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Keynote Address

*A. K. Antony**

Offsets are today a common feature of international arms trade. It is estimated that offsets and related forms of counter-trade constitute 5 to 30 per cent of global trade. More than a hundred countries use the mode of offsets in their arms contracts. Business and trade analysts put the exact volume of defence offsets at the global level at over $5 billion each year. The United States, the biggest arms exporter in recent times, is obviously one of the largest providers of offsets. In 2006 alone, it signed nearly $3.5 billion worth of offset contracts with more than 20 companies located in 12 different countries. At the global level, the threshold of defence offsets, that is the minimum value of the contract at which offsets apply, is as low as $0.5 million, where as offsets as a percentage of the value of arms contract is more than 100 for some countries.

India's defence offset policy has been promulgated as part of Defence Procurement Procedure (DPP). The offset policy has undergone two revisions since it was first promulgated in 2005. The latest revision was carried out recently and has been in vogue since September 1, 2008. India's offset provision applies to all Capital Acquisitions categorised as “Buy (Global)” or “Buy and Make with Transfer of Technology”, where the estimated cost of the acquisition proposal is Rs. 300 crore or more. A minimum offset of 30 per cent of the indicative cost is required in such acquisitions. The offset obligations of the foreign vendors can be met either through investment in our domestic defence industrial

*This is the text of the speech of the Hon'ble Minister of Defence at the Defence Offsets Seminar organized by the Institute for Defence Studies and Analyses, New Delhi, on October 24, 2008.

infrastructure, including defence R&D, leading to Joint Ventures, co-development and co-production of defence items, or through purchase or execution of export orders for defence goods and services produced by Indian defence enterprises, both in public and private sector.

The Ministry of Defence has set up a dedicated single window agency called Defence Offset Facilitation Agency or DOFA to facilitate offset related work. DOFA's mandate is to interact with various stakeholders, assist in implementation of the policy and suggest improvements in the offset policy.

Our offset policy has been revised a couple of times in a short duration. This reflects our commitment to take into account the genuine demands of our stakeholders into our offset policy. The policy has been designed to enable our domestic defence industry to participate actively in the complex job of defence production, and forge partnerships with international defence majors to bring in latest technologies and manufacturing efficiencies. We welcome any suggestions to further this objective.

In this context, I would like to mention some of the salient features of our revised offset policy under Defence Procurement Procedure 2008. Some of the improvements include introduction of offset banking, listing of defence products and relaxation of industrial licensing requirements. The revised policy has rationalised the industrial licensing process. The mandatory requirement of an industrial license for a domestic firm to participate in offset programmes has been relaxed. The private sector will henceforth require industrial license "only if so stipulated under the licensing requirements for defence industry issued by the Department of Industrial Policy and Promotion". It is hoped that this will save valuable time and effort of the applicants and expedite their cases.

The new offset policy provides a list of 13 categories of defence products.

The product list has been added to help foreign as well as Indian companies in devising their offset strategies.

Under the new banking provisions, foreign vendors are now allowed to create prior offsets and bank the same to discharge their future offset obligations. This will benefit both the foreign as well as Indian companies to forge a long-term partnership, which would enhance India's defence industrial capability. The new banking guidelines allow vendors to discharge the banked credits within two financial years of the date of approval of the banked offset credits. If a foreign company generates more offsets than their stipulated obligations under the terms of the existing contract, the surplus credits can be banked and would remain valid for a period of two financial years after the conclusion of the said contract.

The Ministry of Defence fully recognises the importance of the Indian private sector in defence production. We have allowed participation of Indian private sector in defence production and also opened up our defence industry to foreign direct investment. At present, Foreign Direct Investment (FDI) is permitted up to 26 per cent.

At this point, I wish to emphasise that we would give due consideration to all pragmatic suggestions arising out of today's deliberations. Our offset policy is forward looking and dynamic. We will continue to strive to strengthen the policy and procedural framework for rapid transformation of defence capabilities and infrastructure based on offset investment inflows.

Special Address at Defence Offset Seminar

*Pradeep Kumar**

As an introduction a few general points may be made regarding defence offsets. *Firstly*, offsets as a policy has been widely practiced all over the world. In fact most of the countries have offset policies in some form or the other whether they are developed countries or developing countries. The *second* point is that there is a cost to offsets. It is not something which has only positives. The common debates against offsets are that it is inefficient, distort and the defence procurements should be based on the quality of the product, cost, affordability and the delivery schedules. However, what is seen across that offset policy has come to stay. There are reasons for it to vary from country to country. Some of them use offsets to source a particular kind of a technology. Others want their defence industrial base to be strengthened. In some cases, it is argued that if big ticket acquisitions are being made from abroad then we must try to make them more acceptable to local polity and offsets help in making this by getting some investment from abroad and creating job opportunities within the country. The short point is that every country has to tailor the offset requirements according to it own needs and we in India have also tried make a defence offset policy which meets the requirements of our situation. There are a few elements to be considered essential while forming this policy. *Firstly*, we have to decide what would be the minimum threshold level, since there has always been a debate on this matter. The policy should state whether the minimum threshold level is Rs. 100 crores, Rs. 300 crores, Rs. 500 crores or perhaps, other figures. *Secondly,* the other point of discussion is what should be the

*Pradeep Kumar is a Secretary, Defence Production at the Ministry of Defence.

percentage of offsets. As already indicated, it may go up to a 100-150 per cent India has currently 30 per cent offset requirement and in some selected cases, it can be further increased. Therefore, confirming the percentage of offset requirement is a pivotal issue. *Thirdly*, the nature of offsets to be permitted is a burning concern. Questions such as 'should we permit direct or indirect offsets? Should we include technology transfer or not? How do we value the technology?'—are relevant and ought to be dealt with. Technology transfer raises questions if multiplier should be allowed to facilitate to get certain kinds of hi-tech technologies. There are also other policy issues like whether offset credit banking should be allowed or not. Then there are certain other core issues involved in the offset policy which have to be addressed. What should be the period of performance of offset obligations? Since we are trying to attract about Rs. 45, 000 crores from defence offsets during the next five years, should the performance of offsets contract be co-terminus with the main contract and what should be the period within which offset should be allowed to be liquidated? In fact, on the civil side, unlike defence, on the purchase of civil aircrafts they have allowed a much longer period for liquidation of offsets. The policy issues must also address to the penalty provision on non-performance. Hence, whenever an offset policy is being formulated, it must always be kept in mind that certain discussion covering these aspects have to be made. India's defence offset policy was started in 2005 and the detailed guidelines were introduced in 2006. Based on the feedback that we have received from various stakeholders, certain changes have been brought about in the revised DPP-2008. The three major changes that have been brought about comprise of offset credit banking, relaxation in licensing and inclusion of the defence product list. Much effort and time must be given to serve the basic objectives for which the policy has been formulated.

Special Address at the Defence Offsets Seminar

*V. K. Misra**

Defence offsets can potentially play a transformational role in bringing about a sea change in the capabilities, infrastructure and R&D as well as the engineering and production base for Indian defence. Even while we have planned to take comprehensive stock of defence offset experiences worldwide covering both the success stories as well as pitfalls and inadequacies and a critique of the Defence Offset policy frame as it exists today post Defence Procurement Procedure 2008, the important feature to note is the resolve of the highest decision making levels in Indian MoD to seek to evolve an India specific Defence Offset Model which would usher in far reaching changes in defence capabilities, infrastructural strengths and the defence industrial base in a rapid enough time frame. Consequently, Indian MoD has displayed a dynamic and proactive response to the policy imperatives for the offset cause. Yet, as today's discussions would expectedly bring into sharp focus, urgent progress is needed in more proactive channelling of offset investment inflows into high priority areas and seriously reappraising the policy frame for licensing and direct foreign investments.

The mandatory first steps towards optimal realisation of offset benefits would be for the three defence services to take full stock of critical capability gaps in the 20-25 year time horizon given the current force

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levels and the present and likely state of the art in defence technologies and the diverse blend of capabilities that we must acquire in this period of time. Thus, clarity with regard to the most pressing deficiencies in terms of capabilities, infrastructure, including training, repair, maintenance and overhaul requirements and the R&D, engineering and production bases would alone translate into prioritised investments including through the potentially formidable offset route. The Service specific offset absorption roadmaps would thus lay a strong foundation for the pursuit of the requisite levels of domestic strength in defence R&D, manufacturing and infrastructure.

Given the sizable investments already made in the Defence PSUs and ordnance factories as well as the DRDO and their innate strengths in terms of skills, capacity for technology absorption, engineering and production infrastructure, a significant proportion of the offset inflows is likely to be channelled in their direction. It is therefore urgent and important that these organisations also do comprehensive stock taking of their core strengths and capabilities on the one hand and the expectations and the definitive long range plans of the services on the other in order to urgently enter into collaborative joint ventures with potential foreign vendors in high priority areas. Modernisation, capacity argumentation, enhanced design, engineering production capabilities, improved reliability and maintainability of equipments that gets manufactured and potential export strengths would all well arise as a result of consciously directed offset inflows into these entities.

It has clearly emerged at the same time that defence PSUs and ordnance factories alone would not be able to meet the myriad and dynamic needs of Indian defence and the time has come for close integration of the vibrant private sector in the country with the cause of defence. Thus, whether it is for outsourcing of core or non-core responsibilities, a well construed role in supply chain management and training and maintenance functions

including the emerging tasks of performance based logistics or in basic and applied research, design, engineering and production, the Indian private sector is extremely well poised currently to seize this opportunity. Offsets in this context can have an extremely favourable impact on the defence industrial base as they would facilitate a much needed osmosis of design, engineering and manufacturing efficiencies and best practices from leading armament manufacturers, R&D entities, logistics organisations and the like worldwide to their joint ventures with Indian partners in India. Further, both because of India's likely role in the comity of nations and the potentially competitive advantage in the medium and long term in terms of costs, productivity and the like, Indian private and public sector companies engaged in defence could also expect to reap a rich and steady export harvest. The buoyant services sector in India, particularly in the domain of information and communication technology, could also hope to benefit enormously through the defence offsets route.

An import dependence of the order of 70 per cent in respect of capital acquisitions for modernisation as well as for meeting the operational and maintenance needs is not sustainable in the medium and long terms whether for rapid attainment of the necessary capabilities or from the point of view of affordable and cost efficient defence. India's vision of becoming a significant power in military terms can therefore be realised only if Indian defence can tap and nurture on a lasting basis the full range of capabilities with the public and private sectors working in harmony and with synergy. Offsets can thus play a strong catalytic role in this behalf.

Let me finally touch upon one other crucial aspect of the Offset process which would influence whether offsets could radically alter the defence capability landscape in India. This pertains to the role and responsibility of the defence offsets facilitation agency or any other similar body or organisation. In close concert with industry associations such as CII, FICCI, ASSOCHAM we need to comprehensively map the current

strengths and potential of Indian industry in all key defence technology related areas. This alone would enable such a facilitation structure that I mentioned earlier to provide professionally sound choices to potential offset investors to bring in and thereafter realise quickly the full benefits of such investment inflows.

We do believe that the government would be willing to bring about such other changes in the offset policy framework as would be found compelling enough either through specific experience over a reasonable time frame or on account of materially different professional and analytical new insights in this realm. These could well pave the way for appropriate fine tuning of the policy precepts and implementation skills necessary for a successful offset programme. idsa

Special Address at the Defence Offsets Seminar

*S. K. Sharma**

The timing of the seminar is very apt and we are at a stage when we have made some headway and we can actually deliberate on certain issues relating to the subject. The entire exercise of introducing offsets and formulating and promulgating a policy in this regard is aimed at encouraging sound relationship between the defence industries of the advanced countries and those of our own. Fortunately, we have a reasonable depth in our industry and there is a plenty of promise. To set the pace of the seminar it is imperative that I outline the factors that we have considered while formulating the offset policy and towards this end I would like to recall the events that have unfolded in the recent past.

The defence industry was opened for the private participation in 2001. 100 per cent private participation was allowed with 26 per cent FDI and the defence sector was removed from reserved category to the licensed category and the situation is the same till date. Offsets were formerly introduced into the Defence Procurement Procedure for the first time in the DPP 2005. That was a simple enunciation of a concept and was well received by all the stakeholders. Detailed Offset Guidelines were thereafter incorporated in DPP 2006 to provide for the much needed clarity with regard to Offsets, a number of acquisition programs with offsets were initiated in this period and we in the MoD were receiving a number of suggestions for improvement and incorporation from the various seminars and discussions with the stakeholders that were organised in this period.

*S. K. Sharma is the Director General Defence Acquisitions at the Ministry of Defence.

DPP 2008 in all earnest has incorporated most of these aspirations of the industry, both domestic and foreign alike, and the policy as it exists today is rather a comprehensive one. There may still be a number of issues that are not addressed and for this I would like to say that from the beginning MoD has done a study of the offset policies of a few countries around the world and the adaptation to the Indian context was considered to be the overriding consideration and hence was the policy evolved accordingly.

One of the important inclusions in the offset policy is the dispensation of the mandated licensing condition as spelt out in DPP-2006. The policy now envisages government regulations as applicable by the extant regulations and the conditions as lay down by the DPP and no fresh condition is laid down. This actually expands the scope of the Indian defence industry from 37 licensed industries to almost 2000 or more industries who otherwise comply with the government regulations on the subject. Thus, the capacity of the Indian industry to absorb offsets has been practically increased manifold. We have also taken a step to include a list of defence products for ease the foreign vendors to make a choice of products and have provided for full freedom to the foreign vendor to choose the Indian partner from the entire list of defence industry without insisting on any type of licensing conditions which otherwise would have made the choice restrictive. The list of defence products has amplified the scope of offset discharge and has enlightened the domestic industry on various types of manufacturing products including component level activities, services including software and knowledge based design services, etc. Thus more number of industries have become eligible for offset absorption and can make necessary investments to gear up to the requirement. This will also increase the capacity to absorb offsets. The policy encourages FDI in industrial infrastructure and also for FDI in R&D establishments engaged in defence products. This will encourage more and more foreign OEMs to set up shop here and help to include the domestic industry into their supply chain which indeed is the focus for more exports.

The banking provisions were introduced to increase the duration of offset discharge by providing a platform for longer gestation periods for various offset projects which might have not been feasible in a co-terminus application. The long term relationships are to be encouraged. The provisions are clearly spelt out in the guidelines and here we intend with clear focus on banking projects to have some tacit relation with future acquisition programs and that is why the foreign vendor is required to indicate the RFP for banking in a span of two and half years or so which is the life period for the bank offset credit. While one may wonder why such a short time span has been accorded for bank offset credits it may highlight that it is in fact much longer. Once the RFP is indicated the foreign OEM can grow with the RFP till its logical culmination into a contract which will provide for a time span of anything between five to seven years. Thus, banking provides more time for fulfilling offset obligations and thus inherently increases the capacity to absorb offsets. We have consciously not included for trading of banking credits as we see no reasonable benefit acquiring to the Indian industry as of now. There are already more than 25 programs operating with offsets and in some, offset contracts have also been concluded. The offset policy of the MoD is here to stay and we will grow with our experience and modify the same as we learn more as we do with our procurement procedure from time to time.

Some of the operational issues as well as policy issues which are critical to the success and growth of offset policy may be mentioned. Coming to the operational issues, the offset guidelines are relatively new and they have been framed in the environment of Indian defence procurements. The objective is to develop our indigenous capability through growth of Indian defence industry. Experiences of other countries were studied but primarily this is our indigenous policy. Learning experience is little; nevertheless DPP 2008 made certain improvements over what was given in DPP 2006. First operational issue proposed to focus is with regards to procedural flexibility. Two examples of how a procedural rigidity can

impact the program adversely may be stated. At present the time limit which is uniformly intimated to all the vendors to submit their offset proposals is normally three months. In case a vendor is not able to finalise his proposal on account of complexity of the whole subject within this time limit, a request for an extension of time is made which is denied as the procedure does not provide for this. Preparing an offset proposal requires intensive interaction with Indian industry, perhaps there is room for some flexibility here. Another example is for accepting a request for change in the offset partner after the contract is signed. Should such a request be allowed through a contract amendment? This may be necessary if an offset partner is not agreeing to provide the product or services of the desirable quality or at agreed price. The other operational issue which may be mentioned is to do with developing an in house system in MoD for registration of proposed offsets programs aiming at creation of credits, account keeping, monitoring of discharge of banking credit and keeping balance of offset credits. Though MoD is aware of this need and a monitoring cell had been created in department of defence production it would remain a live operational issue as the volume of offset program would grow. The third operational issue is with regards to the optimum time period which should be allowed for an offset program, from inception to discharge stage. Any mismatch between the main procurement contract and the offset contract would create enforcement problems. Safeguards would have therefore to be found for such mismatch if allowed.

Here some policy issues may be indicated. The first and foremost is the direct versus indirect offsets. Logic of defence ministry is simple, defence offset program is an offshoot of defence modernisation program and the objective therefore is to develop and grow indigenous defence manufacturing capability. Nevertheless, the capability of the Indian defence industry to absorb a volume of offsets obligations which are likely to be created as defence modernisation program unfolds in future may be a limiting factor. Further, let us agree that the offset program has a cost which

is loaded on the main contract. A question therefore can be reasonably raised as to why the defence budget should meet the cost of offset which are to be discharged in sectors other than defence. The issue leads us to desirability of having a national policy on offset which Ministry of Commerce is already working on. Another important policy issue is to decide as what must constitute the permissible scope of offset activities. A very relevant proposal in this regard is to include transfer of technology within the offset program. There are obvious difficulties in deciding a fool-proof methodology for the evaluation of ToT; also foreign bidders have raised the issue of multiplication factor in the context of discharge of offset obligation through ToT. Then is the issue of necessity and quality of technology which is being offered. We have not yet reached a stage in our experience with offset programs where we can find acceptable solutions to these issues. However without doubt there is need to seek critical and sensitive technologies many of which are otherwise under denial regime. Whether we can leverage the offset program to force the foreign bidders to part with such critical technologies by way of offsets an answer to this question must be found in near future if we aim to raise the qualitative level of indigenous defence production capabilities. Another policy issue is the desirability of allowing transaction in banking credits. The current policy provides for such transaction only between the main vendor and his sub-contractor within the same acquisition program. Desirability of a universal transaction though of questionable merit at this stage, will remain a live policy issue as the offset program grows.

Considering whether the offset route is the most cost effective way to promote indigenous defence industry, the experience of offset till now has shown that offset obligations are being discharged in most mundane areas and not much value addition in terms of learning experience or technology is being achieved. On the other hand, there is a hidden cost of such offsets which are loaded on defence procurements. In some quarters an apprehension as to whether offset has a slow down effect on defence

procurement is also raised. Though guidelines allow FDI under offset may be better results could be achieved by raising the FDI limit from 26 per cent to a higher percentage. These burning policy issues can find answers through immense research and more experience.

Offset Policy Framework

*Satyajeet Rajan**

I shall basically discuss the road map which we have offsets in the country. We in fact have a very good phrase called *quasi* direct offsets for our system. It is not as direct as is understood internationally and a foreign OEM can in fact buy ships from India if they were to supply multi-role combat aircrafts. While this is true of all the offset proposals in the Ministry of Defence, I would like to mention that barring two or three cases, all cases are in fact 'direct' as is internationally known. It is in respect of the acquisition program for which the technical evaluation committee meets and discusses. OEMs give proposals of areas where they would like to supply us equipment to build up Indian competency in those areas. Director General Acquisition has indicated that the kind of offset proposals which are coming and are being looked at actually do not give him the confidence. I would like to elaborate upon the basic premise on which the offset policy revolves. The Secretary Defence Production has stated that an absolute free choice is given to the foreign OEM to select the Indian partner and in selection the product and services. By giving this freedom we are doing we are trying to minimise the cost. By giving the freedom to OEM we are quite sure it will definitely reflect upon the quality of offset proposals which we would be getting. That is exactly what is now happening and is exactly in tune with what was envisaged.

Another point is that everybody wants DOFA to be strengthened. What is it that we are missing right now has not been identified. What is it that is not happening right now? One would love to have a critique of what is not

*Satyajeet Rajan is Joint Secretary (Export), Department of Defence Production, Ministry of Defence.

happening to appreciate and to give a direction to what we are doing. Right now we have a very good system where the technical evaluation committees meet. These committees have members to include DRDO and the services. The DOFA is also represented there through an officer of a very important setup which was created in the 1960s after the Indo China war, i.e. the Directorate of Planning and Coordination, which is part of the Department of Defence Production. There are over ten technical experts there advising and giving technical inputs at different categorisation committee meetings and it is these officers who attend apart from the DRDO experts and the Services' experts. They sit in the technical evaluation committee. I feel it is a perfect system. We could have a very dedicated kind of a structure, but that could be pursued in time. These technical evaluation committees are taking care of the services' needs and are building up the competencies in certain sectors which did not actually exist in this country including in maintenance. We had to fly our planes all the way abroad to get them repaired at one time. At least basic competencies will get built up and the services are all making efforts to that end. The technical evaluation committees have a huge amount of leeway in asking the OEMs to change the offset proposal if it is allowed as per the DPP. However our officers are asking them to change the proposals to bring in tune with DPP. Once the offset banking proposals start coming in, we have a senior officer at the level of the Additional Secretary Defence Production who chairs a committee. In this representation is of officers from the services acquisition wing. They discuss the different offset paid banking proposals. There is highlighted which are the areas where the offsets are preferred with a view to guide the technical evaluation committees. So we have a setup created and the Additional Secretary is there at the helm. Then there is an offset monitoring cell, apart from the lot of technical experts we have which guide the technical evaluation committee for different acquisition proposals. The offsets monitoring cell has been created to take into account different offset proposals and help the acquisition wing in monitoring those offset proposals. It will also prepare

the basic draft for consideration of the committee for its approval. With this particular background - creation of an offset monitoring cell and that a committee has been created at the level of Additional Secretary Defence Production to take care of the offset credit banking – we have a credible system in place.

Essential Elements of India's Defence Offset Policy - A Critique

*Thomas Mathew**

Offsets have been variously defined. In essence, offsets in defence as in civil trade are compensations that a buyer seeks from the seller for the purchase of goods and/or services.

Demand for offsets in defence has exhibited an upward trajectory since the 1950s[1]. It gained further momentum since the 1980s and has been growing ever since. From around 20 nations about two decades ago, it is now adopted by more than 130 nations[2].

European nations have been able to generate more offsets than others. During the period 1993-2004, European countries were able to obtain offsets valued at 99.1 per cent of their defence imports while non-European countries achieved 46.6 per cent[3]. Significantly, 72.9 per cent of the offsets obtained by European nations were 100 per cent or more of the value of the weapon systems imported by them. Data show that demands offsets “are increasing over time in all regions[4].''

India was, however, late in adopting an official offset policy though it had obtained some compensatory benefits since its independence through a

*Dr. Thomas Mathew is Deputy Director General at the Institute for Defence and Strategic Analyses, New Delhi.

series of bilateral arrangements. It was only in 2005 that the nation through its Defence Procurement Procedure (DPP), announced an official policy to secure offsets for its defence imports.

The policy was amended to give it greater clarity and direction in the DPP of 2006 and 2008. Consequently, as a late entrant in the field, India's polices are yet to be fully tested against the complex process of managing offsets and traverse the path to achieving its declared objective of creating a vibrant military-industrial base in the country. India's offset policy is under test now.

Objective of Paper

This paper seeks to critically examine the salient features of India's offset policy and answer the following questions.

- Will the policy outlined in DPP 2008 contribute substantially to the development of a military-industrial base in India?
- What are the shortcomings of the policy?
- What are the modifications required in the offset policy and connected government procedures to maximise the benefits that could accrue to the nation from the capital acquisition of defence equipment?

In order to understand the basic arguments contained in this paper, a few concepts relating to offsets in general and in defence trade in particular are explained.

Offsets Explained

Offset as the term implies is an element that counterbalances or

compensates an act. It is a set off from a development, in this case, military acquisition. However defined, the term offset primarily signifies an element of 'compensation' as the predominant import of the term. It occurs "when the supplier places work to an agreed value with firms in the buying country, over and above what it would have brought in the absence of the offset[5]."

As is commonly understood, in trade, offsets have been classified as direct or indirect offsets. Direct offsets, as the term implies, are those that are directly connected with the item being sold by the seller and can take the form of co-production, component production, licensed production etc. Indirect offsets on the other hand are not directly related to the product being imported and compensations can be secured in any other area with the aim of obtaining for the economy what would otherwise have not been available to the buyer but for the purchase.

Though the above two forms characterise the two widely accepted compensatory strategy, it is necessary to add a new terminology to describe a hybrid compensation between direct and indirect offsets that India seeks to obtain through offsets. This may be termed as quasi-direct offsets. It can be defined as compensation given in the sector under which the purchase falls, but is not directly connected with the product that is being imported. For instance, when tanks are imported, and compensation (offset) is obtained for the co-production of a ship, then it would fall within this definition (quasi-direct) as it enhances the defence capability that the importer seeks to achieve through the import of the equipment, though it has no direct connection in the form of co-production etc. of the item that is being purchased. Therefore, though analysts have largely described India's policy as seeking direct offsets, in actuality, it does fall within the import of the accepted lexicon of direct offsets.

History of India's Defence Offset Policy

India inherited some defence industries from Great Britain. They included Hindustan Aeronautics Limited (HAL) which is today India's largest Defence Public Sector Undertaking (DPSU), Mazagon Docks Limited (MDL), the largest shipyard in the nation and more than half a dozen ordnance factories. The growth of domestic defence industry has, however, been sporadic since independence. It did not follow any definite plan though emphasis was placed on enhancing indigenous defence production capability.

Some analysts have also traced certain vigorousness in the Indian effort at developing an indigenous defence capability to early 1960s spawned by the 1962 India-China war[6]. It underscored the urgency of building a domestic defence industry through foreign assistance. It went hand in hand with Nehru's policy of building a strong industrial base patterned on the Soviet model. Though the war with China has been identified as the milestone in the effort at developing a domestic defence base, there was no concerted, systematic and well orchestrated effort that yielded any dramatic result.

There were many factors that stood in the way of India building a strong military-industrial base. India's comparatively easy access to various types of defence equipment from the Former Soviet Union (FSU) and their purchase against deferred rupee payments and on “friendship” price were some of them. Sophisticated defence equipment was transferred to India under the favourable rupee-rouble arrangements from FSU. Some license production facilities were, however, established in India for Mig-21 aircraft for instance. The cold war also ensured that India continued to have a favourable and preferred source of defence systems and equipment from

FSU. It did not find the superpower wanting in any critical manner in fulfilling India's defence requirements adding to a certain extent a sense of complacency in developing the domestic defence industry. Coupled with this was the reluctance of the US to help in India's effort to develop a domestic defence production base. Nevertheless, trudging along, India was able to develop the largest defence industry among developing nations.

However, the collapse of FSU led to the loss of easy access to sophisticated defence equipment at cheap prices. India was suddenly confronted with the absence of any dependable alternate source of modern defence equipment. At about the same time, India's economic prospects brightened after it embraced the policy of liberalisation. The need to service various kinds of equipment imported from FSU also led in some ways to seek necessary technology to maintain and gain expertise for their deep level repair. With this objective in mind, technology was also obtained to indigenously produce some critical spare parts. These efforts were mostly case-specific and were not components of any systematic approach to developing the indigenous defence industry. The efforts were also service-driven in the absence of any overarching policy aimed at the achievement of self-reliance in the defence sector. Nevertheless, all these factors encouraged the need to seriously develop a domestic military-industrial base.

It was, however, not until 2005 that India formulated a defence offset policy to contribute to the nation's goal of developing its domestic defence industry. Accordingly, the Defence Procurement Procedure (DPP) 2005 laid down a defence offset policy. In the policy, it was stipulated that all contracts falling under “buy” and 'buy and make” category above the value of Rs. 3 billion rupees should have an offset component of 30 per cent of the contracted value of the equipment.

The policy of 2005 also gave freedom to foreign vendors to discharge their obligations either through the execution of defence exports of Indian items and services or through investments in India's defence infrastructure. The foreign vendors in addition were given the liberty to select Indian firms in consultation with the industry associate of their choice to implement their offset programmes. The hallmark of this policy was its non-obligatory nature or in other words, these offsets were non-mandatory. It was left to the Services Capital Acquisition Plan Categorisation Committee (SACPCC) to recommend the inclusion of offset provisions as part of acquisition proposals.

The offset policy was, however, in the nascent stage and lacked clarity in many areas. It also suffered from the absence of any designated agency in the Ministry of Defence (MoD) for guiding, overseeing the execution and monitoring the implementation of the offset policy. In reality, confusion reigned in equal measure in the corridors of South Block as in the minds of the vendors on how to implement the offset obligations. Consequently the offset policy did not yield any dividend.

The absence of any offset benefit to the Indian defence industry led the Government of India (GoI) to make significant changes in DPP 2006. Many changes were made in the policy and they included the following:

- offset was made mandatory in defence contracts of the size and nature as prescribed in the 2005 policy,
- foreign firms were allowed the flexibility of forming Joint Ventures (JVs) with Indian firms, and;
- a new organisation called the Defence Offset Facilitation Agency (DOFA) was established consisting of representatives of stake holders (Services, DPSUs, Defence and Research Organisation(DRDO) etc.).

Offset Policy in DPP-2008

The limited success of the offset policy contained of 2006 led to the formulation of a more elaborate policy in the succeeding procedure in 2008. This policy improved on the policy of 2006 and addressed many of its short comings. The salient features of the offset policy as announced in 2008 include the following:

- A list of products which would qualify for the discharge of offset obligations (Annexure-VI of the DPP),
- Removal of the requirement for private industry to obtain industrial license to participate in offset programme unless stipulated by the regulations of the Departmental of Industrial Policy and Promotion (DIPP),
- Offset credit banking,
- Banking of surplus offset credit with a validity period of two years after the conclusion of the relevant contract, and,
- Exempting acquisitions under fast track from offset obligations.

Will the 2008 offset policy facilitate the creation of a military-industrial base in India?

