guns in service in the Indian Army with a modern 155 mm artillery gun. The Armament Research and Development Establishment (ARDE) partnered with the Kalyani Group, Tata Power SED and OFB for this purpose.[9] It proved that India has the indigenous design and development capability for artillery guns. The OFB won the tender to manufacture the gun barrels, along with the forgings experts, the Kalyani Group. Mahindra Defence Systems will make the recoil system along with Tata Power SED, while Punj Lloyd will make the muzzle brake. During full-scale manufacture, an entire ecosystem of smaller Tier-2 and Tier-3 suppliers is expected to come up.[10] During the trial stage, the prototype fired 48 km in the Pokhran ranges, creating a record.[11] The Defence Acquisition Council has

approved procurement of the gun for the Indian Army and it has since been introduced into the Army.

- **Akash (Air Defence System):** The Akash Surface-to-Air Missile (SAM) system, a part of the Integrated Guided Missile Development Programme (IGMDP) was produced by Bharat Electronics (BEL). Bharat Dynamics (BDL) serves as the nodal agency for the Akash SAMs' production for the Army. A number of DRDO labs are involved in the development of the Akash. Launcher systems were provided by Tata Power and Larsen & Toubro.[12] The equipment has been successfully inducted in the Indian Air Force (IAF) and Indian Army (IA). Akash is the outcome of a successful partnership between the Defence Research and Development Laboratory (DRDL), the nodal lab in DRDO, along with 13 other DRDO labs, 19 Public Sector Units (PSUs), 5 OFs, 3 national laboratories, 6 academic institutions and more than 265 private industries across the country.[13]
- **Missile Development Programme:** India's missile development programme is completely indigenous. Under the leadership of Dr APJ Abdul Kalam, then Director, DRDL, the indigenous development of a series of missiles was progressed by the DRDO. The Integrated Missile Development Programme (IGMDP) included five missiles viz. the Agni, Prithvi, Akash, Trishul and Nag. The project was accorded approval by the Government of India on July 26, 1983, and was completed in March 2012.[14] The ambitious time-bound project brought together the scientific community, academic institutions, Research and Development (R&D) laboratories, industries and the armed forces in giving shape to the strategic missile development programme.[15]
- **Light Combat Aircraft (LCA) Tejas:** The LCA was designed and developed by the Aeronautical Development Agency (ADA) with Hindustan Aeronautics Limited (HAL) as the principal partner, along with DRDO, Council for Scientific and Industrial Research

(CSIR), BEL, Directorate General of Aeronautical Quality Assurance (DG AQA), Indian Air Force (IAF) and Indian Navy (IN).[16] Thirty-three R&D establishments, 60 major industries and 11 academic institutions participated in the project.[17] On January 17, 2015, the IAF got its first indigenously built LCA Tejas, Series Production-1 (SP1), which was handed over by the then Defence Minister, the late Mr Manohar Parrikar, to the Indian Air Force in Bengaluru. Raksha Rajya Mantri Dr. Subhash Bhamre, in a written reply, stated in the Rajya Sabha on December 31, 2018, that out of 16 Initial Operational Clearance (IOC) fighter aircraft, 10 fighters have been delivered by HAL and are operational with the IAF's 45 Squadron.[18] The remaining 6 IOC fighter aircraft were to be delivered in 2019.

- **Samyukta (Early Warning System):** The Samyukta, a mobile integrated electronic warfare system, was jointly developed by the DRDO, DRDL, Instrument Research & Development Establishment (IRDE), Electronics & Radar Development Establishment (LRDE),[19] Bharat Electronics Limited (BEL), Electronics Corporation of India Limited (ECIL),[20] Tata Power SED and the Corps of Signals of the Indian Army. Nearly 40 small companies developed components indigenously for the system.[21] It was delivered to the Indian Army in 2004.
- **INS Arihant [Ship Submersible Ballistic, Nuclear (SSBN) Submarine]:** The INS *Arihant* is the lead ship of India's Arihant class of nuclear-powered ballistic missile submarines. The 6,000-ton vessel was built under the Advanced Technology Vessel (ATV) project at the Ship Building Centre in the port city of Visakhapatnam. The project was launched in 1997 and was jointly developed by the Indian Navy, Bhabha Atomic Research Centre (BARC) and DRDO at the naval dockyard in Visakhapatnam. Russian designers assisted in building the vessel. Domestic private companies involved in the development of the submarine were Tata Power, a division of Tata

Group; L&T, and Walchandnagar Industries.[22] The submarine was successfully delivered under the PPP model and commissioned in the Indian Navy in August 2016.

- **Launch Vehicle for Nirbhay Missile System:** Nirbhay, a sub-sonic cruise missile which is under trial, is launched from the LPTA 5252-12 x 12, an all-terrain and all-wheel drive mobile launch vehicle. The launcher was developed jointly by Tatas in close coordination with the Vehicles Research and Development Establishment (VRDE) at Vahannagar.[23]

Issues

Despite the successful partnerships between public and private entities, as discussed above, the general impression in the environment is that the government/Ministry of Defence (MoD), instead of encouraging PPP, has avoided it because of perceived "security" related issues. It is also perceived that Bharat Electronics Limited (BEL) was nominated for all Integrated Early Warning (EW) projects, primarily for "security" reasons.

Approximately 30-35 per cent of the Buy (Indian) capital acquisitions of Rs 52,700 crore in the last three years has been based on the nomination of government enterprises. Nomination may be considered akin to rewarding inefficiency against merit based competition.

Today, many Indian companies viz Tata Group, Reliance Group, Mahindra, L&T, Ashok Leyland amongst others, can be categorised as truly global companies. In defence also, these companies are capable of collaborating with futuristic technology players abroad, to meet the requirements of the Indian armed forces and be a part of the global supply chain, if 'fair competition' and a 'level playing field' are ensured. Considering the same, the following issues gain significance:

- **Competence Mapping:** With that grant of 353 industrial licences[24] to the private industry for defence manufacturing between 2001 to 2018, competence mapping, in terms of both capability and capacity

of the domestic defence companies, becomes essential. Further, due to the rapid scientific and technological developments worldwide, there is a growing volume of defence weapons and equipment technology that can potentially impact and be incorporated in design, development and manufacturing capability of the domestic defence industry. Competence mapping of the Indian private industry engaged in the defence sector has not yet been carried out.

- **Lack of Effective Implementation of Public Procurement Policy for Medium, Small and Micro Enterprises (MSMEs):** The Public Procurement Policy Order, 2012 has been notified under Section 11 of the MSME Act, 2006. The policy become effective from April 1, 2012 (Gazette notification on March 26, 2012). For the ministry/department/central PSUs, the overall procurement goal of minimum 20 per cent has become mandatory from April 1, 2015.[25] The procurement of defence products from MSEs needs to be encouraged to facilitate the MSMEs participation in defence manufacturing.
- **Participation in 'Buy and Make' Category Procurement:** The 'Buy & Make' category refers to an initial procurement of equipment in Fully Formed (FF) state or otherwise, in a specified quantity from a foreign vendor.[26] This would be followed by indigenous production by an Indian Production Agency (PA) selected by the foreign vendor and would involve Transfer of Technology (ToT) in accordance with the contract. An Indian company cannot field a system, jointly developed abroad with a foreign partner, under this category. It is, however, noted that the Defence Procurement Procedure (DPP-2016) allows an Indian company to participate in the Buy (Global) category. Similarly, the Indian company should, logically, be permitted to participate in the acquisition proposals categorised as 'Buy and Make'.
- **Applicability of Simulation Trials:** In the 'Buy (Global)'/'Buy and Make' category procurements, there may be cases where trials need

to be conducted abroad in the vendors' premises. If field evaluation is not feasible, the goverment/MoD may explore the possibility of conducting evaluation through computer simulation, and suitable options are recommended for approval by the Services Capital Acquisition Plan Categorisation Higher Committee (SCAPCHC)/ Defence Procurement Board (DPB)/Defence Acquisition Council (DAC).[27] In such cases, the government accepts the simulation trials. For example, the land based Medium Range Surface-to-Air Missile (MRSAM), a Government-to-Government (G-to-G) development project, for joint development and production by the DRDO, India and IAI (Israel Aerospace Industries), Israel, was contracted, based on the simulation trial, while the missile was still being developed. The scenarios were simulated utilising the Meggitt BTT-3 "Banshee" Unmanned Aerial Vehicle (UAV).[28] The contract for the land-based MR-SAM worth Rs 10,075.68 crore was inked on February 27, 2009.[29] However, the facility of simulation trials is not available to the Indian vendors, which gives a negative signal to the environment.

- **Participation as Single Vendor:** If an Indian company buys the Intellectual Property Rights (IPRs) for critical technology abroad and wishes to field a product for procurement by the Indian armed forces; it is highly unlikely, under a "single vendor situation". The feasibility of an Indian company (other than a defence PSU) to become a single vendor supplier to the Indian armed forces is very low. Even if the Indian private company buys the technology and creates the infrastructure, there is extremely low feasibility to sell the systems to the Indian armed forces in a single vendor case. Such cases will be rare, yet the aspect of psychological impact cannot be ignored.
- **Unfavourable Tax Structure:** The structure in the case of taxes and duties is unfavourable for the domestic defence industry. The finished weapons and equipment, when imported, attract zero taxes and duties. On the contrary, if a semi-finished product is imported

and any value addition in India is effected, the value addition would attract the General Services Tax (GST). Therefore, with the reduction of the import content and corresponding increase in the indigenous content, the cost of the equipment is likely to be higher due to the levy of GST on the indigenous content.

- **Lack of Flexibility in Procedures:** The implementation of procedures is carried out very rigidly. One of the reasons for the same is attributed to following the rule book in both letter and spirit. While emphasis on transparency and probity is vital, lack of flexibility in the procedures and their implementation causes unforgivable delays, sometimes to the tune of years, in procurement of munitions, critical weapons and equipment that have a direct bearing on the preparedness of the defence forces. In place of the stipulated period of 76 weeks, a majority of the capital procurement cases drag on for four to five years, whereafter the contract may be signed. A case in point is the delay in the conclusion of the contract for the Medium Multi-Role Combat Aircraft (MMRCA) by India. This case was initiated in 2007 and the Rafale was chosen in 2012, over rival offers from the United States, Europe and Russia. India finally signed an inter-governmental agreement with France in September 2016.[30]
- **Idle Infrastructure:** Sustenance of the private defence industry needs consistent orders either from own defence forces or friendly foreign countries. In case, the orders are not received, the infrastructure created to manufacture the weapon system/equipment would lie idle and the entire effort would get wasted. For instance, the complete quantity of the Pinaka Multi-Barrel Rocket Launcher (MBRL) as contracted by the Indian Army has already been delivered by L&T, as stated by Mr. J D Patil, a whole-time Director, and Senior Executive Vice President for L&T's Defence Business, during a seminar on 'Defence Technology in India' organised by the Delhi Policy Group in March 2019. Unless the system is permitted to be exported to

friendly foreign countries or more fresh orders are placed by own defence forces, the infrastructure created would remain unutilised.

Issues already Resolved by the Government

Some of the issues that were identified in consultation with all the stakeholders and already stand resolved by the government are discussed as under:

- **Withdrawal of Excise Duty Exemption:** Exemption of excise duty to all defence PSUs and ordnance factories was withdrawn by the government with effect from June 1, 2015 to establish a level playing field between the Indian private and public sectors.[31] As per the revised policy, all Indian industries (public and private) are subjected to the same kind of excise duty levies.
- **Distribution Among More than One Vendor in Same Procurement:** The distribution of the order/quantity among more than one vendor in the same development project/procurement case, during acquisition of a weapon/equipment/product, is now being carried out, provided the parameters pertaining to cost and quality are fulfilled. Such a criterion is laid out in the Request for Proposal (RFP) itself.[32] For instance, the DRDO Advanced Towed Artillery Gun System (ATAGS), a towed 155 mm/52 calibre howitzer, has been developed for the Indian Army as a joint project of two private-sector corporations, Tata Power SED and Kalyani Group.[33]
- **Effort to Reduce Nomination:** Defence PSUs are now required to compete with other vendors for capital acquisition projects. Hence, the issue of nomination has been resolved to an extent. For instance, in all the projects related to modernisation of infrastructure (turnkey projects), initiated since 2014 for the Army Ordnance Corps echelons and certain Army Base Workshops of the Corps of Electronics and Mechanical Engineers, various private firms, including Xplorer Limited, Mahindra Defence Systems amongst others and MECON

(Metallurgical & Engineering Consultants) Limited, a Public Sector Undertaking (PSU) under the Ministry of Steel of the Government of India, participated under similar terms and conditions. While in the various previous turnkey projects, MECON Limited was selected as consultants on nomination basis, the current emphasis is on fair competition among all public and private sector enterprises. Thus, a deliberate effort has been made to reduce the nomination of public enterprises in certain areas of capital procurements.

- **Sharing of Technology Perspective and Capability Roadmap (TPCR)**: In line with the recommendations from the industry, the TPCR-2018 has been placed in the open domain to provide to the industry an overview of equipment that is envisaged to be inducted into the Indian armed forces up to the late 2020s.[34] The intention is to drive and guide the technology development process that the industry may like to pursue. This roadmap would assist the industry in planning or initiating technology development, partnerships and production arrangements in line with the 'Make in India' initiative of the government.
- **Sharing of List of Make Projects:** Lists of weapons/equipment, to meet current and futuristic requirements of the armed forces, proposed to be developed under Chapter III, 'Make-I' (government funded) procedure under the provisions of DPP-2016, are placed in the open domain for sharing with the industry by the Indian Army, Navy and Air Force. For instance, the list of products required by the Army, to include the Future Ready Combat Vehicle (FRCV), 3rd generation missiles for the 125 mm gun barrels of the T-72 and T-90 tanks and advanced/new generation 30 mm ammunition for the BMP-2/2K, is readily available on the Indian Army's website.[35] However, analysis reveals that details like the expected initial order quantity, annual/recurring requirement, period for which the product is likely to be in service, anticipated cost per item, etc., are not indicated against each product. Sharing of these details and any additional information, as

deemed appropriate, would be of much assistance to the industry to decide their strategy to participate in these projects. In February 2018, the government notified a separate, simplified procedure for sub-category 'Make-II' (industry funded) which has many industry friendly provisions. The projects under Make-II are divided into two categories, that is, projects that stand 'Approved-in-Principle (AIP)' as per the new 'Make-II' procedure and being progressed for accord of Acceptance of Necessity (AoN) by the defence forces Headquarters (HQ); and the projects which are at the exploratory stages for which the process of a preliminary feasibility study is in progress. The list of these projects has been placed by the government in the open domain.[36]

- **Identification of Imported Components for Indigenisation**
  - The identification of imported components of existing in-service weapons/equipment for indigenisation, to include assemblies, sub-assemblies and spares, is already being carried out by the defence forces and a significant range of items has been indigenised by the Directorate of Indigenisation (DoI) at the Integrated HQ of the MoD (Army) and the respective Directorates of the Navy and Air Force.
  - The DRDO has identified 100 components of the LCA to be indigenised by the domestic private industry. These components are currently being imported.[37]
  - More such items are required to be identified and comprehensive lists prepared. The lists of items and quantities so identified, less items classified as confidential, should be placed in the open domain/shared with the industry to enable them to avail the opportunity to indigenise them.

The Road Ahead

The government has taken some path-breaking policy decisions for ease of doing business and creating a suitable environment for the participation

of the private industry in the defence sector. Withdrawal of excise duty exemption to public enterprises, enhanced Foreign Direct Investment (FDI) in defence, promulgation of the strategy for defence exports, streamlining of procedures for the grant of industrial licences, guidelines for the formation of JVs (Joint Ventures), streamlining the procedure for the imposition of penalties on erring entities are some of the major decisions that have definitely played a pivotal role in encouraging the private sector's participation in the defence sector. However, much ground still needs to be covered to provide a 'truly level playing field' to the private industry in defence manufacturing. Certain measures recommended to be implemented to encourage PPP in the defence sector are discussed as under:

- **Aim at Long-Term Sustenance of Defence Industrial Base (DIB):** The government needs to aim at long-term sustenance of the DIB for achieving self-reliance in defence in the foreseeable future. Participation of the domestic private industry, in both partnership with public enterprises and individually or in joint ventures with foreign industry, is vital for a vibrant and robust DIB. The government also needs to acknowledge that there is a consistent requirement of supply orders for maintaining the capacity and sustenance of the defence industry.
- **Investment in R&D in Defence Technology Projects:** Investment in R&D in defence technology projects by the private industry needs to be encouraged. Since such investments may not yield immediate results and profits, hand-holding would be necessary. The development of strategic capabilities should be completely government funded. The government could also consider financing of R&D in defence technology projects by the private industry in the stand-alone or PPP mode. Wide publicity should be given for financing/subsidising of R&D projects for defence. The recipients could be research institutes, private enterprises, MSMEs and other

eligible organisations. All decisions regarding financing of research should be taken by a collegiate (headed by defence officers with all the stakeholders as members) rather than routing on files that are prone to the personal biases of individual appointments in the bureaucratic chain. A non-lapsable corpus of Rs 1,000 crore should be earmarked for the same.

