SEMINAR REPORT: NATIONAL CONCLAVE ON TECHNOLOGICAL SOVEREIGNTY 2014

NTSM,DEFENCE INDUSTRIAL BASE,DEFENCE MANUFACTURING POLICIES

Key Recommendations Summary

- Establishment of National Technology Sovereignty Mission (NTSM) within 24 months, to be composed of, firstly – scientists, secondly – academia, thirdly – armed forces, fourthly – industry and fifthly – government.
- NTSM to be headed by an eminent scientist.
- Role of Government, firstly – establishment of organisation structure of NTSM, secondly - amend policies to improve ease of doing business, thirdly - giving fillip to Research and Development and innovations and establishment of industrial complexes, fourthly - provision of level playing field, fifthly - better implementation of offsets, and sixthly - fund High risk, fundamental research to established centres of excellence.
- Establish Defence Economic Zones.
- Industry be given access to DRDO labs for research work and military facilities for field trials.
- Hiking FDI to 74% in defence.
- Collaboration with foreign entities where technology is easy to harness to save on time and resources.
- To move from India's current status as an assembler and integrator to a design and development power house.

Background

India aims to be a leading power in the world and our vision for the future has to encompass all factors which constitute National Power, an important component of which is the nation's technological prowess. World over, powerful nations are managing technology as a strategic issue. India will have to be 'Technologically Sovereign' and invest time, money, political will and manpower to achieve this strategic and national aim, however, we do not have Technological Sovereignty as a formal part of our strategic thinking and vision.

Centre for Land Warfare Studies (CLAWS) along with Centre for Digital Economy Policy Research commenced National Conclaves on Technological Sovereignty in 2012 with the aim of researching and recommending the way forward for the country to achieve Technological Sovereignty keeping in mind the requirements of the Armed Forces. This report is of the third in the series of Seminars on Technological Sovereignty. The earlier Seminars in 2012 and 2013 focused on the following issues:-

- Institutional mechanisms for achieving technological sovereignty in defence acquisition.
- Giving a boost to indigenisation and self-reliance.
- Approach towards a more transparent and user-friendly procurement process.

Objectives of the Conclave

The National Conclave on Technological Sovereignty held on 20 Nov 14 had the following objectives:-

- Establishment of **National Technology Sovereignty Mission**.
- Establishment of **Defence Industrial Base**.
- **Defence Industrial Reforms and Policies**.

Conduct

The Seminar was conducted as a full day Seminar over three sessions.

Session 1: Improving Institutional Framework The session deliberated on the way forward for establishing and sustaining an institutional process by delving into the following key issues / sub themes:-

- Implementing Institutional setup for National Technology Sovereignty Mission- Dr Jaijit Bhattacharya ,President, Centre for Digital Economy Policy Research.
- Role of the Industry in the National Technology Sovereignty Mission – Mr Amber Dubey, Partner Head, Aerospace and Defence, KPMG.

Session 2: Enhancing Defence Industrial Base Sub Themes for the session were:-

- Policy changes required to facilitate defence manufacturing- Cdr Vishal Nigam(Retd),Associate Vice President, Bharat Forge.
- Defence Economic Zone as a Game Changer in Enhancing Defence Industrial Base – Mr Ashish Puntambekar, Lead Designer, Planning and Design Lab,The Nataraja Foundation .
- Challenges of Military R&D in India-Vice Admiral Raman Puri (Retd), former CISC.
- Technology Absorption – Gp Capt CR Mohan, Director Hawk Maintenance ,Air HQ.

Session 3: Defence Industrial Reforms and Policies The issues discussed were:-

- Policies required for indigenization of defence IT Systems- Dr BK Gairola, Mission Director, e-Governance.
- Defence Manufacturing Policy at the State level – Shri Srinivasan – OSD Government of Andhra Pradesh.

General

The rapid changes in the conduct of operations in the spectrum of war demand matching technologies, and at times technology changes doctrines, strategies and capabilities, and conduct of operations. India has the capability to harness technology for defence and civil but

there is a need to identify key technologies for research and development, and focus on technological superiority in key areas because technological superiority may not be required in all domains of technology. Technological sovereignty does not mean indigenisation, the issue is of sovereignty of the technology, control over the technology is paramount, technological sovereignty may therefore have components of foreign collaboration without jeopardising our interests.