India is one of the largest importers of defence equipment in the world. Its military budget is also growing rapidly and during the period 2003-07 it registered the 4th largest growth in real terms amongst the 10 largest military spenders in the world[7]. Further, nearly 70 per cent of Indian defence needs are met through imports. In view of the high reliance on imports, the increasing defence requirements of the country and the growing sophistication of the industrial base of the nation, the prospects of achieving self reliance in the defence sector is being seen as an

increasingly achievable goal. To assist in this effort, the new offset policy was formulated. There are, however, certain risks associated with offset policy. It is therefore imperative to make rules that encourage and polices that maximise yield from the offset provisions.

There is almost complete unanimity among defence economists who have analysed the impact of defence offset on the development of defence industry in various countries that the process is highly complex and therefore defies easy conclusion. Their efforts have been stymied primarily by the absence of data relating to offset implementation and the notorious level of secrecy with which defence firms guard such details. Offsets have been termed as “smoke and mirrors” with nobody being sure as to “who benefits[8].” But almost all of them have questioned the economic efficiency of offset transactions.

Offsets are no free lunches. They are neither freebies. There is an economic cost to offsets. For instance, in a survey conducted in UK, it was concluded that “evidence suggests that offsets do cost more than off-the shelf purchase and, not surprisingly, that vendors seek to include most of this premium in the selling price[9].” In a study of the defence offset implementation in Belgium, it was estimated that the nation had to pay between 20-30 per cent in increased costs in connection with “offsets tied to it military procurement[10].”

Depending on the economic conditions prevalent in the offset applying nation, its industrial base or its capacity to absorb technology, vendors would hike the cost of their goods / services to compensate for the inefficiency inherent in the nation seeking offsets. Therefore, an offset implementing nation would have to pay more for the import of defence items than it would otherwise had to do if it did not impose mandatory offset obligations.

Among offsets, mandatory offsets have been further estimated to bring less economic dividends. They have been estimated to be less efficient and that "there is no good reason for a mandatory offsets scheme" as such schemes "merely shift the initiative away from the purchaser and give suppliers scope for opportunism at the expense of the buyer[11]."

From the above it would be seen that India too would be able to acquire only less for the same money than what it could have in the absence of its mandatory offset obligations. Given the overwhelming evidence that offsets are generally not welfare enhancing, implicit in the Indian offset policy is the assumption that it is willing to forsake economy in acquisition of weapons for the long-term goal of creating a defence industrial base (which according to existing studies is difficult to achieve) through only induction of technology, co-production, license production etc. that the policy may compel. Therefore the moot question is whether India has carefully calibrated its regulations and put in place a system that can optimize the benefits of offset policy that in the first place comes at a cost.

An analysis of the situation in India would, however, reveal that the mandatory offset obligations would yield greater dividends if necessary changes had been made in all the relevant rules and guide lines. Some of the rules are archaic and were not in the first place formulated to encourage the absorption of the benefits that offsets could offer. Such rules and procedures that were formulated prior to the incorporation of the policy of offsets (licensing policy requirement for private firms to produce defence items for instance) it is argued, cannot but reduce the yield from the policy. Some of the areas that are glaringly deficient and where new initiatives may be needed are the following:

Foreign Direct Investment (FDI) in Defence Sector

"Direct foreign investment in Indian defence industries for industrial

infrastructure for services, co-development, joint and a production of defence products and components" have been identified by DPP-2008 as various means to discharge defence offset obligations[12]. But in order to encourage investment and transfer of technology to India, it would be important to give foreign defence firms the confidence that they would have greater share in the profits and larger say in the management of the entities they would create. Larger stakes should be allowed to foreign firms in such entities whose creation would not take place if it is not for them. Foreign Investment Promotion Board (FIPB) guidelines do not ironically encourage this.

According to the FIPB guidelines, foreign firms that may tie up with Indian entities are allowed only 26 per cent equity in such ventures. The remaining equity has to be owned of Indian entities. The ceiling of 26 per cent on foreign equity would be a major impediment to the success of the offset policy[13]. First, foreign firms are reluctant collaborators in any mandatory offset arrangement. Otherwise, these firms would have without any compulsion tied up with Indian entities for the production of defence equipment. But as offsets have been made mandatory in cases involving acquisition over Rs.300 crores, foreign firms can nevertheless be expected to collaborate with Indian firms as otherwise they would be lose the opportunity to make profit from the contract that can only be signed with the offset obligation. But, if the created entity would have to survive on a long-term basis, the collaborating foreign firm should have a stake in it. This can only come through the creation of attractive prospects for the foreign firms to make greater profit than investments made elsewhere. Therefore, there is a need to make them, not reluctant parties, but willing and enthusiastic partners in JVs by increasing their stake in such collaborations. An example of how higher stakes in companies can help add value to the offset policy is the Boeing purchase of 34 per cent of Aero Vodochody a Czech firm as an offset deal. Boeing's subsidiary Ayers

bought LET Kunovice, a Czech plane manufacturing firm, with plans to move part of the production line for its own planes to LET[14].

Second, if the balance of the 26 per cent that a foreign company brings has to be found by Indian partners, it raises many difficulties. Since 26 per cent equity is the upper ceiling that a foreign vendor can invest in India by way of equity, it would have to find an Indian firm that would be willing to raise the balance 74 per cent. This in turn raises two difficulties. First, it has to find an Indian partner willing to find resources for this high level of investment. Second, if the foreign firm decides to use a JV as the sole means of fulfilling its 30 per cent obligation under offset, then it would have to find an Indian partner or partners willing to invest more in terms of equity. To illustrate, if a company X enters into a contract for Rs. 1000 crores, then it would have to invest Rs. 300 crores to discharge its offset obligations. But since a foreign vendor is only allowed 26 per cent equity, to invest Rs. 300 crores, it would have to form a JV that would have a total investment of Rs.1153.8 crores (Rs. 300 crores by the foreign vendor and Rs. 853.8 crores by the Indian entity or entities). Both the choices are difficult as is would not be easy to find Indian entities that can make such high investments.

Conversely, increasing the equity may benefit the nation in several ways. Given the above dampeners (arising from the upper ceiling of 26 per cent) it may encourage greater participation by foreign firms in JVs if they have larger share of the equity. First, foreign vendors would be reluctant to invest 26 per cent in equity and transfer proprietary technology that may have been developed at high Research and Development (R&D) cost. There is always a stubborn resistance to transferring technical capability abroad and it can only come at a price as “the transferring country does not simply stand still while its “beautiful princess” (Williamson 1983) is shipped abroad and effective competition is created[15]." Therefore, a

foreign firm would be less reluctant to grudge competition from an entity established in India in which it has substantial stakes and from whose sales it stands to profit.

Given that comparatively cheap factors of production exist in India, the foreign parent company may even chose to outsource components/items from their Indian JV. Though not in the defence sector, the export performance of Hyundai Motors in India should give India reason to allow more liberal FDI in defence sector also[16]. Second, a foreign firm that invests higher equity would have a stake in the success of the project. It would be more willing to outsource items from India to its other holdings to make the project a success. Otherwise, there is a danger of the interest of the foreign vendor dissipating once the contract is completed as without a reason to retain their interests, they would close shop and return. This point can be illustrated with the instance of armoured personnel carriers purchased by the Philippines Army from UK. After 8 of these were imported from UK and the remaining 142 were assembled in Philippines, the assembly line was closed with only minimal offset benefits to the nation[17]. Third, as offset banking has now been permitted, it would give such vendors incentive to accumulate credits for discharging their obligations in future contracts by making value additions and introducing new products. (For this to yield optimum results, the validity of the bankable credits would have to be enhanced. This aspect has been discussed subsequently).

There should be further transparency in dealing with prospective foreign vendors. At present, GoI does consider higher investments on a case-to-case basis. This concept of case-to-case approach is indeed intriguing to a foreign vendor who in any case finds Indian procedures, bureaucratic control and the penchant for secrecy rather perplexing. The recent reports in the press that the GoI turned down a joint venture proposal of Mahindra

and Mahindra with the British defence giant BAE systems, has not helped convey the right message only weeks after the revised offset procedure was announced[18].

This rejection has even raised doubts on the seriousness with which Indian is pursuing its policy to attract foreign investment in the defence sector. Perhaps, GoI may have had strong reasons to reject the proposal. But explaining the reasons to the firms may have to a certain extent limited the damage. There should be more transparency in expressing our views and this would result in increased vendor confidence in the nation.

It may also be difficult to argue that increasing the limits of equity participation for foreign firms would impinge on national security. The only danger perhaps is that such foreign firms may end up buying up Indian entities (a view expressed by one of the large Indian entities in response of the questionnaire sent by the author). If this is a serious concern the problem could be addressed by making it a requirement to obtain the approval of GoI before the takeover of any defence establishment by a joint venture.

Involvement of Domestic Industry in Defence Planning

Private entities are answerable to their shareholders and are in business to make profits, whether in defence or any other sector. Attractive return on investment, more than what can be expected in non-defence sectors, is the only mantra that can make them divert their finite resources to the defence sector. Gestation period is also quite high in defence sector and establishing a defence venture can take more time than other commercial ventures. Therefore, advance information of the acquisition plans of the government can give potential domestic investors the lead time and the opportunity to study the prospects of raising funds and also seek foreign collaborations. This is a necessary pre-condition for creating the right

atmosphere to develop the indigenous defence industry.

Presently, private players do not have prior knowledge of the defence plans of the country. Though we have 15 year Long Term Integrated Perspective Plan (LTIPP) that flows into the five year Services Capital Acquisition Plan (SCAP) which in turn flows into the two year roll on plan for Capital Acquisitions, the acquisition proposals are most often than not guarded as secrets. Indian domestic industry is not privy to these plans. As a consequence, information is sent to them only when Requests for Proposals (RFPs) are issued. Potential Indian investors therefore lose the lead time that would be required to plan and prepare for such large investments.

The solution may lie in sharing with a select group of Indian industries the LTIPP and the SCAPs to the extent they relate to items proposed for acquisition. The argument that revealing in advance what the nations seeks to acquire would be detrimental to national security may also not hold much water. Private companies have been involved in the development of closely guarded defence projects in India. Further, details of almost all acquisitions, even those relating to some of the most sensitive projects, find their way into leading arms publications sooner than later. Again, there is no reason to believe that private sector can be less trusted in keeping state secrets than public sectors. In any case, we lose some of our eminent public sector personnel to private sector. Like in the US, we should involve the private sector at the planning stage itself. To ensure secrecy of information, suitable regulations may be put in place like in the US. If necessary, in very sensitive projects, the information need not be shared.

Abolish License Requirement for Defence Items

As argued above, private entities would not embark on any manufacturing

venture, defence or otherwise, unless they are confident of reaping dividends from it. Therefore, prudence would lie in completely opening up this sector. Let the market forces regulate the industry.

Defence contractors are most often not large. Even the large entities source components and subcomponents that make up complex systems from countless small enterprises. In India too, there are thousands of small and medium producers. Several of them do not have licenses as many of the items used in defence equipment also have civilian application. Therefore, the need to have licenses for the manufacture of defence related items only complicates not only the existing situation but also destroys individual initiative and entrepreneurial initiatives.

Introduce Offset Credit Trading

The 2008 procedure has introduced offset banking. According to the guidelines, offset banking is permissible for a maximum of two-and-a-half years. Given the lead time available from the time RFPs are issued, this time-frame may be around 5 years or even 10 depending on the completion schedule of the project. This is a very positive step and has been very widely welcomed. But the bankable years should not end with the end of the project as "Rather than linked to the life of a specific offset project, the technology strategy needs to embrace productive opportunities across the broader economy. Offset policy thus needs to be framed accordingly[19]." It has been estimated that credit transfers account for around 7.5 per cent of all offset transactions and that the banking of offsets has resulted in a trend to permit offset commitments over longer periods of time covering several projects rather than limited to specific projects[20]. It would give confidence to foreign firms hoping to bag Indian contracts return for their investment. But this alone is not enough. The most encouraging step would be to introduce offset trading[21].

Offset trading is the sale of credits accumulated by firms over a defined period. The introduction of this provision would make it possible to sell offset credits to any firm that bags a contract in India and has certain offset obligations to fulfil. It would yield several benefits. First, every prospective firm that is hopeful of bagging any defence contract in India would be assured return on their investment even if they are unsuccessful in securing the contract they may have targeted. It may at least ensure that they may have no losses and also obtain profit in many cases. This could motivate firms to shed their fears of investing in the military sector in India. Second, India has attractive factors of production. The prospect of offset trading would only increase the willingness of foreign firms to capitalise on these advantages and invest in the defence sector in India. While allowing offset trading, government could also consider prescribing diminishing value to credits over a period of time unless there is value addition to the product. This would encourage firms to sustain their investments in India over a longer time horizon. Third, a firm that is already discharging its offset obligations could continue producing defence equipment over a longer period of time hoping to accumulate credits for future contracts. Even if it does not bag the contract it may have hoped to, it would be able to trade the offsets. This policy could create a win-win situation for both foreign firms and India. The key to success is the prosperity of all the key stake holders and hope of future profits for investors. Nothing else would succeed. Success would lie in giving foreign firms the incentive to sustain their interests in India by encouraging innovativeness and hope of profits through it.

Directing Offsets

The 2008 procedure (at Annexure-VI) lists the defence products that would qualify for the discharge of offset obligations. This list is generic in nature and has small arms to directed energy weapon system. In effect there is no

precise direction in which offset is channelised. Any vendor would be well within his right to produce any item related to the list aforementioned to fulfil its offset obligations. But this would not yield optimum results. For instance, it has been concluded that Netherlands and Switzerland have been able to displace jobs in the US through offset arrangements by transferring production facilities to these nations. To achieve this, the two nations exercised careful control to ensure the "precise direction in which offset-resources are steered. Almost never are they aimed at increasing indigenous military production capacity[22]." In the study by Brauer, he has cited Molas-Gallart to argue that Spain had to abandon its dream of an "integrated, comprehensive, indigenous industry to be generated via arms trade offsets[23]." It was also argued that when offsets are bureaucratically mandated and applied to some vaguely specified national interests, net benefits may not exist[24]. Therefore, prescribing a generic list from which offset obligations are to be chosen for implementation may not be the best strategy to serve India's defence needs. This issue deserves further examination[25].

India is a nation that has a reasonable defence industrial capability. It is more advanced in some areas than in others. For instance, in the field of naval ship building, India has been able to achieve a fair degree of indigenisation and in some cases around 76 per cent. India today is designing stealth frigates and constructing them at Indian yards. But almost all the weapon systems are imported though India has developed and is using many indigenous sensors. Therefore for instance, the navy should be able to identify areas of high priority such as the weapon systems that it would prefer to produce indigenously and incorporate them in the list. Through this process the benefits of offset could be channelised into identified areas. For instance, given the plan of the navy for 160-plus ship force[26] from the 145 that it has at present by 2022, a prospective vendor would be inclined to invest in identified areas included in the list to: 1)

fulfil its offset obligations, 2) accumulate offset credits knowing that orders for the weapons or other naval items would be assured for a known period given the navy's maritime plan, and; 3) be reasonably assured of future orders.

Assured of continuing orders firms would also be inclined to provide value addition over time. To give further impetus to foreign vendors to endeavour towards this goal, a system of procurement though repeat orders, say for 10 years or so, from the same source that had produced indigenously such critical items could be seriously considered. Provision of value addition etc. could also be made mandatory for such repeat orders. Similarly, critical items for the three services could be compiled and included in the list eligible for discharging offset obligations.

Use of Multipliers

Along with the critical areas/systems that may be included in the list eligible for the discharge of offset obligations, the concept of multipliers could be used. This could be a twin pronged strategy to sharp focus and direct offset benefits. At present, the offset policy of India does not allow the use of multipliers which are a device to give additional credits for offsets in critical items or most critical technology. For some of the reasons that have been stated in the preceding paragraph, it would be desirable to introduce the system of multipliers[27].

The use of multipliers would further help in directing the development of defence industry. The danger in allowing the development of defence industry through a less-focused development strategy is that we may have the capability to produce small components of defence equipment, but not be able to produce complex systems. For instance, mortars are items that

have been made eligible for the discharge of offset obligation. Therefore, a foreign firm may be able to discharge its obligations by setting up production units for the fins of mortars. But unless this is a technology that is lacking in India, little value is added to the Indian defence industry through the creation of such a facility.

Let us take another example how multipliers in conjunction with a carefully prepared list can reap rich dividends both in monetary terms and improving the defence preparedness of the country. Multipliers along with a priority list can provide relief to some of the projects that have been bedevilled by time overruns. For instance, the MBT, Arjun Tank project that was approved in 1974 for which over Rs. 306 crore[28] has been spent till 2005 is still struggling to gain approval of the army which has complained among other things that it has had “four engine failures so far[29].” Would it therefore not be omniscient to include the kind of engine in the offset list and if necessary, provide multipliers for its co-production/license production etc.?

Another area where it would be advisable to apply multipliers is perhaps the indigenous development of special ammunitions. Though Indian ordnance factories produce a wide range of ammunitions, in regard to special ammunitions we are hopelessly dependant on imports. This affects India's operational capability as was painfully endured during the Kargil conflict when emergency supplies had to be airlifted from Russia. Domestic production of such ammunition would also help in providing better training to our forces by giving them more opportunity to engage in live firing training without having to unduly worry about War Wastage Reserves (WWR). Perhaps application of multipliers for the indigenous production of ammunition along with the import of guns should deserve serious consideration.

Strengthening DOFA

It has been estimated that in the 11th Five Year Plan alone, India expects nearly 10 Billion US$ (approx. Rs. 47000 crores[30]) to flow into India through offsets. This would mean that for every year of the five years, offsets worth Rs. 9400 crores would have to be processed by DOFA.

DOFA today has mainly officials who work part-time in the organisation. It is headed by the Joint Secretary (Exports), Department of Defence Production, MoD, and has a supporting structure which includes the Director of Planning and Coordination as its Member Secretary and members from the armed forces to assist in the functioning of the organisation.

DOFA would therefore need to be strengthened and made into a dedicated organisation with economists, financial and technical experts drawn also from outside the government to steer the offset programme in the right direction[31]. Similarly, a more elaborate mechanism for offset monitoring should be put in place. It should also consist of dedicated staff who would not be assigned any other task.

Conclusion

As has been argued, defence offsets come at a cost and defence economists are still confounded as to who benefits (seller or buyer) from these arrangements. There is no overwhelming evidence to support any definite conclusion. If the empirical data of Belgium is any evidence, then implementation of offsets in defence contracts could add 20-30 per cent to the cost of imported equipment. Depending on the industrial and defence infrastructure of a country and its political relations with the seller nation, the cost to the purchasing nation could vary. But what is certain that offsets

come at a price. At the same time, overwhelming evidence also suggests that offsets are gaining wide acceptance over time and in all regions. Evidently, importing nations are willing to compromise economic efficiency for the dividends that offsets promise in strengthening their defence industry. India has also now decided likewise.

Since offset comes at a price, implementation of the policy would also imply that the armed forces do not get what they would have got in the absence of offset provisions. Therefore, there is a need to ensure that the policy is most carefully calibrated to focus development in identified areas as opposed to the aim of creating general defence capability, lest it should become a sterile investment of scarce resources.

GoI has taken some remarkable initiatives towards the achievement of these goals. They may, however, not be enough. Suitable changes should not only be made in the procedures of the MoD, but across the regulations and procedures of Ministries (Commerce for instance) that can impact the success of the policy. This should emanate from the acceptance of the harsh reality that no foreign vendor would invest in India for the long haul if it cannot make profits and does not see it in the future too. No policy to create a viable defence infrastructure in the country can succeed unless this reality is accepted, however, unpalatable it may be. In other words, any offset policy to succeed should be able to create a stake for the foreign vendors to continue operating in the country, upgrading their systems along the way and in the process make it a win-win situation for both the parties.

At the appropriate time, though not in the distant future, GoI may also consider revising the offset requirement for contracts. It could be lower than Rs. 300 crores as the world average today is US$ 15 million (Rs. 70.5 crores). It could also consider increasing the offset requirement from the

present 30 per cent to say 60 per cent and also fix a percentage for dual use technology inductions, a strategy that Singapore and Japan have adopted with remarkable success.

Bold and innovative steps may have to be taken. For instance, a system of assured orders for 10 years for a JV that invests in certain critical areas could reap rich dividends. Certainly, additional conditions like minimum indigenous content for such equipment, mandatory export obligations could be incorporated on a case-to-case basis. Special provisions like tax holidays for JVs and domestic entities engaged in critical defence areas could also be considered. Special concessions should also be extended to subcontractors of JVs who are able to penetrate the defence supply networks of foreign vendors. It is important for the subcontractors to flourish as they would eventually create the base for a viable defence base in the country. Alone they would not be able to succeed as, "even potentially competitive domestic firms may not able to break into subcontracting networks of large foreign suppliers" unassisted[32]. Therefore, what is needed is a holistic approach to make success of India's offset policy.

Notes

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12. Defence Procurement Procedure-2008, Ministry of Defence, Government of India, pp. 44.
13. The author had sent questionnaires to four large Indian entities to ascertain their views on this issue. Two opposed its expansion while the other two were in favour of the increase in FDI limit. Of the latter, one said that FDI should be increased to 50 per cent while the other said it would be desirable to increase it to 51 per cent. They also opined that higher FDI would encourage infusion of superior technology through the process.
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15. Jurgen Brauer, Economics aspects of arms trade offset in Jurgen Brauer and J. Paul Dunne Arms Trade and Economic, development: Theory, Policy, and Cases in Arms Trade Offsets (Routledge London and New York, 2004), pp. 59.
16. In 10 years of its existence, the wholly owned subsidiary of Hyundai Motor Company of South Korea is the fastest growing car manufacturer in India exporting 42 per cent of the company's products.
17. Cited in Ron Matthew's Defense offsets: policy versus pragmatism in Jurgen Brauer and J. Paul Dunne's Arms Trade and Economic, development: Theory, Policy, and Cases in Arms Trade Offsets, Routledge London and New York, 2004, pp. 97.
18. It was, however, been later reported that the JV received the approval of the government after the foreign collaborator lowered their equity in the proposed entity.
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20. Udis cited in Ron Matthews Defense offsets: policy versus pragmatism in Jurgen Brauer and J. Paul Dunne Arms Trade and Economic development: Theory, Policy, and Cases in Arms Trade Offsets, Routledge London and New York, 2004, pp. 95.
21. The author had sent questionnaires to four large Indian entities to ascertain their views on this issue. Two companies opposed offset trading. One favoured it saying that it would encourage exports of high technology items. The other firm stated that a decision could be taken on the basis of experience gained over the years.
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24. Stefan Markowski and Peter Hall Mandatory defence offsets – conceptual foundations, in Jurgen Brauer and J. Paul Dunne Arms Trade and Economic, development: Theory, Policy, and Cases in Arms Trade Offsets Routledge London and New York, 2004, pp. 53
25. The author had sent questionnaires to four large Indian entities to ascertain their views on this issue. All the four firms opposed limiting offsets to a shelf of projects. (In view of the overwhelming opposition to the limiting of offsets to a shelf of projects, the author recommends use of multipliers at least to attract offsets in critical areas. The list of items eligible for offset should have these identified areas).
26. The programme also envisages the indigenous construction of 38 of these vessels (Indian Naval Chief Admiral Sureesh Mehta spells out vision 2022) August 10, 2008, at http://www.india-defence.com/print/3954. Accessed on October 22, 2008. Such a programme would open the prospects of obtaining through JV, licensed production etc. of critical items.
27. The author has sent questionnaires to four large Indian entities to ascertain their views on this issue. Of the four, only one opposed the application of multipliers. Two supported it vigorously while the other accepting it as "useful" has recommended that it be considered after 5 years.
28. Jane's Armour and Artillery, "Arjun MBT (India)," March 20, 2008, http://www.janes.com/extracts/extract/jaa/jaa_0027.html. Accessed on October 21, 2008.
29. Twenty Ninth Report, Standing Committee on Defence (2007-02008), Fourteenth Lok Sabha, Ministry of Defence, Demands for Grants (2008-09), April 2008, pp. 75.
30. Throughout the paper, the conversion of US $ has been taken at the rate of $1=Rs.47.
31. The author has sent questionnaires to four large Indian entities to ascertain their views on this issue. All the four firms were unanimous in their support of this aspect though their suggestions varied slightly. But all were agreed on the need to give more representation to the domestic industry.
32. Peter Hall and Stefan Markowski, On the Normality and Abnormality of Offsets Obligations, Defence and Peace Economics, 1994, Vol.5, pp.186.

A Survey of Successful Offset Experiences Worldwide

*Anuradha Mitra**

In venturing to write about successful offset policy and experience in different countries, the basic problem faced is that of unavailability of data. There are no universally laid down parameters or measures to weigh the costs and benefits of offset programmes. Even if some countries have individually undertaken an exercise to evaluate such costs and benefits, the information is not always available in the public domain. Cross country comparisons would also not yield consistent results.

Nearly all governments make purchases of defence equipment, and a majority of them have some form of offset policy. The objectives of the policy may vary, but are usually stated with a fair degree of clarity. One approach to the evaluation of offset programmes could be to make a general assessment, based on such empirical evidence as is available, of the direction and degree of the achievements, viewed against the stated objectives. Another approach could be to look at the results for the buyer country of offset provisions embedded in particular defence acquisition programs. From a survey of country-wide experience, it is also possible to discern common trends in the growth path of offset policies, which could impart useful lessons for the future. This paper is an effort in these general directions.

The Middle East: Saudi Arabia

Saudi Arabian policy has focused on the need to transform the economy and to reduce the overall dependence of the country on the export of

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petroleum. Their economic plans prioritise the development of agriculture and industry; they seek to diversify the production base and to improve the skill levels of workers for the benefit of the national economy. There is also an emphasis on promotion of private sector participation and encouragement to the investment of capital in business ventures within Saudi Arabia.

In Saudi Arabia, offset programmes are not regarded as instruments for counter-trade. The objective of the offset programme is to create a number of private sector business projects, mutually beneficial partnerships between Saudi and foreign companies, usually in the form of joint ventures. The Saudi government is looking for technology transfer to upgrade its own capabilities for an overall diversification and strengthening of the economy. Other objectives are to make the best use of the country's natural resources, to improve potential for long term export, and to develop various service industries which are needed for supporting infrastructure.

The three major programmes through which the Saudi offsets policy has evolved are discussed below:

(a) Peace Shield: This was a programme with Boeing of the USA as prime contractor for establishment of a ground based air defence facility in which the Saudi government pursued an offset programme aimed at bringing in high technology transfer content. The Boeing group set up four Peace Shield offset companies-

- The Advanced Electronic Company, to manufacture the latest and most advanced military and commercial electronic equipment within Saudi Arabia.
- Aircraft Accessories and Components Company, for maintenance, repair and overhaul of aircraft components like flight controls, pneumatic fuel and hydraulic systems.

- Al -Salam Aircraft Company for MRO, upgrade and modification of civil and military aircraft.
- International Systems Engineering is a company that specializes in information technology, systems integration and development.

(b) Al-Yamamah: This was a major defence contract between the UK and Saudi Arabia for purchase of military and civil aircraft, helicopters and ships, with associated training and support, as well as construction projects, with British Aerospace as the prime contractor. The total value of this programme was around $7-8 billion i.e. about four to six times larger than the Peace Shield programme. The contract had an investment target of about $1.5 billion. Investments in pharmaceuticals, vegetable oil manufacturing, petroleum, food processing, health care and environment care equipment were also welcomed. The objective was to acquire fully developed, proven technology for immediate commercial application.

(c) Al-Sawary II: This was a programme for purchase of frigates from France for the Saudi Navy at a cost of $3 billion, carrying an offset investment obligation of about 35per cent, in various fields including glass, precious metals, smart cards and agro industry.

Offsets have certainly helped to contribute to the industrialization of Saudi Arabia, diversification of the economy, and participation by the private sector in national economic development. A number of high technology ventures which otherwise may not have fructified, came into existence. Ventures lower in technology content, but with favourable long term business prospects, have also been established. As per the Secretary General of the Economic Offset Program, as many as 36 industrial service projects have come up, with investments totalling about $4.5 billion. These projects have created more than 6,500 new job opportunities. In 2006, the total sales of the companies created under the offset program reached $8 billion and exports about $1.5 billion. The main investments have been in

the aircraft, electronic and electric industries (13 per cent), food and medicine (12 per cent), and chemicals and petrochemicals (6 per cent). Health management through specialist medical colleges, nursing schools, nanotechnology research centres and production of specialist medical equipment are the next focus areas.

Technology transfer was always important in the Saudi offset programme. In the beginning, some of the offset proposals were attractively "high technology"; however, high technology is not always easy to transfer. Cutting edge technology is generally not shared. What may be passed on is technology that is shortly about to be replaced by new developments. Even so, there has to be a work force with high skill level and capabilities in the buying country to fully utilize the benefits of the technology. Further, there should not only be an ability to use the technology, but also to carry forward the technological developments, without which the acquired technology will rapidly become obsolete. Recognizing these inherent problems, the Saudi offset program has progressively stressed on the transfer of medium, commercial exploitable technology, rather than "high" technology.

Saudi Arabia also did not embark on the route of trying to manufacture components and sub assemblies of main systems under license as was done in some other countries. They did not have a huge skilled workforce, for whom it was necessary to find jobs. The market for such items is also quite limited. Besides, the sale of items manufactured under license is generally controlled by the license giver. The Saudis preferred to concentrate on the establishment of industry and R&D for commercial and dual use products with wider markets.

Measured against the total available resources for investment actually available, the investments that have been made may be somewhat small. Some of the reasons put forward are: lack of progress in identifying good

business opportunities, lack of reliable market data on local partners, and complexity of the government procedures / organizations that foreign vendors have to deal with. The Saudi government has tried to put in place a friendlier organization to smooth over bureaucratic hurdles, and provides advice through a one stop administration under Saudi Arabian General Investment Authority (SAGIA). SAGIA holds international road shows, and coordinates with regional chambers of commerce and industry to achieve better results. Offset financing is made available to reduce upfront investment risks. Loans up to $10 million are available on a seven year term basis. Joint ventures are recipients of number of facilities such as tax holiday, freedom to repatriate capital/profits, exemption from import duty on essential imports, and tariff protection up to certain levels. They also have access to reasonably priced infrastructural amenities.