- **Flexibility in Procedures:** While rigidity in procurement procedures provides a semblance of transparency and fairness in defence acquisitions, a certain degree of flexibility, while maintaining the desired levels of transparency and probity, would go a long way in curtailing procedural delays and expediting capital procurements. Amendments to the procedures to include the following may be considered:
  - Permit the Indian private company that buys critical IPR abroad to field a product under a "single vendor situation". If the Indian vendor gets the technology and creates the entire value chain and infrastructure, it should be allowed to become a single vendor supplier and offer/sell systems to the Indian defence forces.
  - Allow Indian private companies to field a system jointly developed abroad for NC NC (No Cost, No Commitment) trials under the 'Buy and Make' category. When the DPP permits an Indian company to participate in the 'Buy (Global)' category, it should also be allowed to participate in a 'Buy and Make' project.
  - Accept simulation trials for equipment under development by an Indian company, if NC NC trials are not feasible. It would be in line with the facility being provided to foreign companies.
  - The unfavourable structure, in the case of taxes and duties on domestic defence industry, needs to be corrected without delay. Suitable incentives should be provided for an enhanced percentage of indigenous content, to encourage indigenisation and value addition by the domestic defence industry.

- **Stop Nomination and Ensure Fair Internal Competition:** Nomination is akin to promoting and rewarding inefficiency in government owned enterprises. Nominations for all defence procurements and research projects should cease forthwith. Let there be fair competition among all the interested vendors, whether from public or private sector.
- **Appoint a Cost Regulator:** An independent cost regulator, as recommended by the Aatre Task Force, should be established for strategic partnership projects.[38] It would act as an immense confidence building measure and encourage the private industry to invest in the defence sector.
- **Implement Effectively Public Procurement Policy for MSMEs:** The Public Procurement Policy, mandating 20 percent procurement by ministries/departments, should be sincerely implemented for defence products (assemblies, sub-assemblies, spares, etc.). This is essential to encourage MSMEs' participation in defence manufacturing.
- **Reserve Government Line of Credit for Defence Products:** The government line of credit should be reserved for export of Indian made defence products. Further, the line of credit to friendly foreign countries should be enhanced to generate a demand for the weapons and equipment manufactured in India.
- **List Specified Projects for PPP:** The government, in consultation with the defence forces, should identify weapons and equipment that can be developed under PPP to include both Make-I and Make-II projects. A list of such projects should be shared with the industry and placed in the open domain. A positive beginning has already been made as the Army, Navy and Air Force have listed out 'Make' projects, with details, on the MoD website. The MoD has listed Make-II projects on its website and the defence forces have nominated nodal officers for these projects. There is also a requirement to get Make-I effectively functional by launching more

projects under this category. The project lists are recommended to be revised on a monthly basis to further add additional projects/ requirements that may crop up. The step would instill confidence in the domestic private industry and encourage it to invest in defence industry in a big way.

- **Carry out Competence Mapping:** There is a need to carry out competence mapping of domestic private vendors to assess their capability and capacity. A study group/committee to identify competencies, assess their impact in the next two decades and indicate the level of confidence in predicting the outcome may be considered. The committee could have representation from the industry. Competence mapping would be of immense value in short listing of domestic private companies for strategic long-term defence projects under PPP and would reflect the degree of clarity with which the outcomes can reliably be predicted.
- **Create Venture Fund to Finance Start-ups:** The government needs to take a lead and create a venture fund (investment banks and/or other financial institutions) to carry out institutional investment into early-stage/start-up companies (new ventures). Finance provided to start-up companies and small businesses in the defence sector that are expected to have long-term growth potential, is likely to enthuse young entrepreneurs to delve into defence design, development and manufacturing.
- **R&D Corpus Fund:** The R&D corpus fund should be fully utilised for indigenous development of complex systems and advanced technologies by the private industry. Targets need to be set and sincere efforts made to achieve them. Under-utilisation of the R&D corpus fund is a sore point that should be addressed on priority. The procedure to be followed for grant of funds from the government for R&D in the defence sector, should be available 'on-line' and given wide publicity.
- **Indicate Business Volume and Numbers:** The government, in consultation with the defence forces, should indicate the approximate

business volume and numbers for weapons and equipment that are planned to be procured in the future. It would be logical for the government to enter into long-term business agreements with the private industry for continued orders and thereby mitigate uncertainty that currently envelops the defence sector.

- **End User Accessibility:** The private industry has indicated in various forums the need for greater accessibility to the end users i.e. the defence forces. In the case of the Army, the issue has been addressed to a certain extent by the establishment of the Army Design Bureau (ADB). However, the access to individual user directorates is largely restricted. There is, thus, a need to evolve institutionalised mechanisms to facilitate more frequent interactions to enable the private industry to understand the future requirements of the defence forces and plan accordingly.
- **Department of Defence Production (DDP) to Facilitate PPPs:** The DDP should act as a facilitating agency and encourage the defence PSUs, OFB and DRDO to enter into JVs/PPPs for co-development and co-production of modern technology weapons, equipment and munitions.

Conclusion

Self-reliance in the defence sector can be achieved only when the domestic private industry makes substantial investments in the design, development and manufacturing of modern technology weapons and equipment. PPPs in the defence sector comprise an effective mechanism to progress rapidly on the road to achieve self-reliance and indigenisation. PPPs should essentially involve long-term strategic ventures and focus on modern technology. The relationship with the private industry should shift from the 'seller' to the 'partner' and the partnerships should make an endeavour to address both Indian and global requirements.

The government should state unambiguously its readiness to absorb/minimise risk(s) and act as a guide, facilitator, insurer and under-writer

of the last resort. India needs to unhesitatingly leverage the financial and techno acumen of the private industry, encourage PPPs and employ them as strategic tools for expanding indigenous design, development and manufacturing capability in the coveted defence sector.

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An Overview of Indian Defence Industry:
A Transformative Perspective

S P Das

Introduction

The Indian defence manufacturing sector is largely dominated by the Defence Public Sector Units (DPSUs) and Ordnance Factory Board (OFB), whereas the Research and Development (R&D) sector is solely controlled by the Defence Research and Development Organisation (DRDO). India's defence industry is primarily controlled by the government and its agencies. Though the defence industry was opened up for private domestic players in 2001, so far there has been limited participation of the private sector in the overall defence procurement. India boasts of one of the largest defence industrial bases among the developing nations in the world. Approximately two lakh people are employed in the various defence manufacturing units/laboratories of the government. The key components of India's existing Defence Industrial Base (DIB) are the DPSUs, Ordnance Factories (Ord Fys), DRDO—all functioning under the overall control of the government's Ministry of Defence (MoD)—and a few private sector companies comprising both large and Micro, Small and Medium Enterprises (MSMEs).

It is a well-known fact that in spite of having its own vast defence industrial base, India depends heavily upon foreign imports to meet

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the requirements of its armed forces for weapon systems and platforms. Although India has achieved significant success in areas such as space technology, missile development, atomic sector, information technology, pharmaceuticals sector, and others, a similar achievement remains elusive in the defence sector. However, it is well-noted that India has the potential to be a major player in the field of defence manufacturing provided it plays its cards well. In doing so, the primary task lies in identifying a few potential areas of defence production, wherein it can expertise its capabilities.

In terms of functioning, in India, the MoD plays an all-encompassing role in the defence sector. It acts as the sole developer, manufacturer, seller and buyer of defence equipment and weapon systems within the country through its various agencies/organisations. Further, the formulation of a policy framework for various functions related to defence manufacturing and defence procurement is also orchestrated under the domain of the MoD. These aspects make it significant for the MoD to play an active role in driving the growth of the defence industrial base within the country. Various other ministries/departments such as the Ministry of Home Affairs (MHA), Ministry of Commerce, Trade and Corporate Affairs, Ministry of Finance, Ministry of and Industries, and Ministry of External Affairs, also contribute significantly towards the defence industry by way of issue of policies/guidelines, which directly or indirectly affect the functioning of the industry. However, the most significant is the role of the armed forces in the growth of the industrial base within the country. That is, being the ultimate users, the armed forces have a greater say in the selection and acquisition of defence equipment and weapon platforms by the government.

Significant Aspects of Indian Defence Sector

India's defence sector can be understood from the following aspects, which are listed below:

- India has the third largest armed forces in the world.

- It is the world's fifth largest spender on defence. India's annual defence budget for Financial Year (FY) 2018-19 was about Rs 2,95,511 crore (at the BE stage). It spends approximately 35 per cent of its defence budget on capital acquisition.
- India imports nearly 60 per cent of its military hardware requirements from the global arms manufacturing countries. As per Stockholm International Peace Research Institute (SIPRI) data, the value of imports of defence equipment and weapon systems by India for the period 2013-16 was approximately Rs 82,496 crore. India accounts for 14 per cent of all global arms imports and has the dubious distinction of being the largest importer of arms in the world.[1]
- Despite having a strong DIB, the long-cherished goal of achieving minimum 70 per cent self-sufficiency in defence procurement remain elusive. Currently, India's self-reliance is hovering at around just 35-40 per cent.[2]
- India is mostly involved in licensed production or manufacturing of defence equipment based on the Transfer of Technologies (TOT) obtained through the purchase of main equipment/systems in the past from the Original Equipment Manufacturers (OEMs).
- There has been a very limited participation of the private sector (less than 5 per cent) in the overall defence acquisition.
- It is no surprise that the country has to bear the burden of a large import bill for purchasing military hardware, which puts further strain on its limited resources. Moreover, the genuine needs of the country's large population for development and creation of civic facilities have to be compromised on account of the heavy expenditure on defence imports.
- Though the government has given some additional thrust to indigenisation and 'Make in India' in the recent past, tangible results are yet to become visible in the defence sector.
- The government in the recent past has announced the creation of two defence corridors in the country, which is a welcome step. However,

there is a need for greater clarity on the matter and strong will to implement the plan in a time-bound manner.

- In the past, some selective restructuring of Ord Fys and DPSUs has been undertaken by the government, but it has not fructified into reduction in foreign imports.
- It is a well-known fact that procurement of defence equipment and systems ex-import is carried out by the government to meet the urgent and unavoidable needs of the armed forces, in order to maintain the minimum acceptable level of operational preparedness. However, this is largely due to the non-availability of modern, hi-tech and advanced weapon systems through the domestic industry (public and private).Though such imports serve the immediate needs of the country, in the larger perspective, they delay the process of indigenisation.
- Nearly US$ 14 billion worth of defence offset obligations are expected to be discharged in India by the foreign OEMs by the year 2028. As per an estimate, the Indian defence sector has the potential to add about one million direct and indirect jobs.

Existing Fault Lines in the Structure of Defence Production

The prime reason for the large import of defence equipment is the inability of our existing R&D organisations, Ord Fys and DPSUs to develop and manufacture the modern, high-tech and advanced weapon systems/platforms indigenously. Some of the key fault lines in the existing structure of defence production are discussed below:

- The DPSUs/Ord Fys/DRDO were raised with the expectation to create self-reliance in the field of defence manufacturing, however, the same has remained elusive so far. Over the years, the contribution of the DPSUs/Ord Fys has been dismal, which is adequately mirrored in their decreasing stake in India's capital budget. Instead of reducing,

India's dependence on foreign imports for the purchase of arms and weapon platforms is ever increasing.

- There are gaps in the capacity and capability of the DPSUs/Ord Fys/ DRDO vis-à-vis the requirements of the armed forces for modernisation/ upgradation of the equipment profile, which leads to the off-the-shelf procurement of arms/weapon systems ex-import. It gets amply clear from the fact that the value of total production (revenue and capital) by the DPSUs/Ord Fys in 2016-17 was approximately Rs 57,000 crore, whereas India's capital budget for defence for the same year i.e., 2016-17 was Rs 86,529 crore. Hence, the DPSUs/Ord Fys are in no position to absorb the country's capital defence budget.
- It has been generally observed that the DPSUs/Ord Fys are involved in low value addition and over-reliance on foreign sources. Concerns were also raised by the Comptroller and Auditor General (CAG) in its report of the year 2011, wherein it had flagged the issue of 90 percent import of raw material/components by Hindustan Aeronautics Limited (HAL) for the production of its so-called indigenous Advanced Light Helicopter (ALH). Further, issues were raised by the Parliament Standing Committee on Defence about the low indigenisation level in two of its flagship indigenous projects such as the Main Battle Tank (MBT) Arjun and Light Combat Aircraft (LCA). It has also been noticed that the ratio of value additions by the DPSUs to the total value of their production, has reduced from 51 to 38 per cent.
- There is dismal participation in R&D. There is enormous scope for investment in defence R&D by the public as well as private sector, but, in reality, the participation by the public sector has been dismal, whereas there has been nil participation by the private sector. As per a study carried out by Institute for Defence Studies and Analyses (IDSA), the OFB invests only 0.7 per cent of its budget in R&D against the minimum inescapable requirement of 3 per cent. It was also revealed that four of nine DPSUs do not own a single patent or copyright.

- The outdated structure of defence production calls for great attention. It is felt that India has been extremely late in carrying out policy reforms in the defence sector. Momentum was gained only after the Kelkar Committee Report. It is a well-known fact that the DPSUs and Ord Fys [functioning under the administrative control of the Department of Defence Production (DDP) of the MoD] have been suffering from many ills which include lack of a professional approach, excessive bureaucratic control, poor work efficiency, etc. These lead to substantial time-delays and cost-overruns in completion of orders/ projects as well as delay in decision-making on critical defence matters.
- There is a lack of Foreign Direct Investment (FDI) in the defence sector. The aspect of FDI has not received adequate importance so far and, hence, there has been very low FDI in the defence sector.
- There is a negligible participation by the private sector. So far, the environment has not been very conducive for the active participation of the private sector in defence manufacturing. Only a few big orders have been placed on a handful of large firms. The private sector has largely remained content with the supply of components, sub-systems and low-tech items to the public sector. Further, there seems to be lack of trust amongst the decision-makers as far as placing orders on the private firms for development/manufacturing of big ticket projects like weapon platforms, fighter aircraft, submarines, armoured fighting vehicles, battleships, etc., is concerned. It also appears that the existing big players of the public sector, that is, the DPSUs/Ord Fys/DRDO see the role of the private sector to be that of a supplier and not a lead integrator or manufacturer of weapon systems. This can probably help them to maintain their superiority in this field. The non-participation by the private sector may be explained as being due to issues such as: the decades of insulation, prejudices and old mindsets among the decision-makers. Further, due to the complexity of procurement procedures and the clout wielded by the public sector

companies within the MoD/government, the new entrants find the whole regime to be highly forbidding.

- The concerns of the private sector mainly relate to apprehensions that there is no level playing field between the public sector units and them, as regards the pricing of an item/equipment and price-related competition. The apprehension comes with the premise that the DPSUs/Ord Fys enjoy the patronage of the government and have comparatively easy access to public money. Further, it is argued that the public sector doesn't have to take into account the cost of capital, land, fixed assets like plant and machinery, etc., while quoting the price for equipment, as these expenditure have already been incurred by the government over the years. Further, a public sector entity can afford to under-quote for an item as some part of the cost can be provisioned by it through some other projects being handled by it. However, such freedom is not enjoyed by the private sector.
- There is a need for funding, as the incremental increase in the country's defence budget is not enough to undertake big-ticket modernisation plans for the armed forces. Further, there will be a need for capital for enhancing the capacity and capabilities of the DPSUs, Ord Fys and DRDO.

Need for Developing Autonomy in Defence Sector

Requirement of Armed Forces in Future

Often the debate raised delves into the issue of the need for India to achieve autonomy in the defence sector. More specifically, why should India try to achieve autonomy in defence manufacturing, especially when many developed countries in the world are ready to give it the required modern weapon systems and defence equipment. Though such arguments may sound logical in the short-term perspective, in the long run, it is vital for India to have strategic autonomy. This will be

possible only when India becomes economically, militarily, socially and politically strong and self-dependent. Being one of the fastest growing economies in the world and ranked the seventh largest economy globally, India cannot afford to be a net importer of security, if it wants to play an important role in the regional and global arenas. However, to achieve this, at the foremost, it is important to understand the futuristic requirements of the armed forces.

It is envisaged that the future requirements of the armed forces are going to be enormous, complex, dynamic and based on future warfare. As per the study titled "A Technology Perspective and Capability Roadmap", prepared by Headquarters Integrated Defence Staff (HQ IDS) in 2013, India's requirement for hi-tech military hardware, drones, precision weapons, radars, guns, sensors, aircraft, etc., would be worth about US$ 100 billion over the next 10 years. The future requirements of the armed forces would be dependent on a number of factors, some of which are highlighted below:

- Technology is essentially changing the landscape of future warfare, which is going to be more complex, integrated, net-centric and hi-tech.
- The security environment in our neighbourhood will continue to be complex and the presence of volatile adversaries in the immediate neighbourhood necessitates a high level of operational preparedness by the armed forces at all times.
- To achieve a high degree of operational-preparedness, it is important that the Indian armed forces always remain updated, modernised and equipped with advanced weapon systems and platforms.
- In view of the prevailing security environment in our neighbourhood, there seems to be nil possibility of reduction in the requirements of the armed forces in the near future.

Why Should India Endeavour to Achieve Autonomy in the Defence Sector?

