ORF POLICY PAPER #01

SEPTEMBER 2012

Recommendations on Arms Procurement Reforms in India

Ravinder Pal Singh

OBSERVER RESEARCH FOUNDATION

Recommendations on Arms Procurement Reforms in India

Ravinder Pal Singh

OBSERVER RESEARCH FOUNDATION

About the Author

Ravinder Pal Singh was Project Leader on arms procurement decision-making the Stockholm International Peace Research Institute (SIPRI). His research in 12 countries from 1993 to 2000 was published by the Oxford University Press in the form of two volumes,—"Arms Procurement Decision Making, Volume 1: China, India, Israel, Japan, South Korea and Thailand" and Vol. 2, "Chile, Greece, Poland, Malaysia, South Africa and Taiwan". He was Senior Fellow at the Geneva Centre for Democratic Control of the Armed Forces.

Recommendations on Arms Procurement Reforms in India

Introduction

The focus of the discourse on reforms in the arms procurement decision-making process needs now to be shifted from that of the last two decades to reaching a consensus on the precise objectives of the reforms. These have yet to be clearly stated, thereby delaying the formulation and implementation of a coherent arms procurement system. The Observer Research Foundation's programme on this important issue, following a seminar organised in May, 2012, has now moved to the second stage of identifying initiatives that can be taken in the executive and the legislative branches. This Paper presents practical recommendations to improve capacities and decision-making methodologies in India's arms procurement system.

The recommendations given below delineate the two broad methods for streamlining the system:

a) Part I—Reforms for Time, Cost and Technology efficiencies: This category will identify reforms needed in advanced technology innovation and defence industrial capacity building, both in the public and private sectors. It covers seven areas where reforms are needed.

b) Part II—Reforms for improving and developing a mechanism for public accountability that prevents abuse, fraud and corruption in the system. In this regard, the debate has yet to identify ways to harmonise public accountability methods with the military's need for confidentiality.

Recommendations for Time, Cost and Technology Efficiencies

The continuing obsolescence of India's indigenous armoury is indicated by its military's dependence on the import of advanced French or Soviet defence systems for the last six decades.

1. Long term plans have to be integrated with financial plans

- Acquisition of major weapons systems through a long term, integrated procurement plan (LTIPP) has to be matched to the quantum of funds available from the Ministry of Finance. Without building predictability in this allocation process, the viability of long term investment plans of the public and private sector industry is stymied.

- Acquisition of major weapons systems through mid-term plans requires a legislative committee's approval, and a five year Service Capital Acquisition Plans (SCAP) needs to be authorized by Parliament. Without this, R&D organisations and the industry would not be able to start research work, nor make R&D capacity building investments. Absence of financial allocation process leads to delays and uncertainty.

- Two-year annual acquisition plans for financial appropriations need to be formulated after the seven Acquisition Steps have been completed and presented to the Cabinet Committee for Security for approval. The Arms Acquisition Agency should have a three year window to complete these seven steps along with the financial approvals.

(A note on Arms Procurement Budget Making is enclosed in the Annexure.)

2. *The following elements are lacking in India's decision-making process for arms acquisition:*

- A PPBES model for procurement budget planning, i.e., for Planning, Programming, Budgeting, Evaluation System has not yet been developed, as also an independent verification agency that validates the decision-making steps and reports independently to its highest decision-making authority.

- A complaint mechanism with statutory powers and competency in professional-cum-technology domain knowledge to apply the due diligence criterion on the lines of Competition Commission.

- Acquisition plans that are not integrated with technology acquisition plans of other government agencies (such as the MHA, the space or the aviation agencies), lead to lack of co-ordination, inter-operability, logistical and financial mismanagement.

- Major arms acquisition projects have to develop a **Project Mission Approach (PMA)** that assembles multi-disciplinary teams from the user services (operational and maintenance), DRDO, DPSU, private sector industrial participants, financial authorities and foreign suppliers. The aim should be to deploy a comprehensive team of experts under a single leadership and finance structure to achieve the desired results in terms of costs, time and technology performance objectives.

3. Offset Policy or an Advanced Technology Investment Programme?

India's offset policy is inappropriately designed to contribute towards the objectives of technology capacity building. The policy should aim at reducing the technology acquisition burden of procurement. But the new policy as defined is a generation older than those of other nations and not conducive to joint technology-intensive ventures with leading global suppliers of key technologies. Instead of crafting itself into global supply chain of advanced technology components or sub-systems, our policy is tangled in a knot of mandatory implementation procedures of industrial offsets that are sought by its private sector lobbies.

What India needs is an Advanced Technology Investment Programme for building up its R&D capabilities to participate in global supply chain in key advanced technologies. These technologies are defined in terms of performance threshold above the export controls listed under the Wassenaar Arrangement. The MoD approach to get exemptions for the DRDO sanctions remains short-sighted to enable India to obtain a full membership of the Wassenaar Arrangement, without which the Indian R&D entities will have to continue to grind through technology export licensing requirements of all the WA member countries.

India remaining outside the international technology arrangement may have lesser impact on the major players in its private sector, but small and medium (SME) scale technology innovators would remain outside the international opportunities and developments in key advanced technologies. Our decision-makers need to realize that innovation and enterprise that resides in any country is found in its SMEs.