Israel

The offset philosophy of the Israeli government is different from that of Saudi Arabia. The policy in Israel is one of encouraging industrial co-operation i.e. the offset programme aims to promote close co-operative working between Israeli and foreign firms, with the long range perspective of enabling the former to add value through such strategic partnering. In fact, the Israeli government agency that promotes and administers offsets is called, appropriately, the Industrial Co-operation Authority.

To understand this philosophy one has to consider the general economic conditions in Israel and the level of their technological capabilities. A dominant characteristic of the Israeli environment is the extremely high skill levels of their work force. It is estimated that more than a quarter of the work force has acquired higher technical and academic qualifications. At the same time, manpower costs in Israel are quite competitive when compared the Western world. The Israeli government also chips in with large subsidies and other kinds of assistance including financial incentives

and tax holidays for R&D investments, further reducing the cost of technological and research efforts.

By leveraging the unique skill sets of the work force, within a period of about 50 years, the economy has been transformed from agrarian to fully industrialized, with special capabilities in niche markets such as medical aids and equipment, digital communication and information technology, defence electronics, advanced agricultural technologies, etc. Israel is today recognized the world over as a centre for high technology. Israeli companies are known for their state-of-the-art technologies and quality products. This makes it easier for foreign companies to place high tech work in quite substantial quantities, with Israel.

As mentioned above, the government of Israel has, as a conscious policy, spent large amounts of money in the promotion of research and development. Israel spends about 3 per cent of its GDP on R&D, which is at par with the most advanced economies of the world.

In spite of the high levels of technical sophistication, the problem that Israeli companies faced was that of lack of access to large global markets. There was a need to link these firms with the global economy. This is what the offsets were used for. Offset helped to bring the Israeli firms into contact with some of the world's technological and industrial leaders, and by partnering with them the Israeli firms have been able to get an entry into the world market and add to their value. Offsets have enabled these firms to undertake high tech subcontracting and R&D, and given them world wide exposure and market openings.

Offsets have also led to additional investment, new jobs and technology transfer, which the Israeli economy was in a very good position to absorb.

One of the important principles underlying the Israeli offset policy is that

the projects and activities pursued under programme should be of mutual benefit to both parties. The underlying intention is to forge long term strategic alliances between foreign and Israeli firms which will outlast the requirement of the offset contract; if the policy tries to extract too much out of the foreign firms it will lead only to short term opportunistic projects and the offset partner will try to exit at the earliest opportunity.

For this reason, the Israeli offset policy is quite lenient in several respects. There is no clause for liquidated damages or other formal penalties. A reasonable percentage (minimum 35 per cent in the case of civil procurements and 50 per cent in the case of military procurements) is asked for by way of offset. The policy does not lay down precisely what sectors the offsets are to be directed at; the general principle is of direct or other high tech technology transfer and defence industry investments. This gives the country the required flexibility to take advantage of any good proposal that may come its way. There are arrangements for pre-offsets i.e. offsets without specific obligation and for banking of offsets. At least 20 per cent of the offset should be direct offset. The time period for completion of the offset obligation is also flexible and negotiable – usually it is stipulated at three years.

There are two aspects of offset policy in Israel- offsets programmes that are created as a result of government purchases and offset programmes that are created out of private sector procurement activity. The Israeli government requires mandatory offsets on its procurements. However, the volume of voluntary offsets in the private sector is greater than that of mandatory offsets required by the commercial activities of the government. The Industrial Co-operation Authority (ICA) monitors and co-ordinates the offset policy both in the government and in the private sector, although it does not formally approve projects; conclusion of agreements is in the domain of the respective parties that are taking part in the trade. The approach followed by the ICA is of active support and openness to

innovative ideas and out-of-the-box proposals for fulfilment of offset obligations.

The success of the Israeli offset policy can be gauged from the following statistics for 2000-2006 put out by the ICA:

Obligations-	Civil	$2167 million
	Military	$2299 million
Fulfilment-	Civil	$5583 million
	Military	$3168 million

One of the larger and more successful offset programmes finalized by the Israeli government was associated with the $2 billion purchase of combat aircraft in the nineties. Mc Donnell Douglas, who won the bid, agreed to provide liberal offset package of about 100 per cent of the sale value. The technology transfers that came out of these offsets have helped Israeli companies such as Israel Aircraft Industries, Cyclone Aviation Products, Israel Military Industries, and TAT Aero to develop their own weapons and systems that now enable them to compete for export orders.

Asia: Japan

Japan is a good example of a country which has utilized its strategic importance and favoured relationship with a world superpower to develop its indigenous defence industry in the post World War II years.

Japan's industrial policy since the second half of the 19th century, has been based on the principle that technology transfer and absorption from the western powers with the idea of first emulating their state-of-the-art techniques and finally overtaking them, is the key to rapid, robust and diversified industrialization. In the realm of defence industrialization, Japan has used its special position vis-à-vis the United States to obtain

substantial offsets in the form of technology transfer and rights to undertake licensed production of high tech military equipments and systems. It has built up a sizeable military industrial complex of its own. Moreover, the spin-off benefits from the technological developments in defence industry have resulted in huge gains in the civilian sector as well.

The Japanese policy of indigenization of defence production is shaped by its overall view with regard to technological self-sufficiency and ascendance. The Japanese belief is that there cannot be real security unless the country is independent with regard to technological knowledge and competence, and self sufficient in the production of armaments. A general unease on account of the excessive dependence on American military support, misgivings about the state of the US economy and its continued commitment and interest in backing Japan, and the rising life-cycle costs being incurred on the maintenance and upgrade of foreign systems, were other factors that propelled Japan to strive for self reliance in arms production. Last but not the least, there was a clear vision that the absorption of military technology and the creation of domestic arms production capacity would have important spread effects in the development of civil commercial technologies that would serve Japan's long term goal of becoming an industrial and technological superpower.

A major source of the technology inflows into Japan came from defence offsets. Japan has received from the US licence rights for a larger number of defence equipments and systems than any other country in the world. As per the US government data, between 1960 and 1988, licences for 28 major systems were given to Japan. These include several programmes under fixed wing and rotary wing aircraft, aircraft parts, sub-systems and engines, and missiles.

Transfer of licences helped in a rapid indigenization of the Japanese military industry. Japan has made major progress in self sufficiency and

more than 90 per cent of Japan's requirements for military products are now met within the country. There have been a number of important developments in the aerospace sector. For the F1 fighter there was a Japanese fire control design; for the T4 intermediate jet trainer the fuselage and engine were developed in Japan; 80 per cent of the materials and systems for the P3-C Orion are sourced from within the country; the FS-X advanced fighter bomber has been built indigenously with Mitsubishi as the prime contractor in collaboration with General Dynamics (later Lockheed Martin); almost all the air defence missiles required by Japan are locally produced. On the naval side, Japan indigenously manufactures all the combat vessels and submarines that it uses. In land systems, Japan has a huge capability for all kind of infantry weapons. Japan's main battle tank in earlier years was the Type 74 produced by Mitsubishi Heavy Industries, with many of the systems and sub systems of Japan design and make, and the tank's 105mm gun manufactured under licence from Royal Ordnance, a British company. This MBT was replaced by the Type 90 - a completely indigenous tank again manufactured by MHI as prime contractor, using several advanced materials and technologies including modular composite ceramic armour developed by local industry.

The technological developments from offsets also had important spin-offs in the promotion of strategic civil industries in Japan. The technology for the brakes of Japan's famous Bullet train came out of the knowledge gained from production of F-86 aircraft. In a unique example of sharing of learning and experience, Mitsubishi Heavy Industries that produces the FS X fighters, use the same premises, machinery and skilled operatives for doing works connected with Boeing civil jets. Japanese firms have acquired much knowledge in the manufacture of composites from work experience on tanks and aircraft wing structures. Licensed production of military radio equipment led to the establishment of the radio production industry in Japan.

Other kinds of spin-offs are with regard to soft skills including advanced project management from handling complex military projects, expertise in systems integration, production, inventory and quality control, standardization of products, industrial engineering, etc. In enabling the country to absorb such technologies, Japan's early investment in human resources and education paid rich dividends.

In Japan, development of military and civil productive activities has remained closely co-operative and interwoven. The military and civilian industries have evolved together, not isolated or separate from each other. Japan's strategic industries specialize in dual use technologies i.e. technologies which have commercial as well military uses. These technologies are great drivers of economic growth and pervade the aerospace, electronics and telecommunications, materials, machine tool, and automobile industries. In respect of a number of critical dual use technologies such as micro-electronic circuitry, semi-conductor compounds and robotics, Japanese industry is perceived to be ahead even of the US. The dual use industries permit reverse spin-offs with the advancements taking place in the civilian sphere aiding new developments of military items and processes.

Also noteworthy is the fact that the benefits of development and production of military equipment was not confined to the primary contractors who won the initial contracts but was allowed to diffuse downwards to a larger number of companies through the mechanism of sub contracting, many of whom might have been losers in the primary bid. This unique system has helped to build up a body of expertise in the different industries of suitable scale without over-concentration or over-dispersion. The Japanese defence contractors are diversified companies dealing in a wide range of civilian goods. This helps them to tide over periods of contraction in defence demand as they are not dependent on defence sales for their survival.

Japan's R&D funding is also interesting. Nearly 95 per cent of the R&D expenditure, government and private, is devoted to commercial applications with maximum economic and social returns. Government is more of a facilitator, rather than a funding agency, for promising projects. The major share of funding comes from the private sector. In case the R&D efforts result in the development of a marketable product, the investment can be recovered from the price of the item. However, the R&D risks in the event of failure have to be shared by the private sector as well.

Today, Japan is a serious competitor to its erstwhile suppliers in the US in respect of a number of products, components, systems and sub-systems. As the US gets more cautious about parting with cutting-edge technologies to Japan, the Japanese authorities have also tempered their stand on complete technological self reliance, to focus more on the benefits of co-development and co-production programmes to sustain their research and development base and retain access to the best technologies of the world.

Europe: Spain

Spain is a good example of a country which has used offsets and allied programmes to stimulate defence industry and use it as an instrument for re-industrialisation. By stimulating demand through government owned production entities, providing tariff protection to new industries and creating high volume export oriented sectors, the government aimed at propelling the Spanish armaments industry to European standards. In particular, the electronic industry was seen as a possible high tech industrial niche. The mechanisms employed were offsets on foreign military purchases, encouragement to R&D projects and subsidy support to military electronic and engineering industries.

In 1983, Spain entered into agreement with McDonnell Douglas Corporation, USA, to buy 84 F 18 aircraft, in what was the first major

acquisition effort of the Spanish armed forces in the post Franco years. McDonnell Douglas Corporation agreed to provide offsets of $ 1.8 billion. An Offset Management Office was set up in Spain to oversee the implementation of the offset programme.

The government's objectives were: *first*, to spur the development of Spanish firms, particularly in the aerospace and electronics sectors, *second* to enhance the technological base of Spanish industry through technology transfer from abroad, *third*, to create export opportunities for Spanish firms to break into the global market, particularly the American market, and *finally*, to create employment in Spain so that the negative effects of the purchase of aircraft on the Spanish trade balance were fully compensated.

The offsets were in four groups:

- *Group A*- designated offsets- which referred to work, items or services to be carried out by Spanish firms on the aircraft that were being purchased.
- *Group B*- aerospace co-production offsets- which referred to work to be done by Spanish firms for aircraft meant to be exported to other countries or other aerospace activities.
- *Group C*- indirect offsets- activities involving the use of defence related technologies other than in the aerospace area.
- *Group D*- indirect commercial offset including investments made in Spain and sales from such investments.

The total offsets from groups A and B had to be not less than 17 per cent of the total package and tourism related offsets could not be more than 10 per cent.

When work was subtracted by McDonnell Douglas to Spanish companies, if the costs of production were higher than would be incurred by McDonnell Douglas in normal subcontracts, the additional cost would be

reimbursed to McDonnell Douglas by the Spanish government. For this purpose, the Spanish government set aside US $100 million. Despite the extra costs, the Spanish government was keen to maximize the amount of group A and B offsets during the negotiations phase. Although local assembly could not be taken up being prohibitively expensive, offsets were obtained for equipment, material, avionics and simulators. The offsets were to be implemented over a period of 10 years.

It was found that the fulfilment of the offsets was biased in favour of indirect offsets in the industrial sectors where Spain has been traditionally strong, such as chemicals, pharmaceuticals, iron and steel, foodstuffs and consumer goods and electronics. These industries generated a considerable volume of exports. The increase in exports helped to compensate to some extent the negative effect on the trade balance of the import of F 18 fighters by Spain. There was also an increase in job opportunities and employment in different sectors of the Spanish economy.

There were limitations on the capacity of Spain's defence industry to absorb large amounts of direct offsets. However, technology transfers to an extent did take place also in sectors such as aerospace in which Spain did not have much commercial advantage. Although such transfers were low in terms of comparative volume, they were important in that they created capabilities in areas like micro electronics, radars, automated test beds and simulators, materials and composites.

In the defence sector the benefits of direct offset were reaped by a limited number of firms. Two companies, CASA (aerospace) and INDRA (electronics) received more than 90 per cent of the defence related direct offsets. Technology diffusion has also therefore been confined to these firms. On the other hand, the indirect commercial offsets were dispersed amongst a large number of small firms. An important implication is that

indirect offsets proved to be an administrative challenge for the Offsets Management Office as it had to put in much greater time and effort in overseeing the implementation of the programme through a wide variety of small firms and to appraise a number of individual projects for suitability and calculation of "offset value" to the Spanish economy.

Spain has since been concentrating on smaller and more focused and targeted offset programmes of shorter duration, many of which are structured as co-production or co-development agreements. The Offsets Management Office has been re-named the Industrial Co-operation Management Office to reflect the change in focus. Some of the advantages of co-operation and co-production are:

- Activities to be done by the local partner are finalized before the arms purchase is made;
- Activities usually relate to the field in which the arms purchase is being made;
- There is no need to administer offset applications;
- The Spanish firms are able to interact more closely with their foreign partners and have a greater involvement in the evolution of the project and associated R&D.

The challenge is for countries at lower technological levels to identify areas in which they could meaningfully participate in a co-development programme. The experience gained by Spain from the early offset programmes proved useful as it helped to raise the level of the defence industrial base, demarcated areas of potential development and gave an opening to Spanish exports in niche markets.

In the 1990s, the government evolved a policy to use the arms acquisition programmes to attract foreign partners into investments in domestic companies. As per this policy, a state company with a prime contract from the government could have a foreign subcontractor with a minority share.

It was felt that after making sizeable (though minority) investments to modernize and develop Spanish firms, and to equip them with the latest skills, the foreign partners would display greater long term commitment to Spanish industry.

South America: Brazil

Brazil, though a peaceful nation, has always been a dominant force in the Americas. One of the principles underlying the Brazilian policy is that the country should be able to provide adequately for national security and should not depend for its protection on foreign arms. Development of the armaments industry has therefore been a very important objective. It was also felt that the growth of military industry would have the effect of stimulating the development of the civilian industrial sector as well, while helping the economy to gradually ascend the technology ladder.

The Brazilian government has for many years now, leveraged its armaments purchases to acquire the latest military technologies from abroad through such methods as licensed production, co-production and joint ventures although it has formally articulated its offsets policy quite recently. Technology transfer has always been a key requisite in all Brazilian arms procurements. The state has also been willing to invest a good deal of resources in the indigenous projects, although commercial success of the ventures has been somewhat patchy.

The first big steps in the programme of military industrialization of Brazil were taken in the late sixties. Embraer Corporation, the Brazilian aeronautics major, was established in 1969. It proved to be leader in the absorption and indigenization of foreign aeronautic technologies that accrued to it by way of offset deals. Embraer made good use of the excellent industrial and human resource base that had been painstakingly built up by the government in the run-up to industrialization. The

Embraer's first military plane, the EMB 326 Xavante trainer was manufactured under licence from Aeromacchi, Italy. In the early 1970s, Embraer had a technology transfer agreement with Piper of the US for manufacture of the Piper Seneca light aero-planes. In 1975, when 49 F-5 aircraft were purchased by Brazil from Northrop of the US, Embraer was involved in the manufacture of several fuselage components. Embraer next embarked on a co-production arrangement with Aeromacchi and Aeritalia of Italy a subsonic light attack jet fighter aircraft, the AMX. Different parts and subsystems of this aircraft were made in Brazil under licence arrangements, such as engine components, multi-mode radar, and head-up display. Some 200 of these aircraft have been produced and are in use in the Brazilian and Italian Air Force. SIVAM is a huge monitoring, surveillance, communications and air traffic control system for Brazil's Amazon basin area. It is a $1.4 billion contract and the collaborators are Raytheon, US along with Embraer and other Brazilian companies. Embraer supplied some of the airborne platforms by adapting existing regional jets. The SIVAM programme also gave a new lease of life to Embraer's ALX super Tucano, a light attack turbo prop aircraft which was a collaborative up-grade of the indigenous Tucano trainer, with Aeromacchi of Italy. This apart, a company called ATECH was set up so that Brazil could take part in development, operation, maintenance and up-grades of all the software required under the SIVAM project. The SIVAM project was a major step forward in technology absorption by Brazil and also gave an opportunity for the development of local software capabilities. Brazil is now embarking on a next generation fighter replacement programme.

Brazil has thus experienced a steady increase of its capabilities in the aviation sector and the various projects that have been undertaken have helped to bring about a broad diffusion of technology throughout the economy. The commercial results, especially for military planes, have been mixed- some of the programmes such as the AMX proved to be quite expensive and could not obtain any export orders. This was fortunately

compensated by Embraer's good export performance in the regional civil jet market. Another criticism that is sometimes levelled against the Brazilian paradigm is that there is quite a heavy dependence on imported components and sub-systems and up to 60 per cent of the components of any Embraer aircraft continue to be imported. The counter argument is that this could be a deliberate strategy whereby Embraer concentrated on absorbing technologies in pre-determined critical areas such as fuselage and systems integration rather than pursuing an unattainable goal of complete indigenization.

The first major contract on the naval side was for the construction of six frigates in collaboration with Vosper Thorneycroft of the UK. Local Brazilian capabilities in ship borne weapons and electronics are greater than their ability to construct ships; the up-gradation of their frigates with a dedicated combat system was undertaken by a consortium of one French and four Brazilian firms.

Small arms and ammunition have been manufactured by Brazil under licence from Italian, Belgium and British firms for a long time. Avibras, Brazil's missile producing company uses a lot of indigenous technology, but has had technology sharing arrangements with Canada, former Soviet Union and China.

Brazil has not looked for job creation or correction of balance of trade, but rather only to technological development of its defence and related industries through technology transfers, collaboration, co-production and joint ventures. Foreign companies on their part were attracted by Brazil's cheap labour and raw material supply, efforts and investments made for developing the capability of absorbing technology, conducive government policies and potential access to South American markets. By developing an autonomous technological capability, so much so that Brazil is in a position to take part in international collaborative projects for design,

development and production of advanced aircraft, it can be said that the Brazilian policy makers have achieved the goals they had set for themselves. With the development and up-gradation of military industry, there has also been a strengthening of the entire civilian industrial and technological base.

Whether the programmes have been a thumping commercial success is a different question altogether. It has been noted that costs of some of the projects has been quite high. Because of Brazil's small defence procurement budget, the commercial success of its various projects has always been heavily dependent on exports. In the eighties, Brazil was ranked amongst the top 10 arms exporters of the world. With the end of the Iran- Iraq conflict and the Cold war, arms sales dropped. Although Embraer's military sales expectedly fell, it was able to pull through because of a continued strong export performance for the civilian regional jets. With 40 per cent market share in 1999, it was about equal to Bombardier of Canada. In fact, diversification into civil production was required to maintain viable operations also for Avibras, which went into production of telecommunications and electronic industrial equipment. The defence industry of Brazil is now showing some signs of a small revival. The government is hopeful that the offsets that are likely to flow from the induction of the latest advanced jet fighter will help the process.

Conclusion

Are there any common themes or principles we can arrive at from this study? The following points emerge.

There is no universal “one size fits all” policy applicable to all countries. Each country has to evolve the offset policy that suits it best, taking into account its special requirements, unique capabilities, the depth and extent of its natural and human resources, and the level of its economic

development. The objectives of the offset policy should be based on a realistic assessment of the country's capability to absorb potential inputs.

The desire to acquire and absorb the latest technologies underlies most offset programmes. Technology transfer may sound quite attractive but it is only as effective as the ability to learn and make productive use of that learning. Good use of technology of course requires a highly skilled workforce. Moreover, merely acquiring an existing technology is not enough, there has to be the capability to take that technology forward through continuous and vigorous R&D. Otherwise, the nation receiving the technology becomes at best a branch manufacturing facility for the vendor country. Further, technologies have a way of becoming rapidly obsolete.

An offset policy should have a clear focus. Instead of dissipating energies in broad generalized programmes with multiple objectives, the nation is better served by a concentration of effort in specific objectives.

An offset policy can be successful in the long term only if both the parties in the offset deal find a real interest in the transaction. This is the difficult balancing act for the offset policy maker of achieving equilibrium between the obligations imposed on the foreign party, and the co-operation and benefits it wishes to reap. Imposition of stringent penalties for non-performance of offset contracts may be counter-productive.

Finally, the offset policy should have flexibility. Once an offset programme is in place, its results need to be monitored carefully and based on feedback received from actual implementation, moderations or mid-course corrections could be undertaken. The roll out of an offset programme is likely to be a learning experience for both parties.

What India can Learn from Global Offset Experiences

*Vivek Lall**

Boeing has successfully implemented offset programmes in over 35 countries completing over $29 billion in offset commitments and we are currently engaged in executing over 45 active programmes valued at over $14 billion involving 18 countries. Therefore, we have some relevant experience in this area.

The Boeing Company has been following the developments in India's Defence Procurement Procedure (DPP) as it relates to defence offsets with great interest. We believe that instituting an offset policy and the associated infrastructure is a positive move for India and will serve to enhance India's position in the global aerospace domain. Current offset guidelines are structured to promote India's national industrial objectives of the sustainment and creation of aerospace and defence jobs, acceleration in the maturity of the defence technology base, an increase in indigenous capability to build and support defence platforms, and the enhanced global competitiveness of public and private sector firms of all sizes. The offset programme should serve as a vehicle for Original Equipment Manufacturers (OEMs) to partner with their Government customers to support and achieve these objectives. A successful offset programme is one where the relationship between the OEM and the local offset partners makes good business sense and is of mutual benefit to both parties. The OEM can attain productivity gains such as cost reduction, cycle time reduction and access to market-leading technologies while the offset partners can expand their portfolio of export orders, infuse needed

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technology, and meet growth objectives. As a result, the Government has helped facilitate job creation and sustenance along with an increase in the indigenous aerospace and defence manufacturing capabilities. This dynamic creates a win/win/win scenario for the three major stakeholders in the offset program – the Government, the OEM, and local industry.

Boeing is also aware that certain drawbacks exist in offset policies that need to be avoided if the policy is to be successful in serving as a catalyst for growth and productivity. Although there are many lessons the Boeing has learned from its offset experience, the paper has focused on two critical areas in achieving the policy objectives that underpin the offset guidelines, the evolution of the offset guidelines and structure of the organisation responsible for evaluation and implementation of offset programs.

Evolution of Offset Guidelines

In our experience, one of the most important lessons of defence offset programmes the company has learned is the importance of evolving offset guidelines on a constant basis. Offset guidelines are created to assist in the achievement of specific industrial policy objectives. The role of the offset guidelines is to provide a framework for successful achievement of these policy objectives. Therefore, the offset guidelines should be reviewed on a regular basis to ensure they are not excluding activities that would further the achievement of the industrial policy objectives.

An example of a country that has evolved their guidelines in support of their national policy objectives is Australia. In 2007, Australia issued a new Defence and Industry Policy Statement and revised its offset guidelines accordingly. The industrial focus of the new policy is on the acquisition and sustenance of industrial capabilities essential to meeting Australia's military self-reliance needs and in the creation of competitive opportunities for local industry as part of global supply chains based on a

best value for money analysis. The offset guidelines were revised from prescriptive obligations to programs structured to provide bid opportunities for Australian companies with no requirements levied with respect to the type or level of work to be competed or won by Australian industry.

The Australian's approach is to use the industrial engagement elements of current programs, e.g., C-17 and Super Hornet, to give Australian industry opportunities to capture business in the global aerospace and defence market. A critical part of this approach is an on-going analysis of the successes and failures of Australian industry as part of this process. The results of this analysis will assist in the determination of what corrective actions need to be taken to ensure that Australian industry will be competitive in the global market outside of the guise of offset programmes leading to long-term sustainable business relationships. These eligible opportunities include activity in both commercial and defence. The benefits of including the commercial aerospace activities in the defence offset programme activities for the Australians include the following:

- The commercial and defence aerospace markets tend to be cyclical and the highs and lows of each tend to complement each other.
- The rates on commercial aerospace projects are substantially higher.
- The technologies inherent in the products in both markets have a high degree of commonality.
- A regime typically less stringent on commercial items.

There are a number of parallels between the Australian Defence Industrial Policy and the National Policy Objectives of India. Both are focused on positioning the aerospace and defence supply base to be more competitive in the global market. Both are focused on the development of indigenous industry capabilities required to support the defence forces operational capability, and both are focused on the sustenance and creation of

aerospace and defence jobs.

With a talented and educated workforce, and a national mission defined in the highest ranks of government, India's aerospace and defence industry has embarked on a journey to become a world class indigenous manufacturer of aerospace and defence products that will meet India's current and long-term needs. If offset programmes are to be utilised as a means for India to fulfill its aspirations to be a world class manufacturer of defence aerospace products and services, and to position its aerospace and defence industry to be competitive in the global market, the defence offset guidelines should be written and interpreted in such a fashion to generate the highest probability of success. Today, India is poised to greatly enhance its indigenous capability by enhancing its aerospace domain knowledge. However, for this to be maximized, the allowance of offset policy flexibility and discretion, to allow the transfer of general domain knowledge, such as commercial aerospace work and knowledge transfer activities would be beneficial. The goal of successful offset guidelines is to stimulate ideas on the part of the OEMs that will support the national industrial policy as well as generate a favourable offset credit return.

The Ministry of Defence regularly reviews and considers revisions to the offset policy as part of the DPP review process. This is an extremely forward thinking step on the part of the Indian Government. We propose that for the next DPP, consideration be given for inclusion of additional activities such as commercial aerospace work and knowledge transfer activities to be included as part of the defence offset guidelines, if it is determined that these activities support the achievement of national industrial policy objectives.

Structure of the Offset Authority

The promulgation of offset guidelines necessitates the establishment of an

organisation responsible for the interpretation and implementation of these guidelines. The primary goal of this organisation is the furtherance of the National Industrial Policy through successful consistent interpretation and implementation of the guidelines. The structure of the offset authority can have a significant impact on success of supporting this policy. One of the keys to this success is the separation of the acquisition team from the offset authority. This allows each not to be distracted by the other during the acquisition process and creates an environment where subject matter experts can be developed. This assists in the creation of an environment where consistency is achieved in the interpretation and implementation of the offset guidelines and in the evaluation of offset proposals. It also allows the offset authority to support the acquisition community in meeting procurement schedules and supports overall policy objectives by working in a collaborative environment. Also, this operational structure allows the OEMs to focus on the priorities of the offset guidelines and avoid the confusion that is often manifested when one decision body has direct responsibility for both acquisition and offset implementation. An additional benefit of this approach is that the interpretation of the offset guidelines will not vary according to the service tasked with interpreting the guidelines. This enables a consistent approach of achieving the industrial policy objectives across all offset programs. Also, having a single authority over offset related matters will lead to a greater understanding on the part of the OEMs of the expectations of the Government of India. The result of this will be offset proposals and programmes which will align more consistently with the industrial policy objectives and lead to consistent success in the implementation of offset programmes. It also gives the OEMs a single authority to which they can address offset questions and issues. Finally, as the industrial policy matures and new priorities and focus areas are identified, the offset authority can work with the OEMs to develop possible approaches to address the new areas of priority.

The United Kingdom is an example of a country that has evolved their structure for offset to best meet the objectives of the Ministry of Defence (MoD). The Industrial Participation Unit (IPU) within the MoD is responsible for implementing the UK's Industrial Participation policy. They are part of the MoD Central organisation and are seconded to the UK Trade and Investment Security Group. The IPU reports into the Central Staff at MoD headquarters which is the heart of policy making for the MoD. The Central Staff has the responsibility for the promulgation of the Defence Industrial Strategy. The IPU has the responsibility for the implementation of the MoD's Defence Industrial Strategy and the development and implementation of the Industrial Participation Policy. The IPU engages with the MoD Integrated Product Teams (IPTs) in the acquisition community to support new requirements. The IPU assesses offset proposals from OEMs and make recommendations on how the offset proposal enhances or negatively impacts the business case. They also make recommendations with respect to the quality of the offset programme offered and the relevance to the UK Defence Industrial Strategy and IP policy. Both the IPT and the IPU evaluations form the basis for overall business case analysis. In addition, the IPU negotiates offset agreements with OEMs for new contracts and has the responsibility to evaluate all credit reports against the obligation. They also take an active role in working with the OEMs throughout the period of performance to ensure successful execution and liquidation of the offset obligation.

The benefits of the UK structure allow separation of the acquisition IPT and the IPU during the acquisition process and create not only an environment where subject matter experts can be developed but also an environment where consistency is achieved in the implementation of the policy and evaluation of offset proposals. It also allows the IPU to support the acquisition community in meeting procurement schedules. The OEMs are allowed to focus on priorities of the policy and avoid the confusion that is often manifested when one decision body has direct responsibility for

both acquisition and offset implementation resulting in programmes and proposals that align more consistently with the policy and guidelines and more consistent success in implementation of offset programmes.