The arguments in support of this are enumerated below:

- Attaining self-reliance in the defence sector is considered to be an inescapable requirement, both strategically and economically.
- Indigenous manufacturing of weapons and equipment is more important for the defence sector than for any other sector.
- Manufacturing of defence equipment indigenously will yield numerous benefits like:
  - It will help in identification of gaps in defence requirements and will lead to filling up those gaps in a faster timeframe.
  - It will enhance the level of India's operational preparedness substantially.
  - Domestic manufacturing will promote investment, employment and the growth of many ancillary industries within the country.
  - The nation would be able to save a large amount of foreign exchange.
  - India can also earn substantially from defence exports as there is a huge global market for defence equipment.
- If India doesn't develop its defence industry, China will emerge as a sole defence equipment manufacturer and supplier in the region. It has already sold some critical defence equipment to countries in the South Asian region, such as the sale of 24 China-Pakistan made JF-17 'Thunder' jets to Sri Lanka and the sale of two China-made submarines to Bangladesh. It is worth noting that 80 per cent of the Bangladesh military's inventory is from China. India's anxiety is grounded in China's increasing influence in the South Asian region.
- India is striving for a permanent seat at the United Nations Security Council (UNSC), however, it cannot remain effectively a net importer of security from four out of five permanent members of the UNSC.

Recommendations and Way Ahead

In view of the aforesaid, it is recommended that the necessary actions must be taken to ensure that India develops the required capacity and

capability to become self-reliant in defence manufacturing, which would lead to greater strategic autonomy and economic development. Some of the significant recommendations and the ways forward are listed in the succeeding paragraphs.

Build up Capacities and Capabilities of Domestic Defence Industry: India should try to build up the capacities and capabilities of its domestic defence industry. The aim should be to meet the requirement of the defence forces for modernisation as well as upgradation of weapon systems and equipment indigenously. This will result in reducing dependency on imports, saving of forex reserves and lead to attaining strategic autonomy in the true sense.

Develop Desired Competencies, Skills and Competitive Advantage in Defence R&D, Defence Production and Acquisition: There is a need to develop the desired competencies, skills and competitive advantage in the fields of defence research and development, defence production and acquisition. This will lead to increased production of state-of-the-art and modern weapon systems and equipment. As this cannot be done by the public sector/ government alone, greater participation of the private sector in these activities needs to be allowed. If needed, some hand-holding or incentives can be provided to the private sector initially till the time it develops adequate competency in the defence sector.

Review of Existing Government Policies and Procedures: It is worth examining that in spite of the government undertaking so many reforms in the defence manufacturing sector, no substantial progress has been made. To address this issue, the government should carry out a third-party neutral review of the various existing government policies, procedures and guidelines, which directly/indirectly affect the defence manufacturing within the country. The review committee should consult all the stakeholders of India's defence industry and seek their views on the subject and thereafter, come out with recommendations for improving

defence manufacturing in the country. The neutral or independent review of the policy is the most important aspect of the policy planning as it will generate more realistic feedback than any committee comprising representatives of the ministries or government owned organisations.

Encourage Participation by Private Sector in Defence R&D and Defence Production: The DPSUs/Ord Fys/DRDO still view the private sector as the supplier of raw material/components/sub-systems and not as a lead integrator which can compete with them on a level-playing field. Needless to say, the private sector should be encouraged by the government to take an active part in defence research and development as well as defence manufacturing within the country. If required, the government should provide it appropriate incentives, tax relief, funding and hand-holding for the initial period of ten to fifteen years. The nomination of two defence industrial corridors by the government is the right step in this direction, however, creation of defence specific Special Economic Zones (SEZs) may be considered on the lines of the Information Technology (IT) or pharma SEZs. Further, the private sector must be allotted some big ticket contracts to boost its confidence and morale.[3]

Encourage Foreign Direct Investment (FDI) in Defence Industry: FDI in the defence sector is most desirable as there is an urgent need for large scale capital infusion in this sector. Moreover, FDI will also help in getting the latest hi-tech modern technologies from the developed countries. Though this is easier said than done, to attract FDI, the government needs to clear various issues related to defence. Moreover, the private sector as well as FDI will seek the certainty of government orders to some extent in order to be commercially viable.

Key Suggestions for the Way Forward

To make a way ahead in the desired direction, certain steps can be undertaken, which are as follows:

- **Encourage Public-Private Partnerships**: There is a need to

encourage interaction and real term partnerships between the public sector companies/organisations and the private sector. The strengths and weaknesses of both need to be acknowledged and jointly worked on. The specific capabilities and expertise of the private sector need to be harnessed and given due consideration. Though there should be fair competition between the two in the larger national interest, initially, at least for some years, there should be demarcation of manufacturing responsibilities between the private sector and public sector, in order to provide hand-holding to the private sector.

- **Projection of Feasible and Realistic Requirements by Armed Forces:** The three wings of the armed forces need to sit together and make a Long-Term Integrated Perspective Plan (LTIPP) in the true sense, which should be rational, pragmatic and really integrated. Further, the armed forces need to project the requirements of weapon systems and equipment, which are feasible, realistic and based on their threat perceptions.
- **Encourage Export of Defence Equipment:** The government should encourage export of defence equipment for which adequate expertise is available with the DPSUs/Ord Fys/private sector. Grant of incentives to the industry in this regard can also be explored. However, if the aim is to achieve export capability, the weapon system must first be in service with our armed forces.[4]
- **Coopt Academia and Research Institutes:** The DRDO should coopt the academia, universities like Indian Institutes of Technology (IITs), Indian Institutes of Science (IIS) and other technical institutes in defence research activities to harness their skills, knowledge and potential. Further, the knowhow available with the Indian technical diasporas must be harnessed for R&D purpose.
- **Creation of Defence Exclusive Economic Zones (EEZs):** There is a need for the creation of exclusive economic zones catering specifically for the defence industry. This will provide the desired concerted push

towards the growth of the defence industry. Designation of two defence clusters (one in UP and the other in Tamil Nadu) is a right step in this regard, however, more such efforts are required.

- **Grant of Incentives for Defence Industry:** There is a need for giving incentives to the indigenous defence industry in order to make it more lucrative and bring faster growth in the defence sector. These could be in the form of grant of a national award for excellence, tax holidays for the private sector, grant of permission for export of the stores produced, easy availability of funds, provision of land, and others.
- **Loosening of Bureaucratic Control:** As far as possible, the government should avoid being the manufacturer/controller of the defence sector. Rather, it should be the regulator and facilitator for the growth of the defence industry within the country.
- **Strategic Partnership Model:** The government has launched this wonderful and well-intended policy after prolonged deliberations and consultations. But there is a need for quick implementation and operationalisation of this policy.
- **Absorption of Technology:** There should be concerted efforts in absorbing the imported technology by the public sector as well as the private sector units.
- **Sense of Competition:** There should be healthy competition between the public and private sectors. There is a need to bridge the long standing trust gap between the private industry and the government. Therefore, the government should ensure a level playing field for the private industry, DRDO, DPSUs and Ord Fys.[5]
- **Focus on R&D, Innovations and Upgradation of Technology:** There is a need to continuously focus on R&D, innovations and upgradation of technologies in the field of defence. This will result in India gaining the competitive edge at the global level and soon becoming part of the militarily-developed nations. The existing gap between the development

of the prototype and mass production of equipment can be bridged with the help of the private industry. There is a need to incorporate the private industry at the prototype development stage itself.

- **Restructuring of DPSUs and Ord Fys:** There is an urgent need to restructure the organisation, functioning, system and processes being followed by the DPSUs and Ord Fys in order to enhance their productivity, efficiency and accountability. In view of this, the following measures as suggested below can be undertake:
  - These organisations must be reorganised to be 'lean', modern and competitive, so that they can be made more efficient and effective. Further, they should be made fully accountable for any time delays and price overruns.
  - Qualified persons ex private sector/academia may be inducted for efficient running and management of these organisations.
  - The DPSUs and Ord Fys should be corporatised and made more autonomous. These organisations should be out of the administrative control of the Department of Defence Production and given more leeway in running their affairs.
  - All the DPSUs/Ord Fys should be disinvested in a time-bound manner so that their value and expertise can be leveraged. This will also help in generating capital, which can be used for their modernisation and capacity expansion projects. Further, this will help in ensuring a higher level of corporate governance standards in the public sector units.
  - There is a need to upskill/refresh the technical skills of the workforce employed at these organisations. This will enhance the overall efficiency of these organisations.

Conclusion

It is considered that the growth of the domestic manufacturing industry is essential for achieving self-reliance in the defence sector as well as to achieve strategic autonomy of the country. It is opined that the armed forces need to take an active part in the defence procurement process, being the ultimate users and also important stakeholders. The Indian

private sector has already demonstrated its competence in the fields of automobiles, IT and service sectors at the global level, however, the same is required to be replicated in the defence sector.

In order to be a modern, self-sufficient and advanced military, India does not need to transform only its defence forces (by reducing military manpower), but also the associated organisations and structures like the MoD, DPSUs, Ord Fys, DRDO, Directorate General of Quality Assurance (DGQA) and Defence Accounts Department. It needs to reform its entire framework of defence production and defence R&D.

Furthermore, it also becomes imperative to provide full thrust to indigenisation and build up the capacities and capabilities of India's domestic defence industrial base. This will then help to indigenously meet the requirements of the defence forces for modernisation/up-gradation of weapon systems and equipment. Resultantly, it will help reduce India's huge import bill and will also assist in the growth of many other ancillary industries and in generation of employment in the country. In view of this, the Indian government has launched many reforms and initiatives to reverse the country's huge arms import dependency, however, the result of these initiatives in the defence sector is yet to be seen. Hence, it is to suggest that there lies an enormous potential for investment in defence R&D by both the public and private sectors, which only needs to be harnessed in time to reap the dividends.

Notes

1. As per the latest report of SIPRI (2014-18), India's share in the global arms import has reduced to 9 per cent, which is largely due to non-materialisation of supplies ex import by OEMs. Reduction in import is not attributed to an increase in the domestic defence manufacturing capabilities.
2. Laxman Kumar Behera, *Indian Defence Industry: An Agenda for Making in India* (New Delhi: Pentagon, 2016), p. ix.
3. Dalip Bhardwaj, "Make in India' in Defence Sector: A Distant Dream," Observer Research Foundation, May 07, 2018, https://www.orfonline.org/expert-speak/make-in-india-defence-sector-distant-dream/). Accessed on April 18, 2019.
4. Ibid.
5. Ibid.

Chinese Defence Reforms and Lessons for India

D S Rana

Introduction

Since the formation of the People's Republic of China (PRC), China's defence forces have evolved through various stages of modernisation with a focus on doctrinal changes, structural reforms, as well as reduction of forces. Post Mao era, the first sincere attempt to infuse professionalism in the outdated People's Liberation Army (PLA) commenced in the true sense, when 'national defence' was made one of the 'Four Modernisations,' as announced by Deng Xiaoping in 1978. This boost towards military modernisation was catalysed by the reduced threat perception post disintegration of the Soviet Union in 1991 and greater allocation in the defence budget for upgradation post 1995, as boosted by an improved Chinese economy.

The display of high-end technology by the US in the Gulf War and its outcome forced the Chinese brass for the first time to acknowledge the PLA's shortcomings for future wars, and served as a trigger for the present stage of reforms.[1] As a result of the assessed "period of strategic opportunity" by China in the beginning of the 21st century and the consequent Hu Jintao's new set of "historic missions" for the PLA, the concept of 'the Revolution in Military Affairs (RMA) with Chinese characteristics' was enunciated through China's 2004 National Defence White Paper. As a follow-up, the timeline for the modernisation of the

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PLA was laid out in three steps in the following 2006 White Paper. The 19th National Congress of the Communist Party of China (CPC) in October 2017, as part of acceleration of the military modernisation plan, shortened the timeline of the original third step of 'completion of informationisation' by 15 years from 2049 to 2035—a result of China's perceived emerging complex security environment.

Why Study China's Military Reforms?

China being the primary adversary, with outstanding boundary claims, would be the first argument for an in-depth study into the rapid changes in PLA structures and capabilities. On other hand, these reforms based on lessons from recent conflicts and best practices of the developed world militaries, may also provide valuable lessons for the transformation of own armed forces. China's defence reforms are apt case studies for management of change and leapfrogging reforms, based on a long-term vision.

Contours of Present Reforms

On November 23, 2015, Xi Jinping announced a new five-year plan of PLA reforms, scheduled for completion by the end of 2020. The ongoing military reforms are intended to bridge the gap between the PLAs self-assessed weaknesses, identified as the "two incompatibles," the "two inabilities," and the "five incapables", and the expectations of the Party and the state.[2] The unprecedent reforms can be analysed in two broad themes: first, the politics of military reform; and, second, the restructuring of the PLA itself to optimise its war-fighting capabilities.

Politics of Reforms

The immediate political goal of military reforms is to enhance Xi's authority to control the gun on behalf of the CPC.[3] This very objective prompted Xi to assume all three key positions concurrently: President,

Party Secretary and Central Military Commission (CMC) Chairman, on taking over from Hu in 2012. The abolition of the two-term limit of the state presidency in the 13th National People's Congress (NPC) in March 2018 has further consolidated Xi's power. The restructured CMC (seven members against the earlier 11) and replacing four erstwhile Army dominated powerful General Departments with 15 functional departments/offices/commissions has resulted in reinstating the supreme authority of the CMC chair. Some major implications of the political reforms are as follows:

- The emergence of the CMC chair's one-man rule emphasises Xi's consolidation, centralisation, and personalisation rather than civilian control. The all-powerful Politburo Standing Committee (PBSC) members, other than Xi, have limited involvement and say in PLA matters. This increased power stature, coupled with the anti-corruption campaign, has ensured minimum resistance to Xi's command and reform measures.
- The People's Armed Police (PAP), including the Border Defence (BD) troops deployed on the Line of Actual Control (LAC) are now placed under the direct CMC operational and organisational command, with no dual control by the State Council. The PLA would, thus, be in full control over border affairs which would result in better response to CMC directives.
- Xi, as Commander-in Chief, is routinely involved even in operational matters. To ensure his firm control, there has been increased political and ideological training in the PLA post 2012 which may adversely impact the directive style of command required at different levels for modern warfare.

Restructuring the PLA

The restructuring of the PLA could be termed as the second most important agenda in the present reform aimed to achieve the stated

goal of "complete mechanization and make major progress in informationalization" by 2020. With the 'head' and 'body' of the reforms completed, the PLA is presently undergoing the consolidation phase of the restructuring. Two major implications, besides creating/upgrading new services [PLA Strategic Support Force (PLASSF) and PLA Rocket Force (PLARF)] and formation of five Theatre Commands, to support new concepts of war-fighting, are as follows:

- A lean combat ready force has been achieved by the reduction of three lakh troops, mostly from non-combat areas, with measures like termination of the PLA's profit generation activities, outsourcing logistic functions and military education, to name a few. Flab from the field force has been trimmed by reducing the Group Armies from 18 to 13, removing division headquarters, conversion to modular forces (brigade equivalent) in all the three Services as also streamlining logistic functions.
- There has been concurrent rebalancing among three Services. The Army's dominance in policy-making structures has been reduced, with diluted versions of the erstwhile four powerful departments, balanced composition of members in the restructured CMC as well as nomination of Theatre Commanders from the Navy (Southern Theatre Command—STC) and Air Force (Central Theatre Command—CTC). Since April 2017, "84 corps-level units" have been established in order to instill better interoperability by rebalancing of grades between various services and organisations.[4]

Drivers of Military Reforms

The doctrine evolved out of the military strategy would be the prime driver for force structuring and capability development of any country. China's military strategy of "active defense in the new situation" enunciated through the 2015 White Paper, besides other aspects, highlights maritime orientation.[5] The PLA doctrine has evolved through various phases, with

the present doctrine of "winning informationalized local wars" since 2015 being the guiding factor for the ongoing modernisation efforts. The fifth generation operational regulations, which would translate doctrine into specific guidance for the Services, are long overdue (fourth generation published in 1999) and are likely to include aspects like cyber and space.[6] Some other significant drivers for the reforms are given below:

Shift in Foreign Policy

The foreign policy of China has been guided by two well-known slogans. The first is *tao guang yang hui,* usually rendered into English as "hide your light and bide your time", which guided Chinese policy for decades from the 1980s when Deng Xiaoping first established it as a principle of caution in foreign affairs. In late 2013, though, a new slogan was coined by President Xi Jinping to define a more assertive, muscular approach to foreign policy: *fen fa you wei* or, as it is commonly translated, "strive for achievement".[7] This drift led to China's declaration of an air defence identification zone over the East China Sea in late 2013, its assertive behaviour in the South China Sea, and the beginning of the transformational military reforms.

Economy

China has maintained 1.2 to 1.4 percent of Gross Domestic Product (GDP) as the defence budget albeit with the exclusion of many aspects like foreign weapons procurements, Research and Development (R&D) and certain personnel benefits. As per a recent Brookings Paper on 'economic activity', China has overstated its GDP from 2008-16 by as much as 16 per cent.[8] In that case, China's defence spending as a percentage of GDP would be over 2 per cent. China's military spending increased by an average 10 per cent (inflation adjusted) per year from 2000 to 2016 and has gradually slowed to 5 to 7 per cent during 2017-18.[9] The 2019 defence spending increase of 7.5 per cent with the official outlay of Yuan 1.19 trillion ($177.49 billion), outpaces the economic

growth target of 6.0 to 6.5 per cent.[10] China has benefited from the "latecomer advantage" and, without investing in R&D, has acquired certain new technologies through the direct purchase of platforms from foreign militaries, by retrofits or by theft of Intellectual Property Rights (IPRs).[11]

Science and Technology

China hopes to be a leader of "The Fourth Industrial Revolution" with the focus to exploit the exploding number of technological breakthroughs in fields as diverse as hypersonic; nanotechnology; high-performance computing; quantum communications; space systems; autonomous systems; artificial intelligence; robotics; high-performance turbofan engine design; new, more efficient and powerful forms of propulsion; advanced manufacturing processes (including additive manufacturing/3-D printing); and advanced aerospace quality materials, to name a few. "Made in China 2025", unveiled in 2015, is the first 10-year action plan designed to transform China from a manufacturing giant into a world manufacturing power and is likely to make it almost 70 per cent self-sufficient in technology.[12] These ambitions have caught the attention of the Western world, especially, the US which has repeatedly accused China of unfair practices to achieve its targets by 'leapfrogging'.