Among the two important factors required for viable offset or technology investment programmes are: one, a sufficient stock of highly specialised technology manpower to undertake and sustain the high-tech production. This requires enhancing the outturn of both the university and national R&D systems, which includes training of individuals and research teams in cutting edge technologies to guard against technological surprises that can have both civilian and military implications. Two, access to R&D capabilities with advanced technology infrastructure and laboratories supported by a robust policy to systematically pursue the task of acquiring critical technologies.

There is need to organize an Advanced Technology Investment Programme (ATIP) that focuses on access to such key advanced technologies by developing strong manufacturing links with the global technology supply chain. In the area of research and development, we need to integrate with the world's advanced civilian applications so as to financially sustain such investments, as also to meet the financial risks involved in innovative exploratory research. The MoD's technology capacity building approach has to formulate ways to integrate the technology needs of the three armed services, so that the proposed weapon systems and force multipliers are producible in a sustained manner on the strength of India's advanced technology infrastructure and its technology export competitiveness.

The Indian Ministry of Defence has to examine various methods for developing the ATIP. It is evident that venture capitalists have unparalleled access to cutting edge technology in global commercial sectors. Commercially developed products, components and sub-systems are increasingly being used by the military systems. However, given that technology innovation has uncertain chances of breakthroughs in the immediate future, it needs financial support for the incubation period. The MoD-cum venture capital initiatives can provide the following benefits to the defence sector's technology capacity building: a wider "window" on new technology development; an increased technology supplier base; more leverage to private investment and its access to domestic technology market; and speedier acquisition of new technologies through technology incubation capacities and offsets.

A consortium could be set up by clubbing the Ministry of Defence, the private sector defence industries, the Venture Capitalists, foreign technology suppliers (i.e. defence equipment OEM and component supplier) and the academic research centres in 17 key technology areas. (These 17 fields are delineated on pages 10-12) They could be established at the leading engineering institutes to form technology-industrial venture (TIV) clusters. Each of these clusters should provide the resources to include funding, access to technology and market buy back for the products (i.e.–above the export-control threshold) and, above all, assuring the supply of highly skilled human resources necessary for sustained advancement of innovation in the military and commercial sectors. In return, these stake holders could be given partial ownership (equity stake) in the venture/company. By this method, the MoD, the OEM suppliers, the academic research centres, the private sector and the venture capitalists would be integrated in mutually reinforcing advanced technology investment cum market opportunity both locally and globally.

There may be a divergence of interests over the commercial value of technology between the VC (which is concerned with the financial aspect) and the MoD (which focuses on the strategic value of its technology inputs). The ATIP must find ways to develop these 17 clusters into 'technology champions' for the country's R&D programmes. These could become the terms of skills and expertise that flow between the TIV clusters and the Ministry's R&D effort to innovate and shepherd in new technologies. The advantages of TIV clusters should be their ability to cross-fertilise with internationally recognised R&D centres. If arms supplying companies are incentivised to join the ATIP, technology acquisitions would have greater benefit than the current offset policy.

4. *Indian Military R&D Sector's Competitive Capacities*

- The DRDO has to replace its triple-hatted model with a competitive and flexible model so as to develop strategic and major weapons systems and for the acquisition of key advanced technologies. Its monopsony thwarts the attempt to independently evaluate the technological product, because the armed services are compelled by the executive branch to accept DRDO's products without any independent verification, a process that is still to be developed in India. Most of the industrialised countries have independent R&D testing bodies. For example, China has the State Test and Evaluation Committee (STEC), which is independent of technology developers like COSTIND and other Corporations involved in R&D and manufacturing. It reports independently to the Central Military Commission (CMC).

- Other limitations in the DRDO that need to be addressed are: shortage of specialised research staff; budget allocations for salaries of administration and accommodation that are far in excess of comparable R&D organisations. It has the highest number of administration staff and the least number of research staff in comparison to the country's CSIR labs. Several other Asian countries' military R&D staff is much larger, with advantages of greater military experience. (For detailed findings about the comparative limitations in India's military R&D base refer to[1])

- **The three Armed Services should develop R&D laboratories and co-locate them with their major research centres that work on the operational-tactical doctrines.** These labs should enable the need-assessment and acquisition of emerging technologies, and examination of the user's equipment requirements in terms of efficiencies, maintainability and reliability requirements, so that the three services can make balanced decisions based on costs and operability. These labs will preclude the need for frequent revisions in SQR and RFP and provide the executive and the military users with independent capacities for technology verification and assessment. **Integration of advanced engineering knowledge with combat experience is the key to technology innovation and for narrowing the technology obsolescence gap.**

These armed services labs will enable the defence sector as a whole to carry out techno-operational innovations related to: (*a*) emerging threats and comparative technology levels; (*b*) identify emerging/breakthrough technologies and develop innovative operational concepts; (c) identifying

RMA-related systems and processes; (d) validate technological capability definition and feasibility studies; (e) scrutinize project definition and development of a full scale engineering model or sub-system models; (f) enable the military user to test proof systems offered by the DRDO or foreign suppliers; (g) provision of skill sets for SQR and RFP formulation that would do away with the lack of advanced engineering expertise and the limitations on technology assessment due to frequent job rotations in the current method and; (h) assist the field user to prepare trial reports.[2] The current capacities of the DGQA are organised for **post-production equipment certification in terms of performance, maintainability, serviceability and reliability standards. The DGQA does not have the comprehensive expertise to conduct pre-development assessment of technology alternatives or knowledge thresholds of technology developers in the country such as the DRDO or in the private sector.**

- **Defining and Developing Key Advanced Technologies Acquisition and Industrial Integration Plan.** These are required to build and sustain global technology competitiveness. Unless critical military technologies are assessed on an on-going and systematic basis, it will be difficult for policy-makers to properly plan their investments for development of skills, design and manufacturing capabilities.