We have all seen in the press that there is the potential in India for a substantial number of sizeable defence procurements on the horizon. It is anticipated that there will be an offset obligation associated with each of these procurements. Having an offset organisation in place that is structured to support the acquisition community and to manage the successful implementation of the resultant obligations with the OEMs will be of great benefit in achieving the industrial policy objectives.

Therefore, based on our understanding of the Defence Procurement Procedure relative to the above, the following points are provided for consideration:

- The establishment of a single point of accountability for the entire offset process. One nodal agency within the MoD could be responsible for the evaluation of offset proposals as part of the acquisition process, approving projects during implementation and approving the offset credits gained for that project. This should result in offset programmes that are structured to support the national industrial policy objectives and have a low execution risk.
- Keep the valuation of offset projects as simple as possible and establish reasonable documentation requirements for crediting purposes. Project valuation could be mutually agreed to by the provider and recipient, before being presented to the offset authority for final approval.

In conclusion, India is poised to become a leading manufacturer and exporter of defence articles as a result of its proposed defence procurements coupled with a strong and sensible offset policy that is

focused on achieving national industrial policy objectives. The Indian MoD has already shown great foresight by introducing progressive provisions such as banking of credits. It is recommended that the offset guidelines be periodically reviewed to ensure they support the industrial policy objectives and do not exclude activity that is in furtherance of those objectives. It is also recommended that a single entity is granted to the authority to handle all offset related matters. Boeing is confident that the MoD will continue to have an evolving policy that will fulfil India's goals and maximize benefits created by or resulting from offset programmes.

Implementation of Offset Policy in Defence Contracts: Indian Army Perspective

*S. Sunder**

The Offset Policy has been articulated in the DPP 2008. The Offset Clause would be applicable for all procurement proposals where indicative cost is above Rs. 300 crores and schemes are categorized as 'Buy Global' involving outright purchase from foreign/Indian vendors and 'Buy and Make with Transfer of Technology' i.e. purchase from foreign vendor followed by licensed production. There is an urgent need for us to act together so as to extract the maximum mileage from this new clause introduced in the procurement procedure for the modernization of the armed forces in general and Army in particular.

The provisions of offset policy will apply to all Capital Acquisition categorized as 'Buy (Global)' or 'Buy and Make' where indicative cost is Rs 300 crores or more. Initially, a uniform offset of 30 per cent of indicative cost in 'Buy Category' or 30 per cent of foreign exchange component in 'Buy and make category' will be minimum required value of offset.
The paper covers the following aspects:

(a) Part I: Defence Offset Policy.
(b) Part II: Offsets from Army's View Point.
(c) Part III: Concerns.
(d) Part IV: Recommendations.

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PART I: Defence Offset Policy

India is amongst top ten countries in terms of defence expenditure and third largest importer of defence hardware. Offsets in defence trade are a global phenomenon. More than 130 countries demand offsets in one form or the other. Percentages vary like 174 per cent in Austria, 118 per cent in Netherlands, 100 per cent in United Kingdom, 27 per cent in Thailand and 20 per cent in Taiwan.

In India offset policy was long overdue and implementation since DPP 2005 is a welcome step. Offsets are here to stay and thus need to be harmonised. Offset policy necessarily aims at acquisition and development of the state of the art technologies and create world class defence production industry which should be able to meet both domestic and export requirements of the country. *It is important to note that Offsets work best only when they result in a win – win situation for the buyer and the seller.*

Defence Offset Obligations: For the purpose of defence purchases made under the DPP 2008, offset obligations shall be discharged directly by any combination of the following methods:

- Direct purchase of, or executing export orders for, defence products and components manufactured by, or services provided by, Indian defence industries, i.e., Defence Public Sector Undertakings, the Ordnance Factory Board and private defence industry. For the purpose of defence offset, services will mean maintenance, overhaul, up gradation, life extension, engineering, design, testing of defence products, defence related software or quality assurance services.
- Direct Foreign Investment in Indian defence industries for industrial infrastructure for services, co-development, joint ventures and co-production of defence products and components.

- Direct foreign investment in Indian organisations engaged in defence R&D as certified by Defence Offset Facilitation Agency (DOFA). While certifying, DOFA shall not consider civil infrastructure and such technologies that are otherwise easily available in the open market.
- Foreign vendors could consider creation of offset programmes in anticipation of future obligations. Offset credits so acquired can be banked and discharged against future contracts. Banked offset credits would not be transferable except between the main contractor and his sub-contractors within the same acquisition programme. The main contractor would be required to submit a list of such sub-contractors at the time of signing the contract.

PART II: Offsets from Army's View Point

Since independence in August 1947, the country has been tackling a large number of security cases, both external and internal. Despite this, even today, it is saddled with a large number of security issues. There are many trends that will impinge on the security of India in the next decade or so. These include terrorism - global, regional as well as local. Unilateralism of the US, the rise of China both as economic and military power, continued instability in Indian neighbourhood, nuclear brinkmanship and continued proliferation in the region, internal conflicts of varying intensities, economic factor including globalization, the diminishing oil resources and volatility in prices of oil, impact of science and technology demographic changes and the interplay of important players at the global and regional levels. *Economic and military strengths are cornerstone of Indian power. Sustained, equitable and balanced economic growth is as much a necessity as removing the hollowness of military, with infusion of modern weapons and equipment.*

Key Technologies Expected: Focus is on military capabilities that

make use of technology to improve combat capabilities at modest cost. This philosophy termed as "system of system" approach to military modernization, places emphasis on what the weapon platforms carry and how they are networked. Some of the following technologies are significant to improve and enhance the combating qualities of the armed forces in general and army in particular. These capabilities are important from the point of view of modernisation of our armed forces as well.

Precision Guided Missions (PGMs): These include a host of weapons that range from missiles to individual war heads to defence against enemy smart weapons.

These include:

- *Cruise Missiles* – guided by GPS- which can reliably hit a target thousand miles away.
- *Tactical Missile System* which can destroy battalion sized formations of moving combat vehicles at ranges excess of 140 kilometres.
- *Combat Aircraft* using direct attack munitions from a stand of range of about 100 kilometres and hit targets by day and night under any weather conditions.
- *Sensor Fuzed* weapons and joint stand off weapons carrying sub munitions.

Stealth

- Technological advances are being made in many military platforms, increasing force-projection capabilities. Stealthy platforms can penetrate high threat areas and deliver PGMs.
- New armoured fighting vehicle are platforms incorporating the latest techniques.
- The focus is on low thermal and 'Acrostic Signatures' than its predecessor. This characteristic was discussed in context of future

tank design for Indian Army during their International Seminar (AFV) in November 2007.

Battle Space Awareness:

- Sensors in satellites, manned aircraft or UAVs can now monitor virtually everything that is going on in a particular battle area, dramatically improving battle space awareness resulting in complete "situational awareness" of commanders at various levels.
- GPS satellite navigation Network and Air Borne Warning and Control System (AWACS) are examples of systems where this technology has been refined over a period of time.
- UAVs for strategic roles, medium attitude long endurance (MALG) and low altitude UAVs are the requirement today. Searcher, Heron and Nishant UAVs have been evaluated by Indian Army recently.
- Night vision devices to remove night blindness are a must for India Army.

Command and Control Architecture:

- Digital technology is being built into aircraft, tanks, artillery and individual soldier systems with the intention of providing commanders with "situational awareness" - an instantaneous and complete picture of battlefield.
- Each soldier and vehicle is to be equipped with a small computer that displays a map of battlefield over laid with friendly and enemy position and aircraft flight paths.
- Battle space awareness together with Command and Control architecture to act on an information recently requires advanced command, control, communications, computers and intelligence processing (C&I) systems which have now been incrementally moved to (C412SR) (intelligence, interoperability, surveillance

and reconnaissance) in that manner.

- The Indian Army has been working on this by an ambitious project called CIDSS (Combined Information & Decision Support System) with ACCCS (Artillery Command, Control and Communication Support System), ADC&R (Air Defence Control and Reporting System), BSS (Battlefield Surveillance System), EWS (Electronic Warfare System) and BMS (Battlefield Management system). An international Defence Seminar on Battlefield Management System was recently conducted in April 2008 where the user perspective was deliberated in detail.

Technology and Infrastructure: A nation derives its power from a variety of factors – its geographical position, its economic strength, its administration or political system, its military and its people. While these are identified separately, they are closely interlinked. While we scale greater heights, our profile and strategy faces challenges on three fronts: *firstly*, globalization process in the new economic technological order; *secondly*, acquisition of strategic – technological strengths and *thirdly*, the vision of enhanced military powers. It is seen that technology is at the heart of above mentioned challenges. To enhance military powers, it entails acquisition, assumption, application and exploitation of technology and anti-technology in warfare of tomorrow. This does not figure in our offset procedure. The critical technologies in the strategic domain which we must leverage are:

- Area Missile Defence and Remote Warfare.
- Platform with stealth technology carbons composite and fibre.
- Sensors with good capability of image processing and diffusion.
- Precision munitions.
- Technologies to enhance survivability, awareness connectivity and war fighting capability of the soldier.
- Electronic warfare, direction finding and deception technologies.
- Space technology to exploit applications of real time meteorology,

navigation, communication surveillance, weapon guidance, cartography, synchronization and so on.
- High speed data processing.
- Nano technology.
- Cryptography and crypto analysis.
- Artificial Intelligence and Robotics.

PART III: Concerns

All successful offset programmes have certain common well defined characteristics, purposeful selection in consonance with well defined objectives, hard negotiations, detailed planning and close oversight. It is being deduced that Offset Policy aims at defence industrial development of country.

Equipment Acquisition in Jeopardy: In their enthusiasm to obtain order, many vendors fail to grasp the full implications of offset liabilities. They tend to take obligation lightly and do not make adequate budgetary provisions.

This will result in following:

- *Time Delays*: During critical stages of acquisition – the trial stage or CNC stage, the vendor will be disqualified. This leads to unjustified delays and waste of time and effort. Critical operational voids continue to remain due to the induced delays. The inability to fulfil offset obligations makes them liable to substantial penalties and may render main contract economically not viable.
- *Implementation:* The policy of 5 per cent penalty on vendor is not major penalty. The vendor may have no qualms about not following contractual obligations with confidence that buyer would prefer to renegotiate offset contract rather than imperil main contract.

Offset as Incidental Considerations: *Offset will work best when aspirations of both the vendor and buyer country are fulfilled and resulting in a win-win situation for both seller and buyer.* An analysis of buyers' perspective on offsets to gain maximum advantages and vendors' reluctance to give away too much may lead to the impression that offsets aspirations of buyer and possible approach towards same by vendor are dichotomous. However, offsets work only if it is win-win situation for all. Mere dependence on offsets would only lead to granting subsidies to state run enterprises and may lead to inefficiencies of the buyer.

Receipt of Extraneous Offset Programmes: India neither indicates areas in which offset should be offered nor prioritizes them. A vendor can hypothetically, therefore, discharge his offset obligations simply by purchasing mundane items or they may outsource defence related software solutions to India and have them counted against offset liabilities. Since our Defence Offset policy is in its infancy, we may need to give it time to mature and stabilise. Post offset studies in some other countries programmes have revealed that:

- Technology received was outdated and did not improve competitions of indigenous industry.
- Business generated in routine commercial trade was often counted against offsets.
- Offsets did not create new markets for local produce. Existing markets were exploited for short term gains.
- Offset requirements outsourced to in experienced entities which lacked commitments.

PART IV: Recommendations

There is reason to expect that new offset policy can be used constructively to benefit the Indian defence industry, both public and private. But for this, lessons must be learnt from international experience and indeed our past

knowledge in the field. Our own approach must be well conceived and implemented with clearly defined quantifiable benchmarks.

Setting of Priorities: The priorities to a great extent should be guided by the strategic and economic objectives laid down by DAC for each programme, ideally within a larger policy framework for the national defence industry. The illustrative lists of priorities are:

- Acquire state-of-the-art technologies.
- Provide opportunities of manufacturing and exporting components and parts of acquired equipment.
- Acquire depot maintenance technology, facilities, equipment, tools for service.
- Receive upgraded system of weapons.
- Export defence industrial products.
- Acquire foreign maintenance works.

Recommendations

The following is accordingly recommended:

- Offset should not delay main acquisition nor should it drive acquisition of equipment and technology.
- Industry should gear itself to absorb the benefits of offsets.
- Wherever feasible, we should resort to direct offsets.
- Technology being obtained through offsets should be both relevant and contemporary.

Conclusion

The very fact that number of countries seeking offset benefits has gone up manifold within a couple of decades is an indication that offsets do result in positive out comes. India's initiative in introducing offsets policy comes at right time when acquisition budgets have been reflecting impressive

growth levels, as a result of buoyant economic progress made by our country. What is now required is a careful steering of the policy from here onwards, with carefully chosen objectives and a clear roadmap to convert policy intentions into reality. Offsets should be leveraged to establish a vibrant defence industrial base in the country, thereby promoting self-reliance and boosting our economic and military prowess. Offsets should be seen as a fringe benefit accruing from procurement of the main weapon system and not vice-versa. idsa

Offset Absorption: Adding Arsenal to Armament

*Sujeet Samaddar**

Considering the volume of defence expenditure planned in the 11th Five Year Plan and in the future, it is certainly befitting for each recipient service to debate methods and procedures that offset this expenditure and contribute towards the economic and technological development of the country.

Over several years offsets have grown in importance; have found favour; and gained currency amongst arms importing countries. India has identified the great promise that offsets afford since expenditure on acquiring armament could now add to the arsenal; both through development of armament related industries and through other related / unrelated industry; balance of trade payment; generate employment; develop niche technologies; and, in some small or large measure achieve all these objectives. India has recently formulated an offset policy framework for defence procurements. After studying various models, India has adopted a gradual, incremental and phased approach for offsets in defence procurements. This policy is reviewed periodically and two such reviews have already been undertaken. Therefore, it is indeed opportune that we are today discussing a road map to see how and with what effect the offset policies can be put into operation and what outcomes and value addition can accrue to Indian industry without causing additional obstacles to the procurement process.

*Commodore Sujeet Samaddar is Principal Director Naval Plans. He has authored the book *Defence, Development and National Security*.

To begin with, India has taken a policy decision to incorporate a clause for seeking offsets on all defence imports of value exceeding Rs 300 crores, as Direct Offsets only. The paper covers the following broad issues:

- Key Concepts and Ideas.
- Stakeholders, Categories and Options.
- IN(Indian Navy)-offsets: Values and Volumes.
- Offset Absorption – Plans and Approaches.

Key Concepts and Ideas

There should be complete clarity on what offsets must achieve and also what they must not. Offsets must accomplish well thought out and well defined strategic or economic objectives. The defence industry, worldwide, is uniformly not a perfectly competitive industry and with technology control regimes as well as other non-tariff barriers to trade which distort the arms market significantly every arms trade transaction is somehow unique. Given this scenario, countries tend to extract for themselves the best terms of contract, and contract negotiation is quite often based on relative bargaining skills of the buyer and the seller. The bottom line is that we need to exercise caution and discretion against attractive offset offers that could detract the buyer from the main objective of the purchase and instead chase the red herring offset at the cost of the quality and price of the required equipment.

A second important consideration is not the type of offset in terms of quantities but its value as a quality product of high technology or service that must be accorded primacy in evaluating offset proposals. It must contribute towards developing niche technology in specific sectors, develop indigenous capacity and promote domestic defence industry but it must not be seen as a simple balance of payment issue. Since acquisition goals of the services are driven by operational considerations, which are time bound, therefore, in the process we need to guard against the pitfall of

laying more than required emphasis on offsets to the detriment of the acquisition programme itself. Finally, offset offers must of course be supported by the principle of value for money.

Stakeholders, Categories and Options

It is well known that there are three prime stake holders in offset programmes. *Firstly*, the Government must lay down the policies for compliance by the Industry and the Services. Industry must be able to absorb the offered offset offer and deliver the requisite production capability to the international offset partner. The Services seek quality and timely induction. Hence, offset proposals would need to be balanced in such a way that the end result is a win-win-win situation for all three stakeholders. This is depicted in Figure 1 below:

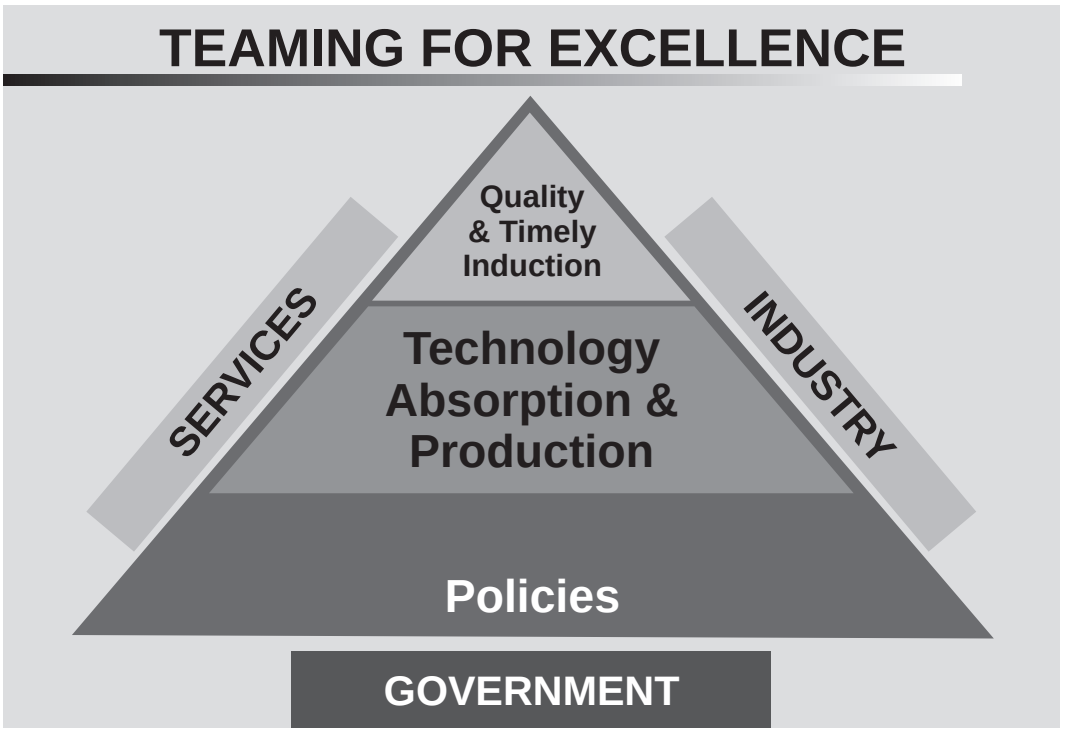

Figure 1

It would be apparent that the aspirations of the three stake holders could be different and if not at conflict certainly in competition with each other. These are tabulated at Figure 2 below. The success of an offset programme would lie in maximizing the aspirations of all three stakeholders. Theoretical tools, drawn from welfare economics such as the concept of Paretto optimality and Nash Equilibrium can indeed be applied to each proposal but that would be a subject by itself. At this stage not mathematical modeling but objective value judgments should steer the offset discussions. A cooperative rather than a competitive approach between the three stakeholders could maximize benefits. However, true value would only be forthcoming if the Government takes industry into confidence before processing the acquisition programme and certainly before the Request for Proposal (RFP) has been issued. This would enable a long term strategic approach to realize the benefits of offsets as a planned activity.

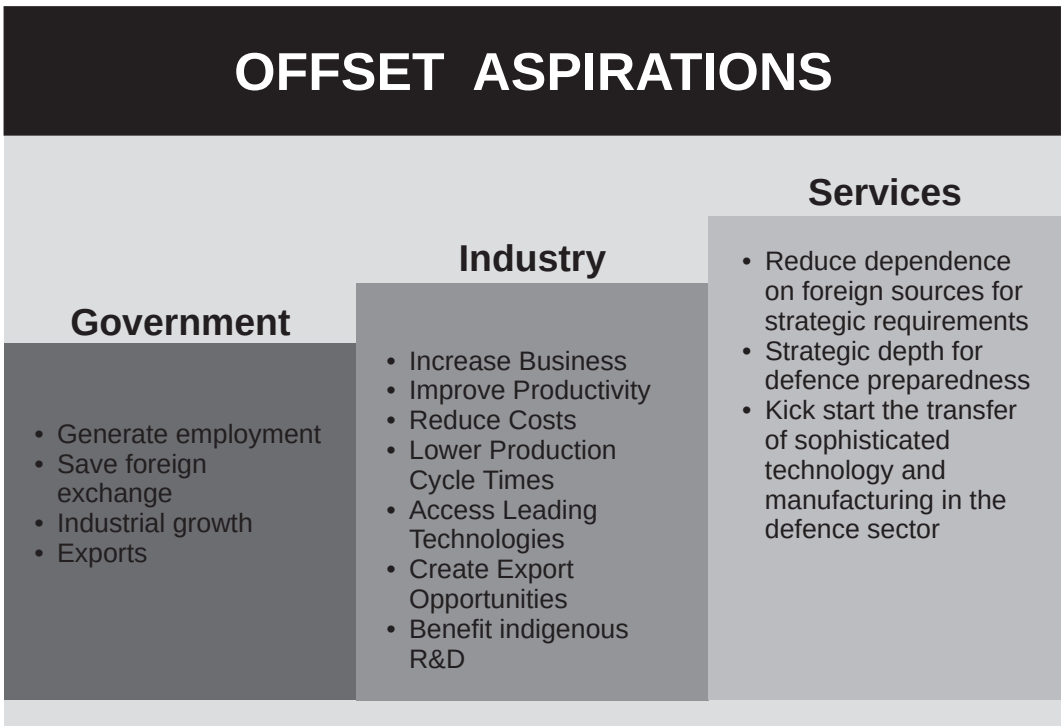

Figure 2

Categories and Options

There are several categories and options for availing offsets. So far as the categories are concerned, they can be broadly divided into technology, products and services. The options for partners are limited to DPSUs (Defence Public Sector Units), OFB (Ordnance Factory Board) and Private Industry. Figure 3 correlates the offset categories and partnership option. What is interesting to note here is that Direct Foreign Investment in R&D has now been included in DPP-2008 but only in those Indian Organisations certified by the Defence Offset Facilitating Agency (DOFA).

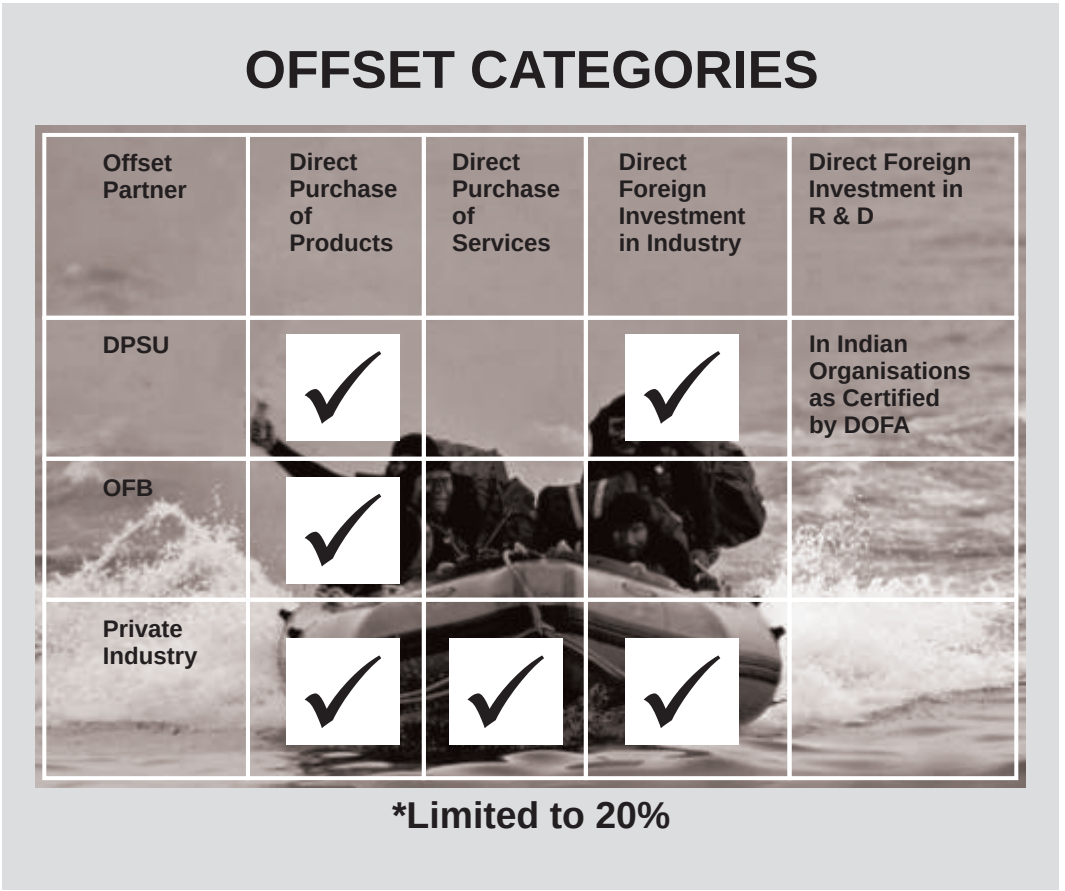

Figure 3

Worldwide, the usual mechanisms for offsets can be broadly classified as sub contracts, equipment and machinery purchases, co-production, technology transfer and license production. Of these, Transfer of Technology (ToT) remains the most popular and usually preferred type of offset the world over, especially for countries that aspire to build an indigenous defence industry. In an analysis, it emerged that up to 30 per cent of all offsets provided relate to technology transfers. Statistically, transfer of technology is needed the most popular and preferred type of offsets the world over. 16 per cent of all offsets provided by U.S. companies have been towards technology transfers. By and large, nations see technology induction through the offsets route as a stepping stone to develop indigenously more advanced technologies than was transferred. One example, that is often quoted, refers to the success of the aeronautics industry in Brazil where aviation technology in both the military and civil sectors have synergized effectively, producing a world-leader in the regional short haul jet market.

Successful technology transfer requires some well defined underlay. *Firstly*, the transfer of technology must be economically valuable. *Secondly*, there must be institutional capacity and a knowledge base available within the buyer country to absorb superior technology smoothly. *Thirdly*, such transfers must be without any restrictive conditions attached. Inclusion of a restrictive condition should be combated in any offset contract, particularly those that do not include the know-why components of a ToT proposal, for example, source codes for IT products. Technology transfers should be sought by indigenous Defence Industry only if such transfers can be subsequently self-sustaining through in-house value addition and innovation to create a more superior next generation product. Only then can the local defence industry become self-sustaining and avoid obsolescence. Singapore is an example of the successful implementation of a niche based technology transfer offset policy. Therefore, technologies sought as a part of offsets package must be

clearly spelt out at the Request for Proposal stage of the procurement process itself, after due consultation with industry and indigenous R&D centers. However, whilst a centralized Offset agency has been created in the form of DOFA at the Ministry of Defence, coordination with industry through CII / FICCI / ASSOCHAM / NASCOM and the industrial R&D base including academic institutional research carried out at IITs, is somewhat loose ended as a single window facility is yet to be created or if it exists then it requires greater publicity. The danger is that unless there is coordination at the apex level, technology offers can be duplicated, as say in the case of aircraft inductions which are based on civilian airframes, avionics and engines, resulting in less than optimal gains from the offset process.

As far as category of offsets is concerned, this paper is limited to discussing issues of obtaining technology as offset options. In India technology transfer is not an option for offsets. *Firstly*, it is contended that latest technology is never on offer since a host of export control laws are imposed by the vendor country upon the buyer which actually escalates the commercial value of the technology transfer proposal without commensurate benefit. *Secondly*, there is the difficulty in measuring the real impact and effectiveness of the ToT. Consequently, a critical aspect of technology transfer is its valuation. In any such evaluation, the differentiation between the cost of a product and its value to a buyer needs to be noted. Mathematically, a model using economic theories such as utility theory and rational choice theory can possibly throw up some methodology for objectively evaluating the cost and benefits of technology transfer of cost specific production. Despite these drawbacks this paper argues that ToT should be included as the foremost options for offsets.

However, it is important that an integrated approach is followed to evaluate the best benefit. The indigenous industry capacity to absorb technology,

the state R&D infrastructure to develop such technology further and the national Human Resource base needed to do so must all be holistically synergized if technology transfer is to succeed. All cogs of the offset process must indeed be meshed if the offset machinery is to move. This is shown in Figure 4 below:

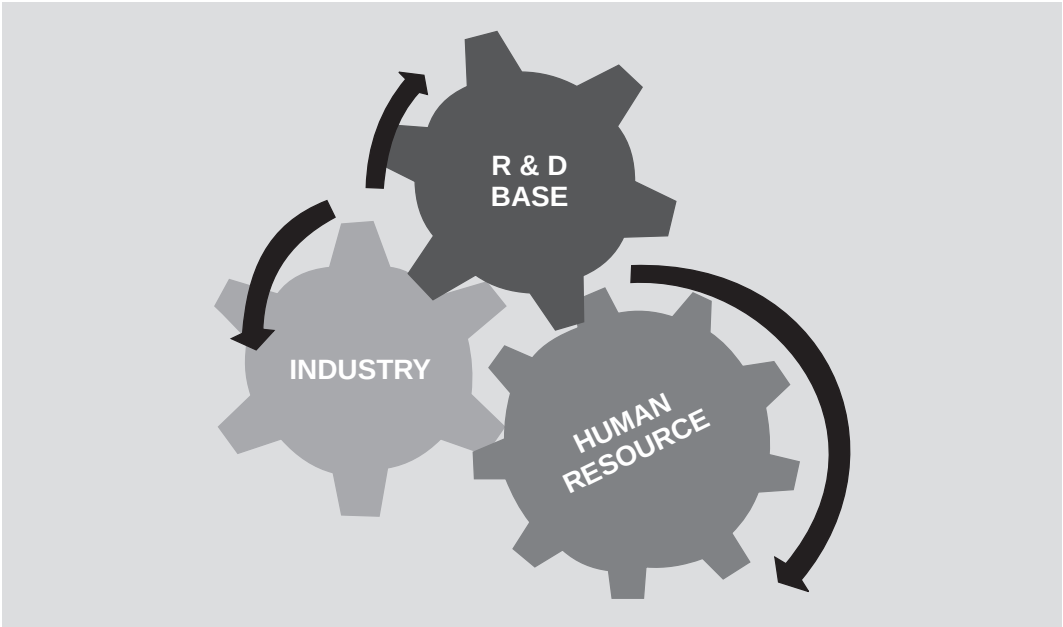

Figure 4

Technology absorption should only be sought in sectors where some degree of basic national competence and international competitiveness already exists. This is the foundation upon which the technology absorption strategy is to unfold. As a model it could begin with an integrated approach of setting up appropriate specialized institutions that nurture, develop and expand HR skills that can support the induction of such technology initially. This must be simultaneously supplemented with establishment of R&D Labs that can test products and establishment of manufacturing facilities at the sub assembly level. Thereafter, developing HR skills that support absorption of technology, improving the R&D

infrastructure to the product design level and manufacturing facilities at the component level can be established. Subsequently, the niche advantage can only accrue if industry develops a production hub at the regional level, develops the HR leadership in that specific niche technology which is supported by world class R&D Labs that has the potential to develop patents in that particular sector to finally assume global leadership in that specific niche product.