Defence Industries Reforms

The PLA initiated the latest defence-industrial reforms in 2016 and these are expected to be implemented by 2020. They are aimed to reduce the bureaucracy, develop a more structured R&D apparatus, streamline developmental timelines and promote innovation through civil-military integration. The aspect of *hungai* (混改), or Mixed-Ownership Reform (MOR) is aimed to relieve the state's financial burden by broadening access to capital market financing, and the long-term objective is to introduce market forces into the industry. Public-private

partnerships manifested through civil-military integration are already reaping rich dividends, as when the PLA, in March 2017, declassified more than 3,000 dual-use technology patents.[13]

Intellectual Foundation

One of the significant and often overlooked aspects of the current military reforms has been an overhaul of the research and doctrinal development system within the PLA. As part of "below-the-neck" reforms which commenced some time in 2017, there has been a revision of the Professional Military Education (PME) system, with emphasis on joint operations. There has been major realignment of the Academy of Military Sciences (AMS) along with some changes to the National Defence University (NDU) and National University of Defence Technology (NUDT), the institutions under the CMC. The AMS which, till now, had the niche on doctrinal issues, including publication of Defence White Papers, etc., has received fresh Science and Technology (S&T) focus after the recent merger of six research institutes, earlier subordinate to the PLA's former General Departments[14], within its fold. This is aimed at closer alignment of S&T progress with doctrinal development. There have been new partnerships with civilian universities and research academies to achieve what the PLA refers to as "military-civilian fusion" (军民融合). Military educational institutes also contribute to writing joint training scenarios, organise training, participate in exercise assessments and evaluations, and provide a blue force of experts for the confrontation exercises. These changes are already bringing PLA academics and operational commanders in close contact, which should improve the quality of both groups.

Concept of 'System of System' Warfare and Integrated Joint Operations (IJOs)

Indepth study of the Gulf War (1991) and Kosovo conflict (1999) has led the PLA to adopt systems thinking (integrate so that the sum

is greater than the parts). China has adapted the US concept of net-centric warfare and aims to achieve the *"information system-based system of system operational capability",* and the IJO is the foundation to achieve this capability. As per the PLA's *system destruction warfare,* modern warfare would be a confrontation between opposing *operational systems* [作战体系] rather than merely opposing Armies.[15] The aim would be to paralyse the critical functioning of the opposing force by striking key points and nodes through kinetic and non-kinetic means by employing a more robust, capable, and adaptable operational system. These operational systems would be tailor-made for specific needs, employing all domains, including cyber, electronic warfare, psychological and others.

The PLA is presently undergoing a transition from coordinated joint operations to IJOs with the aim to integrate domains like cyber, electronic warfare, psychological and others, till the lower tactical echelons. Some of the important concepts associated with the system of system and IJOs, as discussed in PLA publications, include precision operations, modular forces groupings, information firepower strike, non-contact and non-linear operations.[16] To achieve these capabilities, the PLA has almost doubled its integrated training to almost 40 per cent. The ongoing Non-Commissioned Officer (NCO) reforms aim to build a more permanent technical oriented professional corps, thus, overcome problems arising out of the non-permanent nature of the conscription system. The concept of the system of system and IJO may seem more aspirational at this stage but a degree of these capabilities would be achieved by the end of 2020 and the PLA hopes to mature the same by 2035, coinciding with the laid down milestone of completion of informationalisation.

Evolved Key Capabilities for War-Fighting: Implications

The PLA has moved a long way from the Mao Zedonga's era military which was ground force-centric and lacked mechanisation. Most of the

evolving capabilities and structures in the recent past have been designed to achieve information system-based system of system operational and IJO capabilities. The implications of these structures and capabilities are as follows.

Integrated C4ISR

The development of integrated Command, Control, Communications, Computer, Intelligence, Surveillance, and Reconnaissance (C4ISR) is the backbone to achieve IJOs capabilities. Beidou-based integrated command platforms have been developed and made available till the tactical levels to all combat and support elements, which would provide seamless battlefield awareness and connectivity. There is focus on redundancy of communication by a combination of Optical Fibre Communication (OFC), satellite, combat net radio and establishing a communication grid through Unmanned Aerial Vehicles (UAVs), if required. Major advances have been made in developing a very expensive hackproof quantum communication. China successfully launched the world's first quantum-enabled satellite in August 2016.

Modular Forces and Brigadisation

As per the PLA concept of system of system, the 'operational units' are basic 'plug and play' modular units which can be rapidly structured to form bigger modular combat formations, as per requirement, thereby enhancing flexibility.[17] Within the ground forces, the combined arms battalion and brigade are part of such modular forces. The three regiments of the 15th Airborne Corps of the PLA Air Force (PLAAF) is also now reformed into six airborne brigades directly under the corps headquarters along with other support brigades.[18] The recent reorganisation of the PLAAF from 20-25 air regiments to a largely brigade structure today (as also the PLA Naval Aviation) makes it a more agile and flexible force.[19]

Non-Contact Warfare (NCW)

Some of the likely reasons for China's enhanced impetus to develop NCW capabilities, with the underlying principle of "fighting wars without suffering casualties" are lessons from their successful employment by the US in Gulf War, China's self-realisation of its lack of combat experience, coupled with the impact of its one-child policy. In order to achieve asymmetric advantage, China, over a period, has developed these capabilities in both the kinetic and non-kinetic spheres, as described below.

Cyber and Electronic Warfare

Chinese writings indicate "information domination" as the prerequisite for achieving victory in modern warfare. The PLA could use cyber warfare capabilities to support military operations in the early stages of the conflict by interfering in the adversary's mobilisation, targeting networks based on Command and Control (C2), C4ISR, logistics and others by exploiting extensive data collected by cyber reconnaissance during peace-time. The enhanced cyber activities would continue as force multipliers to the conventional capabilities during a conflict. Centralisation of cyber reconnaissance, cyber attack and cyber defence capabilities under the PLASSF would enhance the potential of NCW. The dual control of its assets at the theatre level also would facilitate war-fighting. The display of separate Information Operations Group during the 90th anniversary parade at Zhurihe in 2017 suggests the PLA's increasing priority to control the complex electromagnetic environment.[20]

Space and Counter-Space

China gradually realised the importance of 'space' when, in 2013, it become an independent and essential domain of modern warfare. All space-based programmes have been historically managed by the PLA, which, post current reorganisation, have become part of the Space Division of the

PLASSF. China's strategists regard the ability to use space-based systems and deny them to adversaries as central to enabling modern informatised warfare.[21] Post 2020, with a "high-resolution Earth Observation system" in place, China would achieve almost real-time Intelligence Surveillance and Reconnaissance (ISR) capabilities.[22] The BeiDou Navigation Satellite System (BDS) would achieve a global network by 2020, with higher grade accuracy for the military (navigation, guidance of missiles/weapon system).[23] In order to gain asymmetric advantage over the US (whose communication, ISR and navigation is mostly space-based), China's focus over the next decade would be the development of counter-space capabilities. Some of these existing Chinese capabilities include direct ascent Anti-Satellite (ASAT) weapons, co-orbital systems like the Aolong-1 and Directed Energy Weapons (DEW) which allegedly have been used in the past to blind US satellites.[24]

Unmanned Systems

As part of the advanced weapon systems programmes, China's unmanned system is the most rapid growing sector, being a low cost, safe, less escalatory and very versatile option.[25] While China has made some progress on the Unmanned Ground Vehicles (UGVs) and Unmanned Surface Vehicles (USVs), maximum expansion has been in UAVs and Unmanned Combat Aerial Vehicles (UCAVs) with almost 140 variants being presently operated by the PLA. Chinese armed drones (UCAVs) have been operated or ordered by 17 [mostly Belt and Road Initiative (BRI)] countries, with Pakistan producing a licensed version of the Wing Loong II model.[26] China set a world record in December 2017 when it succeeded in showcasing collective orchestration of over 1,000 miniature drones.[27] While presently, Chinese UAV models may lack in detection capabilities and overall endurance, when compared to US models, the ranges (with data link from Beidou) and payload capabilities are increasing.

Precision Strikes

A key part of China's PLARF arsenal is a large force of approximately 1,200 conventionally armed variety of Short Range Ballastic Missiles (SRBMs).[28] China is also fielding conventional Medium Range Ballistic Missiles (MRBMs) like the manoeuvrable warheads with higher accuracy DF 21D (1,500 km range) and DF 16 G missiles to conduct precision strikes against land as also aircraft carriers.[29] The CJ 10 ground launched cruise missile (ranges over 1,500 km), along with similar air launched land attack cruise missiles, offers flight paths different from the SRBMs, enhancing targeting options and flexibility. In addition, the PLA Ground Forces have in recent years acquired artillery rockets comparable in range to the SRBMs and may be acquiring tactical-range cruise missiles.[30]

Implications of NCW

In any future war, China is likely to have a protracted Network-Centric Warfare (NCW) phase prior to the contact phase. The "*Three Warfares Strategy*" adopted by the CMC in 2003, involving psychological warfare, public opinion warfare, and legal warfare, would be effective months and even years before the war. Now, with the PLASSF increasingly participating in all field joint exercises including 'Stride,' there would be greater impact of NCW in all stages of the battle.[31] The real-time ISR capability, coupled with improved Circular Error Probable (CEPs) of its SRBMs would translate into a precise and effective kinetic targeting of own operational assets and Vital Areas/Vital Points (VAs/VPs). The vertical Take-Off and Landing (VTOL) UAV, the AV 500 W, capable of carrying air-to-ground missiles, participated in the PLA exercise in Tibet in September 2018.[32] When deployed along the Sino-India border, these would pose additional challenges of detection and interception. The demonstrated smart, self-healing swarm drones can saturate enemy defences and undertake operations like Suppression of Enemy Air Defences (SEAD) very effectively. China considers its most innovative network warfare capability, including cyber

weapons, as 'single use resources' and would reveal them only to attain major strategic objective at the appropriate time.[33]

Pockets for Excellence (POE) for War-Fighting

The contours of the present modernisation and structures suggest that in the future, China would avoid attrition warfare. The concept would involve prolonged NCW, as described earlier, followed by the land campaign with more reliance on third dimensions (vertical envelopment) along multiple thrust lines. The POEs developed in the realm of ground forces to support this concept are as follows.

Special Operation Force (SOF)

One SOF or Special Operation Brigade is now grouped with each reorganised Group Army (GA)/Combined Corps (CC), including Xinjiang Military District (XMD) and Tibet Military District (TMD).[34] These forces in the Western Theatre Command (WTC), mostly co-located and training with aviation assets, are now equipped with the latest equipment like the QTS 11, an advanced integrated individual soldier combat system and, thus, would have a significant force multiplier effect at the tactical and operational levels.[35]

Air Assault Brigades

The Air Assault Brigades, formed by the merging of the motorised infantry division and aviation assets, were first displayed in air assault demonstration in 2017, at Zhurihe during the 90th anniversary military parade to mark the founding of the PLA. The air assault simulated the integration of reconnaissance, attack, and transport helicopters with infantry to secure a remote landing zone.[36] Currently, there is one air assault brigade each in 75CC/ STC and 83CC/CTC and more are likely to be raised.[37] These could well be utilised for *coup-de-main* operations against unheld areas on the Sino-India borders.

Aviation

Army Aviation as one of the "new-type combat forces" has been rapidly expanding, especially after 2015, with the PLA receiving its 1,000th helicopter in 2016.[38] Presently, the PLA Army Aviation comprises 13 brigades, one aviation brigade per CC (except 75 and 88, which have air assault brigade each), XMD and TMD.[39] Aviation is modernising quantitively as well as qualitatively, with the induction of the latest helicopters, including the WZ 10 attack helicopter, and the Z18, Z 8G, Z 20 transport version replacing the old MI 171, S 70, and aiming to achieve all-weather day or night capability.[40] The combined SOF and aviation expansion in the WTC, with increased helicopter bases close to the Sino-India border, provide increased heliborne capabilities thereby, altering the threat perception.

Force Projection and its Manifestation in IOR

The PLA Navy (PLAN) is gradually acquiring blue water capabilities aligned to its fresh orientation of 'offshore water defence with open sea protection', as highlighted in the 2015 White Paper. It is likely to operate three aircraft carriers by 2022. The PLAN is also rapidly expanding the Marines with presently seven battalions, has launched four of the planned eight world's largest Type 55 destroyers (displacement over 10,000 tons), capable of independent blue water deployments.[41] With five Type 71 Landing Platform Docks (LPDs), each capable of carrying a battalion group, and the under construction 35,000 tons displacement Type 75 LPDs, it would provide sizeable amphibious capabilities.

Since 2008, as part of naval diplomacy, China has sent 30 Anti-Piracy Task Forces in the Indian Ocean Region (IOR), generally comprising two battleships and a supply ship.[42] Regular naval exercises with foreign countries, especially Russia, have provided the necessary nuances of blue water operations. In addition, the PLA Air Force (PLAAF)has incrementally improved its power projection capabilities with frequent

exercises beyond the first island chain involving H-6K bombers equipped with the CJ-20 Land Attack Cruise Missiles (LACMs). Strategic lift is on the rise with increased induction of the Y-20 transport aircraft and the ongoing joint production of the world's largest transport aircraft (An-225) with Ukraine.[43] There are many reports of Chinese submarines' forays in the Indian Ocean, including nuclear ones (SSNs). With these developments, the PLAN is likely to be capable of undertaking meaningful combat manifestation in the Indian Ocean Region (IOR) by 2025.

Logistics for IJO

The PLA considers joint logistics an important foundation for its emerging IJO capability. A Joint Logistic Support Force (JLSF) was established in September 2016, with one central logistic base at Wuhan and five logistic centres in each Theatre Command. An integrated C4ISR, along with the Bediou-based Integrated Command Platform (providing real-time status) would provide the foundation to the Just in Time (JIT) responsive logistic framework. There is provision for a tailor-made contingency logistic support brigade to support the 'system of system' confrontation warfare.[44]

Lessons for India

Aligning Defence Modernisation with Political Vision

India is possibly the only democratic country where civilian control over the military is exercised by the bureaucracy rather than the political class. The experiences of the PLA and other developed militaries indicate that no transformative reform is possible without the direct involvement of the apex political leadership. In the absence of the required transformational changes, an empowered Defence Planning Committee (DPC) was established in April 2018, under the chairmanship of the National Security Adviser (NSA). While the DPC, headed by a political appointee, would play

an important role to bridge a key gap in the existing integrated capability building, it doesn't replace the ultimate need of an institutionalised CDS/ permanent Chairman Chief of Staff Committee (COSC). As, in the case of China, aligning defence modernisation goals with the national vision would also provide the required impetus to defence modernisation.

Integrated Theatre Commands

In the present set-up, the Indian armed forces are organised in 18 Commands excluding the Strategic Forces Command (SFC). In the event of hostilities with India, China would employ the Western Theatre Command (WTC) on the land borders and the Southern Theatre Command (STC) with the South China Sea fleet component at sea. In contrast, eight Indian operational commands (from the Indian Army and Indian Air Force) would be involved on land, and for the maritime domain, the Navy's Eastern Command and Tri-Service Andaman and Nicobar Theatre Command would also come into play, which incidentally report to the rotational Chairman COSC. There is no gainsaying the fact that in the absence of both a CDS/permanent COSC and a Joint Operations Directorate, there would be total lack of coordination which would adversely impact the operational effectiveness. Learning from China's approach and specific Indian conditions, it is recommended that the undermentioned actions be undertaken as a precursor to implementing the proposed unified structure in the Indian armed forces.

- Synchronise the boundaries of different operational commands of the three Services, in the same theatre of war. Wherever possible, the headquarters of these commands to be co-located, with cross-posting of staff officers from the three Services up to the division levels and equivalent. These steps would instill better coordination.
- In 2018, China had brought all its border defence formations directly under the CMC with no dual control by the state which would make them more responsive to the PLA in all contingencies. Similarly,

the Indo-Tibetan Border Police (ITBP) deployed on the northern borders needs to be under the Army's operational control for greater operational synergy and optimal utilisation of resources.

- Appoint a Permanent Chairman, Chiefs of Staff Committee, as recommended by the Naresh Chandra Task Force in 2013. Besides the tri-Service institutions presently under the CISC, he should command future Integrated Functional Commands (Space, Cyber, Special Forces). He may also be mandated to integrate logistics, training and such functions in a time-bound manner and undertake pilot studies for further integration.