India has a loose structural mechanism of managing technology and defence industry in support of our armed forces, but does not have the institutional structures to put the soldier, technologist, capitalist, academician and the government together, to be able to work effectively. There exists a need to understand of the domain of work, fresh research ideas, better institutional structure and the long term plan, of what needs to be manufactured. The industry cannot bid in terms of point vendors and cannot invest capital and resources for one tender. Parts of the LTIP, to the extent feasible, need to be made public so that the industry can invest in roadmap which gives them a better idea of revenue generation from the projects.

The Indian Armed Forces need to debate the contours of future warfare and put their technological requirements based on the changing warfare scenarios in the open domain.

Improving Institutional Framework

The conclave accepted the necessity of creating the National Technological Sovereignty Mission (NTSM). It will be a single point of authority and responsibility for achieving Technological Sovereignty in the country. Following was deliberated with respect to NTSM :-

- NTSM to incorporate all stakeholders and have representative organization. There has to be a hand-holding between the industry, the user and the academia functionally with each entity looking at its function closely.
- Be given sufficient freedom and funding from the government to perform their work.
- To be directly under the PMO.

NTSM needs to look into the following issues :-

- The **policy** remains under the domain of the government. NTSM to advise government on policy changes required to achieve and maintain technological sovereignty.
- The **processes** in the country will have to be handled by both the public and the private sector, based on the policies that are being formulated. NTSM to deliberate and suggest processes to aid the whole process.
- The sovereignty that comes in the products requires specialized **people**. The question remains whether India is ready with skilled manpower. NTSM to identify required Skill development.
- The government and the industry also need to look at the **infrastructure**. The defence industrial base has to be strengthened from the foundation. The process and

the roadmap need to be well defined before moving towards technological independence.

- If the market of the defence industry is not opened internationally, India will not get international quality products and it will not be worthwhile for the manufacturer to get into this field. India needs to be internationally collaborative and create best environment to use international expertise for Indian benefit.
- Deliberate approval of export of non-critical equipment for local manufacturers in the defence field.

Enhancing Defence Industrial Base

Historically India has been a buyer of state of the art defence equipment and now there is a gradual transformation from being a total buyer to a limited manufacturer and system engineer, working towards progressive self-reliance in critical technologies. This self-reliance will also be an economic contributor. The game changer in self reliance would be the important role of the private sector which will drive the defence economy in the future.

Several committees including the Parliamentary Standing Committee on Defence have been lamenting our low indigenization quotient and call for better synergy between the private and public sectors, reiterating the recommendations of the Kelkar Committee.

Current state of the Defence Complex

The participants discussed and brought out the strengths and weaknesses of the current state as :-

- Success has been achieved in the ballistic missile programme, and certain equipments.
- Major entities in the Indian defence complex are the DRDO and the DPSUs/OFBs which are compartmentalized and individually responsible to the government for their respective roles of R&D and Manufacture.
- The burden of sustaining DRDO is shouldered by the government which absorbs sunk costs and escalation for programmes as also a large import bill.
- There are strict export controls of Defence hardware and large imports are permitted to meet defence needs.
- DPSUs are sustained and kept financially viable through large license production contracts mandated by each large import contract rather than bulk induction of indigenously developed products.
- Clearly the current system is not structurally sustainable to provide the gift of self-reliance to the nation.

Major impediments. Major impediments to participation of the private sector are as stated :-

- Identification of Production Agency based on nomination.
- Taxation Regime favouring Foreign Suppliers or DPSUs.

- Make programs have not taken off – For '**Made in India',** Make Programme will have to be the corner stone of acquisition process.
- Request for Proposals (RFPs) are retracted after many years of trials.
- Acquisition cycle is extremely long and protracted.
- Offsets have been unable to boost manufacturing of defence equipment.
- Absence of clarity on future orders / consolidation of orders, leads to unviable business propositions.

Defence Economic Zones

The conclave discussed the concept of Defence Economic Zones (DEZs) and recommended that these be established at the earliest.

Concept. Defence Economic Zones (DEZs) are mooted as military industrial complexes established to improve the defence industrial base.