Such a model clearly brings out that if technology absorption is to succeed then isolated and superficial transfer of technology only to industry will not serve the national objective of offsets. Unless complementary HR issues such as development of specific scientific expertise and commensurate manufacturing technology is also imbibed no real and long term benefit from costly offsets would accrue. A model for technology absorption through offsets is depicted in Figure 5 below.

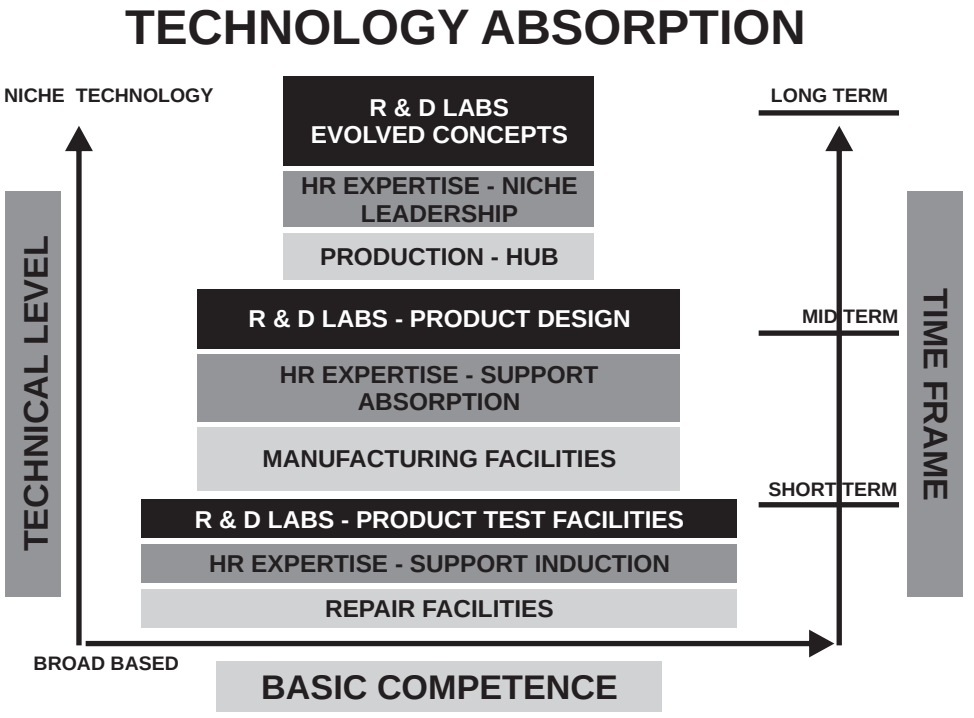

Figure 5

Multipliers in Offsets

A second issue addressed in this section is the issue of Multipliers. Buyer countries today, provide “multipliers” to offsets that provide technology that they critically require or even investments in sectors that need Foreign Direct Investment. Multipliers are additional credits over and above the market value of the technology or product or service offered. It is for the buyer to ensure that sufficient information is available to vendors to formulate offset packages that closely meet the buyers' specific technology requirements.

Multipliers are defined as additional mechanisms to offset offers that serve a specific highly defined purpose or an economic objective. These multipliers act as an incentive for foreign vendors to offer offsets which requires them to spend least capital and human effort and yet meet the offset obligation efficiently in a product or sector in which the buyer has interest. This is achieved by applying multipliers to the actual value of an offset offer to provide a larger credit value to the vendor and thus reflects the buyers' targeted preference in deriving specific benefits from the offset proposal. Thus, credit value may be more or less than the actual value depending upon the multipliers determined by the buyers. Multipliers in offset offers have not yet been introduced in the offset policy in India.

In the Indian context also, offset proposals that provide enhanced benefit in a desired area which could be technology, economy or industry needs to be considered. Figure 6 illustrates the broad concept of multipliers. For example, offsets in the engineering design sector attract a multiplier of two and therefore whilst the actual value of the offset obligation may be 20 MUSD the credit value would be 40 MUSD. Similarly, manufacturing facilities established in green field areas would attract multipliers of two whilst setting up the same facility in an industrial area would only allow a multiplier of 0.75, thereby reducing the 5 MUSD actual values to a credit

value of only 3.75 MUSD. Consequently, the credit value could change as depicted in Figure 6 below. In this way, i.e. if multipliers are introduced in the offsets policy the percentage value of offsets can rise beyond 100 per cent.

Sector	Category	Multiplier	Actual value	Credit Value
Engg.	Tooling	1	10 MUSD	10 MUSD
Engg.	Design	2.0	20 MUSD	40 MUSD
Engg.	Training	1.5	05 MUSD	7.5 MUSD
Manf.	Greenfield	2.0	05 MUSD	10 MUSD
Manf.	SEZ	1.5	05 MUSD	7.5 MUSD
Manf.	Indl. Belt	0.75	05 MUSD	3.75 MUSD

Figure 6

Reports state that buyers who demand high percentage of offsets are also liberal with multipliers. This is apparent since both vendors and buyers can benefit by following a higher credit value of offsets with multipliers which can be leveraged for future transactions. Both vendors and buyers may also benefit from reduced offset management costs by concentrating on fewer offset contracts offering higher multipliers. Therefore, to meet an offset obligation of say 100 MUSD both vendors and buyers may prefer a single contract of an actual value of 25 MUSD but with a multiplier of four rather than several small value obligations with multipliers of one or less.

Mechanism for Implementing Offsets

Vendors have certain mechanism for meeting offsets obligations. These include sub-contracts including for services, equipment and machinery purchase from Indian Industry, co-production of assemblies, sub-

assemblies of components sourced from Indian industry, license production through use of fully formed / semi knocked down or completely knocked down units. In the process of production some amount of technology, limited to know-how rather than know-why, is imbibed through unstructured osmosis to an Indian vendor. However, there are other sectors where offsets can be sought. These relate to repair and overall facilities either at the inspection level or at the deep level, manufacturing and production of spares and components, establishment of design and testing facilities and investment in research and development activities which could be either product specific or technology specific.

Seeking product specific offsets has certain advantages. Here again the formative principle must be to ensure long term benefits and not just transient business opportunities. In the manufacturing sector, high technology components and product with assured markets and which, in the long term, can help in creation of a production base that can meet the regional if not global demand should be sought. Similarly, in the service sector, offsets should result in value added services particularly in the finance, outsourcing and software development sector. Meeting offset obligations in the service sector is a fairy difficult proposition since valuation of the offsets offer is difficult to bench mark against the services offered. However, since the service sector is manpower intensive, offsets obligation in this sector could result in larger employment generation and specific skill creation.

IN-offsets: Values and Volumes

Approximately Rs 22,500 crores worth of naval acquisitions are planned in the 11th plan which would attract the provision of offsets. If indigenous industry has not evolved then an almost similar amount can be anticipated to be available in the 12th Plan also. It is, therefore, imperative that the opportunity that offset obligations foreign vendors provide must be

leveraged to the best advantage of the state. If this opportunity is to be fruitfully exploited, then an offsets absorption plan for the short, medium and long-term should also be conceived, discussed with Industry and approved by the Government. In one word a consolidated and comprehensive approach needs to be in place for the offset programme to genuinely succeed.

Aerospace, Shipbuilding and Development of Systems are the key sectors in which offsets would be generated for the Indian Navy. The aerospace sector has a potential of about Rs 6500 crores in offsets, the ship building sector has a potential of about Rs. 6200 crores and high technology weapons and sensors have a potential value in the range of about Rs. 1600 crores. All in all, business worth anywhere between Rs. 6500 crores and Rs. 11000 crores is expected to be generated through the Offsets Route, if the planned schemes fructify.

Project	Products & Goods	Manf. facilities	DFI	Services include Software	Re-Export
Ships	85	-	-	15	-
Aircraft and Aerial Vehicles	52	9	4	16	19
Missiles	95	5	-	-	-

Figure 7

The first naval case involving offsets was the acquisition of the Fleet Tanker for which the contract was signed in April 2008. Many valuable lessons pertaining to offsets were learnt while negotiating the deal and a need was felt to have a coherent and cohesive offset absorption plan in place if the full benefit from the provisions of offsets in future naval

acquisitions were to be derived. These plans are being prepared for the short term, mid term and long term. The Indian Navy, since the inception of the offsets provisions of the DPP, has negotiated four offsets in the sectors of shipbuilding, aircraft and aerial vehicles and missiles. The broad pattern of the offsets obligations, by percentage value, is depicted in Figure 7.

However, the percentage distribution between the private sector and the public sector in respect of these offsets negotiation is depicted in Figure 8 below:-

Sector	Aerial Vehicles	Aircraft	Ships	Weapons
Private Sector	72	52	34	100
Public Sector	28	48	66 (OFB)	-

Figure 8

A Vision and Objectives

As mentioned earlier, for offset programmes to be beneficial for national development, a clear vision and an enunciation of policy objectives is necessary. A possible vision statement for the Navy with regard to offset absorption could be "*To achieve global leadership in specific technology, products and services in the maritime sector by leveraging offset opportunities which arise through induction of foreign equipment and systems.*"

From this vision statement the fundamental objectives of the offset absorption plan can be enunciated and these could be summarised as follows:-

- To access, absorb and amass expertise in sophisticated niche technologies and products.
- To develop HR resources that support specific niche technologies.
- To develop an export / re-export base for domestic industry in defined technology sectors.
- To develop comparative advantage in production and marketing of specific maritime applications products.
- To obtain lifecycle support for the purchased product and the opportunity to re-engineer the same after incorporation of innovations and improvements in design.
- To reduce the foreign exchange component of naval Capital procurements.
- To leverage arms purchases for benefits in "other" sectors by way of counter trade, linked purchases or obtaining concessions in various negotiations.
- Offsets in academic research programmes at IITs and other such institutions.

Offset Absorption Plans and Approaches

Broadly speaking, Offset Absorption Plans can be categorised into `Product Specific' and 'Technology Specific Plans'. Within each of these two categories, Short Term, Mid Term and Long Term goals can thereafter be set. Irrespective of the category, the overall aim of the offset absorption roadmap is to attain global supremacy both in the specific technology as well as the product.

Utilising Technology specific offsets would require identifying sectors and attract investments in state-of-the-art technology such as nano-technology and material sciences etc, that, in the long term, provide a competitive advantage in producing niche products. This could be in conjunction with the DRDO which could render advice on the preferable technologies for

seeking offsets, since DRDO has the domain knowledge on the degree of defence technology available in India and also has information on the critical requirements of the future. Similarly, the Department of Defence Production has the domain knowledge on the potential of the Indian industry and could identify firms that could absorb the manufacturing technology in a particular field. Also, it is not sufficient to identify the specific technology or competence that it is sought to be developed but at the RFP stage itself it would be appropriate to indicate to potential vendors the prioritisation that India would seek in offset offers. An indicative methodology is as shown in Figure 9 below. Therefore, identification of the priority areas where technology transfer is to be sought would be the first task and subsequently the same would be stated upfront in the RFP itself.

Sector	% offset Sought	Specific Area	Multiplier	Indian Offset Partners	Remarks
DFI	20	Hardware	2.5	As per List	Processor Motherboards
Purchase of Indian Goods and Services	40	SME Others	1.5 1.0	As per List	
Production and Manufacture Facilities	30	Greenfield Sites Industrialised Areas SEZ	1.5 0.75 1.0	As per List	
Science and Technology Investments	10	Embedded Systems MWT Materials ELSI	2.0 1.5 1.5 1.5	DRDO IIT IISc	Includes Cost of Higher Studies and Internship for two Scientists at Plant

Figure 9

Five core sectors for utilising technology-specific offsets can be identified. These would enhance the nation's manufacturing and production capability in the sectors of industry that is of interest to the Navy. Offsets

could effectively be utilised to create or modernise repair and overhaul facilities for ships and aircraft and even various equipment and their sub components. Development of dual use technology is another core competency that could be developed. Design, research and development in niche technology areas in which competitive advantage can be created or accentuated is another vital sector for utilising offsets. Close cooperation with DRDO, Department of Defence Production and Industry will be needed for identification and implementation of technology specific offsets. Associated with the induction of technology would be the establishment of laboratories, simulators and testing facilities which are essential for strengthening the Research and Development base and the development of HR skills and expertise.

Developing technology or setting up production facilities are alone not sufficient to ensure global supremacy. There is a need to develop HR skills concurrently to absorb and develop niche technology. Induction of manpower and their training for the highest levels of utilisation of technology and production is an activity whose importance cannot be over overlooked and must form an integral part of the offset absorption plans. An example that is often quoted is that of Turkey which negotiated a package for two personnel to train as Astronauts with Boeing. A graphical representation of the various milestones envisioned while utilising offsets is shown in Figure 10 below.

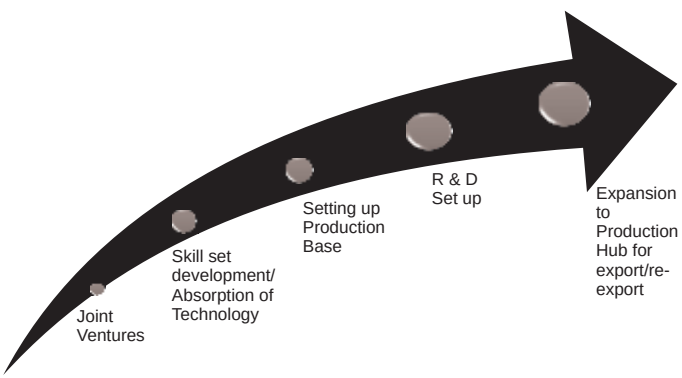

Figure 10

The precise time frame required for completing various activities related to absorbing offsets would be different for every acquisition case involving offsets. While this is being laid down at the project level, various key activities need to be also identified for accomplishment in the Short Term, Mid Term and Long Term. Some of these are illustrated in Figure 11 below.

SECTOR	SHORT TERM	MID TERM	LONG TERM
SHIPBUILDING	Modular Design & Integrated Construction	Material Sciences	Ship Systems
AIRCRAFT	Embedded Systems	Microwave Systems	Propulsion Plants
HELICOPTERS	Composite Materials	Gear Boxes	Propulsion Plants
MISSILES	Rocket Propulsion	Canisters / VLS	Seeker Tech
SENSORS	Medium Frequency Sonar	MFR / Phased Array Radar	Advanced Intelligent Systems

Figure 11

Product Specific Offsets - Some Examples

As far as Product Specific Offsets are concerned, these would aim at developing the capability for manufacture of niche products such as Missile Homing Heads, Actuators, Gyros, Radars, certain components of high technology systems, Rocket propulsion materials, Turbine blades, crankshafts to name a few. Products taken up for manufacture through the offsets route must however be those with substantial demand and an assured market in the long term. Induction of technology would then be accompanied by the setting up of a 'Production Base' which would be expanded progressively to become a `Production Hub'.

Beginning with naval aviation, Figure 12 provides an illustration of the

specific products that are required to build up the indigenous industry to world class standards.

Figure 12

Microwave technology is useful in developing intelligent and sophisticated modern air borne combat systems and applications include Electronic Surveillance Measures (ESM), Radar, and EW Jammers, etc. Such technologies also have COTS application in field of RF / Microwave Technology. The point is that there is already some experience with DRDO, and only an incremental investment in capabilities would need to be augmented by developing commercial entities. Offsets in this area would support in transitioning COTs technology into military / naval requirement. So far as embedded solutions are concerned some features are depicted in Figure 13. Again this is a niche technology area and

expertise development would provide long term competitive advantage to the Indian aviation industry.

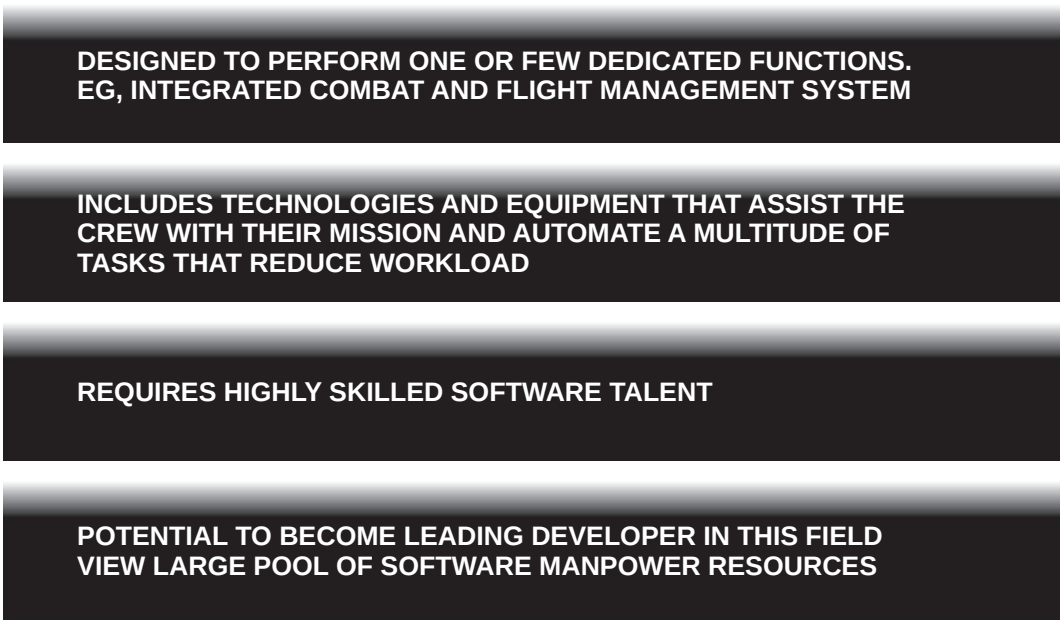

Figure 13

From the shipbuilding sector an example is Power End Turbine Blades of Marine Gas Turbines. Whilst Indian industry and the R&D establishment do have some inherent competence in manufacturing Marine Gas Turbines, a core area where competence and expertise does not exist is in the sector of Power End Turbine Blades. Figure 14 below depicts how a well planned offset strategy can develop this expertise in India.

Similarly, another area where due lack of a specific expertise a world class competence in the manufacture of generator sets has not been achieved is the fabrication of crankshafts for heavy duty continuous rating mega Diesel Engines. Figure 15 indicates a Model for absorption of offsets in a generic manner and the example that it refers to is in the case of microwave systems.

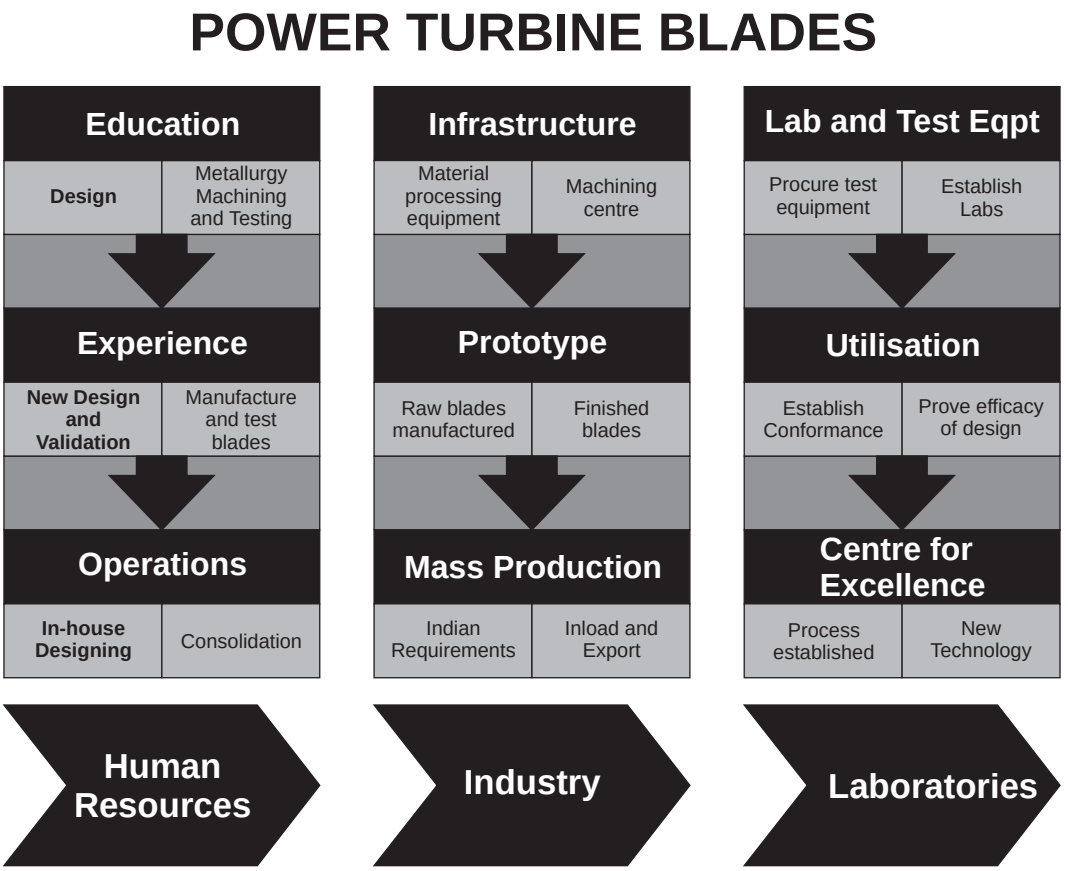

Figure 14

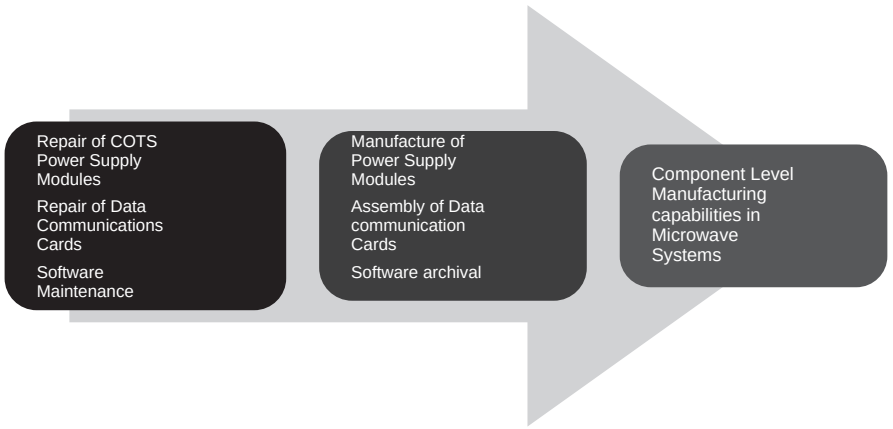

Figure 15

Action towards such a Model would be mandatory to develop a three step process that integrates Research and Development, knowledge transfer and subsequent specific manufacturing and production including test facilities. Figure 16 below depicts a process that could be adopted to facilitate this objective.

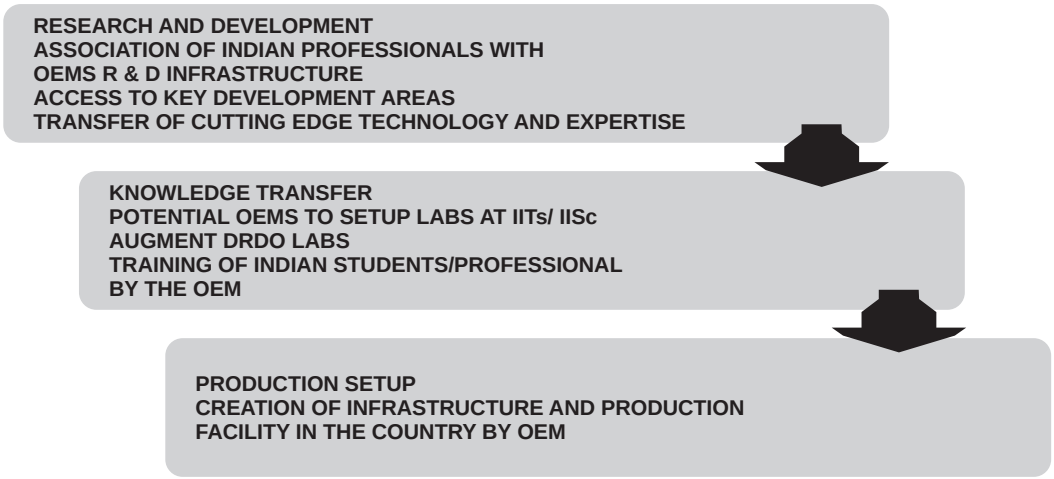

Figure 16

Conclusion

One of the most important methods of policy implementation is project management. As a discipline, Project Management developed from several different fields of application, including military projects, mechanical engineering, and construction activities. Like any undertaking, projects need to be executed under certain constraints.

Traditionally, these constraints have been listed as: scope, time, and cost. With the onslaught of globalisation, all sectors of indigenous economies worldwide have become extremely competitive, more result oriented, structurally lean and technologically sophisticated. The room for error is undoubtedly less and this calls for extremely sensitive and adept handling

of projects that must meet the specified scope of the project in the allotted time and budgeted cost. Even adherence to these stipulations may not satisfy governments if they suspect that chances for higher productivity in project implementation have been overlooked by the project management team. In order to derive the benefits of the Offset Policy, successful implementation of the offset policy is of paramount importance. It, however, needs to be emphasized that implementation of the offset policy involves a learning experience for both the buyer and the seller, and solutions will evolve as we work on our offset programmes.

In essence, this paper suggests that policies are not sufficient by themselves to achieve the full benefit of offsets and unless policies are supplemented with a clear vision, specific objectives and a well articulated strategy, piecemeal and fragmented offset proposals will be the order of the day. This would be sub-optimal returns on a rather significant investment.

To conclude, it is significant to reiterate that the value of an offset depends primarily on its appropriate selection, implementation and monitoring. Ill-conceived and ill-planned offset programs invariably prove to be highly wasteful in national resources and uneconomical in value. Further, offsets should not be viewed in isolation as one-time agreements, but as an important and integral element of a long-term national policy.

In summation, the key recommendations of the paper are:

- Formulation of a National Offset Vision which factors in :
  - Requirements of the Services.
  - R&D Capabilities including Laboratories and HR resources.
  - Existing and Forecast Industrial Capacity.
  - Economic Objectives.
- Change from Vendor Driven to Buyer demanded Offsets:
  - RFP to specify desired Sectoral preferences in offset propositions.

- Direct Foreign Investment sought in specific industries and targeted areas.
- Purchase of specially identified goods and services from the SME.
- Creation of definite manufacturing and co-production facilities in Greenfield areas.
- Specific technologies that are to accompany offset investments and the multiplier that such technologies and sectors of investment would provide.

- Multipliers as incentives for offsets in priority areas:
  - Targeted locations.
  - Specific industrial products.
  - Niche technologies.
  - Provide for more than 100 per cent offsets.
- Consideration for Industry:
  - Offset sales to be deemed exports.
  - Encourage SMEs.
  - Guarantee assured markets for co-developed products after offset absorption.

Offset Absorption Roadmap for the Indian Air Force

*Sudhir V. Bal**

Offsets in some form or the other have been practiced in many countries over a long period of time. Even in India, licensed production contracts and technology transfer contracts with the erstwhile USSR were a type of offsets. However, Defence Procurement Procedure-2006 (DPP-2006) had streamlined the process to a great extent. DPP-2008 has refined the policy further. Random scrutiny of the few of the offset contracts finalized in the past couples of years indicates that offsets offered are by and large relate to buyback of certain sub-systems/support equipment of the systems procured, simulators for the equipment or maintenance facilities or such allied aspects. These offsets, while meeting the DPP requirements in letter, may not raise the technology base of the Indian industry as envisaged by the offset policy. Therefore, the thrust should be towards ensuring that the offset policy facilitates overall national aim of raising the technology base. In view of this, certain aspects are proposed to be dealt in this paper.

Road Map for Offset Absorption

It would be rather restrictive and against the tenets of offset policy to chalk out a road map for offset absorption for the Indian Air Force (IAF). The entire offset policy is aimed at bringing in value additions in Indian defence industry by leveraging on the enormous defence budget expended on imports in large part. Therefore, restrictive definition such as 'road map for IAF' must be avoided. Offsets provided against a contract for IAF could

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well be for improving technology needed for equipment utilised by land forces. This flexibility must be made use of by formulating a 'total road map for the offset policy absorption'. In fact it would be the Indian industries which have to absorb the offsets rather than the defence forces, which are the consumers.