- Specialised research institutions have to be developed by the MoD at selected IITs and engineering universities in 17 fields of key advanced technologies.[3] These R&D centres should be enabled to invest in technology infrastructure and for the incubation period for developing military and advanced commercial technology markets in a financially self-sustainable way. The MoD should facilitate collaborations between defence, private sector technology developers and its OEM suppliers. Systems based on technologies listed below have to be selected, reviewed and approved by the MoD, the three armed services, the DRDO, as also other technology developers.

Some examples of key military technologies indicating their commercial applications:

- **Air breathing Propulsion** ♠♠♠♠♠ Aerospace industry, ship propulsion and stationary power generating systems.

- **Semi-conductor materials and micro electronic circuits** ♠♠ ♠♠Very high speed integrated circuits based on gallium arsenide or silicon chips with applications in automotive, telecom and computer industries, manufacture of industrial robotics.

- **Passive Sensors** ♠ ♠ ♠ ♠ Specialized fire-fighting, medicine, controlling pollutants, diagnostic tools an engines, monitoring industrial hazards, satellites for remote sensing, communications and weather applications.

- **Composite Materials** ♠♠♠♠Commercial aircraft (by the year 2005, composites were making up 65% weight of transport aircraft), automotive and construction industry.

- **Signal Processing** ♠♠♠basic research in neural networks and related applications.

- **Simulation and Modelling** ♠♠♠Military: designing, testing and validating weapon systems development; and theatre-wide decision making in ops. Commercial: Undersea geophysics, petroleum exploration, virtual prototyping, expert systems training, integration design; management of industrial manufacturing, transportation modeling.

- **Advanced Software production capabilities** ♠ ♠ ♠ All segments of advanced industries, complex project management, air traffic control, including medical applications.

- **Sensitive Radars** ♠ ♠ ♠ Robotics, automated manufacturing processes, speed determination safety radars and remote detection of chemical effluents.

- **Parallel computer architecture** ♠♠♠Computer aided design, manufacturing and engineering simulation in aerospace, petroleum electronics research, weather forecasting.

- **Photonics** ♠♠High speed computing, lasers detectors, local area networks and trans-oceanic cabling. Optical communications immune to electromagnetic interference for transmitting information as photons over fibre rather than electrons over copper.

- **Computational Fluid Dynamics** ♠ ♠ Aerospace industry, production of silicon wafers, gas-deposited coatings on materials, welding of high temperature metals, production of circuit boards, machine tools and gas turbine parts.

- **Machine Intelligence and Robotics** ♠♠ Robotics, handling hazardous materials and automated manufacturing. Recent studies indicate that expert systems diagnostics can reduce maintenance man-hours significantly.

- **Data Fusion** ♠ ♠ Urban planning, resource management, pollution control monitoring, climate, crop and geological analysis. Information engineering tools to support planning, analysis in industry, control of computer and telecommunications networks, traffic control, financial markets, etc.

- **Weapon System Environment.** ♠ Pollution control, research being conducted in weather forecasting, as well as in oceanographic, space and geological research.

- **Pulsed Power.** ♠Electrical utilities for power factor corrections & medical industry.

- **Hypervelocity Projectiles.** ♠Commercial space launch vehicles.

- **Superconductivity.** ♠For improved distribution and utilization of electrical energy, medical monitoring, non invasive diagnostic surgery, magnetic resonance imaging (MRI) and high performance computing.

5. *Competitiveness in the Indian Defence Industrial Sector*

- Examine development of venture capital based Joint Ventures with OF-DPSU–private sector industries–international centres of high–tech R&D for building up export competitiveness in the telecom, aviation, space sectors. This will improve India's **technological infrastructure and technology productive capacity**:[4]

- **Technological Infrastructure (TI)** plans for setting up institutions and creating resources so as to build the capacity to produce and market new technologies. Noteworthy here is China's ascendancy to the fourth position on the global rung of technological superiority, surpassing the UK but, as yet, behind the US, Japan and Germany. India is at the 20th position, between Singapore and the Czech Republic.

- **Technological Standing (TS):** Improve India's current world market share in high technology products to come up to the current levels of technology development and manufacturing capability. While China stands at the number 1 position, India is far behind at the 21st place behind Australia and New Zealand.

- **Technology Productive Capacity (TPC):** India needs to increase its human resources output in advanced science and engineering, as also the percentage of export-oriented advanced technology products; it needs to enhance cross-fertilization efficiency of these resources in the military equipment sector.

The prevailing rules and laws for the administration of defence public sector undertakings (ordnance factories) restrict the country's strategic potential in advanced technology production. These rules and laws were made in the 1950s, when an infant India had a very low productivity threshold. These laws have not yet been liberalized.