Integration for Jointness

The reservations amongst the various stakeholders in India have resulted in the less than optimum level of jointness required to address the threat arising from the reformed armed forces of China in the near future. There is a need to combine the top down and bottom up approach to achieve gradual 'integration' of various functions which will act as a catalyst and ultimately lead to the desired end state of 'jointness'. While functions like communication between the Services have achieved a fair level of integration, the following aspects/areas which possibly can be integrated are as under.

Logistics

The logistics chain of various operational commands of the different Services can be integrated after some restructuring. Learning from China's experiment, initially, only common or general logistics may be integrated while retaining separate Service specific requirements.

Professional Military Education (PME)

Knowledge integration of commanders with common procedures and staff work between the Services would be an inescapable necessity for future wars. In order to implement cross-posting of staff officers, as

recommended above, joint training of staff officers by integrating our training institutions like the Defence Services Staff College (DSSC) (same course curriculum) and co-locating the Higher Command (HC) and equivalent courses from the three Services need to be instituted as a first step. India may explore China's experience as part of civil-military integration and that of the US since the 1990s, wherein more and more civilians are being inducted as faculty members in military academic institutions. This, along with allocating training slots in joint Services training institutions for the bureaucrats handling defence matters in the Ministry of Defence, would also enhance civil-military integration.

Training

More focus is required on joint planning rather than merely joint operations during training. More integrated training is the need of the hour, with participation of not only Service platforms but also aspects like cyber, space, information warfare in realistic settings, down to tactical levels. Existing Service specific training areas, with a scale of at least one per Army Command should be gradually converted to Integrated Training Bases (ITBs) as enabling infrastructure. Employing a state-of-the-art enemy force combined with simulation techniques could help in evolving more efficient procedures and tactics. All outcomes of war-games and exercises need to be retained as data base for feeding in the Artificial Intelligence (AI) enabled national level joint simulation centre which is recommended to be established in the near future.

Doctrine and Strategy

China has been publishing Defence White Papers since 1998, with the 2015 White Paper on "Chinese Military Strategy," being the ninth in the order. India published the first unclassified Joint Armed Forces Doctrine in 2017 despite the absence of any formal National Security Strategy and National Military Strategy. For these reasons, the doctrine may not

be perfect, nevertheless, it provides a window into the beginning of a formal articulation of India's guiding strategic thought. In the past, India has come out with various informal limited war doctrines addressing the western adversary, like "cold start doctrine" to sub-conventional, covert action (informally called "hot pursuit" or "surgical strike"), with some degree of success on the intended impact. There is a need to articulate an appropriate doctrine for the northern front to bridge the increasing gap in military capabilities. As an example, there is possibly a rethinking on the "no first use" nuclear policy within China in certain conditions considering its powerful adversary (US).[45] Similar reconsideration by India may also be debated to enhance our deterrence.

Defence Industry Reforms

India's defence industry has gained traction with the government's policy changes and reforms such as streamlining of the Defence Procurement Procedure (DPP 2016) and changes in Foreign Direct Investment (FDI) regulations from 26 to 49 per cent. Despite the above steps and unrolling of the Strategic Partnership Policy (SPP) to create capacity in the private sector, the process remains complex, with limited flow of FDI and less than optimum utility of the Defence Public Sector Undertakings (DPSUs). India could gainfully utilise China's reforms experiences wherein the State-Owned Enterprises (SOEs) are benefiting from civil-military integration in the fields of R&D (dual use patents) and more cost-effective practices. It would go a long way to create an efficient ecology by establishing widely distributed "science cities", industrial parks, and high-tech zones near our defence-industrial corporations. This would also facilitate absorption of disruptive technology in which there is substantial expertise available in Indian private industries, like AI, nano technology, robotics, and others for military purpose. India may also reduce the state's financial burden in its state enterprises by broadening access to capital market financing from issuing bonds and equity, as now being done in China.

Domination of IOR

With China's threat of manifestation in the IOR looming large in the foreseeable future, India may draw valuable lessons from China's Anti-Access/Area Denial (A2/AD) strategy against the US military intervention in its immediate areas of concern. India should maintain its focus on deepening security cooperation with regional partners to ensure the effectiveness of its radar initiative as part of an ambitious project to build a maritime domain awareness network across the Indian Ocean.[46] It would be prudent to further expand the strategic reach of the Andaman and Nicobar (A&N) Islands. The strategically located Lakshadweep Islands, which also comprise a natural unsinkable aircraft carrier, like the A&N Islands, could be developed and converted into another Tri-Service Command, along with the Southern Naval Command in Kochi.[47] Taking a clue from China's 'underwater great wall' project, India too could deploy sensors on the bottlenecks of the Straits of Ombai Wetar and Lombak, from where Chinese submarines could enter the IOR, submerged and undetected. Gradually enhancing Maritime Domain Awareness (MDA) in the South China Sea would provide the required leverage to the Indian Navy.

Increase Interaction with PLA Institutions

The PLA plays an important role in China's foreign and security policies, be it relations with neighbours or its interests overseas. Therefore, it is necessary that the Indian establishment deepen its contacts with PLA academies and institutions. Indian think-tanks can play a role in this regard.[48] The National Defence College (NDC), Higher Command (HC) and equivalent courses should regularly visit China as part of foreign study tours. Similarly, more training courses at various training institutions may be allotted for the PLA in India on a reciprocal bases. The frequency of joint exercises like 'Hand in Hand' needs to increase. These interactions would provide insight into China's perspective on various issues and the future contours and challenges of its defence reforms.

Operational Concept

PLA modernisation is primarily aimed against a superior adversary (the US) and the application of its new force structure based on mechanisation gives it an edge in some areas in eastern Ladakh and northern Sikkim opposite India.[49] Indian military's operational concepts need to be tailored to the nature of the terrain which imposes mostly attrition warfare beyond the crust of the Tibetan plateau, and assessing the Chinese military threat post reorganisation in view of the increased special forces, aviation and NCW capabilities. In accordance with its doctrine on frontier defence, China does not follow the concept of ground holding and most of its conventional forces are in the interior—to be surged in times of crisis, supported by a well-developed infrastructure. With China's focus on border development, many more valuable objectives have emerged closer to the LAC.

Operational Structures and Capabilities

Cyber and Space

China has integrated cyber and space under the PLASSF which is directly under the CMC. In India, the diluted versions of integrated functional commands in the form of the Defence Cyber Agency and Defence Space Agency may be a good beginning but are short of the desired level of integration. For example, post reorganisation, the cyber aspects for critical and non-critical infrastructure would be the responsibility of the National Technical Research Organisation (NTRO) and Ministry of Electronics and Information Technology (MEITY) respectively, with separate defence cyber agencies for the different Services. Thus, the structures are still in compartments, and functioning through coordination without integrating has its pitfalls and needs to be factored for further reforms.

Approaches to Develop C4ISR Capabilities

To bridge rapidly growing gap with China in space and ISR capability, a separate focussed well-articulated military space programme is needed to develop indigenous space and counter-space capabilities. India would need many more satellites in the Low Earth Orbit (LEO) [both Earth Observation (EO) and Synthetic Aperture Radar (SAR)] with better resolution to match the almost real-time revisit that China is likely to achieve by 2020. To cater for redundancy and counter-space weapons, India needs to develop capabilities to launch LEO satellites on demand. India's latest test of ASAT weapon capability on March 27, 2019, is indeed a strategic achievement. Enhanced focus on UAVs and other platforms for Electronic Intelligence (ELINT) is needed for the northern borders. India should fully the utilise provisions of COMCASA, or Communications Compatibility and Security Agreement signed with the US in September 2018, for intelligence sharing, including real-time imagery. India needs to undertake a pilot study for harnessing the power of research in AI and Internet of Things (IoT) in the private sector to develop an efficient model for network-centric warfare capabilities.

Adapting to Non-Contact Warfare

On priority, India should invest in, or acquire, advanced UAVs (including UCAVs) and counter UAV technology against China's significant expansion of similar capabilities. India's BrahMos supersonic cruise terrain hugging missile, with steep dive capabilities, is most difficult to intercept.[50] Increased production and further modifications to the BrahMos missile (including a hypersonic version) which is already capable of being launched from the sea, land, and air would be an apt response to China's precision strike capabilities. Induction of such an indigenous system in good numbers could again be a very cost-effective solution to bridge the SRBM gap with China.

India needs to gradually develop the indigenous and secure Indian Regional Navigation System (IRNSS) receiver chips for all our long-range vectors. Creating redundancies in command and control structures and communications, forward logistics, ability to fight when cutoff, maintaining conventional methods of operations without over-reliance on satellite-based utilities (for example, artillery shoots) would be some of the war-fighting methods to adapt in the NCW setting. China's enhanced SRBM capabilities may necessitate more dispersal of own Air Force assets and the need to acquire advance technology for a more effective Runway Rehabilitation Scheme (RRS). There is also a need to acquire more precision strike standoff armour piercing munitions by the Air Force in view of the increased mechanisation of the PLA.

Asymmetric Strategic Capabilities

With China's official military budget three times that of India, it wouldn't be prudent to match China's defence capabilities strength with strength. Till India achieves such capability, an indirect approach may be the preferred option to deter China. China's famous book "*Unrestricted Warfare*" written by two Chinese Colonels in 1999 had advocated how China can defeat a technologically superior opponent (such as the United States) through a variety of means including "military and non-military" and with "no rules, with nothing forbidden". China has demonstrated the same with its regional competitor, India, by creating Pakistan as its proxy, and continues to block Masood Azhar being designated as a terrorist even post Pulwama attack, while it considers the Dalai Lama as a radical separatist. India needs to consider the option of supporting the Tibetan cause, engage with the youth there who may be used as a strategic asset in case China escalates the situation along the borders. To cater for such a situation, India needs to plan for, and be involved in evolving, a post Dalai Lama scenario. At the same time, India should monitor resumption of secret talks after a long gap between the Dalai Lama's representative

and Chinese United Front Works Department (UFWD) and the source of increased funding of monasteries along the Sino-India border. Taking a cue from the imperial era practice, China could even be using the powerful Tibetan cultural connectivity for expanding its influence across the Indian Himalayan belt, Mongolia and Russia.[51] Thus, blindly playing the 'Dalai Lama card' may be a simplistic approach. The ongoing initiative under the Border Area Development Plan (BADP) along the Sino-India border would arrest the migration of locals from these remote areas.

Exploitation of PLA Grey Areas in Reforms

India's own defences should to be organised in the classic mountain warfare format to force the PLA to fight attrition warfare which it is presently not equipped to do. This is due to the PLA's over-reliance on mechanisation, lack of real combat experience since 1979 and likely reduced foot infantry post the reforms. The holding units should train and equip one-fourth of their strength to operate in small teams akin to the Ghatak platoon for standoff fire assaults, act as stay behind parties, and prevent the main defences being cut off and bypassed.

Considering the rugged terrain and not so developed infrastructure, there needs to be more reliance on a reactive, distributed and mobile force structure, in tandem with scouts, based on the sons of the soil concept, dovetailed in the overall conventional defensive framework. Increased employment of long range anti-tank weapons in selected areas in eastern Ladakh and north Sikkim will prove effective against mechanised thrust lines in narrow mobility corridors. Heliborne insertions by enhanced aviation assets and SOF in the WTC, including employment of air assault formations have their limitations in high altitude areas due to the reduced carrying capabilities of helicopters, necessitating large trails through valleys. Such attempts could be thwarted by deploying more mobile Air Defence (AD) resources [Man-Portable Air Defence System (MANPADS)] along the valleys.

Conclusion

China's recent military reforms are transformational in nature, which would bring China's hard power to the next level post 2020. Its growing footprint in South Asia and the extended IOR, along with collusion with Pakistan, has added to India's security concerns. There is a variance in the ways to deal with these existing challenges: while the larger political dialogue emphasises cooperation and restrains competition, there is, nonetheless, a growing awareness that India needs to develop reliable and effective hard power as a dissuasive strategy against China. It may not be possible at this stage for India to compete with China in defence spending, but it is extremely prudent to fully optimise and integrate its limited resources. To achieve the same, India needs to take concrete steps to develop its hard power by transformative reforms in the defence structures at all levels, in a time-bound manner.

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Has Pakistan's Military Doctrine Transformed?

Jyoti M Pathania

Introduction

The importance of military power will remain as long as the nation state exists. Some prominent military strategist and thinkers like Chanakya, Clausewitz and Sun Tzu believed that no nation could be secure unless it had a powerful military, which could deter a potential adversary. Military power is the power that not only determines a country's power ranking but, for many states, the development and growth of their military power becomes a catalyst for their rise to great power status.

For any military of the world, it is a perhaps necessary to have a basic rule/principle or a set of beliefs to serve as its foundation. This is best encapsulated in the form of a doctrine. But the question arises: should the doctrine also reflect the modernisation and transformation which is required to keep the military upgraded and up to date? This would involve a change in the mindset/thought process, review of doctrine, strategy, war-fighting, concept, organisational structures, human resource optimisation, training methodology and logistics concepts in order to meet the operational challenges of the future. In other words, transformation would require a profound change in the overall military affairs.

In view of this, the article will examine if any changes have taken place in Pakistan's military doctrine. In doing so, the article is divided

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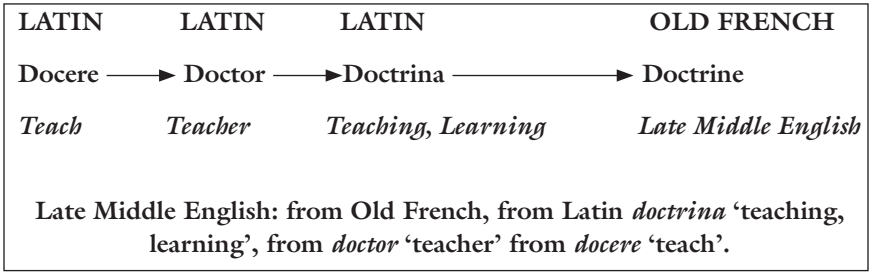
into three parts: part one traces the etymology of the word doctrine and defines military doctrine; part two, covers the typology of doctrine; and part three, studies the fundamentals of Pakistan's military doctrine in a two-fold perspective: (a) functions of a fundamental military doctrine; (b) roots of a fundamental military doctrine, and analyses the changes in the doctrine.

Part One: Etymology of Doctrine

The word doctrine has its origin in the Latin word *docere*, which means teach. Doctrine is a teaching of a school, religion or political group. The etymology of the word can be traced in the diagram below:

Fig 1: Etymology of DOCTRINE/DɒKTRɪN



Source: Google search

Military Doctrine

A military doctrine is the fundamental set of principles that guide military forces in pursuit of national security objectives and is an important part of the building material for military strategy. It represents central beliefs or principles of how to wage war in order to achieve the desired military ends. Thus, it provides ways to use military means against a given type of threat or scenario and also has implications for force structure, training and equipment.[1]

The ideal military doctrine should be truly joint, integrating land, air, maritime, and special operations in an effective way to achieve the

military objectives. It should be flexible enough to deal with any kind of foreseen and unforeseen threats. Clausewitz believed that a doctrine must also reflect the political interests and objectives, as well as the capabilities which are made available for warfare.[2]

Military doctrines often differ by country or military Service of origin. According to Dennis Drew and Don Snow, a military doctrine is "what one believes is the best way to conduct military affairs". The use of the word believe suggests that a doctrine is the result of an examination and interpretation of the available evidence and this is subject to change and new interpretation, depending upon the new technology and the new circumstances. The term best connotes a standard—a guide for those who conduct military affairs.[3] In the modern form, a military doctrine consists of a series of written manuals that together are representative of the military's institutional belief system, according to Aaron P. Jackson.[4] Doctrines, therefore, provide the military with an authoritative body of statements on how military forces conduct operations and provide a common lexicon for use by military planners and leaders.[5]

Part Two: Typology of Doctrine

There are three types of distinct doctrines, according to Dennis Drew and Don Snow:[6]

- Fundamental
- Environmental
- Organisational

Fundamental Doctrine

This is the foundation for all other types of doctrine. The nature of war, the purpose of military forces, the relationship of the military forces to other instruments of power and similar subject matters on which less abstract beliefs are founded, all come under the rubric of a fundamental doctrine. Two significant characteristics of a fundamental doctrine are:

- The timeless nature of a fundamental doctrine which seldom changes since it deals with basic concepts and not contemporary techniques.
- A fundamental doctrine is relatively insensitive to changes in political philosophy or technology.[7]

Environmental Doctrine

The expanse of sea power, air power, land power and space power is dealt with in this doctrine. It is a compilation of beliefs about the employment of military forces within a particular operating medium only; hence, it is narrower in scope than the fundamental doctrine. It is significantly influenced by factors like geography and technology as in the case of the sea power doctrine.