Scrutiny of offset contacts finalised / proposed till date indicates that limitations of Indian industry to absorb the technology are sited by the vendors for any meaningful upgrade of technology. Though many companies are technologically advanced and capable of absorbing the offsets, it may not fit into their business models. As a result, offsets are not resulting into desired outcome. One of the problems is that the companies do not know what the defence forces need. While official secrets act restricts publishing details of future planned inductions, adequate information is available in the public domain for industry to short list some of the areas that could be sought by defence forces in years to come; e.g. missile technology, guidance systems, propulsion, radar, fuses, weapons and other related technologies, navigational equipment, precision guidance equipment, avionics, aircraft and sub-systems, etc. The organisations such as FICCI and CII must formulate such guidelines to facilitate companies to look for areas of interest that suit their business model. At the same time the Service Head Quarters (SHQ) / Ministry of Defence (MoD) must publish a list of technologies that would be required by the defence forces in years ahead.

Progress made on schemes using 'Make' procedure is not adequate. This is mainly because the procedure is long and past experience does not instil confidence in the outcome of such projects. With very limited number of companies capable of handling such 'Make' projects, there is no competition. As a result, the mantle of progress of such schemes falls on the DPSUs, who have made immense contribution to the defence preparedness in spite of inefficiencies plaguing them by way of structure,

business environment, labour laws and many other reasons well known to all. Therefore, there is a need to increase competition by raising the technology base of private sector companies in the field of defence production.

Defence related equipment needs certain technologies which are specific to the sector. Licenses, procedures, Intellectual Property Rights and other issues are also restrictive. The R&D has a long gestation period and demand is not predictable in almost all cases. The market worldwide is large but is invariably subject to government controls, restrictions and international control regimes. Many defence products especially in the weapons' category have limited shelf life and replacement demand would continue. Invariably the replacement cycle is adequate to bring in new technologies to address the needs of the segment. The industry has few players and thus in it may operate in monopolistic / duopolistic environment with attendant benefits. It has a long gestation, high investment, high risk but extremely high yield field. The company that develops the technology and is available with a product in the market when needed could reap gains disproportionately to the initial estimates, which may prove to be worth against the above conceived drawbacks. At the same time, the effort cannot be directed to emerging product requirement, but has to address the needs of future requirements so as to have a proven product when the demand arises. This aspect is a bit different than most other sectors where products have lesser gestation period and could be addressed to existing demand or demand which is perceived to emanate in near future, thus providing revenue stream in the shorter timeframe. This aspect needs to be understood by the private sector. This is not a field to prop up your balance sheet in the short run. However, records show that world wide companies have thrived in this field.

Considering the present technology base of the Indian industry, it would be prudent to follow step by step approach. One scan of the industry would

reveal that ship building industry is very similar to the defence products industry. There too the gestation period is long, initial investments are very large, the demand is sporadic and cyclic with little or very limited overlap in terms of alternate usage of technologies. The industry cycle is also large but there is generally a mismatch between the industry cycle and production cycle. In spite of these adverse aspects, over the years Indian ship building has grown from a minor player with capacity to build only smaller craft to one that has orders to build large vessels such as Panamax Carriers. From a mere 0.001 per cent of the world trade in this field during the year 2000, today the contribution has increased 1000 times to one per cent of the world trade in this sector. Though the overall contribution may not be significant in terms of number, the meteoric rise if sustained through continuous enhancement of investments in capacity and technology development, it is definite that the country would have a distinct edge in years to come. Following this strategy may yield the best results. The steps suggested are as follows:

- *First Step:* Arrange Joint Venture (JV) or Consortium Company to absorb transfer of ripe technology through offset contracts and commence revenue stream.
- *Second Step*: Plough back investment to enhance technology base. Set up R&D units with own investments / JV route to address medium term requirements by making use of offsets if feasible or through other resources – near ripe technology.
- *Third Step:* Form JVs / consortiums for R&D in defence sector keeping the requirements of at least 15 years hence.

Offsets could be facilitated in all the three stages. Each company should analyse its state of technology and business plan and adopt the steps as deemed fit. The thing to be remembered is that the *light at the end of the tunnel is very bright*. It is not very clear how offsets in the service sector would be dealt, though permitted. However, there are enough opportunities in the civil sectors for the service industry to thrive and

indeed excellent contribution of this sector to the GDP is evident. It is not clear how service sector offsets would bring in much by way of enhancement of capabilities, unless they are in niche segment. Though not totally ruling out, one cannot be too sanguine about contribution of service sector with respect to offset policy. It would be prudent to focus the efforts on manufacturing sector, which has immense potential.

In view of the aforesaid, the following steps are suggested to progress offset policy so that offsets generated are best absorbed:

(a) Information Sharing: Publish technologies required including details of systems and sub-systems that are envisaged in 5-15 years time. Many of these systems / sub-systems have a large component of software and power source equipment. We already have fair amount of expertise in these segments. Some of the areas suggested are:

- *Armament / Weapons:* Explosives, fuses, guidance for precision munitions, specialized munitions, anti-minefield devices, mines, grenades, rockets, fire arms, pyrotechnic devices etc.
- *Aircraft and Avionics:* Light to medium transport aircraft / helicopter and sub-systems i.e. control systems, navigation and attack systems, aero-engines, airborne radars, electronic warfare systems, hydraulic systems / pneumatic / pressurization and oxygen systems, bearings and propulsion systems, etc.
- *Missiles:* Propulsion / guidance systems, seeker heads, data-links,
- *Radars:* Wide range of radars would be required e.g. acquisition radars, tracking radars, search / surveillance radars, secondary radars and radar based avionics etc.
- *Communication Systems:* Trans-receivers, secrecy devices, ECCM devices, etc.
- *Specialised Equipment:* Bomb disposal equipment, runway rehabilitation equipment, NBC sanitisation / decontamination equipment, NBC protection habitat, habitat for extreme weather

areas, survival kits, Search and Rescue equipment, desert / snow mobility solutions, etc.

(b) Level Playing Field: Ensure level playing field to private sector industry. Preferential purchase arrangements / tax concession or any other incentives must be extended to all recognised companies operating in the defence goods domain in the private sector as well.

(c) Licensing Norms: Licensing norms may be reviewed. It may not be feasible in the short run for most companies to invest significant amounts over a longer periods envisaged in defence production to address demand for full systems. It would be, however feasible to address demand for individual sub-systems. To increase the number of such sub-system suppliers, licensing as 'Mini Raksha Udyog Unit' (MRUU) status may be considered. Certain percentage of annual turnover towards defence related products should be made mandatory to retain the MRUU status.

(d) Streamlining Export Policies: Domestic demand is unlikely to be large enough in some of these segments. Domestic demand being sporadic and unpredictable, to achieve a viable business model, additional volumes would have to be garnered and only source could be exports. In this field there may be a few hurdles that would have to be addressed by streamlining the relevant policies. In absence of market friendly policies concerning exports of defence goods, however, there would be a strong impediment to companies accepting this sector in their bouquet of verticals.

(e) Vendor Base Development: DPSUs / Raksha Udyog Ratna (RURs) must encourage and develop ancillary units as mentioned above amongst the MRUU. Certain tax benefits at the expenses of vendor base development may be considered specifically to address defence production requirements.

(f) Quality Control: Strict quality control can be ensured at every stage. If the market becomes as competitive and effective as the civil sector, it is sure that market forces would drive the quality control significantly. However, this scenario is unlikely. By nature this sector tends to function in near monopolistic conditions and therefore, high grade quality control without being an impediment in the functioning would be called for.

(g) Liaison: To ensure better liaison / interaction with the selected vendors / sub-vendors, representatives from the concerned services / MoD may be deputed at appropriate level in all such companies. Such representatives should be responsible to the Department of Defence Production (DDP) / MoD. Their status could be in capacity of an advisor to the board of directors.

(h) Offsets with Multiplier: Offsets should be credited / accounted taking into account 'Multiplier' factor to ensure technology transfer related offsets get an impetus. Graded multiplier, for buy back of complete system / sub-systems, maintenance facilities, provision of allied facilities such as simulators / training, ripe technology transfer, setting up / participate in R&D activity in one of the desired fields, should be considered.

(i) Offsets in the Service Sector: Offsets in the service sector are unlikely to result in rise of technology base and should be considered only in niche segments and as a last resort. Without offsets there are innumerable opportunities in this category and therefore, it would suit the policy makers to ignore this sector altogether as a priority sector for offsets.

(j) Banking of Offsets: Banking of offsets is now permitted as per DPP-2008, albeit only for two years. Banking of offsets over longer duration of at least five years may result in better vendor response considering the acquisition cycle time.

(k) Trading of Offsets: If banking of offsets is to be limited to two years, wider consideration for trading of offsets may be considered. Lapsing of offset credits in a system that has long and uncertain decision cycle does not make good business sense. This aspect is likely to deter many vendors to come forward with meaningful offset proposals. Trading of offsets is likely to bring in even more valuable returns.

Offsets are an excellent tool to effect fast paced rise of technological base so it is very important for India. It must be understood that simple offsets are unlikely to result in any serious rise in technological base. It is the additional features such as graded multipliers, banking and trading of offsets that are likely to make the scheme more interesting and therefore attractive. The offset proposition needs to be a win-win situation for both the seller and buyer. Only then there is greater chance of a serious proposal for higher technology coming through. Else we would continue getting proposals that would increase the exports of existing technology without enhancing.

Conclusion

To derive expected result of raising the technology base of the Indian industry, besides providing enhanced business opportunity to them, it is necessary to chalk out an integrated offset absorption roadmap for the Indian industry. The defence services, being consumers of such products, should make all efforts to facilitate such a road map. To this end, a consolidated list of technologies, systems, sub-systems that would be required by the defence forces in the next 5–15 years and beyond should be made available to the industry. The licensing norms should be reviewed to include smaller companies which could be capable of undertaking sub-system level production and R&D. JVs / consortium approach should be encouraged. Level playing field for private / public sector companies should be ensured. Recognition of MRUU along with incentives to MRUU

may be considered. Development of vendor base by the DPSUs / RURs with associated tax benefits for such efforts may be considered. Liaison / advisory officers from concerned service / MoD / DDP may be positioned at RURs / MRUUs. Offsets with multiplier factor for transfer of technology and R&D effort would enhance industrial base at a faster rate. Trading of offsets if permitted is likely to bring in significantly higher quality offset proposals. There may be a necessity to streamline policies related to exports of defence goods, without which absorption of huge offsets which are envisaged is unlikely to be feasible. idsa

Leveraging Defence Offset Policy for Technology Acquisition

*Prahlada, S. Radhakrishnan & Parimal Kumar**

Offset provisions were promulgated by Ministry of Defence (MOD), Government of India in DPP-2006 [1], and revised in DPP 2008 [2]. These provisions are applicable to all Capital Acquisitions categorized as 'Buy (Global)', i.e., outright purchase from foreign / Indian vendor, or 'Buy and Make with Transfer of Technology', i.e., purchase from foreign vendor followed by Licensed production, where the estimated cost of the acquisition proposal is Rs. 300 crore or more. A uniform offset of 30 per cent of the estimated cost of the acquisition in 'Buy (Global)' category acquisitions and 30 per cent of the foreign exchange component in 'Buy and Make' category acquisitions is the minimum required value of the offset. A dedicated body 'Defence offset facilitation Agency' (DOFA) has been set up under DPP, MoD as a single window agency mainly to facilitate the implementation of the offsets policy and assist potential vendors (OEMs) in interfacing with the Indian Industry. Banking of offset credits has been also introduced in DPP-2008. Foreign vendors could consider creation of offset programmes in anticipation of further obligations. Offset credits so acquired can be banked and discharged against future contracts.

India is one of the largest arms importers in the world. Its defence imports which at present stands at $5-6 billion per year, is expected to grow further. It is estimated that in the 11th plan period, business worth $10 billion

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would be generated through the offset route. Utililisation of this purchasing power by leveraging offset provisions to achieve the national aim of self-reliance in design, development and production of Defence systems is a challenge for the entire country. All stakeholders involved in the development and production of defence systems e.g. Department Of Defence R&D, Services and Indian Industry need to synergize to achieve this National objective. Prioritizing the areas for leveraging offset investment flow is essential for meeting this National challenge.

In this paper the authors discuss why acquisition of critical technologies and specialized facilities is accorded highest priority for leveraging offset investment flows.

What is 'Technology' and why it is important?

Technology means different things for different people and is also defined differently by different people. Therefore, it is important to define 'Technology' in the first place and then look at its importance. The National Academy of Engineering (NAE) defines:

"Technology includes all the infrastructure necessary for designing, manufacture and repair of technological artifacts- engineering know-how, manufacturing expertise and various technical skills - all or equally important part of technology"

Therefore technology is not just products. It is a combination of Science and Engineering. Science aims to understand the "Why", Engineering is design "under constraint" with science being the main limiting factor. Therefore, technology is all encompassing. It involves design, drawings, code of practices, engineering standards, data sheets, raw materials, manufacturing processes, software, test procedures, test equipment and above all implicit knowledge resident in human resources.

"Technology is power and will continue to be so in foreseeable future" says Dr. R. Chidambaram PSA to GOI. Those who control the technologies, control the world. The western world fully understands the power of technology and hence tries to control the flow of technologies through control regimes.

Technology is so important because acquiring critical technologies has following advantages:

- Enables design, development and production of systems across the platforms.
- Many related and unrelated applications of some technology can be derived.
- May trigger development of a set of new technologies.
- Enables our industries to handle subsequent product upgrades, provide life cycle support indigenously.
- Enhances technology base in the country.

Why not contract and get 'Technology' instead through offsets?

Critical defence technologies are either denied or controlled through various control regimes. These are never offered and therefore can never be obtained through RFP route even when we are ready to pay.

Often it is not the companies that are really worried about transferring the technologies to the developing world but actually their governments stop them from doing so by denying licenses, approvals, etc. MTCR, ITAR, EAR 99 lists are a few mechanisms that are currently used to deny such technologies.

Past experiences show that exorbitant pricing of critical technology modules and denials for various reasons have made many systems not available when required.

Therefore, often it is not possible to get the technology through contracts and leveraging our purchasing power through offsets proves to be the only sure way for acquisition of denied technologies.

Kelkar Committee Observations: International experiences and possible lessons

Kelkar committee in its report [3] has devoted one chapter on International experiences in acquisition of Defence Material in some of the major weapon producing countries and possible lessons for India. The countries covered in the report are U.K, Australia, Israel, France, South Korea and USA. Israel, Republic of Korea (ROK or South Korea) and Australia are of specific interest to us as USA, UK and France are already militarily developed Nations (Permanent members of UN Security council). These countries have shown tremendous progress in defence preparedness in past few decades. The relevant excerpts from Kelkar committee reports about these countries are as follows:

Australia: "Defence (Ministry) administers several complementary programmes that encourage participation of Australian industries in Defence business, promote R&D, facilitate technology and skills transfer from overseas and support defence exports - consistent with the nation's interest."

Israel: Emphasis is on acquisition of Technology and not the product.

South Korea: Government stress is to maximize indigenous production, diversify defence supply and acquire as much technology as possible with priority to military related technologies including state of the art technologies.

From these excerpts, it is evident that these countries are vigorously pursuing to get technologies into their countries through offsets.

Past Indian Experiences

All the past experiences related to Technology Acquisition actually pertain to Transfer of Technology (ToT) in real terms. Kelkar committee observations regarding the characteristics of Indian ToT model is as follows:

- Confined to only DPSUs & OFs.
- Depth of technology transfer not adequate.
- Essentially transfer of drawings and processes for manufacturing and assembly and no real transfer of technology. Adopting TOT model for manufacture of imported equipments through License manufacture has not been a success e.g. HAL Fighter Aircraft, BDL Antitank Missile, BEL Fly Catcher Radar, OF T72 and T90.
- No flow of Technology as the MK-II versions or next generation systems never came out of these facilities.
- Dependence on OEMs for upgrades has only increased and not decreased. The above points definitely prove that ToT model is not suitable for meeting national aim of self-reliance in design, development, Production and life cycle support of indigenous defence systems.

Global Success Stories: Israel, South Korea and China are three major countries which have tremendously benefited from their offset policies.

Israel		
Size	Million Sq.Kms	0.027
Population	Millions	6.42
GDP	Billion US$	140.3
Defence Exp.	Per cent of GDP	9
Unemployment	Per cent	8.3
Ind. Growth	Per cent	8.6
Total Export	Billion US$	42.6

Table: 1

Offset Obligations fulfilment		
Company Name	Project	Fulfilment Percentage
Boeing IDS	F-15 Aircraft & Defence Related Projects	120per cent
GE Power Systems	Power Stations	1,300per cent
Lockheed Martin Aeronautics	F-16 Aircraft	112per cent
Pratt & Whitney	F-15, F-16 & Commercial Aircraft Engines	115per cent
Rolls Royce	757 & 777 Aircraft Engines	965per cent
Siemens	Power Stations	350per cent

Table: 2

	1st	2nd	3rd	4th
Total expenditure on R&D as per cent of GDP	Israel	Sweden	Finland	France
Skilled labour availability	Denmark	Iceland	Israel	Austria
Qualified engineers	India	Finland	Israel	Japan
Technological readiness	Israel	USA	Finland	Sweden
Venture capital availability	USA	Israel	UK	Hong Kong
Quality of scientific research institutions	USA	Sweden	Israel	Finland
Utility patents	USA	Japan	Taiwan	Israel

Table: 3

It is evident from tables [1-3], that Israel even though has much less number of qualified engineers; it is number one in terms of Technological Readiness. It has a large number of successfully fulfilled offset obligations [4], where the Percentage Fulfilment is much more than 100 per cent. As a direct impact of Defence R&D investments in Israel, the country moved from a non-entity amongst Defence suppliers 10 years ago with <US$ 3 million per annum defence supplies to India to >US $ 900 million per annum today.

South Korea: The focus of the offset policy is on acquiring high technology manufacturing and exporting parts and components. In line with its focus on acquisition of technologies ROK – Ministry of National Defence (MND) reformed [5] its acquisition process in 2001. Under the new provision – the foreign contractors is required to provide assurance in advance that the proposed technologies will be approved for transfer to ROK prior to the approval of the offset contract.

China: Chinese firms have used their leverage to extract offsets agreements to transfer some of the aircraft production along with related expertise and technology [5] as part of the deals. It is one of the most aggressive countries in pursuing offsets agreements and with its market potential and minimal labour standards; it has substantial leverage in negotiating the agreements. China recently announced that it would be entering the large civilian aircraft industry and much of the success of their efforts depends on the transfer of production technology from other countries presumably in the form of outsourcing and offsets from the US and other Aerospace companies. *The moot point here is that when China can leverage offsets agreements for Technology Acquisition, why cannot India?*

Identification of Critical Technologies and Specialized Facilities

In order to leverage offsets for technology acquisition, we need to know what critical technologies and specialized facilities (not already existing in the country) are required. Authors have suggested a representative set of technologies and specialized facilities as listed below:

Missiles

- Uncooled FPA Seeker for PGMs
  - Multi Disciplinary Design Optimization
  - Optimal / adaptive control systems
- MEMS based Dual Mode Seekers
- MMW based Imaging Seekers
- High Temp Aero-structures

Aeronautic

- Airframe Shape Optimization
- Re-configurable control system
- Multispectral Data Fusion
- Multiband Flexible Conformal Antennas
- Adaptive / Optimal / Model Reference control
- Thermal Barrier Coatings
- Manufacturing of Single Crystal Turbine Blades
- Surge Margin Improvement (Casing Treatment) in Gas Turbine Engines
- High Accuracy Direction Finding (HADF) using Phase Interferometer (1 Deg)
- Aerodynamic Design and Shape Optimization for Aerostats
- Autonomous landing, take-off and navigation for UAVs

- Smart Aero-structures
- Airframe engine integration and optimization for supersonic aircraft
- Aero Data Prediction Package "Digital DATCOM"

Materials

- SIC / SiCr technology
- Ultrahigh temperature ceramics such as ZrB_2 / ZrC / SiC for leading edges
- Development of high hardness steels, Ti alloys, Al alloys and advanced ceramics such as B_4C and TiB_2
- Gun barrels
  - Metal matrix composites
  - Ultrahigh strength steel
- Light weight ballistic materials.
- Phase change materials
- Carbon and inorganic nanotubes
- Carbon nanofibres and nanocoils
- Metallic – W, Nb, Ta, Ti alloys and structures
- Non Metallic – Composites / MMC / Multifunctional materials
- Polymers
- Chemicals – Radar absorbing materials
- High Energy Materials
  - Nano-materials
  - Endothermic fuels
- Propellants and explosives

Naval Systems

- Super Caveat Technology
- Pump Jet Propulsion

- Non-Acoustic Detection
- Active Vibration Control
- Air Independent propulsion Systems

Life Sciences

- NBC Defence Technologies
- Underwater Escape System for depths greater than 100metres
- CNT based Sensors
- MIP based Sensors
- MEMS based Sensors

Specialized Facilities

- High Enthalpy facility
- Hypersonic Wind Tunnel
- Free Piston Shock Tunnel

A probable procedure is to plan and conduct a two day workshop involving users, CIDS and DRDO to evolve a list of critical technologies of national importance fulfilling a specified list of criteria. Countries / Companies who own these technologies can also be listed along with. technical note on each of these technologies, their significance and applications should also be added. Based on the workshop's deliberations on the above list of critical technologies a national level list can be generated and forwarded to MoD for including in RFPs of major purchases.

DRDO's views on the Offset policy

- Obtaining Technology: Offset should not be seen as a mere defence trade. All manufacturing activities offered as offset must involve manufacturing of high Technology Defence products

rather than products "any one can do."

- Civil infrastructures: Conventional general purpose equipments and machineries that can be easily sourced from open market should not to be allowed as part of offset. However, special test facilities and equipments that cannot be easily sourced / procured may be allowed as part of offset.
- Leverage large purchase power of the country to acquire Technologies to save time and effort.
- Technology should get into Indian Industry with access to MoD. It need not be into Government entities but allowed to disseminate throughout.
- Technologies into Government Organizations only in cases where industry is not in a position to invest / absorb should get in all such cases provide full access to industries for exploitation.
- Commercialization and exploitation (civilian spin-offs):
  - The urge to excel in a competitive environment and exploit the technology to spin-offs is inherent in Private Industries;
  - Private industries can also negotiate better with OEMs to get maximum access to technologies;
- DRDO can facilitate in identifying critical technologies and also potential industries which can absorb the technology offsets successfully;
- DRDO to participate in the Technology absorption process to ensure totality and comprehensiveness. This is essential to attract and retain high end manufacturing into the country. Establishing research centres for joint task in academic environment also need to be considered.

Costing of the Technologies: It is difficult to arrive at a figure for each of these technologies. It is time variant, depending on the country and opportunities perceived by the suppliers and value of the main contract. Still an estimate can be made which can be used during techno-commercial

evaluation of various proposals.

Conclusion

In brief, leveraging the large purchasing power through offsets is an established method to procure the denied technologies and specialized facilities into the country in relatively shorter times.

Offset Investment Inflow Priorities for Ordnance Factories

*S. Gopalaswamy**

Offset agreements are formal arrangements of trade where some sort of leverage is exploited by a buyer to obtain compensatory benefits in the case of high value off-shore purchases by forcing the seller to undertake well-designated activities for enhancing competitiveness, up-gradation of technology for domestic industries, additions to exports, up-gradation in the infrastructure in appropriate domestic sectors, etc. Though these are business deals with built-in reciprocity clauses, it is not a matter of establishing desired equivalence of inflow and outflow resources. For the seller, it provides additional exploitable avenues to further their business interests. Thus, every offset agreement has its related cost.

The end of cold war has transformed the world polity from war of two blocks to increasing battle among splinter groups. The battle field has changed, so have their management paradigms. But increasing numbers of players are being drawn into newer fields making the world a dangerous place to live in. The concept of superiority of numbers of major weapon systems has given way to fire and forget and net-centric environment with rapidly changing newer technology – accompanied with obsolescence of earlier systems. The costs of weapon-systems are increasing in tandem with technological up-gradation putting pressure on advanced countries to search for cost cutting measures. Thus, while the demands for major weapons systems have dropped considerably, the net defence spending has

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gone up squeezing the available resources away from developmental activities – thereby putting pressure on local governments. To pacify hostile local sentiments against increased defence spending and to partially compensate for the procurement expenditure and outflow of resources, the supplier is pressurised to undertake programs to generate benefits for the economy of the buyer country. The supplier in turn takes the advantage of cheap labour and material costs of the buyer country to buy-back, co-produce, sub-contract or gives licence to produce the desired systems or sub-systems or part thereof. Thus, offsets have got a solid footing.

The basic need for vendor selection and source development arises out of the demand for new products or modification in existing products, change of manufacturing process, market conditions, alternate source of supply, reluctance or closure of existing suppliers, emergence of new suppliers, supplier's poor performance, cost-reduction studies, new policies / regulations, political considerations, etc. The cheapest source is always not the best source. Similarly, the source that provides the best quality may not be the best source. A source providing the best quality may not be able to deliver the required quantity. Choosing the right source that can provide the right quantity of right quality at right time at right price is a tenuous task. The buyer can exploit the level of competition among the producers, their desperation to grab the order, and their own negotiating skills to get a good offset agreement. Purposeful selection in consonance with well defined objectives, hard negotiations to extract maximum benefit, detailed planning for its smooth implementation and timely completion and elimination of oversights are the general characteristics of a goof offset agreement.

A genuine offset is required to be free of charge to the customer. But in real terms, most sellers include the offset cost in the contract price. According to reports, it takes up anything from 3 per cent to 10 per cent of the contract

cost. Since the sellers recognize the fact that the offset obligations will cost money, they make adequate allowances for it while preparing their commercial bids. They also try other camouflage methods like supplying outdated technology, counting business generated in routine commercial trade against offsets, exploiting existing markets for additional short-term gains; outsource offset requirements to new entities without much experience or commitment to deliver genuine benefits in the targeted area, etc. Countries like Belgium have burnt their fingers in offset deals due to lack of in-depth understanding of the interplay of conflicting interests and prevailing insincere practices forcing them to do away with defence offsets.

As offset contracts are required to be completed during the currency of the main contract, their consequential gains are temporary. Many nations, who failed to foresee the absence of assured continuous orders, have been saddled with manufacturing facilities that are lying idle. The resources wasted in creation of excess production capacity have negated all benefits accruing from offsets. South Africa negotiated a stainless steel plant against offsets in a defence deal, but soon found out that it is not economically viable due to surplus capacity.

Offsets are often based on political considerations as well as economic reflections. Once offset obligations are fulfilled, further orders dry up. One-off orders preclude influx of the latest technology and its continued up-gradation as short-term associations do not get translated into long-term partnerships. With no assurance of future orders, few want to go in for major investments. Thus, offsets always do not generate new business – specifically involving valuable technology transfer. For example, no country will offer technology to their business rivals.

Since offsets remain outside the purview of the main defence contract, they invite less attention and scrutiny. This makes offset agreements open to

corruption. For; firstly, offsets are formulated in general terms and do not lend themselves easily to numerical quantification. Secondly, methods of fulfilment of offset obligations are often left unspecified in the original agreement and are negotiated during the term of the contract. Thirdly, the lack of an effective oversight mechanism and the vendor's reluctance to share data, which may be termed as commercially sensitive, renders the whole program open to manipulation. Extension of the time period to fulfil obligations may be granted for subjective considerations. Pricing of sub-contracted items including Integrated Logistics Support may be flawed. Any or all of these conditions can be manipulated by vested interests to further their selfish agenda.

Offsets are of two types: direct offsets and indirect offsets. In direct offset, the trade arrangement is related to the primary product sold. It does not transcend any other economic or social activities. Thus, the compensatory dispensation remains confined to the main weapon systems, its sub-assemblies and components. It may include buy-back or co-production or licensed production or sub-contracts of the system and its sub-systems. In this arrangement, the seller helps the buyer produce the product or a part thereof and buys it back to use it in his products sold to the same country or elsewhere. Many such arrangements include transfer of technology. The seller does it for his own reasons; such as cutting the cost of production, better and cheaper availability of raw materials in buyer's country, availability of skilled workforce at cheaper rates, to meet targets in time, etc. Thus, the developed countries prefer this mode of transaction. The increasing trend of opening BPO in India is due to the above reasons, though it is not a consequence of direct offsets agreement. Often the arrangements are not publicized to avoid adverse public opinion due to transfer of jobs to the purchasing country.

In indirect offset, the scope is much wider as the agreement is not restricted to the products sold. Since it is more broad based and transcend all

economic and social activities, it generally takes the form of compensatory trading. Without using this term, India has been practicing it for a long time in the transactions with the then USSR. The earlier defence purchases of India were done through non-convertible Rupee. Actual defence procurement was done in Roubles, whose exchange value in Rupees was determined by a mutual agreement between the two countries from time to time. The money was kept in the Reserve Bank of India in the account of the Russian export agency. Against this account, the USSR used to import goods from India. After the USSR broke down, the balance at credit of the agency was de-monetized and the Rupee balance was linked to SDR basket rate. During that period, Russia was going through an economic crisis and their imports from India drastically fell. This badly affected some export sectors in India. One of the sectors most badly affected was the export of teas. The impact was felt most in the Nilgiri region hitting the tea growers the hardest.

The above transaction also affected India in a different way. Since the balance at credit was in Rupees as on April 01, 1992 and linked to SDR basket rate on that date, the subsequent devaluation of the Rupee pushed the cost of payment much higher than normally expected. This is one lesson we have to keep in mind while entering into any offset agreement.

In the US, all firms with more than $5 million offset liability are required to report to the Secretary of Commerce. According to reports, offset related defence contracts of the US in 2002 were valued $7.4 billion. The value of attached offsets was $6.1 billion. This is 82.3 per cent of the total value. It is generally estimated that presently the US defence industry has offset obligations of $10 billion. The US Government keeps a close watch on such contracts.

According to reports, the average offset percentage demanded by the 17 EU countries involved in offset activities was 92.6 per cent of the export

contract values. Austria obtained 174.2 per cent offsets from the US. The figure for Netherlands, Greece and Sweden varied from 104 per cent to 120 per cent. Austrian radar program had 280 per cent offset value. Czech fighter deal had 150 per cent and South African arms package had 350 per cent offset obligation.