Salient Aspects. Salient aspects of DEZs are :-

- Each DEZ to be a 3000-5000 acre green field facility. To be developed in phased manner.
- Facility to include representations from all stakeholders viz armed forces, government, academia, R&D institutions and industry.
- Construction of ultra modern factories, logistics and communication facilities via a public-private partnership.
- Active role of State Governments to facilitate land acquisition, basic infrastructure, and labour etc.
- A lead Indian developer selected through a bidding process would be ideal for the facilitation of such projects.
- The possibility of a few large international defence contractors being consortium partners to be explored.
- A medium to long term investment plan to develop powerful backward and forward linkages to sort out the structural problems in the sector.

Expected Spinoffs.

- Help in achieving the goal of self reliance.
- Save valuable foreign currency reserves while creating new jobs in the high technology defence sector. Foreign Exchange savings could be of the order of US$ 200 Billion by 2025.
- Lead to a massive transformation of India's Military Industrial Complex assisted by private sector participation and help in creating a platform for innovation in defence technologies by co-locating research departments and full time inter-disciplinary defence engineering courses within each DEZ.

Some of the suggestions with respect to improving Military Industrial Complexes or Defence Economic Zones discussed/highlighted were :-

- India's experience with Special Economic Zones (SEZs) be studied and looked into. The bottlenecks faced in terms of capital, land acquisition, tax and labour laws, availability of power, talent pool etc. be addressed in order to make DEZs a viable concept.
- Private companies be provided a level playing field. They will only invest if certain number of orders is assured or a Return on Investment model is worked out.
- Timelines for creating various facilities be assessed in a realistic manner. Time required for research and development, user trials and manufacturing major weapon platforms be taken into account.
- Armed Forces be co-opted ab initio so that the weapon systems/platforms meet their requirements.
- Greater synergy between various stakeholders needs to be built and for that NTSM will have to be put in place.

Defence Technology Absorption for Self Reliance

India will have to be dependent on foreign technology in few cases. Despite having TOT arrangements in various defence deals, our ability to absorb technology, especially by DPSUs, is still limited. Conclave felt that our technology absorption capabilities need to be improved. The question debated was, *Are we poor in absorbing military technologies and innovating, or a systemic change the answer to unlock the talent that may already exist within the country?*

Phases of a Defence Project. The conclave discussed and debated the phases of defence projects and associated issues :-

- According to research estimates the production and delivery of systems to potential customers occurs over a period of 10-15 years.
- Most military industrial complexes are based on a market focussed R&D foundation.
- Past R&D investments are leveraged to put in place new product lines through adaptation of past technology assets as well as new innovations.
- Design and development process usually takes about 4 to 5 years before resulting in a product that can then be delivered in numbers in order to satisfy a security objective.
- Production capacity is built up over the first 2-3 years thereafter resulting in steady rates of production over 10-12 years and finally tapering off as the product becomes obsolescent and is replaced.
- The capital employed steadily increases for the first 5 years during the product research and development phase, and exponentially increases for 2-3 years during the initial years of production as capacity is established. The capital investment tapers off as the production capacity is fully established and there is increasing work efficiency and depreciation of fixed assets over the program life.

- Clearly there would be no return on investment till production picks up and the return on capital employed (ROCE) recovers to positive territory after nearly 6-7 years into the programme.
- ROCE shows a steady increase as the investments deliver a profit making product. Export deliveries have the potential to boost the ROCE due to the fact that minimal capital is employed, advances become income and the programme has the opportunity to maximise return on sunk assets created for the domestic programme.