Organisational Doctrine

This doctrine discusses the role and missions of a particular military organisation, current objectives, administrative organisation and force employment principles as they are influenced by the current situation and in some cases, tactics. In addition, the organisational doctrine is current and must change to stay current.[8]

In order to understand these doctrines better, it is necessary to understand their interrelationships. Dennis and Don have studied this by visualising all three as the trunk of the tree. The trunk of the tree is the fundamental doctrine and has its roots in history—the primary of the doctrine. The tree branches represent the environmental doctrine—each springing from the same tree yet all related. The leaves represent the organisational doctrine—dependent on both the trunk and the branches and changing from season to season. This is diagrammatically depicted below:

Fig 2: Doctrine Tree

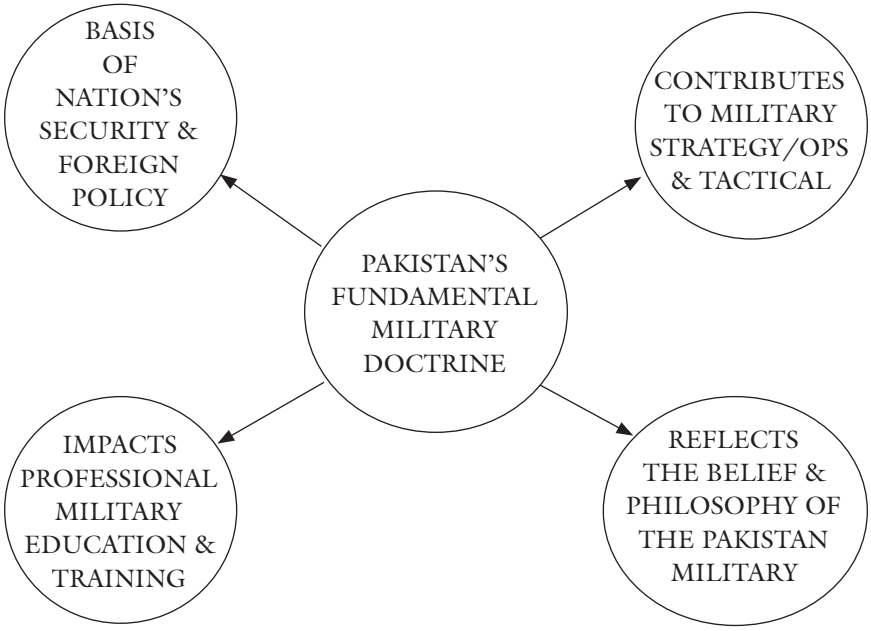
Source: Dennis Drew & Don Snow.[9]

Part Three: Pakistan's Military Doctrine

Fundamentals of Pakistan's Military Doctrine

The fundamentals of Pakistan military doctrine are based on the historical past; institutional belief systems and experience; ethos and principles of the military. Each successive generation of the military is not only taught these fundamental beliefs but is required to abide by then. The doctrine provides a philosophical foundation from which the thinking begins. This function is best represented in the diagram below:

Fig 3: Functions of the Pakistan Military Doctrine



Source: Prepared by the author.

Roots of Pakistan's Fundamental Military Doctrine

- Islam
- *Jihad* and Terrorism
- Kashmir
- India Factor
- Nuclear Factor

Islam

Starting from General Tikka Khan to the present Chief of the Pakistan Army, General Qamar Javed Bajwa, all regarded the military as the guardian of the state and protector of Islamic democracy. The military is Islamic in its ideology even today. The nexus of the retired Army officers and the religious Islamist groups is only growing stronger and bigger.

To quote Lieutenant General Ghulam Muhammad Malik, "Islam is a complete code of life and all aspects of it have been explained in the Quran. The life of the Holy Prophet (peace be upon him) provides us a complete example of how the Islamic code of life should be implemented. This includes the exercise of leadership in all spheres of life, especially the military spheres."[10]

Islamic Concept of Military Leadership

- Firm belief in the basic tenets of Islam i.e. "*Tauheed*"(belief in the oneness of Allah), "*Risalat*" (the belief that Allah has been sending his messages of divine guidance through various prophets, "*Akhirat*", (the belief that all human beings and *jinns* will have to render an account of their deeds on the Day of Judgement).
- Firm adherence to the mission assigned by Allah, through the Holy Prophet (peace be upon him).
- The aim of the whole struggle must be to seek the will and pleasure of Allah.
- A strong character based on the teachings of the Quran and moulded after the life of the Holy Prophet.
- To create an environment where it is easier to be pious and difficult to do evil.
- A state of preparedness for war that strikes terror into the hearts of the enemies.
- During war:
  - Remembering Allah at all times and living according to his dictates despite odds.
  - Complete trust in Allah's help and a firm belief that he will fulfil his covenant.
  - Exemplary display of bravery, sacrifice, steadfastness and professional competence.

The Islamic concept of leadership is required to be adopted by the military, at both the individual and collective levels.

- **At the Individual Level:** Each officer is expected to undertake the following:
  - Study the Quran and understand the Islamic concept of leadership.
  - Study the Islamic history of great leaders like the Khulfa-e-Rashideen.
  - Study the great Commanders like Tariq, Khalid bin Waleed, and Abu Obaida, who strongly implemented the Islamic concept of leadership.
  - Strive for professional competence and excellence.
- **At the Collective Level:** The officers should make all possible efforts to:
  - Create a clean and healthy environment.
  - Strive to remove the dichotomy between thought and action.
  - Help subordinates to become true Muslims.
  - Prepare for war in accordance with the Quranic injunctions and the life of the Holy Prophet.
  - The Military Academy curriculum should emphasise the "Islamic dimension of strategy", namely, fighting for the honour and memory of the previous generation, as well as the larger Muslim community.[11]

Analysis

Pakistan's fundamental military doctrine has an Islamic approach. Part of the Army's legacy is the idea that any insult or slight must be avenged, not only to punish the aggression of the enemy but also to honour the sacrifices of the earlier generation. This serves as a motivational strategy against its superior enemy, India. Using Islam for a variety of institutional and national goals will continue in the near future as well. Hence, nothing much has changed with respect to the usage of Islam as an important ingredient of the fundamental military doctrine.

According to Brigadier Askari Raza Malik of the Pakistan Army, in a society that owes its existence to Islam, its adoption is inescapable; any other system based on borrowed concepts will never appeal to the heart and soul of a Muslim soldier. With regard to modernisation and transformation, he observes that all modern techniques which are not foreign to this concept can be accommodated while working out the details.[12]

Jihad and Terrorism

Use of *jihad* and terrorism by Pakistan continues unabated. Its inability and its unwillingness to give up Islamist militancy remains the unofficial policy of the Pakistan Army. And it has used it or rather abused it profusely against India, especially in the Kashmir region. In the words of Ayres, "The multiple players who make up the Deep State in Pakistan have constructed an ideological environment in which *jihadis* flourish. The Pakistan Army can manipulate some of these players or deploy them for its own purposes. But I am not convinced if it knows how to drain the ideological swamp since that would require a complete rethink of how it defines Pakistan as a state. In other words, even if the willingness to disarm all militants were there, the Pakistan Army doesn't have the imaginative capacity to know how to get underneath the problem".[13] The Pakistani Deep State has, as universally accepted, conceived the contours of, and formalised, the employment of terror as an extension of state policy.[14]

Analysis

The use of terror as a means of warfare has helped justify covert Pakistani support for militant groups operating in India administered Kashmir and India itself. If terror is sanctioned by the Quran, then it is a legitimate instrument of power. This position is widely held in the Pakistan military. Therefore, the justification for the continuation of *jihad* and terrorism.

In the words of Hussain Haqqani, "Pakistan sees *jihad* as a low cost option to bleed India. The security apparatus views terrorism as irregular warfare. Islamabad feels this is the only way to ensure some form of military parity".[15]

State sponsored terrorism has time and again surfaced as the DNA of the Pakistan Army[16]—be it the Pulwama terror attack, Pathankot attack, Uri attack, Indian Parliament attack—the list is never ending. The hands of the Pakistan Army are not clean: its continued support for India focussed militant groups like the Lashkar-e-Taiba (LeT) and Jaish-e-Muhammad (JeM) is well known and well documented in various studies. Hence, the Army cultivates a deep respect for the values of *jihad* which is evident in much of its professional literature as well. The Pakistan Army is not about to give up its use of *jihad* and terrorism as a strategic weapon against India in the times to come.

Kashmir

Since the partition of the Indian subcontinent, Kashmir has been a constant factor in the Pakistan's military mindset. The military as well as the political brass have always believed that Kashmir remains the unfinished agenda of the partition and the core of all the problems. Pakistan has always followed a covert action capability for keeping India bleeding and ultimately annexing Jammu and Kashmir (J&K). It has initiated four full scale wars, countless border skirmishes and a number of small scale proxy wars with India to wrest Kashmir, in 1947-48, 1965, 1971 and 1999. Kashmir remains an intractable conflict. Time and again, the Kashmir issue is raked up not only in the political discourse but also by the Army Chief General Qamar Javed Bajwa, who has repeatedly reaffirmed Islamabad's support for "self-determination" in J&K. Addressing the Defence and Martyrs Day ceremony organised at the Pakistan Army Headquarters in Rawalpindi on September 06, 2018, which was attended by Prime Minister Imran Khan, Bajwa said Pakistan supported the people in J&K in their

"struggle for the right to self-determination". He also said, "The Pakistan Army learnt a lot from the 1965 and 1971 Wars with India and has made the country's defence impregnable by developing nuclear weapons".[17] The Pakistan military acquired the covert capability from the Central Investigation Agency (CIA) in the 1980s for use against the Soviet troops in Afghanistan. It is now being used against India and the Hamid Karzai government of Afghanistan.[18]

Analysis

The Pakistan military will never change its policy on Kashmir. Its nurturing of the militants, and using them as tools to expedite its own aims will continue in the near future as well. The active support of the Army in instigating the Kashmir insurgency will continue unabated. The Pakistan military thrives on the active support it renders to the Kashmiri insurgency. The support is religious, moral, political as well as economic; and the instruments it profusely uses are *jihad* and terrorism. There will be no change in this fundamental military doctrine in the times to come.

India Factor

Since independence, Pakistan has suffered from a small state syndrome vis-à-vis India. The Pakistan military has always considered India as its main enemy. "The seeds of hostility and discord were sown right from the birth of Pakistan, and its visceral hatred for everything India has been the cornerstone of its short-sighted policies since 1947".[19] "Bleed India with a thousand cuts", is a military doctrine followed by Pakistan against India. It consists of waging a covert war against India, using insurgents at multiple locations. This dictum is taught in various studies conducted by the Pakistan military, particularly in the Staff College, Quetta.[20]

Analysis

Pakistan fundamentally believes in having an aggressive posture towards India. The war of 1965 was initiated by Pakistan. The flawed concept of "the defence of East Pakistan lies in the west" remained the basis of its military strategy till the surrender at Dhaka in 1971.[21] Its aggressive posturing was also evident in its strategy to destabilise India through covert support for Sikh separatists throughout the 1980s, and its sponsoring of terrorist activities in the J&K region since the late 1980s is well known. In the 1990s, the Kargil misadventure was again led by Pakistan with the aim of acquiring the territory of Kargil. Pakistan has always followed a doctrine of "offensive defence", given Pakistan's size, location, and terrain along its eastern border with India. In times of crisis, Pakistan has not hesitated to be the first to resort to force to gain the initial advantage. The Quranic concept of *jihad* continues to be the basis of the Islamic strategic doctrine.

Nuclear Factor

The logic behind having a nuclear capability is again Indo-centric. It was only after the defeat in the 1971 War that Pakistan decided to develop its nuclear capability. It finally acquired the nuclear capability in 1987 as admitted by General Mirza Aslam Beg.[22] Thereafter, the concept of nuclear deterrence became a vital element of Pakistan's fundamental military doctrine. The nuclear factor constitutes the most modern and advanced tenet in its fundamental military doctrine. Time and again, it has used this factor to blatantly attack India.

Analysis

There has been no change in the Pakistan Army's attitudes and values in the past 37-year period and there is no reason to expect that it will change appreciably in the future, and certainly not in the next decade, as said by David O. Smith in his study of the Pakistan military. He states

that the Pakistani military (read officers cadre of the Quetta Staff College course) believes that India is less of a threat to Pakistan than the terrorist groups targeting the state institutions.[23] But, the narrative in the Army establishment and the training institutions has been that India is an existential enemy. This narrative will remain embedded in the mindset of the military and be a vital factor in Pakistan's fundamental doctrine.

Conclusion

Though a review of the military doctrine has been done a number of times, the fundamentals have remained the same. The environmental factors have helped in the review of the doctrine in relation to internal security, for instance, now priority is given to the creation of a sub-conventional warfare capability to fight domestically against non-state actors who are posing a threat to Pakistan's internal security. Pakistan's fundamental military doctrine will maintain its continuum for decades, since the very foundation of this state was based on the anti-India syndrome. Until and unless this changes, the roots of its fundamental military doctrine will only go deeper and deeper. Robert G. Wirsing believes that Pakistan's radical strategic transformation is most unlikely to happen because it would sacrifice Pakistan's vital national interests.[24] No nation will ever let its national interest be at stake. Hence, the roots of Pakistan's fundamental military doctrine remain strong, intact and firm.

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Pakistan's Relations with China and the US: Increasing Misgivings on all Sides

Gurmeet Kanwal

Introduction

The vision of a *naya* (new) Pakistan enunciated by Prime Minister Imran Khan, Chairman of the Pakistan Tehreek-e-Insaf (PTI) Party, faces seemingly insurmountable challenges. The new government has inherited poor relations with India, continuing conflict along the Af-Pak border, intractable internal security challenges, a failing economy, with a huge external debt and a steady souring of relations with the US. It also faces the possibility of a dent in its relations with China.

By accommodating and promoting the geo-strategic interests of China and the United States in Southern Asia over several decades, Pakistan made itself virtually indispensable to both. However, the Trump Administration is unwilling to countenance the Pakistan Army's doublespeak and has drastically curtailed military aid. And, in a bearhug which the Pakistanis did not see coming, China has entangled the country in a web of debt through the China-Pakistan Economic Corridor (CPEC).[1] China intends to make the CPEC the flagship project of its ambitious 'Belt and Road Initiative' (BRI) for the geo-political and economic domination of Asia.

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Pakistan-China Relations and CPEC

The China-Pakistan relationship, called an "all-weather friendship", has been variously described as "higher than the mountains, deeper than the oceans, stronger than steel and sweeter than honey". China has provided nuclear warhead technology and ballistic missiles to Pakistan. The two countries also have a close relationship in jointly manufacturing military hardware, including fighter aircraft and main battle tanks. Pakistan's support has been a major factor in China's quest for the strategic encirclement of India. The relations between the two have deepened further with the CPEC beginning to take shape even though apprehensions are emerging regarding the feasibility and likely benefits from the project.

Passing through disputed territory in Gilgit-Baltistan and Pakistan occupied Kashmir (PoK), the US$ 62 billion CPEC project will link Xinjiang province of China with Gwadar port on the Makran coast west of Karachi. However, doubts have been expressed regarding the economic viability of using Gwadar as a warm water port by mainland China. Funds for this ambitious project will be provided by China both through the Asian Infrastructure Investment Bank (AIIB) and by way of direct government-to-government soft loans.

To help it to recover its capital investment in the Gwadar port complex, for example, China will get 91 per cent share of the revenue from the operations of the port and the terminal, and 85 per cent of the revenue generated by the free zone.[2] Under this arrangement, though the port is expected to handle one million tonnes of cargo annually, the impression in Pakistan is that the benefits will accrue mainly to the Chinese. Also, there are misgivings within Pakistan regarding the debt trap that the huge investment in the CPEC will result in. The Pakistani elite are no doubt watching the disaster that the developments in Hambantota port and international airport have been for Sri Lanka. (China has taken over *de facto* possession of the port and the airport at Hambantota as Sri Lanka is unable to repay its debt.)

Resentment Against CPEC in Balochistan

Balochistan is Pakistan's largest province, but has the lowest population (13 million) and is the least developed. For over six decades, Pakistan has extensively exploited the rich mineral resources of Balochistan. The Government of Pakistan does not pay Balochistan any royalty or give it what it considers its due share of the revenues generated from the mines.[3] Due to the lack of transmission lines, electric supply to Balochistan is the lowest of all the provinces.

China is also extremely concerned about the safety and security of its workers engaged in construction work in the CPEC projects. Baloch independence movements have made it clear several times that they will not abandon their people's future in the name of development projects or even democracy. Chinese workers have also been targeted.[4] Three Chinese workers were injured in an attack in Balochistan on August 11, 2018.

Though Pakistan is raising a Special Security Division comprising approximately 15,000 personnel to provide security for the CPEC against terrorist attacks, the construction of a dam by the Chinese in Gilgit-Baltistan has shown that eventually People's Liberation Army (PLA) soldiers are inducted for this purpose.[5] The presence of PLA personnel in Pakistan in large numbers will further vitiate the security environment in South Asia.

Pressure on Pakistan to Act Against the Taliban

US and Pakistani interests coincided during the war against Communism and Pakistan was invited to join both the Central Treaty Organisation (CENTO) and Southeast Asia Treaty Organisation (SEATO). Pakistan was instrumental in facilitating the initial approach in America's policy to open up to China. The US has been a major supplier of modern weapons and military equipment to Pakistan, including the F-16 fighter aircraft. These were provided ostensibly for counter-insurgency operations and to

support the Pakistan Army to maintain stability against a *jihadi* takeover of the country. In the last decades, military aid was also given to encourage Pakistan to act against the Afghan Taliban. However, Pakistan failed to act decisively.

As had been widely anticipated, President Trump put Pakistan on notice for encouraging terrorist organisations to destabilise neighbouring countries. He blamed Pakistan for harbouring "safe havens for terrorist organisations, the Taliban, and other groups that pose a threat to the region and beyond." Trump told Pakistan that it has "much to gain" from partnering with the US, but also warned the country that "it has much to lose by continuing to harbour criminals and terrorists." The US has provided security assistance worth approximately US$ 33 billion to Pakistan since 2002. In the budget for 2018, this has been reduced to US$ 150 million. Most recently, the US has drastically cut the participation of Pakistani officers in training programmes. Also, the US has warned the International Monetary Fund (IMF) not to approve a new bailout package Pakistan as the new loans will be used to repay the Chinese debt.