The Indian offset policy is applicable to all purchases where indicative cost is more than Rs.300 crores ($76 million) for "Buy", "Buy and Make with ToT" and shipbuilding contracts. For joint ventures where an Indian firm is bidding, the foreign partner will have to discharge the offset obligation. All proposals which meet the minimum offset requirements, which are placed at 30 per cent, are to be treated at par. No preference is given to extra offsets which are offered. Offset obligation is to be completed coterminous with the main contract. Thus, it is evident that while we treat offsets as holy cow, the Western nations treat it as the milky cow. If we want to play ball with them, there is a need for changes in our attitude towards offsets. While treating the cow as holy, we still can exploit its dung, horns, hide and calf for economic development.

As per the provision of Defence Procurement Procedure-2008, the mandatory requirement of Industrial Licence to partake in offset programs has been removed. Requirement of Industrial licence for defence goods is to be governed by the DPP guide-lines on licensing. Transfer of Technology is not a part of the offset proposal as at present. However, for the purpose of defence offsets, "Services" includes up-gradation, life extension, maintenance, overhaul which can be taken as offsets. It is the onus of the Services Head Quarters to identify the key areas in which the offsets will be preferred covering a time span of 3 to 5 years.

A Committee on Defence Offsets Facilitation Agency (DOFA) has been constituted to act as a single window agency to:

- Facilitate implementation of the offset policy.

- Assist in vetting offset proposals technically.
- Assist in monitoring the offset provisions.
- Suggest improvements in the policy and procedures.
- Interact with Headquarters Integrated Defence Services, the Services Headquarters.
- Advise in consultation with the Headquarters Integrated Defence Services, the Services and the Defence Research and Development Organization areas in which offsets will be preferred.
- Promote exports of defence products and services.
- Provide advisory clarification on the policy and procedures (in consultation with the acquisition wing wherever necessary).

The DOFA is an Agency under Department of Defence Production. The Agency is functioning under the supervision of a Joint Secretary (Exports) of the DDP. Nodal Officers in the core group for the same are Director (P&C), who is the Member Secretary, assisted by PO (CAP) and DPO (CAP) respectively and representatives from the Services Headquarters, Headquarters Integrated Defence Staff, DRDO, OFB, BEL, BEML, HAL as well as representatives from CII and FICCI.

DOFA assists potential vendors in interfacing with the Indian defence industry for identifying potential offset products / projects as well as provide requisite data and information for this purpose. DOFA may set up committees and sub-groups as considered necessary or based on the inputs received from DRDO.

The total annual turnover of Ordnance Factories is in the range of Rs.7000 crores. Our net import content is about 5 per cent, which may go up to 7 per cent under special circumstances. Thus, most of our contracts have values less than the threshold value for offset agreements. Yet, we should move in the direction of offset in a bigger way due to the following reasons:

- It introduces a quid-pro-quo element in defence procurement.
- Indian defence industry benefits immensely, since orders are assured because of our cheap and talented workforce, skilled in specifically devoted areas.
- There is a possibility of technology absorption and capacity utilization.
- This will also invite inflow of FDI.
- It will complement the intended goal of self-reliance in defence technology.
- It creates employment opportunities and growth in the defence manufacturing sector.
- It opens opportunities for Indian defence industry to provide Integrated Logistics Support for maintenance of imported goods and thereby lead to understanding of the technology involved.

However, because of the reasons explained above and because of our past experience in "Buy and Make with ToT", Ordnance Factories prefer to go for co-production / co-development in the following areas:

- 5.56 mm Rifle.
- 5.56 mm Light Machine Guns.
- 5.56 mm Carbine.
- 105 mm Light Field Gun.
- MBT Arjun.
- Low Temperature Plastic Explosive (LTPE).
- Mine Protected Vehicles.
- Armoured Ambulance.
- Water Bowser.
- Ammunition for AK-47.
- Rocket PINAKA.
- 155 mm High Explosive Extended Range (HEER) Ammunition.
- 155 mm Cargo Ammunition.
- 130 mm Cargo Ammunition.

- 125 mm Fin Stabilized Armour Piercing Discarding Sabot (FSAPDS) Ammunition.
- Protective clothing for extreme cold climates.

Already we are partnering with many foreign vendors for offsets services as follows:

- CQB Carbine and its ammunition.
- 155 mm Artillery Gun Program – towed, SP Wheeled, tracked, etc.
- Future Air Defence Gun.
- Naval Gun and Chaff launcher for fleet tanker.

Offset program will help the OFB in easier absorption of technology for indigenization upon contract finalization. The benefits will flow to the Indian Industry in general as OFB will like to be lead integrator with the help of the Indian public / private sector. This would provide technology to the local industry, enlarge the local content share in the defence sector and simultaneously provide economic benefits. Such a long term relationship would also act as an incentive for the foreign seller to deal with India in a mutually beneficial manner and this calls for using offset credit as an instrument. This would enable passing on the offset benefits across the three services irrespective of the product purchased. The most important factor to be ensured is that the technology gap should not be permitted to widen which can only happen if the offset equation is researched by both parties ensuring mutual advantages in the long run. With a good offset agreement, we can reap the maximum benefits.

Technology Inflows: Issues, Challenges and Methodology

*S. P. Ravindran**

The defence offset policy mandates the foreign suppliers to plough back a minimum of 30 per cent of the contractual value of projects worth Rs. 300 crores or above to the domestic defence industry. The offset route is intended to strengthen the domestic defence industrial base through a combination of technology transfer, investment in R&D and in production facilities, besides export business generation. From the national view point, the offset aims self-reliance and indigenous capability enhancement in the vital defence sector involving advanced technology.

The real success of technology absorption projects and technology enhancement schemes has always been a subject matter of debate between the administrators and technologists. Our experience of serial license – production agreements - reveals the yawning gap between certain types of licensed manufacture and development of indigenous capability. Hence while finalizing offset contracts, apart from the commercial angle, it is very important to ensure that the requirements of short and medium term goals of developing indigenous capability and know how are ensured.

This paper attempts to highlight the "Technology Inflows" as emerging from the implementation of offsets as well as "Challenges" foreseen in such implementations and suggested "Methodologies" for its effectiveness. This paper primarily deals with technology concerning Defence Electronics as the applicability in other sectors may need suitable adaptation.

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Technology Inflow Routes

Over the period, some of the important commonly accessed routes for technology inflow through offsets to the recipient countries are following:

(a) Co-development and Co-production

Co-development and co-production is seen as a very effective mechanism in state of the art technology induction and absorption. In joint development programs, the access to technology that individually the partnering companies / countries could not have developed is realized at substantially less cost and time. The joint development also ensures that the part of production work along with the jobs it creates is ensured to the Indian partner also.

By this process, the companies / countries will become partners at specific contribution levels. There are financial benefits connected with the contribution, the primary benefit being the access to advanced technology and an advanced product. Further, it provides the Indian vendors with the necessary skill sets through their contribution in the joint program.

Joint Intellectual Property (IP) rights and shared international market space should be part of the negotiated contract thereby providing international exposure and a fair share of the resultant revenues to the Indian firms.

(b) Sub- contracting / Contract Manufacturing

Sub-contracting / contract manufacturing occurs when a foreign vendor procures defence-related components, subsystems or products for export from industries in countries where the vendor has to meet offset obligations.

In the short timeframe sub-contracting / contract manufacturing is an effective mechanism in bringing the technology. This could, however, get limited to fabrication, assembly and related services. The sub-contracting can either be through 'Build to Print" or "Build to Spec."

- ***Build to Print***: The foreign vendor provides the complete documentation package to the (Indian) defence industry. The documentation package could include manufacturing drawings, Quality requirements, Test methods, Acceptance / Rejection criteria, etc. The Indian industry executes the task based on user-supplied data, being able to source / manufacture the parts, assemble and test the sub-assemblies / product before they are delivered. The design issues, if any, is an essential responsibility of the supplier while Indian industry could share the responsibility for design verification, especially while implementing modifications to the original documents.
- ***Build to Spec:*** The foreign supplier provides the detailed Technical Specification, Quality requirements, etc. to the (Indian) vendor who undertakes the design, development, manufacture and supply of the product. This method may also go through the phases of development of prototypes, user trials and evaluation, etc. as applicable to the product or sub-assembly.

During contract negotiation stage the IP related issues are to be resolved so as to avoid legal problems later.

(c) Joint Ventures

The technology inflows can be affected through establishment of Joint Ventures (JVs). However, the investment level remains a critical factor affecting the success of a Joint Venture. In a Joint Venture with foreign equity participation restricted to 26 per cent, the OEMs, since they guard their IP, may inhibit / hesitate the collaborating partners to bring in cutting-

edge technology. There are instances where the JVs have become non-functional due to technology obsolescence, with the foreign partner limiting his investments and continue up gradation to his technology.

(d) Licensed Production

The transfer of technology (ToT) to a local defence industry capable of absorbing the technology, if implemented in true sprit, where both the supplier and the recipient are competent organizations, the local industry will be able to further develop the technology and this result in leapfrog on the existing technology lag. However, it has been experienced / seen that the absorption of technology and later its enhancements are often critical issues in its implementation.

From the seller's viewpoint, he would be throwing away his competitive advantage if he transfers all of the technology related to the product being sold. Further, from seller's perspective, he would be giving away know how to a partner who may later become his competitor. The seller therefore, may estimate the opportunity cost excessively causing avoidable increase in ToT costs. Also, precise verification of technology cost is difficult due to non-availability of sufficient details.

Invariably, the depth of technology being transferred becomes selective at the hands of seller. The proprietary items included by the seller in the TOT contract results in buyer being dependent on the seller. The buyer is unable to leverage the ToT. There are always gaps between the needs / expectations of the buyer and the offer from the seller.

While these aspects are primarily applicable to hardware related programs, the issues become further complicated where there is substantial software content also. Generally, the executable codes of software are transferred to the buyer who will be able to copy the same for implementation in another

module. The 'know why' is not normally part of the transfer without which the buyer can not carry out any enhancement /modification of the product for its uninterrupted usage or even marginal up-gradations to overcome obsolescence related issues during its service life.

(e) Maintenance ToT and Training

Long-term customer support activities have become mandatory. The training of local industrial partners and user agencies in maintenance of the system through applicable level of technology transfer ensures effective and committed maintenance support. The establishment of Maintenance Repair and Overhaul (MRO) Facility on partnership basis is an option to achieve this objective. By this the local defence industry acquires the technology and offers maintenance support to the user agency on a long-term basis. Establishment of training facilities like flight simulators and user-training centers by the foreign vendor in partnership with local defence industry will adequately meet this requirement. It will also be necessary to stock and maintain adequate quantity of spare parts for meeting D-level maintenance requirements.

Issues and Challenges associated with Technology Transfer

While the technology inflows may be through various means as explained, there are many issues and challenges foreseen in respect of our goal of achieving self-reliance and becoming leading technology house through technology transfer. Some of the critical issues related to technology transfer are the following:

Relevance and Depth

The vendor may offer transfer of technology not directly related to the product or system being procured. Hence, the offers from foreign vendors

need very careful and in-depth scrutiny to ensure that the technology being offered is relevant to defence applications both current and futuristic. Also, the depth of technology being offered for local manufacture for the systems / products is crucial to the development of local industry. The practice of holding back critical technologies by the *vendors calling them proprietary and necessitating continuous dependence on them for local manufacture of products need to be addressed during contract negotiations.*

Today the products and sub-systems are very software intensive. The software has become a component in most of the sub-systems. The know-how transfer should essentially address this even if the processes and procedures for its implementation are considered to be tedious.

In the present day context, where outsourcing of product development activities including design of sub systems, accessories, etc. are in common practice, we must critically assess the foreign supplier's actual possession of technology and his capability to transfer it. We need to evaluate the suppliers in this regard at a much greater depth during the process of selection.

International status

The technology on offer should be assessed for its current position in the international market and its capability of remaining current for the period of its intended application by the user agency. This will help us avoid the pitfalls of giving credit to sub-standard or obsolete offers for technology transfer.

Capability of Indian Industry

The capability of the local industry to absorb the technology being transferred is a critical factor. Indian Defence Industry with strong R&D base and Defence R&D establishments are certainly capable of absorbing

and translating the critical technology into products and systems needed by defence. For example, Bharat Electronics Limited (BEL) spends approximately 5 per cent of its annual sales turnover on Research and Development, with more than 1200 qualified engineers working on R&D projects. Assimilating technology in a related area and building further on it, poses no hurdles to BEL. There are other capable Indian defence industries also and along with OFB and the DRDO labs, the indigenous capability for technology absorption is indisputable.

However, this critical aspect of the Indian industry could face a technical challenge in future endeavours where the absorption of imported technology is carried out within specified time-frames and applied either directly for new products or in related areas for diverse product ranges.

It should be noted, however, that mere substitution of proprietary components with indigenous ones would take us only a limited distance forward in areas of improving existing products. The emphasis should be on internalizing the capabilities in such a way that new and diversified products can be developed in-house by leveraging the transferred foreign technology.

Industrial Returns

Apart from the most important aspect of meeting the vital defence needs for which the technology is imported in the first place, the technology on offer must necessarily bring in industrial returns either from domestic market or from international market or from both and therefore should be assessed for this potential.

License Issues

Frequently, it is found that the technology concerned is subject to approval of the foreign government and hence obtaining latest technology becomes difficult. In many areas of cutting-edge technologies, foreign suppliers do

not part with their technologies citing patents, IPRs etc., or may fix enormous prices for the same. Even in cases where the supplier is willing to sell the technology for a price, the governments in question do not permit the same under their respective export control regime. A very expensive and extensive licensing procedure, which is a very time consuming, has to be gone through in order for the product / technology to be exported. Finally, there are certain products / technologies that are barred for exports to certain third world countries and certain organizations.

Determination of Multiplier Factor

Since Technology transfer becomes a key component of the Offset agreement, suitable multiplier factors may need to be worked out, if required, to promote and encourage the foreign supplier who is willing to transfer the necessary technology. The negotiated value of the technology is often based on the foreign supplier's prior investment in research and development, the market value of the technology or the cost of developing the technology in India. Multipliers should be applicable only for very critical technology and that too if transferred totally so that Indian industries can further develop on them.

Technology Valuation: Issues and Methodologies

Valuation of technology is highly complex and extremely difficult and at times may appear to be subjective. This is in fact the greatest challenge in the whole process of technology transfer. However, technology valuation is a critical component of the technology transfer process and it is essential that this is carried out in as accurate and transparent manner as possible.

Offset agreements and contracts meet various requirements of the governmental agency entering into the contract with the foreign supplier. If government intends to use the offset value through direct offsets like manufacturing and/or technology transfers in the purchased product area, then the value of the offset is worked out based on the value of the costs of

manufacturing, value of the technology that is to be transferred, etc.

Based on the availability of infrastructure for product manufacture, support and future utility of such infrastructures, decisions could be made for offset value considerations. The multiplier issue can also be addressed based on such factors. As far as transfer of technology is concerned, the offset value can be arrived at only after complete analysis of the value of the technology.

Hence it becomes imperative to carry out a complete analysis of the value of technology involved in the transaction. In this regard, the technology valuation should consider the following aspects:

- *Details of technology and its applications:* In today's industry, technology used for a given product serves as at least a guideline for numerous other products thus paving the way for increased scope of products and services. Also many technologies have a dual-use application and thus many defence technologies also contribute to the civil sector.

- *Expected impact of technology in terms of profits:* It is becoming increasingly difficult to manufacture products with older technologies due to obsolescence of parts and processes leading to considerable erosion in profits caused by increased costs of manufacture and subsequent maintenance. Hence, the impact of latest technology in terms of ease of production and maintenance is realized through increased profits of operation.

These two factors have a significant impact on the importance of the efforts spent on technology valuation.

As regards information to technology and its applications are concerned some relevant questions to be asked are:

- Is it basic research leading to a new product or replacement of an existing product?
  Costs of technology for totally new products need to be evaluated against replacing the existing products of older designs / technology as this could pave the way for newer system designs.
- How does it benchmark with respect to other researchers and competitors?
  Frequently, the new technology is attempted by several companies in the same industry and the specifications on offer need to be critically evaluated before finalizing agreements.

The impact of technology can be assessed by examining the following aspects:

- *Technology impact* in terms of incremental improvement versus break through invention. The costs of products and services based on incremental improvements in the available technologies are frequently found to be higher than that incurred for breakthrough technologies which may cost higher up-front but proves cost effective later on.

- *Potential market size.* Products directly based on imported technologies could have broader market base than local markets. When products are developed in-house after imbibing the technology that is comparable to international levels, the products become eligible for international markets. Also in case of dual-use technologies, the civilian products could have a much wider market in India itself.

- *Competitive advantage* which can be translated into profits.
  When local contractors become eligible for international markets and thus derive competitive advantage over other vendors, this translates into definite profits due to the lower manufacturing costs in India.

Some of the major factors to be considered in valuing technology are as follows:

- *Availability, acceptability of alternate technologies.* Issues related to licensing by foreign governments sometimes force Indian industries to opt for alternate technologies that are more readily available. This becomes an issue not only that of availability of technology but also that of acceptability due to the standards of products limited by available alternate technologies.

- *Quality of IP.* Some of the cutting edge technologies are protected by Intellectual Property Rights. The number of such IPR controls and Patents can form another basis for valuing technology that is offered.

- *Useful life of technology.* The point of introduction of the new technology in the industry will determine the useful life of the technology. For example, if a given product based on slightly older technology has already met most of the market requirements, and if the cost of upgrade / replacement of all the existing products are far higher than the cost benefits due to the new technology, then the life of the technology is limited to that of the remaining market.
  These three factors define the competitive advantage offered by the technology. Competitive advantage generally comes in three major types, lower operating costs, generation of a new product and generation of related products and services.

- *Stage of Product Development* The product can be in any of the known and defined stages of development such as, Research (prove the concept), Development (reduce the concept to practice), Application testing (product performance), Pilot product and Commercial production.

Overall system designs are influenced by available technologies at the time of product conceptualization. In cases where system designs have already progressed based on available technologies and new technology is sought to be introduced for a part of the system that may or may not be possible to integrate at a late stage, this becomes a factor for consideration. In such a situation the new technology may not prove useful.

- *Maturity level* Again given a product's life cycle, the product's maturity level plays a part in decision-making. Introduction of a new technology in a product nearing the end of its life cycle may not be useful.

- *Market status* Sometimes the market may not be ready for a particular technology. Introduction of the technology at such a stage may prove to be un-economical. These factors are indicative of the strength / size of the unmet market need, the competitive situation and the cost situation (manufacturing, operating & capital).

Methods of Valuation of Technology

The commonly adopted major methods of valuing technology are the following:

Cost. Value of technology based on the cost to create it: The cost approach is one of the methods of valuation. Based on the valuation principles, the offset value is worked out using the suggested value from the supplier and peer review value from a panel of experts. Using the suggested value from the seller, the real value is evaluated by a panel of technology experts from relevant institutes and defence firms with the use of proven tools. Economic factors such as budget reduction, economic spill-over, and

technical usefulness factors, technical factors such as technical level, technical importance and technical difficulty factors and defence strength factors such as urgency of technology, defence contribution, and defence needs are considered in the process of evaluation. This has the advantage that it is a very simple and easily understood concept. However, it suffers from the disadvantages of the fact that, the cost may bear little relationship with potential benefits of intellectual assets, it is difficult to make accurate cost estimates and that the opportunity cost is not considered.

Market. Cost of ownership of similar technology through recent transactions: This method has the advantage that it is simple and is based on actual transaction data. But the disadvantages are that the transaction data are limited since transactions are infrequent and most often not public. Also the characteristics of previous transactions could be unique and hence difficult to compare with the present transaction.

Income. Value of Technology as the present worth of projected economic benefits. The income-based valuation is the most accepted practice as it captures the value in use of the technology. The advantages of this method of valuation are being: (i) It is based on economic benefits derived from owning / using the technology; (ii) It reflects full effects of risks including obsolescence associated with the technology. However, the valuation is subjective as it is based on anticipation of future income.

The optimum value of a technology transferred (in / out) is a fair percentage of the cash flow generated by the competitive advantage of the technology (sold / purchased). The market thumb rule is that 25 per cent of the expected profits from the business arising out of the technology should go to the licensor for contributing the technology. Balance 75 per cent of the profits go towards manufacturing, marketing etc. It may also be viewed that at the time of product introduction, 50 per cent of the risk still remains and therefore 25 per cent reflects a 50:50 sharing of market risk. It should

be borne in mind that the use of industry standards can work well if the basis for the development of these standards is well known to both parties negotiating the contract and are applicable to the specific situation. Rational licensees / purchasers of technology are unlikely to pay money or put money in to a venture with out a belief in future cash flow.

Conclusion

The business opportunities arising out of the mandatory offset provisions in the defence import contracts provide ample scope for the Indian Defence Industries to get state of the art technology and if effectively absorbed by us, in due course, we can progress substantially towards achieving self reliance in indigenous design and manufacture of defence products. Through careful analysis and assessment during the selection process of technology on offer and through proper and effective monitoring of offset contract implementation we can reach this goal of self reliance along with significant enhancement in technology capability as well as its spin off effects in associated industrial and research sectors of the national economy.

Enhancing Manufacturing Capability for Efficient Offsets Absorption

*J. D. Patil & Mukesh Bhargava**

Since Independence, as a policy, Defence R&D in India had been reserved for the state sector with the DRDO having been established with the mandate to conduct research into Defence areas. Defence Public Sector Undertaking units (DPSUs) and Ordnance Factories (OFs) were set up with the twin objectives of:

- Productionisation of systems developed by DRDO;
- Produce defence goods under Transfer of Technology (ToT) from foreign suppliers and assimilate the technology.

This policy, when formulated, factored in the *then* state of private sector and also the fact that basic R&D in all nations *need* to be funded by the state. This resulted in investments, over the past decades, in infrastructure and facilities in Defence R&D and Defence Public Sector Undertakings, with the onus to work on technology and product development from the abstract stage to the productizing and hand holding at the production stage. DRDO did invite and involve a large number of industry partners within the limitations of prevalent procurement policies and did create few major success stories.

This model has served the nation to some extent. It can also be seen that little ToT actually happened from foreign technology sources in the cutting edge technology areas to the OFs and the DPSUs. These organizations did master the production skill sets, the ToT model for production denied

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development of upgrades and new systems. For a nation of one billion plus with arguably the best knowledge driven industry better than the best in the world, we ought to have done better. Need for the self reliance we seek cannot be emphasised more than the back of envelop calculation of the multiplier effect it will produce for the national economy through manufacturing growth rates and job creation. The only way ahead over next 10 to 15 years is to build focused product strategy with commensurate investments in Defence Industry across segments including private sector so that in the long term, the country meets its defence requirements as much as possible from within the country. This will only be possible by allowing the private sector to a play rightful role in product design, development, manufacturing and integration capabilities available in the private sector to augment the capacities built in the Public sector through Public–Private–Partnerships (PPP). The same, however, could not be harnessed proactively for the Defence Sector owing to the limitations of prevalent defence policy.

During the pre-liberalisation era, industrial activity was allowed only under license, and imports were controlled by the Director General Technology Development (DGTD) and a cap was put on the production capabilities. Government policies placed barriers on free trade and insulated the country from rapid technological advances. This resulted in stifling the economic and technological growth across sectors. The post liberalisation era, saw the removal of import restrictions, thus bringing in competition from the global players. Indian industry developed competitiveness despite the policy tilt in favour of imports of finished goods. Over the past decade and a half R&D in private sector came of age, Indian industry evolved and poised to become a global player in ICT, engineering and manufacturing. This was realized by the other strategic sectors (nuclear power and aerospace). They collaborated and synergised with private sector R&D for its nimbleness to achieve almost total self reliance in their needs thereby insulated the nation from all kind of

sanctions. In the defence sector, however, the production remained reserved for the DPSUs / OFs. The ToT from OEMs was limited to manufacturing technologies. The result was that the nation remained a net importer of its security.

Even in the post liberalisation era, 1991 onwards, local sourcing was limited to component supplies, limited thrust was given to the private industry and "imports were not discouraged". Realising the vast potential of the industry, the process of integrating the private sector in the defence industry was initiated by the Government in 2001. The policy decisions announced in May 2001 permitted 26 per cent FDI in the Defence industry and allowed the Indian private sector to participate in Defence production by obtaining a license. The Defence Procurement Procedure 2002 (DPP 2002) turned out to be the watershed for the Defence industry as it allowed the participation of the private industry in defence production in-principle. Kelkar Committee was constituted in 2004, to review private sector participation in defence production. Some of the recommendations made by the Committee have also been implemented through the Defence Procurement Procedures. These include constitution of selection committee for Raksha Udyog Ratnas (RUR), which are potential system integrators from the private sector, the very important offset policy common to both the public and the private sectors, and the Make Procedure. The aim was to enhance competitiveness of the industry with an aim to make them efficient, and achieve global benchmarks essential to compete in the global defence market. The subsequent DPP 2005, DPP 2006 and 2008 have incrementally over come some of those shortcomings and bridged the gaps in the promulgated policy. However, the policy intent is yet to be implemented fully as the nomination of the DPSUs / OFs still continues.

The Direct Offset policy applicable to all "Buy Global" RFPs valued at Rs 300 crores and above stipulated a minimum of 30 per cent of the cost of

acquisition to be sourced from Indian defence industry. This policy aimed not only at ensuring the induction of advance technology in the industry but also bring in capital investment for the economic growth of the country.

Further, introduction of Offset Banking, announced in DPP-08, will not only facilitate the implementation of offsets with sunrise and sunset stipulations to enable foreign OEMs to demonstrate their intent for a long term engagement with the Indian Industry.

The foundation for the induction of technology, development of infrastructure and making investments attractive for the foreign OEMs is thus, in place.

Indian Industry: Capability

Indian industry has developed a strong industrial base with a successful track record of implementing technology intensive projects including bulk production within stipulated time frames at reasonable cost and world class quality. It has strengths in design, engineering, finance and marketing. It has a reservoir of management, scientific and technological skills. The growth in the manufacturing sector has been phenomenal and global standards have been reached in ICT, engineering and manufacturing. India is fast turning into a manufacturing hub for the world. Major MNCs have established their R&D and product development centres in India.

Even in defence sector there are large and small industry houses that have, over the years, built capabilities and capacities, through partnership with development agencies like DRDO, indigenisation cells in the services and DGQA. Many large industry houses have either built new capacities or carved out capacities within their own design and manufacturing capacities for defence sector.

Today private industry has the capability and the capacity to take up R&D / system integration projects under the following categories:

- Missile, rocket and torpedo launchers and fire control systems, both land mobile, and naval;
- Naval combat systems and platform management system;
- Naval engineering systems steering gears, stabilisers, landing grids, hanger shutters, traversing mechanism, boat davits;
- Platform specific machinery for ships, submarines, battle tanks;
- Ship design centre;
- Tank and gun upgrades;
- Other weapon systems and upgrades;
- Radar and towed Sonar;
- Rugged computers for ground and mobile applications;
- Air Defence command centres;
- Avionics and airborne systems;
- C^4I^2RS areas;
- Defence electronics;
- Domain specific software development such as EW, Air Defence, RDP, MST, Fire Control / Ballistic Computer applications, etc.

Offset Policy and Offset Banking

The Offset Policy announced by the Government leverages bargaining power to get benefits to the country in the form of offsets to build its Defence Industry. This as per the current policy is direct and demands 30 per cent offsets on all Defence procurement above Rs.300 crores. The benefits are economic gains, skills development, technology gains, employment generation etc.

While looking at offsets, government seem to have stopped at making Indian Industry a part of global supply chain of defence majors and missed out at on the system domain. The consideration seems to be limiting to

Transfer of Technology / Knowledge (Low Level). This is evident from the current taxes and duties treatment of offsets limiting offsets to supply of "parts and subsystems" sold by Indian industry through physical exports (being part of global supply chain) thus misses out on systems and system of systems integration within the country. Following needs to be looked into to make the offset policy more efficacious for the country:

- Offsets could also be supply of indigenous systems supplied as part of system of systems being sold by the foreign OEM and may directly be supplied to Indian services (not getting physically exported).
- It is also possible that offsets could be delivered by the foreign OEM in the form of system integration especially where large systems need to be fully integrated and tested in India. This involves passing on the system level know-how that is vital for building industry capability in doing so in India.
- Tax and Duty (T&D) implications in either of these cases add up to approximately 40 per cent of price accounting for the T&D on inputs as well as at point of sale. This effectively reduces offsets from 30 per cent to 21 per cent if delivered in India.
- To avoid this and facilitating indigenous capability building MoD may treat such system offsets at par with indigenous supplies to MoD or treat offsets either as "Import Substitution" or as "Deemed Exports" with use of corporate bonds and not involving physical payment of T&D upfront and get it reimbursed.

Capability to Absorb Offsets

The myth regarding capability of the Indian industry to absorb the huge quantum of defence offsets need to be looked at from the consideration of capability and non- capacity and track record. Let us examine if the offset volume is really large for the Indian industry? The capital defence purchases for this year are estimated at $10 billion and expected to reach

$20 billion / year by end of 11th plan. Assuming that 50 per cent of this purchase would be from imports, and 60 per cent of that would qualify for offsets (less than Rs 300 crores), Offsets obligation at 30 per cent would mean volume of just about 9 per cent of the capital budget i.e. approximately $1- $2 billion per year.

Indian manufacturing industry has come of age and is growing steadily at the rate of 25 per cent year-on-year since 2001. The manufacturing sector has shown enormous potential for growth. There is a healthy FDI flowing in to further bolster this growth. Thus absorbing approximately $2 billion per year of offset volume is not an issue at all for the Indian industry.

Manufacturing Strength

India is undergoing structural transformation with manufacturing increasing its role in the Indian economy. Manufacturing now accounts for about a 27 per cent of India's GDP and contributes 53 per cent of total exports, 79 per cent of FDI and employs 11 per cent of the workforce. India's competitive advantages offer huge opportunities for exports especially in areas like automotives and electronics.