Technology Absorption

- Effective technology absorption to develop a successful military product depends on a number of factors, the most important being a conducive **business climate**.
- The Business climate includes good infrastructure, easy access to capital, flexible labour policies to attract the best talent, fostering competition, effective intellectual property regimes, support for R&D initiatives, access to international defence markets etc. to state a few. India needs to improve its Ease of Doing Business standards. This package of measures is typical of any economic liberalisation policy. According to World Bank's Ease of Doing Business report for 2014, India ranks a measly 142 out of 189 countries suggesting a difficult atmosphere for a business to thrive in.
- **Skill development** in military technologies is the next step for technology absorption. Over many decades in pursuit of self-reliance, the nation has invested well in skill development. It is no coincidence that the technical powerhouses of the nation in the south of India are all cities where PSUs, DRDO/CSIR labs, ISRO facilities and reputed technical institutions were originally located. Skill development needs to be taken few notches higher to meet the technology absorption requirements.
- Technology absorption can be effectively integrated if most product developments of volume purchases such as aircraft, tanks, ships, submarines, artillery etc. are funded through the industry and reflected as part of the bottom line of the project. By this rationale, industry will need to take the risk of sunk costs and be allowed to enjoy and reinvest the profits from innovations in accordance with their strategic plans. This also will bring accountability to R&D to the bottom line of the overall project.
- If government funding and management policies are steered in such a manner as to increase synergy between academia, defence research and defence production we can expect the indigenous defence industry (both DPSUs and private), Research labs and academia to form an ecosystem of technology absorption and innovation. These ecosystems are already visible in the IT industry and auto industry.
- **DPSU-DRDO Links.** DPSU are primarily licensed producers of foreign weapons and equipment. DPSUs can shift focus to production of only new products from DRDO and civil research firms, then this will bring in a great amount of interest in the DPSUs to engage and ensure correct design and production practices, as it will be vital to its survival. License production can be given to private vendors. DRDO funding for known products such as aircraft, ships, submarines, avionics, radars and missiles, can be channelled through full life cycle projects through the armed forces and then the industry/DPSUs. This would greatly improve the product, profit and timeline focus of the research organisation thereby helping the armed forces to achieve the correct outcomes expected by inducting the equipment. Following is recommended

- High risk, fundamental research can continue to be funded by the government to established centres of excellence.
- R&D to be responsibility of DRDO and Civil R&D firms/departments of manufacturers.
- Production and Maintenance to be responsibility of DPSU and Civil Industry.

Role of the Armed Forces

Specifying the requirements based on strategic security imperatives is the role and duty of the armed forces. The final weapon/equipment provided is based on what is available in the market and budget limitations. To overcome this limitation, there is a need for a LTIPP, the LTIPP will layout Qualitative Requirements (QRs) for future requirements. The R&D organisations will direct their efforts at the research labs to come up with out-of-the-box and efficient solutions to modern security requirements, through constant dialogue and feedback, and deliver national security at an optimum cost. A reworked management structure for capability projects that leverages cross control across disciplines (i.e. R&D, Industry & Armed Forces) would help in better assessment of individual projects and eventually lead to an orderly manner of national military capability building. This would mitigate the concerns of the Armed Forces in respect of lack of availability of cutting edge technology and delays in implementation of projects as also mitigate the concern of DRDO and Industry of the Armed Forces changing their requirements.

Policy Decisions

Continued refinement of the DPP and economic liberalisation has already set the stage for co-ordinating the academia, DRDO and DPSUs to enable a culture of technology absorption and innovation in defence. An outcome oriented approach to policy management could transform the significantly sized Indian defence complex into a world leader in defence products. The right policy decisions should enable the transformation from a Government centric defence research industrial complex to one of partnership between the major players including the government, defence industry, defence research and academia.

Defence Manufacturing Policies

Long term and consistent policies are the most important cog of the Technological Sovereignty wheel and their correct implementation is equally important. Policies need to be formulated to achieve following aims :-

- Government support for High End Technology projects.
- Better coordination between Centre, State, Industry, Armed Forces, DRDO and DPSUs, Academia.
- Level playing field between government and civil firms.
- Simplify procedures, procurement and acquisition, and create environment for defence production facility creation.

Reason for Non participation of Industry in High End Technology

At present the industry is not investing in high end technologies, because the industry is not an important stakeholder. The whole ecosystem consists of the government (both central and state), government policies, defence industrial base, Armed Forces, academia, industry and government aided R&D labs and factories. The following issues are still keeping the industry from investing in high end technologies:-