- **Government Owned Company Operated (GOCO**) model should be examined and reshaped for providing greater flexibility and incentive packages to our defence entities/ordnance factories so that they are able to compete with global exports of advanced technologies. Today, materials and components of 9 ordnance factories with 30,000 employees are engaged in metal forgings, castings, machine tools and cables, as also civilian products–i.e., power, instrumentation and fibre optics cables. Ordnance equipment group of five factories with 18,000 employees are making clothings both for warm and extremely cold climates, leather equipment and sleeping bags.

- India does not yet have a **defence industrial association** that could help formulate unique incentives, rules and policies for its high financial/technology risk industries in the defence sector.

- Technology bidding for transfer becomes more difficult when technology is used for classified military systems. The MoD loses out on innovative solutions that could be offered by several smaller high-technology companies in the country and abroad because of problems of security clearances and interaction with MoD procurement executives. The MoD should create technology transition offices/briefing centres staffed with experienced arms procurement experts to provide guidance and advice to companies or technology developers as they navigate the procurement process. Adding to the problem is the fact that the DRDO sees technology suppliers as business rivals.

6. *Defence Sector Acquisition Management and Executive and Legislative Oversight*

Advanced Technology Management Institute and Research (ATMIR): Four weaknesses in the domain of knowledge and skills specialization come in the way of timely decision-making. These lacunae can be found in the areas of: (1) Operational and technology assessment skills; (2) Decision assessment skills; (3) Contract assessment skills and; (4) security sector governance skills.

Capacities have to be built to create specialised post graduate level studies and advanced research in fields that are increasingly in demand for acquisition of complex technology systems, including advanced weapons systems. These skill sets include academic disciplines such as: Operational Research; Decision Sciences; Systems Analysis; Systems Engineering; Contract Management; International Business Law; Quantitative Finance & Risk Analysis; Applied Financial Valuation; Technology Assessment and Forecasting.

A fully developed ATMIR should also conduct research and training programmes in fields such as: security sector governance, arms procurement risk management; counter corruption processes in the defence sector; commercial accountability of arms procurement decisions; comparative arms procurement processes; technology acquisition strategies; defence industrial performance management; forecasting financial time series; financial probability & measure; life cycle costing; logistics engineering; technology innovation; patent laws and arbitration laws; information and communications technology in defence sector; technology export control policies and processes; ethics and corporate social responsibility and; combinatorial optimization for weapons selection; etc..[5]

Advanced Technology Management Agency and Service (ATMAS). Develop and retain specialised acquisition management skill-sets for acquisition, localise production, maintenance, trials and delivery of complex weapons systems after the service HQ has obtained an acceptance notice of the need for the product. The ATMAS should be able to constantly evaluate the worth of domestic and international technology developers and industrial vendors. Draw on the staff expertise of the ATMIR and exchange complex project management experiences with other technology-intensive sectors such as: aviation, space, telecommunications, nuclear energy, and super-computing etc. An advanced technology assessment and contract management service needs to be institutionalised for executive oversight of complex projects.

Commercial Contract Negotiation and Management teams should be an adjunct of the approving financial authority and should be kept independent of the technology acquisition and management processes. Offset negotiation should segregate pre-offset and post-offset price offers, also factoring in life cycle ownership costs.

7. *Human Resource Capacities for Military Technology Revolution:*

In India, the military technology users in the armed services are not equipped with the required technological education to leverage emerging technologies for innovating new systems. At the same time, the DRDO scientists do not have experience of the military operations for which they are developing the weapons. This capability gap can have dangerous consequences, as technology is changing rapidly and assumptions of technological advantages of the past may not be relevant in the future. In addressing this limitation, we need to note Winston Churchill's observation derived from his war time experience: **"… unless the void that exists between the scientist or engineer and the war fighter is recognised, a hiatus will exist between the inventor who knows what they could invent if only they knew what was wanted, and the soldiers who know, or ought to know, what they want and would ask for it if they only knew how much science could do for them. …"**[6]

For our country, the primary need is to create a technologically competitive military leadership system that makes the present man-power intensive system redundant.

Technocratisation of military leadership: Develop from minimal to maximal education concept. An explanation is given below as to how advanced engineering capability enables military organisations to efficiently use emerging technologies. That is the reason for making the military officers' education system technology intensive in Asian countries such as Israel, Japan, South Korea and Taiwan.

Minimal User Concept requires the officers to possess the educational standard that enables them to understand and explain training manuals, interpret rules and laws, study maps and maintain accounts.

Maximal User Concept requires officers to possess technical educational standards so as to enable them to use advanced engineering knowledge to develop inventive products for maximizing operational advantages. Such an education also encourages exploratory research into emerging technologies for finding innovative solutions to operational problems.

Military leaders trained on the basis of 'maximal user concept' receive tertiary level training in science and engineering to become developers of new products. Thereafter, new systems need to be innovated by comprehending and using new technologies to meet the military's changing needs of operational, logistical and battle space management. The officers, instead of merely knowing how to operate a tank or artillery equipment, need to understand the scientific reasons as to why the systems are so designed. This capability is essential to sustain R&D competitiveness and innovation.