Estrangement with the US is likely to further propel Pakistan into the Chinese arms. Russia too is waiting in the wings to exploit the emerging situation to its advantage. It has begun to provide military equipment to Pakistan and has even offered to train Pakistani officers to fill the gap created by the restrictions imposed by the Pentagon. Iran, which too is facing tougher US sanctions, has invited Pakistan to join hands for the development of Chabahar port to provide a new route to Afghanistan and the Central Asian Republics – a project in it has which a major stake.

Collective Security

In China's plans for the CPEC and hegemony in Asia, Gwadar is an important foothold that is part of its 'string of pearls' strategy for the Indo-Pacific. If Gwadar port is converted into a naval base some time in the future, it will enable the PLA Navy to maintain a permanent

presence in the Arabian Sea and the Gulf of Oman. Both China and Pakistan view the development of Gwadar port as a 'win-win' situation.[6]

However, the new challenge posed by China in the Indo-Pacific is unlikely to go uncontested. The US has renamed the Pacific Command as the Indo-Pacific Command. In November 2017, senior officials of Australia, India, Japan and the US, meeting on the sidelines of the East Asia Summit in the Philippines, agreed that a "free, open, prosperous and inclusive Indo-Pacific region serves the long-term interests of all countries in the region and of the world at large".[7] This development led to speculation that the idea of a Quadrilateral Security Dialogue (also called the QUAD) is being revived after a hiatus of ten years. Though India does not at present favour a formal security arrangement, the QUAD's discussions for cooperative security are likely to eventually lead to strategic realignment for peace and stability in the Indo-Pacific.

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China's Long Range Bombers a Strategic Challenge to the Region

Narender Kumar

Introduction

The Long Range Strike Bomber (LRSB) fleet is a legacy left behind by the Cold War era when trans-regional and inter-continental range bombers were part of the nuclear triad. The United States (US) and Soviet Union maintained LRSBs primarily to support nuclear missions but during the height of the Cold War, these bombers were also kept ready for conventional missions. China has been working for long to develop LRSBs to put in place a credible nuclear triad.

China has redefined its strategic boundaries and is asserting to break the myth of the 'first and second island chains' to project power beyond these geographical bottlenecks through maritime and air power. The strategic bombers give China flexibility to gain access to the Western Pacific and north-south movement along the Asian seaboard to complement its Anti-Access/Area Denial (AA/AD) strategy.[1] In view of this, the modernised H-6K bomber of China has a combat radius of roughly 2,200 miles (3,541 km), just adequate to reach the proximity of Guam, the US maritime base. [2] The H-6K was designed primarily

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as a cruise missile carrier. The bomber is considered to be purely for conventional use rather than as part of the nuclear triad. It can carry six CJ-10K or YJ-12 long-range land attack and anti-ship cruise missiles on its wings and potentially several more inside its weapon bays. That makes it a threat to not only the US and allied shipping, but also to bases on the islands and the mainland.[3] After years of speculation, the People's Liberation Army Air Force (PLAAF) Commander, General Ma Xiaotian, publicly confirmed in September 2016 that China was developing a "next generation, long-range strike bomber".[4]

This will be accomplished by designing the H-20 in the flying wing layout to mirror the stealth advantages that the US and next-generation Russian bombers derive from this configuration.[5] Second, the bomber will be capable of conducting "ultra-long range" missions. The new bomber (H-20) has an intercontinental flying range of more than 10,000 km and combat radius of over 5,000 km.[6] Stealth technology continues to play a key role in the development of these new bombers, which probably will reach initial operational capability by 2025.[7] In view of this, there is a need to examine the current and future capabilities of the LRSBs of China to assess the implications in the Western Pacific and the Indian Ocean Region (IOR).

Strategic Signalling

The 2018 RAND Report notes that in 2015, the PLAAF flew the LRSB that was described as a major milestone of breaking through the first and second chains of islands and flying into the Western Pacific region.[8] It was a departure from the defensive approach to an assertive PLAAF that carried out combat air patrols over disputed territories in the South China Sea including the Fiery Cross Reef, Scarborough Shoal, Mischief Reef and Woody Island.[9] These flights were a demonstration of the PLAAF's willingness to challenge the US and its allies in the region and to break the geographical and strategic containment in the Western Pacific Ocean.

The decision to publicise the PLAAF's flights in the South China Sea was significant because of the message being conveyed to both the internal and external audience.[10]

Furthermore, the RAND report also flags certain important implications of these flights over the first and second chains of islands and Western Pacific Ocean. The report suggests it to be a strategic signalling; a step towards making the PLAAF a world class force to deal with future security challenges and an indication that China is acquiring capabilities to bring the US strategic locations in the Pacific Ocean within the range of its LRSBs. Therefore, the US needs to take all possible measures to dissuade China from such a coercive policy and also build consensus among its regional allies to mitigate the negative impacts of these flights undermining the US policy of containment of China within the first and second chains of islands.

China has demonstrated the ability to conduct over the sea operations against any perceived encirclement or containment by regional and extra-regional powers. This is also a direct message to the US and its regional allies that it is now capable of employing LRSBs if Chinese sovereignty is questioned over the disputed territories in the South China Sea and East China Sea. At the same time, China will continue to develop capabilities to bring the US island territories of Guam and Hawaii within the range of the LRSBs in the near future. It could also be a signal that China will be in a position to establish the Air Defence Identification Zone (ADIZ) over the disputed territories as soon as it is confident of its capabilities to use force against nations that violate the ADIZ.

With the increasing Chinese economic activities across Asia, Africa and island countries in the IOR, China will be compelled to increase its military footprints to protect Chinese strategic and economic interests. Therefore, China would require power projection capabilities to secure its interest. China may create maritime and land bases in the littoral states in the IOR, however, this would require long range bombers to assert its dominance and capabilities. Long range bombers comprise not only

a platform for power projection but also for dual usage of integration of nuclear and conventional capabilities. The PLAAF claims that the LRSB remains vulnerable at this critical juncture and, thus, there is a need to move from quantitative accumulation to qualitative change and from being a big force to a strong force."[11] Furthermore, it argues, "The new-generation LRSB will considerably improve China's strategic attack capability and make the PLAAF a strategic air force in the true sense."[12]

The major lesson that China has conveyed through its policy of increasing LRSB flights is that the policy of the US to contain China within the first and second chains of islands is now a fatigued idea. China cannot be contained militarily by the US or its allies on land, sea and even air. The PLA Navy is already in the process of achieving power projection capabilities and now it is the turn of the PLAAF to be strengthened and converted into a "strategic air force" status. What the US and allies must do is develop the capability to mitigate the threat by developing systems and synergy among allies to ensure that any long range flights either by the H-6K or, in future, the H-20, remain vulnerable to ground, air and sea-based air defence systems. From an institutional perspective, the PLA Rocket Force (PLARF) of China continues to remain the "core force for strategic deterrence".[13] The LRSB is not a replacement for the nuclear capable missile but will give options to China for using the air in addition to the land-based and sea-based nuclear and conventional missiles.

Limitations of Current Long Range Bombers of China

The concerns for China with regard to its LRSBs is that the current range limitations of PLAAF fighters would mean that the H-6Ks on trans-regional missions would not have fighters to defend them and would, therefore, "be *easy targets* for American, Japanese, and Taiwanese air defenders before they could get within range of Guam."[14] The range of the current fleet remains limited due to inadequate refuelling facilities in mid-air or bases on land. Another issue related with range is that even

if refuelling is carried out, the surprise and stealth of the mission gets compromised because the refuelling aircraft may not be able to hide the radar signatures and, thus, will become an easy target for air defence forces. Moreover, China is yet to master the technology of stealth and, as a result, the US bases along the "first and second chain of islands" continue to act as deterrence for over the sea operations. Currently, the US has the Aegis and Terminal High Altitude Area Defence (THAAD) missile defences in Guam and at its Japanese bases, which pose a threat to China's fleet of missiles and LRSBs. The US has no established defence against a stealth bomber, which China will seek to exploit with the H-20.[15] However, the H-6K fleet, in the absence of air defence and electronic warfare escort, remains vulnerable to the US air, ground and sea-based air defence. China does not have the maritime or carrier battle group support for long range bombers in terms of air defence in the open sea.

China may have psychologically bounced the "first and second chains of islands" by flying over the sea, but to presume that it will be able to enforce AA/AD in the South China Sea and Western Pacific region is still a far cry. China is yet to develop it as a comprehensive system of systems that can deal with multiple challenges from the air, ground and sea, including kinetic and non-kinetic threats. The new aircraft of China will necessitate development of significant defensive capabilities, in particular with regard to the Find, Fix, Track, Target, Engage and Assess (F2T2EA) process.[16] Moreover, the potential for the regional bomber to be employed in a deep, offensive counter-air role would likely necessitate the diversion of allied 5th generation aircraft from offensive operations to defend high-value assets.[17] With the current available capabilities of the PLAAF, it is not possible for China to engage and divert the US stealth long range bombers and 5th generation aircraft, thus, employment of the H-6K or H-20 against the US and its allies may be fraught with risk in the absence of a credible air defence system that is able to deny penetration of US missiles and aircraft.

The PLAAF "does not currently have a nuclear mission".[18] The biggest capability gap in the LRSB is that it is incapable of penetrating through the air defence of the US and its allies along the first and second chains of island. Thus, these flights can at best be described as strategic signalling, training and dry rehearsals so that, in the future when the nuclear capable stealth long range bombers are introduced, the PLAAF is ready to operate them as part of the nuclear triad.

Implications for India

The new-generation LRSB will considerably improve China's strategic attack capability and make the PLAAF a strategic air force in the true sense. China's quest for the LRSB is not exclusively to break the encirclement/containment along the "first and second chains of islands" but also to bring the IOR and Australia within the range of the H-20. It will have security implications for India in the land, air and maritime domains. If deployed in mainland China, the range of the H-20 is sufficient to cover Japan, the Korean peninsula (if operating from Hainan), the South China Sea and the northern halves of Sumatra and Borneo plus the entirety of the Philippines; and from western or southern China, much of India and the Bay of Bengal.[19] With the stated capabilities of the H-20, China will be in a position to extend its reach to all of India, the island territories including the Andaman & Nicobar and Lakshadweep Islands. The threat is not from the range but the stealth technology that is central to the development of the regional bomber (H-20) and it will employ many 5th generation fighter technologies that include an Active Electronically Scanned Array (AESA) radar and be capable of delivering precision-guided munitions.[20]

Considering the threat China's LRSBs will pose to India by 2025, there is an urgent need to assess the strategic and operational implications, especially at a time when the Indian Air Force does not have credible surveillance and air defence capabilities to engage stealth bombers. The

threat of the LRSBs is more in the strategic realm than in the operational or tactical domain. It will threaten India's critical military and non-military assets on land, sea and island territories. India not only requires dissuasive capability by developing credible air defence against stealth technology but will also need LRSBs to strike back with equal intensity, should the situation so warrant. In any case, India requires the LRSBs to possess a credible nuclear triad and a system that is dual purpose (nuclear and conventional) and multi-role to perform the task of ground attack, anti-ship, air defence (air-to-air missiles) electronic warfare and airborne early warning long range radar.

Conclusion

China is more focussed to make the Air Force a strategic force that has regional and intercontinental range. It gives China another option as far as nuclear triad is concerned, however, the PLARF remains the main-stay of China's strategic deterrence. China is making formidable strides in logistical and technological advancements in building the LRSBs, however, it still lacks combat experience, whereas the B-52 long range bombers of the US has been in service since 1955. That could prove to be its greatest hindrance to implement a successful long-range bomber strategy. "Today, China's military has an increasingly impressive high-tech arsenal, but its ability to use these weapons and equipment remains unclear. According to Timothy R. Heath, the Army (PLA) struggles under the legacy of an obsolete command system, rampant corruption, and training of debatable realism, among other issues."[21] The editor-in-chief of the defence journal is sceptical about China's abilities to produce a modern long-range stealth strike bomber in a short period, considering that it would require "a state-of-the-art structure and aerodynamic configuration as well as a high-performance turbofan engine".[22] There may be doubts about China in achieving technical capabilities, given the ambitious timelines to make the H-20 operational by 2025. However,

the reorganised People's Libertion Army (PLA) is certainly becoming more professional and focussed in the approach to achieve operational efficiency. The H-6K flights over the Western Pacific should be seen in the light of testing conceptual and training aspects so that when these flights are undertaken to implement the AA/AD or ADIZ, the PLAAF is not found wanting.

The development of the H-20 as the LRSB should not be seen only as a weapon system against the US—India is equally a potential target of this strategic weapon system. India can no longer afford to delay and defer building resilient air defence capabilities, keeping in mind the threat LRSBs will pose to our critical assets based on land, island territories and even carrier battle groups. The need for adding LRSBs in the Indian Air Force arsenal is imperative and undeniable.

Notes

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"Intelligence in a Data-driven Age by Cortney Weinbaum and John N.T. Shanahan"

Ranjan Prabhu

(*Cortney Weinbaum and John N.T. Shanahan, "Intelligence in a Data-Driven Age," Joint Forces Quarterly 90, 3rd Quarter 2018, pp. 4-9.)*

Accessing and analysing news from around the world has become the key to understanding the global security environment. In view of this, in 1941, United States (U.S.) President Franklin D. Roosevelt established an office called the Foreign Broadcast Information Service (FBIS), to be run out of the Central Intelligence Agency (CIA). The office's mandate was simple: translate the news from around the world for US policy-makers to make informed decisions. However, in the past, there was only a handful of electronic and print media which needed to be scoured for news by analysts. But, in the current times, the situation has changed drastically. In today's world, there is a multitude of news platforms which produce an immense amount of news data that require a large number of analysts to process the information—making such an organisation uneconomical and unwieldy.

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Given this perspective, the evolving challenge is not only to identify the news sources which can provide the required data but also to predict future outcomes, based on millions of bytes of data which are continuously generated over a 24-hour cycle. In a world where every human is interconnected with the world 24x7 and is emitting data through social media platforms, browsing habits, blogs, vlogs and other such media, data is produced at a very high rate. This then requires a huge amount of processing power to sift through and analyse the available data into valuable information. In this regard, data science integrated with Artificial Intelligence (AI) has significantly succeeded in sifting through this mass of multi-source, multi-language , disparate and scattered datasets while accurately predicting events which might occur based on the 'tones' of these emitted data on social media and websites.

The Global Database of Events, Language, and Tone (GDELT), created by Kalev Leetaru of *Yahoo!* and Georgetown University, along with Philip Schrodt and others, describes itself as:

> An initiative to construct a catalogue of human societal-scale behaviour and beliefs across all countries of the world, connecting every person, organization, location, count, theme, news source, and event across the planet into a single massive network that captures what's happening around the world, what its context is and who's involved, and how the world is feeling about it, every single day.[1]

This database used millions of publicly available records, robotically analysed for tone along 1,500 dimensions, to accurately pinpoint the location of Osama bin Laden within a 200-km radius of where Bin Laden was eventually found in Pakistan. The co-founder, Kalev Leetaru, used the datasets provided by the database to effectively predict the events of the social or civil uprisings such as the Arab Spring.[2] With the availability of such powerful tools in the public domain, it is not surprising that there

is huge interest and clamour amongst the Intelligence Community (IC) in data analytics and data science, in order to be able to predict events which may be of national security concern.

In this backdrop, the article, aptly titled "Intelligence in a Data Driven Age" by Cortney Weinbaum, a management scientist at the RAND Corporation and Lieutenant General John N.T. "Jack" Shanahan, US Air Force (US AF), Director for Defence Intelligence (Warfighter Support) in the Office of the Under-Secretary of Defence, published in the *Joint Forces Quarterly*, a publication of the National Defence University of the US, critically examines the importance of data emanating today from a multitude of disparate sources and, how it can drive the IC to correctly predict events of concern to national security.

Asserting that the vector, volume, velocity, variety and ubiquity of data are disrupting traditional tools and methods of national security policy, operations, and intelligence, the authors state that the failure to treat data as a strategic asset will cede precious time and space to competitors and adversaries. Spelling out the peculiarities of IC data,[3] Weinbaum and Shanahan argue that such data can be organised, sifted and analysed in critical timeframes only by embracing machine learning tools and devising policies, which encourage human machine teaming to flourish. In this respect, describing the future battle space as consisting of algorithms, networks and sensor grids in addition to ships, aircraft, tanks and missiles, the authors pointedly note that future wars would be fought on civilian and military infrastructures of satellite systems, communication and electrical grids, transportation systems and human networks. Therefore, monitoring of all such critical infrastructure would then necessitate analysing data of disparate data sets, which is a task most suited to AI based analysing tools.

Noting that U.S. does not have a broad national strategy on AI, Weinbaum and Shanahan reflect on the key concern, highlighting that China is likely to outmatch the US by 2030 in this field of utilisation of AI for data analytics. This concern spelled out by senior researchers in the US

IC and think-tanks is a matter of immediate attention for policy-makers in India, which has not so cordial relationship with respect to border issues with China. As the authors correctly assess, though data is increasingly being collected through a larger number of multiple types of sensors than ever before, unless a clear policy path on how such data need to be analysed is drafted, it will fail to provide any valuable information to the IC. To which, creation of huge data warehouses with aggregated data is a better path for obtaining intelligence of value in today's technological and data driven scenario.