- Entire Ecosystem needs to be developed. The industry is looking forward to a Single point of contact for investing in technology related defence projects. Dealing with different departments of the Government is inefficient and does not lead to participation by the industry. Other stakeholders like Academia are not integrated into this ecosystem. There is therefore a need to develop an ecosystem which aids development of cutting edge technology infrastructure in the country.
- Very Significant investments. Majority defence related Projects require very significant long term upfront investment. Funding is thus a key issue and project finances have to be calculated keeping in mind the expected Return on Investment (ROI). The industry needs to be assured on ROI before they can risk big cost investments.
- High Risk environment. Where investment size is high, the industry is very sensitive to risks to projects which can cause financial loss. The business environment needs to be improved wherein the Government has a major role to play to ensure guarantee recuperation of investment and interest costs.
- Government Funding for High Risk technologies. Cutting edge technologies for defence are invariably those technologies which are still not developed and are based on successes achieved in research. A large number of research projects result in failure or non achievement of designated objectives. A government backed funding or partnership is essential to get the Industry to participate in high risk technologies.
- Absence of long-terms partnerships with Indian Military. Historically, the requirement of the military has been catered for by DRDO, OFs etc with very little industry participation. There has been therefore a very limited long term partnership between the military and the private industry. There is a need to build long term partnership between the Industry and the military.

To overcome the present inadequacies a shared roadmap with the industry be worked out to allow :-

- Industry to invest for long term.
- Academia to have directed research.
- Global players to form appropriate partnerships with Indian firms.
- Start ups to propose and develop innovative solutions.
- Military to access solutions in a dependable and sustainable cheaper manner.

Role of Government

The Government of India is the lead player in making policies and has already started taking initiatives to bring changes in the system looking at the growing needs of the armed forces. Few policy changes requiring government consideration were discussed.

FDI Limit. GoI has liberalized the FDI limit in defence from 26 to 49 percent, and removed 60 percent items from the list of defence equipments that earlier required mandatory industrial license. The GoI has also allowed the Indian ownership of 51 percent equity to be split among many Indian companies which means a foreign OEM with 49 percent could be the single largest shareholder. What needs to be seen is whether foreign OEMs are convinced to invest with 49% FDI or they seek a higher limit. There is a case to increase FDI limit beyond 49% as increase of FDI from 26 to 49% has not created the desired effect as yet.

Defence Production Management. Defence Production Management needs a review and changes need to be brought in to improve efficiency and delivery in the whole production ecosystem. To do away with present inefficiencies, we need to bring about few changes in the system; some of them are as stated further:

- Distinctions between short, medium and long term policies.
- Technocrat professionals need to be incorporated or contracted by the government to progress policies.
- Specialised R&D centres to be revisited and role redefined to meet current and future requirements, access to these centres be given to private industry.
- The user and developer should remain part of the system after the success of the project to ensure continuous improvement of the systems developed.
- Where required, import technology and thereafter priority development of infrastructure to host and further harvest technology.
- Policy decision should be a collaborative effort taking all stakeholders on board.

State of Art Technology. 100% FDI allowed in case of State of Art Technology (SOAT), however, there are no laid-down norms as to what qualifies as ‘state of the art’. Most OEMs feel that this ‘case-by-case’ approach may create interpretation issues, delays, misuse and legal disputes (SOAT needs to be more clearly defined).

Private Industry participation models. The DARPA model of USA could be studied and important and viable options be incorporated in the Government policies accordingly. The armed forces in US and EU almost entirely depend on the private sector for their equipment. Private industry in India can be incorporated in a better manner with defence projects.

Enhancing Professional Technical Knowledge. Top decision makers in India’s Ministry of Defence (MoD) have administrative experience and high integrity, but their knowledge of defence matters is limited and is developed on-the-job. This can be offset by regular knowledge updation, modalities and programmes can be worked before induction into the organisation.

Ownership and Control The term 'ownership and control' gets disproportionate importance in India. We have zero ownership and control over the global OEMs from whom we import fully-built aircraft, guns and missiles. But if the same OEM wishes to assemble the equipment on Indian territory, albeit in a subsidiary it controls, permission is not granted. Real control comes not from Indian ownership, but from time-tested conditions like mandatory local staffing (say 90-100%), local value addition (say at least 20%), export controls, walk-in rights, exit restrictions etc. In ten years from now, some Indians working in such companies may move out to other Indian companies or become entrepreneurs widening our defence industrial base. Sectors like auto, telecom, IT and pharma have witnessed such lateral movements, defence is no different.