8. Conclusion

The inability of India's military sector to catch up with the 60 year old obsolescence gap between the foreign technology supplier and the domestic producer cannot be narrowed down unless focused initiatives are taken to develop capacities in technology knowledge domain, both in its R&D and military sector; build expertise in assessment of key advanced technologies, their acquisition, management and oversight.

For technology developers, suppliers and users, uncertainty exists because of lack of experience in delivering, deploying, employing and supporting such advanced technology products. As such, technology is new to the users and the explanation offered is hardly likely to allay their sense of uncertainty. New and novel high-tech ventures—by the very fact that they are new—involve a high degree of the risk associated with leading-edge technologies.

Part II: Accountability Processes

The need to have a professional accountability process which harmonises with the need to maintain rational military confidentiality has to be accurately and appropriately addressed. The following elements are needed to build such a system:

- Firewalls must be built to keep separate interest-group politicians, professionals, decision makers with help of effective public information and dissemination system.

- There is a need to identify systemic limitations leading to financial impropriety and legislate anti-corruption and anti-bribery laws, as also use ICT for project management.

- Technical domain knowledge being weak, decisions get influenced by foreign suppliers; thus, capacities for Technology Audit & Accountability procedures need to be developed.

- Develop dynamic White Papers every two years for defence sector accountability which define processes for the following activities. These have not yet been developed in India:

    - **Coordination** procedures between different departments of the MoD, different ministries and agencies of the government that have a role in arms procurement.

    - **Validation** procedures of LTIPP which has been integrated with financial allocation plan; Service Capital Acquisition

Plans (SCAP), Key technologies Acquisition Plan (to be developed) and Defence Industrial Policy (to be developed);

- **Verification** procedures of executive and legislative oversight on probity procedures to prevent corruption, waste, fraud and abuse. (Compare with CVC recommendations.)

- **Scrutiny** procedures for matching vendor statements with post-procurement equipment performance analysis, as also financial outflows with financial proposals, offset programme performance.

- **Monitor** procedures to identify progress of plan implementation of indigenous models according to identifiable milestones.

- **Review** procedures at ministerial levels for five year defence reviews to examine relevance of defence plans and implement policies and methods and outputs, as also to meet new challenges. Appropriately classified procedures of defence review should be presented to the Parliamentary Standing Committee of Defence.

- Define the 11 Steps of the DPP, the entire Arms Acquisition Process, Contract Negotiation processes, Defence Technology selection-cum-acquisition and Defence Industrial Production processes to identify and assess corruption risks and counter-corruption compliance programmes. Verification studies are required periodically to identify weaknesses, assess internal controls and external checks for managing corruption risks from all sources.

Contact points between the decision makers in the MoD and the vendors in public/private sectors have to be firewalled by an institutional mechanism which is independent from the MoD, but provides support to the MoD for briefing and updating executive decisions. There is a felt need to institutionalise a public information body for defence procurement to address the informational limitations of the MoD industrial and arms procurement processes, such as: (*a*) insufficient/unscientific public debate on the rationale for weapon system procurement; (*b*) greater likelihood of corruption in arms procurement; (*c*) inadequately analysed procurement policy and unverified processes leading to procurement inefficiencies which can have unhealthy consequences for national security and (*d*) opacity in decision-making processes which shakes public confidence in the probity standards of the armed forces, leading to needless controversies. These limitations continue to exist, but have not been removed because corrective steps have not been taken by the country's political leadership, resulting in:

- Lack of a clear information policy on arms procurement decision-making and weak information dissemination on the status of MoD decisions.

- Lack of legal obligation to disclose information.

- Military sector's absolute right to pick and choose information that can be disseminated to the public. Because they lack training and a tradition of transparency, officers often decide on the side of caution in releasing information, which can safely be put in the public domain. An approach to this problem developed by the atomic energy officials is any information that is sent to Atomic Energy Regulatory Board (AERB) can be put in public domain.

- Ambiguity in laws, rules and procedures on releasing commercial or RFP related information leads to commercial lobbying or corrupt practices to access information on military decisions and findings.

- Compensate for ambiguity in bureaucratic behaviour. Explain and interpret the decision-making processes and procedures, priorities and requirements, particularly to new entrants in the defence market. Often, perfectly valid bids are rejected because of lack of information dissemination and flawed understanding about and by the vendor.

- Strengthen democratic accountability practices and compensate for weaknesses in public information/understanding of delays and cost overruns in the decisions.

- **Online audit schemes.** Once the project has been accepted for 'Make or Buy' category, online financial cum technology audit schemes should be put in place to cover the acquisition steps followed by RFP—i.e., commercial evaluation methods and processes in research and development at the prime-cum-subsidiary level, project administration and project leadership methods. Even though audit intrusion would be resented by the developers and users, decision-making and performance audit by multi-disciplinary audit teams, if done without trying to influence the process, would be useful in post-facto lessons learnt, as has been experienced in Israel.

- **Procurement Decision Monitoring & Review Board** needs to be set up to design, develop and instutionalise Defence Sector Complaint Mechanism (DSCM) to investigate complaints independent of the MoD. It should comprise at least three members of legislative oversight committee for defence, as also representatives from the CAG, CVC, DPSU, DRDO and user service. Statutory complaints body on MoD decisions should comprise three retired members of the higher judiciary. It would function as an appeals court replacing the parliamentary committee on defence. The representatives should be from the CAG, CVC, DPSU, DRDO, Competition Commission and the user services.