While acknowledging that intelligence of value can be obtained using modern data analytic tools, the authors contend that such information can be useful only if appropriate combat systems are developed, which can then utilise it to decide a course of action and act accordingly. To which, Weinbaum and Shanahan in their assessment, conclude that AI based systems would be the right choice in the near future, ensuring that each step of the Observe Orient Decide Act (OODA) loop is accelerated in a manner that can outsmart the adversary. In this regard, with most nations developing such systems, future wars may well be algorithm versus algorithm wars wherein decision-making may parse into milliseconds—a capability which is beyond the realms of human ability.

It is known that AI-based intelligence analytics can fuse and analyse data at rates faster than any human can; the fact that all types of data then need to be accessible to such systems is a key issue that the IC needs to deal with. In an environment where data is treated with total confidentiality, with accessibility being highly controlled, allowing an algorithm access to all data then opens up the potential risk of manipulation by adversaries. This risk, therefore, requires intelligence analysts to be trained in recognising attempts by adversaries to manipulate or alter data—which has been correctly assessed by the authors.

Weinbaum and Shanahan in their study strongly recommend that any AI-based analytics programme or system made for the IC must be

based on open architecture in order to be adaptable to fast changing technologies and to be able to ingest multi-source, multi-type data. They also support the fact that in today's world, much of the data which may be relevant to an IC, would be coming from open sources and, therefore, it deems to challenge the very concept of 'intelligence' wherein, classification of information is a parameter to judge its value. This truism was demonstrated during the Crimea crisis in 2014, when much of the information about Russian participation in the annexation was actually derived from the data trail mainly left behind by publicly sourced and available information.[4]

The vast scope of analytics, therefore, needs a skilled workforce, adept at understanding activity patterns rather than individual pieces of information. As Weinbaum and Shanahan rightly point out, adaptation of AI analytics has to be supported by revolutionary changes in human capital, technology acquisition processes and Research and Development (R&D). While technological change in the industrial age occurred at a moderate tempo and as a result, military doctrine was based on the fundamental premise of mass production, future warfare will feature a myriad technological advances that come at a tempo that disallows mass production. Therefore, the authors conclude that the system needed to sustain AI-based intelligence analytics should be based on the "prototype warfare" concept, which caters for quick absorption of niche technologies at much faster rates, thus, creating an asymmetrical advantage against an adversary. While fully supporting the need to infuse high-end technology into intelligence analysis, the authors significantly note that a healthy mix of traditional human intelligence gathering tradecraft needs to be maintained within the US IC. This will then help it to align with the requirement while fighting a low tech adversary, like the one that the U.S. is faced with in Afghanistan.

Weinbaum and Shanahan have emphasised on the need of infusing machine learning in the IC. More specifically, in the Indian context, this

imperative has become the need of the hour. For India, at one end, is faced with a belligerent adversary on the western front, which uses terrorism as a tool of its state policy. While at the other, it deals with a far more assertive neighbour on its northern borders, whose closed society provides very little intelligence. Given these challenges, data from multiple sources which constantly emanates from an interconnected world, can only be amalgamated to study patterns at rapid rates if AI and machine learning are adopted. It is only then that the prediction of future events having strong national security implications can be carried out accurately and in a timely manner which will help us stay within the adversaries' OODA loop. In an overall assessment, the article is futuristic in its concept and recommendations and is a must read for India's intelligence community, policy-makers and students of military affairs.

Notes

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Book Reviews

Israeli National Security: A New Start for an Era of Change

Charles David Freilich,
(New York, NY: Oxford University Press, 2018)
ISBN 978-0-19-060293-2 pp 470 $39.95.

Charles D. Freilich's book, *Israeli National Security: A New Start for an Era of Change* is drawn from a unique blend of the host of national security threats confronting Israel, with its logical requirement of being reviewed, and then, sculpted into a comprehensive Israeli national security strategy. Freilich, a former Israeli Deputy National Security Adviser, is a Senior Fellow at Harvard's Belfer Centre. He teaches political science at Harvard, NYU and the Herzliya Inter-Disciplinary Centre and specialises in the fields of Israeli national security strategy, the US' Middle East policy and Middle Eastern affairs at large. Given his expertise, the author seeks to throw his weight behind diplomacy rather than undertaking a militarised approach to the study.

Security concerns have dominated the Israeli political discourse (both at home and abroad) since its inception. This very factor has been manifested in many insightful books on the subject, such as: *Israeli Statecraft : National Security Challenges and Responses* by Yehezkel Dror or *Israeli's National Security* by Efraim Inbar, and others. However, Charles D Freilich's book has connected almost all the dots dealing with the Israeli security apparatus, to include its internal and external national security domains, and contextually established a fine balance between its

historical baggage, with the understanding that not only Israel but the entire region deserves to secure its future.

The book deals with the prevailing geo-political environment Israel finds itself in and its requirement to find friends in the international community, especially the United States of America, covering the whole range of support that the latter extends to Israel, including on the increasingly important financial front. President Trump formally recognising Israel's sovereignty over the Golan Heights recently, substantiates the author's arguments, as also concerns. The book expresses concern over the existential threat to Israel that has got renewed due to the US pulling out of the US-Iran nuclear deal. It also underlines the realisation of the fact that Israel cannot do it alone (anymore) and must find more friends, which in the current geo-politics must include the European Union (EU), India, Russia and China. More specifically, as the author categorically notes, national security involves many domains of national power other than military capability. Freilich posits that Israel "faces foreign policy and demographic challenges that may prove to be almost as dangerous to its long-term future as the military threats, in some ways may be more so".

The book has been divided into four parts, with the chapters detailing the author's arguments most aptly and exhaustively. Part one on "Confronting a Strategic Nightmare", introduces the reader to the most defining attribute of Israel's existence, that is, the Jewish will power, which manifested in Israel's birth as a nation state amidst the most hostile neighbourhood and regional powers.

It exposes the reader to the tenets, distinctions and nuances of the 'Ben-Gurion Doctrine', that underlined the Israeli security paradigm and response, as late as the 1980s. The very first chapter puts into perspective the great asymmetries Israel faced since its inception, in terms of an extremely hostile Arab neighbourhood and lack of geographical space (thus, resultant resources). In this part of the book, the author also

reveals the three components/pillars of the Israeli response, as part of the Israeli national security strategy formulated mainly by the founding Prime Minister David Ben-Gurion, duly advised by the senior Generals of the Israel Defence Forces (IDF) viz, deterrence, early warning and military decision.

Part two of the book themed as "A Strategic Environment Transformed," lays down an environment scan for the reader in three broad terms viz., the first two being an analysis of the primary changes in the nature of Israel's security environment and the strategic constraints in the past few decades; while the last gives out a synopsis of the present Israeli security environment, akin to a lone ranger forced to fight for its survival, however, with a caveat that it can survive only if it wins each bout, that too, decisively.

In part three on "Israel's Strategic Response", the author analyses the effectiveness and efficacy of the three components/pillars of the Israeli response viz., deterrence, early warning and military decision, with an addition of another pillar—that of defence. Freilich provides a critical assessment of each of the pillars in the context of the responses that Israel has exuded in the past, coupled with their applicability and relevance to the new, hybrid and ever increasing challenges that Israel faces presently, both internally and externally. In doing so, the author has also highlighted the limitations of each of these pillars in the prevailing security environment and the geo-politics confronting Israel in the current times.

Finally, the fourth part on "A National Security Strategy for an Era of Change", lays down the crux of the analysis of the changed nature and character of threats in the Israeli security calculus. In a comprehensive manner, this section provides detailed and precise policy recommendations to the Israeli leadership, as also every other country, institute, think-tank and individual interested in the nature of threats presently facing Israel and its response options to deal with them holistically.

Owing to its comprehensive assessment, Charles D. Freilich's book is current with the environs that Israel finds itself in viz, the Arab states as a collective front, the existential threat from Iran, the chances of Saudi Arabia acquiring weapons of mass destruction, the chemical weapons threat from Syria, the projectiles with increasing lethality, range and accuracy in the hands of Hezbollah and Hamas, coupled with the perennial threat from terrorism and cyber/hybrid warfare. The book provides a holistic, insightful, unbiased and data backed analysis of the threats faced by Israel. It offers precise and concrete ways ahead to the present Israeli leadership, as also to anyone interested in the security environment and resultant future of the Promised Land and the countries posing threats (including existential) to the promise of that land. His arguments, prognosis and recommendations are duly backed with his years of experience, coupled with well researched and unpublished data, supporting his analysis of the present threats faced by Israel to the last word. The suggestions laid out are pragmatic and precise, almost a ready-made security review, with futuristic milestones laid threadbare, for the consideration of the present Israeli policy-makers. However, the author's significant suggestion in this book is that of opting for other means (mostly, diplomatic and political) over military options. In doing so, the author fails to take into account that the standing of Israel as a prominent nation is primarily owing to the response/s it has had to the threats it has faced, with most of them being military in nature. The Israeli leadership and population will do well to realise that, unfortunately, they do not possess many of the attributes that define power in terms of nation building viz, geographical expanse, resources, population, etc., etc., and, hence, the proverbial Jewish will power, which manifested in Israel's birth at the first place and its sustenance till today, will perhaps be the most important reason for their survival in the future too.

Overall, the book makes a comprehensive, coherent and lucid read. This is a must read for, at the foremost, the Israeli policy-makers

and thereafter for any nation, department, institute, think-tank and individuals who are not only interested in the happenings in Israel but are also entrusted with safeguarding their own countries from a myriad threats, similar to the ones faced by Israel today.

From India's perspective, the book is of immense importance to Indian readers, from the entire spectrum of various defence agencies and related professionals to academics and researchers, under a two-fold way: first, to facilitate educative debates on national security issues (India is facing similar challenges); and, secondly, to initiate India to come out of its inertia and craft its national security strategy by laying down time-bound objectives, with dedicated fund allotment. Hence, the book's opening quote by the Israeli founding Prime Minister David Ben-Gurion viz., "The most dangerous enemy of Israel's security is the conceptual inertia of those responsible for its security", are words that India can ignore only at its peril.

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Hacking the Bomb: Cyber Threats and Nuclear Weapons

Andrew Futter

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In the Information Age, the landscape of the battle space has undergone a rapid metamorphosis from the physical domain to the information and cognitive domains. In this transformed battle space, information is the unifying thread amongst various domains of warfare. Thus, the information domain has become an overarching domain and achieving information superiority an operational imperative for all battlefield commanders. The quest to achieve comprehensive information superiority across all domains has blurred the lines among various forms of information warfare. Electronic warfare and cyber warfare now have an overlapping area of Cyber and Electromagnetic Activities (CEMA). Such cross-domain capabilities enable kinetic as well as non-kinetic strikes launched from non-physical domains like the cyber domain. To defend against which, the strategic thinkers are already contemplating the cyber-nuclear weapon as the new 'mother of all weapons'.

The recent standoff between India and Pakistan post Pulwama gave rise to confrontation in the physical as well as non-physical domains. While incidents in the physical domain were covered by the local as well as global media with great enthusiasm, the activities of hackers, who were actively supporting the operations in the physical domain, were seldom publicised. Under such heightened tensions, the escalation of cyber operations to target the nuclear weapons of the adversary may not be ruled out. In the past too, there were well established cyber campaigns in Georgia, Crimea, Estonia and Palestine, to name a few, which banked upon hackers to support the war effort in the physical domain. While

talking of the cyber-nuclear interplay, we cannot skip the 'Stuxnet'. The Stuxnet was a well-planned cyber attack on Iran's nuclear facility, possibly in conjunction with operations in the physical domain. A few cyber experts opine that the Stuxnet was a field trial of '*hacking the bomb*'.

Connecting the dots, Andrew Futter in his book *Hacking the Bomb: Cyber Threats and Nuclear Weapons* takes the idea further and expresses his serious concerns regarding the possibility of triggering/disabling a nuclear weapon by hacking its associated computer system which may have a devastating effect on a particular nation or on all of mankind. The concerns of the author are well placed. The book finds immense relevance in the present day world order, especially for nuclear capable states like India, wherein, even non-nuclear states and non-state actors are exploring cross-domain cyber-nuclear capabilities to open new vistas of warfare.

Andrew Futter is a PhD in international relations and teaches the subject as Assistant Professor in the University of Leicester. He is an accomplished writer on nuclear technology and international relations, with books like *Ballistic Missile Defence* and *Politics of Nuclear Weapons* to his credit. This publication is the result of research work of three years based on secondary data which Futter has extensively quoted in his work.

The book has been methodically divided into four parts and has seven chapters to create a flow and build arguments. The author begins his narrative by referring to the 1980s' sci-fi movie called "Wargames" in which a teenager hacks into the Pentagon computers which control nuclear weapons, and nearly starts World War III. The movie raised hackles all over the world and the President of the United States personally issued directions to mitigate such a threat. Owing to this background, Futter has attempted a similar sensationalism with the cyber-nuclear nexus.

Andrew Futter initially builds up a correct understanding of the nature of the cyber challenge in the given context. He adds that cyber should be viewed as an integral part of Information Warfare (IW) but we should also understand that it is transforming the way IW is being conducted.

The book then delves into the vulnerabilities of nuclear systems which stem from their inherent management structures and exposure to the risk of accidents, mistakes from complexities, and exploitation of weaknesses in the system by cyber operations. The vulnerabilities have further been enhanced by the digitisation of the Nuclear Command, Control and Communication (NC3) structures.

The book further leads the reader through a number of related incidents and their analyses to create the argument that nuclear systems are vulnerable to cyber nuclear espionage as state nuclear secrets are akin to any digital data which can be stolen remotely, lending themselves to exploitation. Based on the types of controls on nuclear weapons, the author has very innovatively divided the possible cyber attacks on nuclear systems as "enabling attacks" wherein an unintended launch of a nuclear missile or a nuclear explosion is initiated or "disabling attacks" whereby the hackers disable the system and prevent a missile from being launched. Futter then rightly builds the argument that while nuclear nation states will be interested in disabling their opponents' systems it would be the non-state actors who would be interested in causing nuclear explosions.

Futter is of the opinion that the future cyber-nuclear strategies will be defined by five dynamics: implementation of technologies to jump the air gap, 3D printing to challenge nuclear non-proliferation, cyber proliferation due to reverse engineering of attack vectors, modernisation of nuclear systems leading to associated vulnerabilities and unlocking of unknown capabilities of computers. The author, thus, concludes that given the nature of the future battlefield, nuclear weapons management should be simple, that is, devoid of any unnecessary complexity, secure from both traditional and digital operations and separated from other weapon systems, including planning processes and sensors.

The main argument of the book is two-fold: first, the burgeoning cyber age is transforming the way we should think about, manage and control nuclear weapons; and, second, establishing a norm of hacking the bomb is a

bad idea fraught with danger, uncertainties and risks. Futter has successfully carried both arguments throughout the book and his articulations have been well organised and equally well supported. He has also extensively included statements from other seminal works which makes the reading lucid and interesting. Bibliographic references are a trove of information on the topic itself and can help to further the research. However, the absence of primary data on cyber attacks on sensitive infrastructure and nuclear systems was felt during the reading but is understandable.

In an overall assessment, Andrew Futter's *Hacking The Bomb* is a well-researched assessment which leaves the reader with valuable takeaways for further research. The author has assumed some state responses against cyber operations. The same can be verified against case studies or war-gamed to understand how opponents can react. It would help build policies on the subject. The book claims that cyber war is not possible and believes that the cyber challenge remains an environment or context but not a domain of military operations—it is a matter of interpretation and can be accordingly theorised. The author has also raised the issue of absence of international regulations for cyber attacks or threats, which can be a niche area of work and persuasion. Finally, while the recommendations of Futter to obviate the challenge largely remain confined to the cyber domain, no concrete recommendations have been provided for nuclear policy-makers. This vertical may be undertaken for further research work.

Overall, the book carries fresh ideas amidst stereotyped speculations of cyber war by various authors. It will be of great interest to scholars and students of cyber and nuclear warfare as well as defence practitioners and policy-makers.

Rajeev Sabherwal

Lieutenant General **Rajeev Sabherwal** is Signal Officer-in-Chief and Colonel Commandant, Indian Corps of Signals

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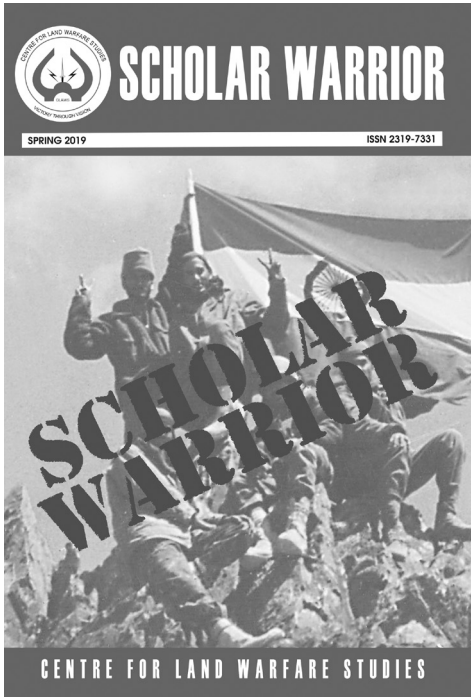

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