Global OEMs. Making India an attractive destination for global OEMs is key to India's long term self-reliance. Entry of Indian OEMs into defence should be facilitated through fiscal and monetary incentives. MoD needs to interact more with industry and academia to arrive at implementable solutions. Due to our current state of technological sovereignty, we have no choice but to partner with foreign OEMs in some areas.

Offset Rules. Under defence offset rules, global OEMs are mandated to outsource a certain percentage of their contract value to Indian industry. Most of the components sourced from the Indian offset partners are what they are anyways good at, so there's no transfer of sensitive technologies. Indian partners simply 'build as per design' than 'design and build as per user requirements'. Since civil aerospace also qualifies for defence offsets, some global players meet their offset obligations by sourcing aircraft doors and floor beams from India. The government is concerned about the limited success of offset rules and these need to be tweaked further if we want to fully exploit offset.

LTIPP. The long term integrated perspective plan (LTIPP) of the services seeks to fill the capability gap of the Services based on existing capability, threat perception and the adversary's likely acquisition of platforms and systems. The LTIPP needs to be shared with the Indian defence industry and DRDO which will help them to draw up their investment and R & D needs and build up the capacity and capability plan accordingly. The present Technology Perspective and Capability Roadmap (TPCR), though a good beginning, does not give the industry the necessary information to enable them to invest large capital in defence manufacturing.

View from States: Perspective from Andhra Pradesh

The Indian states are looking at FDI in the defence sector and trying to give attractive offers for the upcoming defence industrial hubs. The state of Andhra Pradesh with its highly educated manpower and resources is drawing the attention of industries by changing its policies and mechanism in order to setup businesses with ease. DRDO has been already awarded 1,102 acres in Chittoor district to develop an R&D unit and further it is planning to setup a centre for high energy science and system in Kadapa district. Bharat Electronics Ltd has proposed a major defence production unit in Andhra Pradesh. The government of Andhra Pradesh by taking on such major projects is playing the role of a facilitator. It intends to develop its defence manufacturing policy to create a robust defence eco-system. The other states in India have also

started taking such initiatives which will pave the way to the dream of self-sufficiency in the defence production sector.

States can thus play an important role in facilitating establishment of government aided institutions and private industry to setup military industrial complexes in their states by offering sops such as tax reliefs, availability of land, availability of infrastructure, conducive state government etc.

Recommendations

The conclave generated a host of ideas and fruitful discussions, the key recommendations have been collated for perusal and actions by the relevant stakeholders :-

- National Technology Sovereignty Mission be created to steer Technological Sovereignty. A single window Institutional Framework is required which aids achieving Technological Sovereignty by incorporating all stakeholders' representations.
- Government to provide requisite support through funding, policies, provision of level playing field and better implementation of offsets.
- Technology requirement mechanism be institutionalised to ensure that the Armed Forces, Government, academia and the industry are in sync with the present and future requirements of the Armed Forces with respect to technology.
- Work on a shared technology roadmap of achieving and maintaining technological sovereignty. The armed forces should provide a more detailed technology requirement based LTIPP than the present TPCR. Academia and Industry should be incorporated during framing of the TPCR to ensure that correct projects are initiated and there is no need to cull projects later.
- A reworked management structure for capability projects that leverages cross control across disciplines (i.e. R&D, Industry & Armed Forces) would help in better assessment of individual procurements as projects that eventually lead to an orderly national military capability.
- To move from India's current status as an assembler and integrator to a design and development power house.
- To implement the concept of Defence Economic Zone towards establishment of Military Industrial Complexes as an ecosystem having all stakeholders with incentivised policy support from the government.
- Skill development of our labour force to train and equip them to join the technology ecosystem of the country.
- High risk, fundamental research can continue to be funded by the government to established centres of excellence.
- A system be worked out which enables the industry to access DRDO labs for research work and access military facilities for field trials.
- Policy/Norms on 100% FDI in State of Art technology to be laid out in more details to allow active participation y foreign collaborators. Hiking FDI to 74% in defence be actively considered. Industry should be allowed to export a larger number of military equipment to

enable them to recover research and developmental costs and make their future projects financially viable.

- Collaboration with foreign entities where technology is easy to harness to save on time and resources.