- The DSCM should conduct programmes in areas such as: arms procurement risk management, create synergies and procedures to detect and counter corruption threats. Programmes for promoting whistle blower legislations anti-fraud procedures, etc.

Legislative Oversight Processes: This is an area where India is far behind other post-colonial democracies. Executive functions of all the afore-mentioned accountability mechanisms have to be verified and scrutinised by Standing Committees of Defence and other parliamentary committees. Research findings on the weaknesses of such committees are identified as : a) lack of consistency in membership of committees and low knowledge base as the committee changes its membership every year; b) absence of process which enables access to expertise in public domain and in security sector; c) lack of initiative to formulate laws and procedures to harmonise military confidentiality with public accountability processes; d) parliamentary committees, being large, monolithic bodies without smaller sub-committees are unable to conduct any focused studies of specialized fields of enquiry. The committee tends to pick up only episodic tasks that are of immediate topical interest. To make the committee work efficient, it could be formed into smaller and more focused sub-committees specializing in fields such as: (*i*) security policy and threat assessment; (*ii*) arms procurement (R&D and production/industrial issues); (*iii*) human resources planning (education and training); (*iv*) financial planning, budget and audit; (*v*) defence management (estates and assets) and; (*vi*) co-ordination with internal security apparatus.

Professionalisation of parliamentary oversight process would give a sharper definition to the executive's decision-making, as it would then be judged by a broader expert group. It would also pre-empt meaningless criticism and set in place confidential hearings for the exchange of sensitive information. It would deepen the political power's understanding of defence sector needs; enable policy consistency even after the government changes.

In order to build professional capacities, the parliamentary committee should continue with the same composition of its members for the entire duration of Parliament. The sub-committees should be supported by at least 2-3 dedicated academic research centres for providing data and access to national and international expertise on issues that the sub-committees are engaged in; this would help the MPs to develop specialisations in their sub-fields. Even if the sub-committees examine one or two questions in depth every year, over a period of time, a better quality of oversight and wider public knowledge on defence sector decisions will be created. For example, in arms procurement, technical and industrial experts would enable these sub-committees to develop independent assessments of the decisions being made by the executive branches. Some countries have developed processes both for confidential and open hearings that allow critical issues to be examined comprehensively, but without any leakage.

Conclusion

Political leadership should note that efficient processes are those which have clear rules of accountability. It helps in balancing defence and development priorities. Our defence procurement policy and decision-making processes have demonstrated weakness in clarity and limitations in professional and scientific review based on public interest.

Unless the country develops entrepreneurial capabilities in acquisition of advanced technologies for its defence sector, its arms procurement decisions will be based on plodding public sector methods. The second major handicap is: wherever military confidentiality needs to intersect with reliance on state-of-the-art technology, the risks associated with understanding of high-technology leads to lack of public accountability.

Access to or availability of technology knowledge among the users, the decision-makers, the financial assessor, the auditor and political review is of paramount importance in technology acquisition.

ANNEXURE ONE: Note on Arms Procurement Budget-Making

Decision-makers cannot become prisoners of a system which fails to meet the functional requirements. The system has to be re-designed to meet the objectives of the decisions—not the other way. There is no denying the fact that arms procurement plans without matching budgetary commitments lead to ad hoc decisions. If this situation has to be corrected, then the system has to be re-examined for re-design and re-configured.

Other factors that influence procurement decisions are the pace of technological changes and rapid obsolescence rate which allows only long term planning of weapon systems requirements. Also, equipment development and acquisition process is time consuming, particularly so when a country's indigenous technology and industrial base are not well developed. The foreign suppliers too may not be ready or willing to give their latest systems unless these are nearing the sunset phases in their country's armed forces.

In view of the above, long term financial planning (15 -20 yrs) and medium term planning processes (5-6 yrs) are being practiced in most of the advanced countries. These processes were also accepted in India as late as in 2001 on the basis of the Arun Singh committee's recommendations. However, the decision-makers have not been able to develop supporting financial planning methods.

Budgetary Allocation: These are to be made in the long term (10-15 years) by the executive branch (MoF) and re-examined annually with financial forecasts to be modified annually. Unless the Ministry of Finance makes these allocations to support the LTIPP, the recommendations of MoD would keep changing.

Budgetary Authorisations should be made based on parliamentary approval process. The authorisation of payments has to be forecast in five to six years time frame. This provides greater assurance, particularly to private sector R&D or industrial investors, who would be able to predict the government's plans and its arms procurement budgets since it already has received the parliamentary approval. This is possible if parliamentary defence committees are organised as proposed in this paper.

Budgetary Appropriations should be received by the MoD (Finance) on a two year rolling plan for payments to vendors.

Defence Budget process should be redesigned on the basis of Planning, Programming, Execution and Evaluation model. To begin with, this could start with segregating the arms procurement budget from the general budget requests of the three services.

The defence budget designs in NATO countries and other technology intensive military systems generally make long-term budgetary assessments based on Function Based Requirement method. The procurement budget is not allocated by service heads but by the heads of functional military capabilities. Their general ratio of allocations varies as follows:

a) Military capability maintenance costs 30% - 25%;
b) Operational costs 30% - 25%
c) Manpower Equipment maintenance costs 40% - 35% and;
d) Assets and housing costs ± 10%.

From the broader, longer-term allocations, it would feasible to draw out long–term assessment of allocations for military capability, which in turn would identify allocations for the new major weapons either for modernisation, upgrades or obsolescence replacement.

In the Japanese model, the Joint Long Term Defence Estimates (JLTDE) is formulated every five years and targets assessment needs of a 10-year-period, which is 9 years ahead of the year when the assessment is made. (If X is the year of estimates then it will be made for the Years X+9 to X+19). The Joint Mid-Term Defence Estimate is made every five years. (If X is the year of estimates then it will be made for the Years X+3 to X+8.)

In South Korea, the midterm budget also has the advantage of being approved by Parliament, and thereby provides reliability and predictability. As the Mission requirements are converted into specific procurement programmes by Year X—X being the year of commencement of the midterm acquisition—it enables the industry to gear up for likely contracts. Consequently, the possibilities of time overruns are reduced and monitored.

ANNEXURE TWO: Problems experienced at the Indian Ordnance Factories

1. *Manpower constraints.*

Production techniques for new and sophisticated equipment require manpower with higher levels of qualifications and training. Manpower is found to be surplus in entities where old methods of production lines have been closed. There is an acute shortage of adequately trained technical staff in units taking up new products. It is difficult to transfer technically qualified staff. Manpower shortages are found in specilizations requiring higher technical proficiencies, but manpower surpluses are among workers in a higher age group, who lack skills in handling new production techniques and equipment. Retraining this manpower results in inefficient returns, as more than 56% of manpower in the OFs is above 45 years of age. During the decade 1988-98, there has been around 16% decline in the manpower employed in the OFs and the DPSUs.[7]

2. *Inadequate Stores Budget.*

Because the lead time for positioning critical components and material varies from 6 to 12 months, inadequate stores budget in any given year can delay the manufacturing of products in the subsequent year. Among the reasons which create pressures on the stores budget is the archaic inventory management and forecasting procedures in the armed forces which result in erroneous forecasts. Also, the mismatch between supply and demand of the armed forces because of incompatible inventory control systems of the suppliers and the customers (armed forces) leads to fluctuations in orders. There is also the problem of gaps in teaching and actual practice of scientific logistic management methods by the MoD and the armed forces.[8]

3. *Low capacity utilization.*

The capacity utilization in the OFs is between 60% and 65%.[9] The aggregate capacity utilization of the DPSUs is assumed to be somewhat better than the OFs as indicated by a relatively larger share of their output being sold in the civil sector.[10] Surplus defence industrial capacities had been created in India to cater for unexpected surge in demands that could arise during national security emergencies. Capacity utilization is negatively affected due to the following factors: non-modified machineries in some of the older OFs; decreasing demand for older types of systems and propellants. The delays in assembling occur because of delay in procuring necessary components from the private sector or other OFs.

4. *Loss due to poor inventory management, faulty production and old machinery.*

The average percentage of production loss to its total value, due to faulty manufacturing, is estimated to be 0.32 per cent per annum. This loss could be due to factors such as: old and decrepit plants and machinery; inefficient on-line production processes and factory layouts; delayed component procurement; and faulty inventory management. This is evident from the fact that, on an average, an unmanageably high stores inventory—180 to 210 days—is being maintained.[11] Currently 40 per cent of the plants and machinery in the OFs are over 20 years old and machines with modern CNC technologies come to less than 2.5 per cent of the total OF machinery.[12]

5. *Costing and pricing practices.*

The OFs' supplies to the armed forces are priced on a 'no profit no loss' basis. Profit from sales to the government departments and police services are fixed, but the sales to the civilian market are priced at competitive market rates.

6. *Miscellaneous constraints:*

The defence factories are moving from SKD and CKD stages of production to the stage where an increasing number of components are being produced indigenously. The learning curve for manufacturing products matching the required standards has been slower than expected. Delivery lead time can be up to 6 to 12 months, particularly for imported components. These delays lead to bunching and queuing at proof testing ranges. Frequent interruptions in power supply go a-begging for captive power generation.

The above problems have led to time and cost overruns. To address these limitations, the need is to review quality control process involving inspectors from Director General of Quality Assurance. Outsourcing of intermediate products and components from the civil industries for production of ordnance equipment has to be gradually increased. The current level of outsourcing in the OFs is estimated to be around 48-50%, which is still far less than the optimum 70% in industries around the world.[13]

****

Endnotes:

1. Indian Science & Technology and Implications for Military R&D, Economic and Political Weekly Vol. XXXV No. 31, Mumbai, Jul 29 2000. pp. 2762-2775.

2. For example, scores of Israeli military officers specialised in advanced composites, propellants, automotive engineering etc. were engaged in development of the Merkava tank, Uzi sub machine gun, Corner Shot Combat System, the UAVs (after the Lebanon war), combat robotic systems, the mobile telephony switching system etc. Hundreds of IDF officers with engineering backgrounds have transferred to private sector R&D labs in the IAI, Rafael, or Taas, Elbit, El-Op and Tadiran and around100 smaller firms where their operational experience proved to be of great use in technology innovation across the entire spectrum of applications that includes: reconnaissance, surveillance, target acquisition and engagement functions. Similar expert capacities exist in other countries, such as: the ADD (South Korea), TRDI (Japan), Chung Shan Institute (Taiwan). On an average, around 70-80% of their research staff have military backgrounds with PhDs in diverse science and engineering disciplines. The value addition to the military lies in cross-fertilisation of different specialisations and operational backgrounds to throw up innovative ideas on a sustained basis. This concept has not yet developed in our country.

3. Key advanced technologies are identified from an overview of key enabling technologies in Europe see note. France has developed its own priority technology lists. Different organisations in the US, such as the Dept of Defence, Dept of Commerce and the Aerospace Industry Association have identified their priority technologies; The Japanese future technology predictions were made in 1996 for a 30 year technology acquisition plan which had identified 14 fields with five priority themes for development in each field. Sources: Preparing for our future: Developing a common strategy for key enabling technologies in the EU "Commission Staff Working Document," Brussels SEC (2009). Interavia, Jan/Feb. 1996 p. 22. Note: Indicators ♠♠♠describe the scale of R&D funding that was received by specified technology field in the 1990s from joint venture or U.S. federal funds **Source:** This section on Key Advanced Technologies with Applications in Defence and Commercial Sectors is based on Ravinder Pal Singh, "Identifying Key Technologies in Major Weapon Systems" in Gaspirini P. and Hoffman, K. "*The Transfer of Sensitive Technologies and the Future of Control Regimes"* UNIDIR 1997, pp 11 to 13. See "*Science: the End of the Frontier"* Report to the Board of Directors of American Association for Advancement of Sciences, Washington D.C. 1991, p. 16. *Key Technologies for the 1990s*, Aerospace Industries Association, Washington D.C. 1990. Department of Defense, "*Critical Technologies Plan*" for the Committee on Armed Services, US Congress,

March 1990, pp 4-6. *Military Critical Technologies List,* Under Secretary of Defense, Acquisition, Technology and Logistics Pentagon, VA, June 2009; and **Developing Science and Technologies List , US Dept of Defense, Defense Threat Reduction Agency, Ft. Belvoir, VA, June 2000** See Japan: Future Technology Predictions Tokyo Nikkan Kogyo Shimbun (in Japanese) FBIS –EAS-98-124, Jan 8, 1998

4. Sources: National Science Board, p 6-8,9,10 The Civilian High-technology Economy: Where is it heading? Adam Segal Maurice R. Greenberg Senior Fellow for China Studies http://www.cfr.org/publication/10179/msnbc.html. Global high technology exports from 1980 to 2005, lists the top thirty countries for each year. See Gallagher, K.P. & Porzecanski, R. "*Climbing Up the Technology Ladder? High-Technology Exports in China and Latin America* January 2008 University of California Berkeley, Paper No. 20, P.11 For details of statistical indicators and Expert comments see Porter A.L., Newman N.C., Xiao-Yin Jin, Johnson D.M., Roessner, J.D ., op cit. Note 20. pp. 13,14,16, 20 & 22

5. The problem with arms procurement is not weapons replacement with successive generation of weapons, but of finding an optimal assignment of a set of weapons of various types to a set of targets in order to maximize the total expected damage done to the opponent. The complexity of the entire arms /advanced technology procurement process requires specialisations in different fields of research and India has not yet developed institutionalised capabilities in that regard.

6. Beason, D. Op. Cit. Note 3 "Strategy for the Post Cold war Era" DoD Science and Technology, Institute for National Strategic Studies http://www.ndu.edu/ndu/inss/books/dodsnt/ch4.html p. 5.

7. Sixth Report of Standing Committee on Defence 1998-99, 12th Lok Sabha, MoD, Ordnance Factories p. 26.

8. Apte, SS Lt Gen: 'Logistic aspects of Army Industry Partnership,' Army Industry Partnership Seminar 1995. pp. 2-5. Sixth Report of Standing Committee on Defence 1998-99, 12th Lok Sabha, MoD, Ordnance Factories p.5.

9. Sixth Report of Standing Committee on Defence 1998-99, 12th Lok Sabha, MoD, Ordnance Factories, p.9.

10. See Table 2 for the value of the share of DPSU sales to the defence and civil sectors.

11. Sixth Report of Standing Committee on Defence 1998-99, 12th Lok Sabha, MoD, Ordnance Factories, p. 33.

12. Sixth Report of Standing Committee on Defence 1998-99, 12th Lok Sabha, MoD, Ordnance Factories, p.26.

13. Sixth Report of Standing Committee on Defence 1998-99, 12th Lok Sabha, MoD, Ordnance Factories p. 34.

Observer Research Foundation is a public policy think-tank that aims to influence formulation of policies for building a strong and prosperous India. ORF pursues these goals by providing informed and productive inputs, in-depth research and stimulating discussions. The Foundation is supported in its mission by a cross-section of India's leading public figures, academics and business leaders.

₹ 195/-

Observer Research Foundation
20, Rouse Avenue, New Delhi-110 002
Email: orf@orfonline.org
Phone: +91-11-43520020 Fax: +91-11-43520003
www.orfonline.org