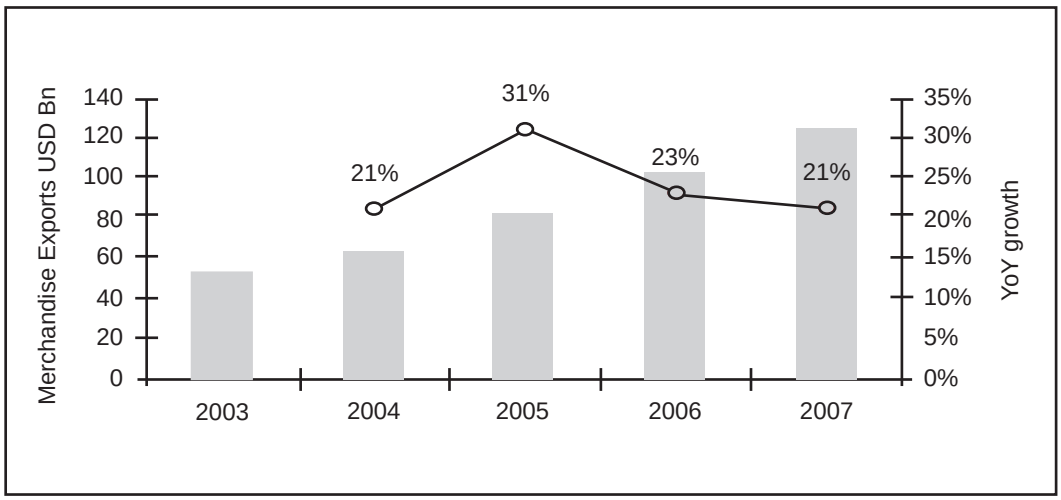
According to a study by the Boston Consulting Group, India's vast domestic market and relatively low-cost workers with advanced technical skills will make it a manufacturing powerhouse within the next 5-10 years. Accordingly, multinationals have already started setting up operations in India to operate in skill-intensive industry segments requiring advanced technical expertise, areas in which India is becoming a primary sourcing and manufacturing base. In fact, high skill sectors account for almost 40 per cent of the manufacturing output of India.

The strong manufacturing base coupled with the well-established IT industry would be able to comfortably absorb offset related investments in

their respective sectors. Given below is some further information on the manufacturing sector which indicates the ability of the local industry to absorb substantial amount of offsets. India is the second largest small car market in the world; it is one of the three countries that make their own super-computers and has the second largest mobile phone market.

The Export Story

India's export target for the year 2008-09 is $200 billion. India has had a sustained year-on-year growth of approximately 25 per cent year-o-year for the past four years.



Source: Ministry of Commerce, Government of India.

Figure 1

India has not yet begun to tap its manufacturing export potential fully, 'Made in India' could become the next big manufacturing export story with its "Frugal" engineering capability.

According to Mckinsey Report, if India were to take advantage of global low cost country manufacturing trend, manufactured goods exports from India could increase from $40 billion in 2002** to approximately $300

billion by 2015, leading to a share of approximately 3.5 per cent of the world trade in manufactured projects. This is likely to create 25-30 million new jobs in manufacturing and add 1 per cent to India's annual GDP growth rate.

Attractiveness of India as a manufacturing destination

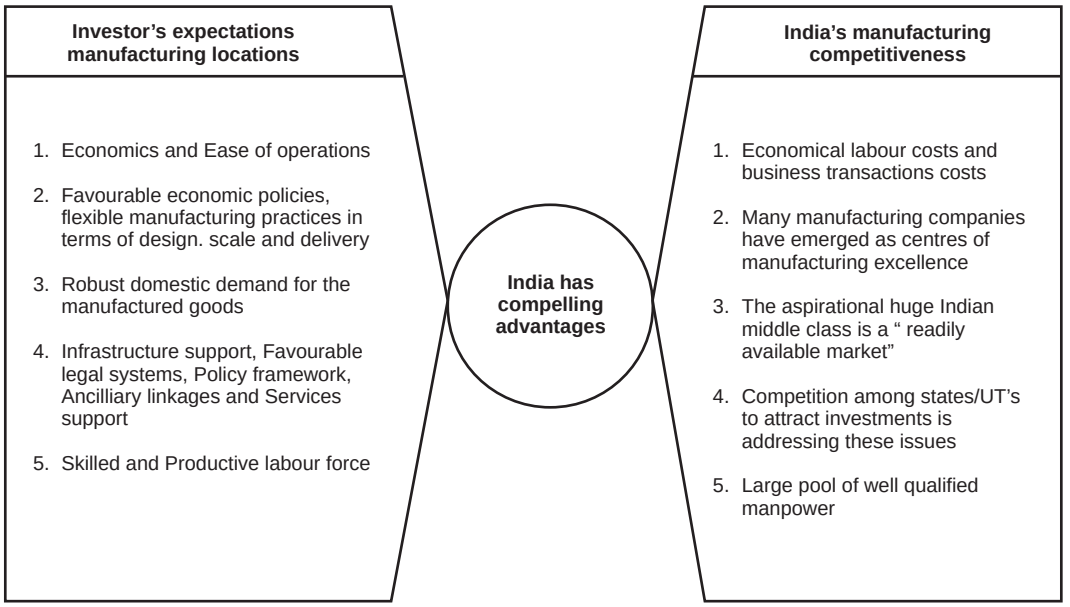


Figure 2

Manufacturing Sector in India

Following sectors contribute 60-70 per cent to export**:**

- *Auto industry*: The Indian auto industry is a $44 billion industry (Automotives is a $34 billion industry and Auto components are $10 billion).
- *Chemicals*: The size of the chemical industry in India (petrochemicals to paints) is $30 billion.
- *Electronics:* The electronics industry is a $11 billion (consumer electronics to electronic components) industry.

- *Engineering*: A $22 billion industry including heavy and light engineering.
- *Machine Tools*: Industry size is $225 million.
- *Textiles*: Industry size is $38 billion.

The balance 30-40 per cent exports are from sectors like automotive, cement, food processing, drugs and pharmaceuticals, telecom equipment, IT hardware, electronics, paper, minerals and metals

Indian manufacturing is forecasted to grow at 12-14 per cent over the next decade and sectors like automotive, electronics etc. are expected to be growth drivers.

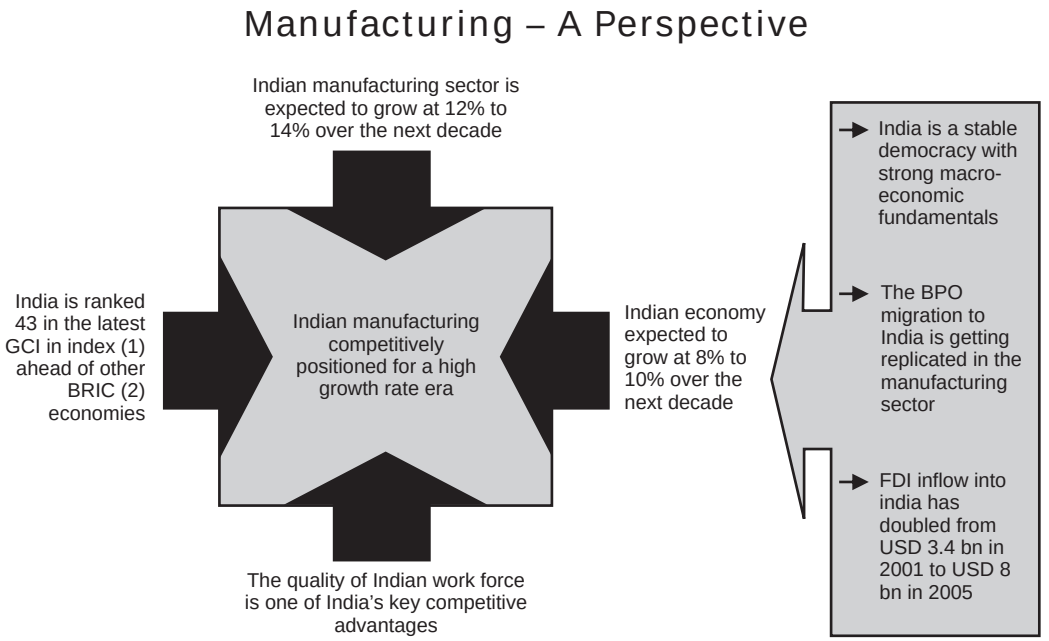


Figure 3

Joint Ventures: The Indian defence industry lags far behind the global defence industry. The capability of Private sector that was introduced to defence sector only after opening up of the defence sector, is in a nascent

stage (with some exceptions). The offset policy introduced in the year 2006 can transform the threshold level of Indian defence industry. Perspective joint ventures precisely help do that task when used as a tool to support the offsets.

The joint ventures partnerships between industries envisage cooperation and co-working by sharing each other's expertise, experience and resources leading to development and further selling of a product globally. Such partnerships can be cross border, across sectors, range, and based on a win–win model to evolve new products, improve existing products, raise the technology threshold, improve skills as well as cater to in service-life support.

Joint Ventures for Indian Defence Industry

The joint ventures and co-production are one of the very effective ways to improve the capabilities of Indian defence industry. The performance of Indian defence industry primarily meant to support the Indian defence forces under the "protective environment" has been sub optimal as is evident from the statistics below.

Breakdown of the revenue of OFs and DPSUs and their share in defence capital expenditure:

Year	Ofs	DPSUs	Total	% of capex
2003-04	6,523.87	9,892.73	16,416.60	78
2004-05	6,186.65	11,248.59	17,435.14	52
2005-06	6,891.68	13,025.07	19,916.74	58

Note: Figures in INR crores;
Source: Ministry of Defence, GOI.

India's defence industry in private sector is in a transition stage, where the effects of the policy changes are yet to materialize. There is thus a need to boost the local defence industry involving both public and private sector through the route of joint ventures facilitated by the Offset Policy through appropriate incentives. This will not only help get the technology and work ethics, but also expose the local industry to the global supply chains and bring in domain knowledge in system integration.

Potential Areas for Joint Ventures in Indian Defence Industry

Defence industry is not restricted to a particular sector, and spreads across complete range of goods and products involving land systems, aviation, marine, arms and ammunition, IT and communication, missile, general stores, to name a few. There will be need to define the priority areas and match them with the existing and potential capability of Indian Defence industry for achieving optimum benefits by Joint Ventures.

Methodology

While Joint Ventures need to be discussed on case to case basis, the following are recommended:

- Define the objective of Joint Venture i.e. upgrade the Indian defence industry.
- Joint Ventures and Long term partnerships are preferred over project to project relationship and other options in offsets.
- All projects for Joint Ventures should be pre approved by DOFA.
- Need to insist on Joint Ventures with production facilities in India and involving domain expertise.
- Monitoring of projects is done by DOFA and credits be banked on yearly basis – based on the progress.
- Rule of 26 per cent FDI cap should be dovetailed with country's

need and level of domain expertise brought in.

- Both private and public sector should be allowed – the foreign partner should have the liberty to pick up the partner as per current offset policy.
- Government should monitor the Joint Ventures and benefits that accrue out of them.

Joint Ventures are a means to upgrade the local industry. They should be given priority in offsets for the benefit of Indian defence industry.

Offsets Implementation: Taxes and Duties

- *Customs Duty on imports*

  Currently the Offset Partner needs to pay applicable customs duty (CD) and countervailing duty (CVD equivalent to excise duty) on the imports that are needed by Offset Partner. At present, for the Defence related contracts placed directly on Indian suppliers, Indian suppliers are provided with customs duty (including CVD) exemption certificate for their imports.

  Further, the Customs duty (as also CVD) is exempted for Defence supplies from Foreign OEM when ordered directly by MOD. A similar treatment need to be given to Indian Offset Partners of foreign OEMs.

- *Excise Duty*

  Deliverables by Offset Partner needs to pay prevalent excise duty (14.42 per cent at present) on their deliverables as well as local input materials. This is at variance with the rest of the specified category Defence systems (for deliverables), when excise duty exemption is granted for the deliverables by Indian supplier to MOD/DRDO etc. Equivalent excise duty (CVD) is also not

applied on the deliverables by foreign supplier, directly to MOD, as CVD is also exempted along with the CD.

There is a case for treating "Indigenous value additions" for indigenous sales either in the form of system integration or systems as part of system of systems supplied by foreign OEMs as *"Import Substitution"* and treated on par with imports.

- *Sales tax / VAT*

  Contract for offset is going to be placed by foreign supplier on Indian Offset Partner. Therefore, deliverables are sold from Offset Partner to Foreign supplier. Hence sales tax / VAT (12.5 per cent) becomes payable on deliverables by Offset Partner.

  There is a case for treating "Indigenous value additions" for Indigenous sales either in the form of system integration or systems as part of system of systems supplied by foreign OEMs as "Import Substitution" and treated on par with imports.

Both the above scenarios would not be the intentions of the "Offset Policy" and are certainly not favourable to Offset Partners looking at large value addition.

Gearing up for the Defence Exports: Challenges, Opportunities and Pitfalls

*B. Khaitan**

India has made rapid strides in defence technology in recent past and reached a stage of self-reliance. The objective was to have thrust in indigenous production and exploring possibilities of exports to other developing nations that may look forward to supplies from India.

In spite of the potential the country had in defence production, in the form of resource capability, know-how and technical expertise, but due to lack of clear policy had prevented its full exploitation. One can assume that our defence industrial policy broadly consists of the following-

- Maximization of indigenous production.
- Licence production of those equipments which are available and can be obtained from abroad.
- Direct procurement of those equipments not covered above, but considered essential for ensuring the security.

The recent change in the policy indicates the intention to involve the private sector in defence R&D and production through licensing and indirect opening of the defence industrial sector to foreign companies through FDI and the offset arrangement.

Defence Exports

As per the estimate country's defence exports of equipment and other systems during 2003-04 was approximate US $93 million. Exports to

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countries like Nepal and Mauritius includes ALH, Lancer attack helicopters and Dornier transport planes. The main defence exporters include state-run BEL, BEML and OFB besides HAL. Defence exports may likely to touch US $130 million as per the government estimates. This is less than that of Israel, South Korea or even Singapore.

Areas which can be addressed for the defence exports are –

- System Engineering
- Maritime
- Armoured Fighting Vehicles / Infantry Combat Vehicles.
- Fixed wing Aircrafts.
- Helicopters.
- General Munitions.
- Communication Equipment.
- Logistics Vehicles/Vehicles for Weapon Platforms and Applications.
- Counter insurgency and Counter Terrorism Related Equipment.

Challenges

A closer examination of the stated policy would reveal that production under license did not help in obtaining the desired technical know-how for subsequent up gradation and further technological innovations. Also, such arrangements may not be the proven mechanism of transfer of technology.

Since the defence technology needs long term investment, its obsolescence is high with low economies of scale. Hence the policy of maximizing indigenous production without well supported R&D policy back-up may not bring tangible results. Therefore, the ultimate defence industrial policy should aim at fostering the defence exports without which the economic base of the defence industry would be difficult to sustain in the present competitive environment.

Defence exports supports "defence diplomacy" and in some countries may act as a key enabling activity for a bilateral defence relationship. This also contributes to building local operational capabilities and therefore enhances inter-operability with our own forces, especially during UN-sponsored peacekeeping missions.

Defence offset policy will also contribute to enhanced defence exports and expected to bring in US $10 billion during the 11th five year plan period (2007-2012). However, nearly 80 per cent of all offsets are likely to be in the area of aerospace.

If we go into a country for exports and fail to deliver what is expected, we are unlikely to be considered for many years thereafter. Any new approach will be met with the comment that "We evaluate your product and which did not meet our requirements". So an unsuccessful bid effectively 'poisons the well' for years to come.

Given that we have only one shot at each country, we must ensure that our offering has the maximum chance of being accepted. This means finding out as much as possible about what the customer would wish for – either via agents or by our diplomatic missions abroad. We must also be prepared to tailor our products to suit the customer's requirements.

Opportunities

There are about 200 countries around the globe and clearly we cannot put serious marketing efforts into all of them. Therefore, essentially we need to identify the markets that would be most attractive and where we would have a decent chance, keeping in view of our present capabilities and ability to deliver what is required.

When we look at the countries where we can export to, there are 169

possible countries in the world. When we exclude those, where the Government of India's restrictions apply, countries where we cannot hope to get sales (US, UK, France etc.), and those that are too small to be of interest (Belize, Timor Leste etc.) we are left probably with 104 countries, and of these 14 are most unlikely (Finland, Pakistan, North Korea etc.). So in reality we have only 90 potential customers.

Issues which merit consideration for the manufacturing of any defence products are-

- High cost and higher risk projects.
- High value and low volume products.
- International collaboration in design and development.
- High barrier to entry.
- Issues of safety, criticality, long service lives and faster obsolescence.

As a matter of fact, a general approach to identify the suitable export market would be to assess the following before hand-

- *Need for defence equipment* – Is it a big population country with big Army? Geo-political status and its standing in the world.
- *Ability to afford* – Can the country afford to buy large number of defence products? Has the country a high GDP and high per capita income? Is there a big defence budget?
- *Competitive factors* – Does the country make the defence equipment itself? Are they good (if not we can still compete, possibly by JV with an existing in country player)? Does it buy from abroad? Does it buy a few here and a few there, or does it show brand / country loyalty? What does it buy expensive, excellent defence equipment or inexpensive low-tech equipment which may not be using current technology?
- *Political environment* – Is there a threat (external or within – insurgency etc), that demand spending on defence? What are the

countries' relations with India? How acceptable would an Indian product be? Are there any trading agreements? Are there opportunities for licence, JV, etc?

Way Ahead

Most of the Indian products can be classified under the following category with respect to the competition-

- Technology- High to Medium
  Medium to Low……. Indian products

- Cost- High to Medium
  Medium to Low…… Indian products

- Quality- High to Medium
  Indian products…….. Medium to Low

In our assessment the export markets which may be attractive to begin with (i.e. the markets that can be tapped with Medium-Low technology products having Low-Medium price), for current technology products are few Sub-Saharan African countries (very price conscious, continual state of low level warfare, not capable of maintaining sophisticated US or European defence equipment). Also, some South American countries, Middle East and other developing countries of Pacific Rim would be other potential markets.

The internationalization of the defence industry has resulted in most of the products which are presently in market; contain a mix of sub-systems sourced from different suppliers regardless of whether they have been developed in collaboration with other nations or in response to a specific defence requirement.

With high level of foreign investment now in our defence industry base, there are greater opportunities for Indian defence industry to work with partnership or in collaboration with overseas companies, thus enabling us to have broader market access. An effective management and fulfilment of collaborations arising out of off-set obligations can also provide an important foothold in new markets and lay the basis for lucrative follow-on and spin-off deals.

Other issues which merit consideration are:

- A stable macro-economic and political environment.
- Low cost of manufacture.
- Transparent business environment which encourages fair competition.
- Government as facilitator for defence exports to friendly countries (with active assistance from Indian Diplomatic Missions abroad and having suitable clauses incorporated in the line of credit given to other countries).
- Increased FDI limit in the defence sector (a foreign investor is expected to invest resources presently in a venture without any significant control, capacity /product constraints and with no purchase guarantee and where preference may be accorded to the local PSUs- perhaps our policy need a review).
- There is also a need to draw list of dual use technologies for these not to be exported in the over-all national interest. The national security interest should be the dominant factor in determining the export of critical technologies.
- The other objective of the defence export policy should be to respond more expeditiously to the military equipment needs of our friendly countries.

Key drivers to effective execution of defence export orders are-

- Irrevocable LC at sight before shipment.

- Offer and recommend products which are best suited for the terrain in which these would be employed.
- Service / parts support to protect the image of the company and the product.
- Training programmes for the end user and maintenance personnel in advance.
- Exhaustive technical literature in local language.

Conclusion

India's defence industrial policy seems to be short of its objective to boost defence exports. As, the viable industrial base need to be sustained both for economic and technological requirements, exports are an essential element of the over all defence industrial policy. Our strategic depth in defence production also can be increased by offering internationally competitive products through the well defined policy objective of defence exports / offsets.

Industry Perspectives on Defence Offsets

*S. K. Kaura**

Defence offsets are expected to generate business in India of about $10 billion over the next five years. Some would be in the form of tangible product and service exports while some in the form of investments made in India, and perhaps technology transfers, and yet some would be reduced through multipliers, banking, etc. We can assume that genuine export business could be $1 to $1.5 billion a year. Large as these may appear, in a trillion dollar economy, the direct impact is less than 0.2 per cent.

However, there is another story. The global military expenditure, running at about 4 per cent GDP (Gross Domestic Product) is about $2400 billion. Of this, about half is for acquisitions. Even with much of this being self produced, the international trade could be about $120 billion. India can aspire for a modest 5 per cent share of this pie, apart from meeting its own requirement. Between offsets, India's own requirement and exports, we can see a potential of over $10 billion a year.

Globally, the defence majors are all strong players in other high-tech areas like aerospace, engineering and electronics, the reason being the commonality of dual technologies. Adding these areas, the market opportunity for India could easily be $20 billion a year. Offsets, for India, are therefore the gateway to global defence and other high-tech markets.

What has prevented India from participating in these global markets?

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Lacks of technology, lack of experience, political barriers, major investments required in a high-risk business have all acted as entry barriers. The position of players on the other side of these barriers is however extremely attractive. With its trained manpower resources and cost factor advantages, India should be able to occupy a strong position on the global scene. Offsets are seen as the step ladder to cross over these barriers.

Industry perspective

Global majors, who understand this context well, are naturally reluctant to start a process of technology sharing or sourcing from Indian industry, which could ultimately lead to their creating competition for themselves. Their concern is greater when dealing with DPSUs, with the MoD backing them, fearing extra-contractual arm twisting. Caps on their equity in Joint Ventures (JV) also ensure that the transfers shall not be within the family but actual steps towards creation of indigenous capabilities. Efforts will naturally be made in diluting the terms of offsets through inclusion of indirect offsets and technology transfer, multipliers, etc. At the same time, they are keen on India's business. This is India's main lever and at this point in the global market, a most powerful one.

Another important point is that to achieve the major targets aspired for, India shall have to export platforms and systems and not just standalone equipment. To do this, the effort needs to be coordinated to ensure all critical elements are developed indigenously to make a complete offering.

Some concrete steps

- The MoD must insist on and implement the offset policy fully, in letter and in spirit and also facilitate the process between the foreign suppliers and the Indian offset partners.

- Both DPSU and private sector players must be encouraged to enter into JVs or other arrangements to obtain and absorb genuine technology, rather than simply licensed production.
- Treating this as a national campaign, the MoD must create a core think tank group comprising important defence players from DRDO, DPSUs and private industry to define critical technologies and acquire them.
- Indigenization or development of such strategic technologies must be supported by the MoD financially.
- The think tank must, along with the services' long term acquisition planning cells, draw up a long term indigenous development and production plan.
- A parallel study of the global market should be carried out and an associated export plan should also be evolved based on the domestic plan above and the global market study.

Background Paper*

Definition, Forms and Types of Offsets

Offsets are 'compensations' demanded by buyers from sellers in return for outflow of resources to the latter. These are applied for the so-called off-the-shelf procurement of items. Offsets come in different forms, but they are broadly divided into two types of categories – direct offsets and indirect offsets. Direct offsets are those transactions that are directly related to the defence items or services exported by a defence firm. Indirect offsets are those transactions that are not directly related to the defence items or services exported by the supplying firm. Indirect offsets are further divided into:

- Defence related indirect offsets
- Non-defence related indirect offset

Depending upon the forms, offsets can be divided into the following categories:

- Subcontracts (normally based on business-to-business agreement[1])
- Co-production (direct offset; based on government-to-government agreement)
- Purchases (indirect offset)
- Export assistance (indirect offset)
- Technology transfer (both types)
- Training (both types)
- Licensed production (both types)
- Investment (both types)
- Credit assistance / financing (both types)

*Prepared by Laxman Kumar Behera, Associate Fellow, Institute for Defence Studies and Analyses, New Delhi. The seminar was held at IDSA on October 24, 2008.

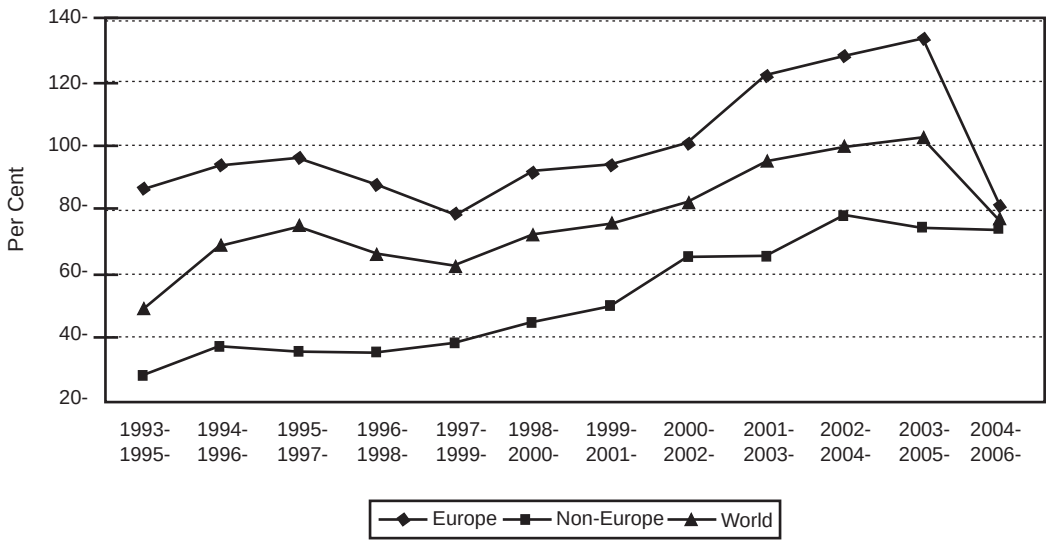
Offsets: Global Practice and Trend

The use of offsets in international trade is widespread and more than 130 countries practice it in different forms[2]. It is believed that offsets and related forms of countertrade account for about 5 to 30 per cent of world trade[3]. In defence, offsets are often used by buyer countries as "discriminating factor" in their arms contracts. The volume of offset and its greater percentage applicability in arms contracts is quite huge. Though the exact value of global defence offsets is not readily available, some idea can be formed from the data provided by the US Department of Commerce's Bureau of Industry and Statistics (BIS) which tracks the offset obligations of the US defence contractors who are also the top arms exporters in the world. As per the 2007 BIS Report, during the 14 year period from 1993 to 2006, the US defence companies signed 582 offset agreements with 42 countries, with total value (of all offset agreements) amounting more than $60 billion, or over 71 per cent of agreed export value[4]. In 2006 alone, it signed 44 offset agreements worth nearly $3.5 billion with 12 companies from 20 countries[5]. In terms of actual transactions, the US companies reported nearly $42 billion of actual offset transaction with 42 countries during the above time period[6].

With time, the percentage demand for offsets – though still varies from region to region and country to country – has increased significantly. It is because countries that did not "require offset during pre-1990s are now require them as routine policy" and, some countries have increased their demands over a period of time. In the above mentioned 14-year period, the US, has witnessed offset percentage of its defence trade increasing, on an average, from 34.3 per cent in 1993 to nearly 125 per cent in 2003[7], before decreasing to some 71 per cent in 2006. Region-wise, European countries with an average offset demand of 98.4 per cent during the above period are ahead of North and South America (97 per cent), Middle East and Africa (44 per cent), and Asia Pacific (39.1 per cent)[8]. A 3 year moving average of

offsets demanded (in percentage terms) from the US defence contractors is shown in the Figure below.

Figure: Offset Percentage in US's Defence Trade, 1993-2006 (3 Year Moving Average)



Note: Extrapolated from Table 4-2: Offset Agreement: Europe Compared to the Rest of World 1993-2006
Source: BIS Offsets database, as cited in U.S. Department of Commerce, Bureau of Industry and Security, Offsets in Defence Trade: Twelfth Report to Congress, December 2007, pp. 4-7.

A closer look at the offset strategies of various countries throws the following aspects (see Table below for a list of offset strategies of 15 countries). The minimum threshold of offset value of defence contract is as low as US $0.5 million (Israel), and is well below US $20 million for the select countries. The minimum offset required as a percentage of contractual value is nearly 100 per cent for these counties with few exceptions such as Israel (35 per cent) and Taiwan (70 per cent) that demand less. Moreover, more than half of the select counties prefer both defence and non-defence offsets. In Europe, the relatively advanced industrialised counties such as the UK and Italy prefer only defence-related offsets[9] and the region, on an average, prefer nearly 75 per cent defence related offset and the rest are civil indirect offset[10].

Table: Offset Statistics of Select Countries

Sl. No.	Country	Minimum Value of Defence Contract	Minimum Offset Required	Offset Sector	Multiplier
1	Australia	US $3.75 million	No Specific Min. of Max	Defence	None in policy
2	Canada	..	100%	Defence & Civilian	None in policy
3	Finland		100%	Defence	0.3-3 for exports of finish products; for others multiplies are negotiated
4	Greece	10 € million	120%	Defence	Up to 10
5	Israel	US $0.5 million	35%	Defence & Civilian	1-1.5
6	Italy	US $6.6 million	Not less than 70%	Defence	Maximum of 3
7	Netherlands	5 € million	100%	Defence & Civilian	Negotiable; ranges of 1-5, 5-10, and 10-30
8	Norway	US $6.7 million	100%	Defence & Civilian	0-5
9	Poland	5 € million	100% (defence 50% min)	Defence & Civilian	Negotiable up to 2-5%
10	South Korea	US $10 million	30%	Defence	Determined by authorities
11	Spain	NA	100%, but may vary	Defence & Civilian	Between 2 and 5, when used
12	Switzerland	US $17 million (may vary)	100%	Defence & Civilian	Maximum of 2-3
13	Taiwan	US $10 million	Will be increasing to 70%	Defence	1-10
14	Turkey	US $10 million	50%	Defence & Civilian	1-5
15	UK	US $17.2 million; £ 50 million for French & German Companies	100% target	Defence	No multiplier for IP credit

Source: U.S. Department of Commerce, Bureau of Industry and Security, "Offsets in Defense Trade: Twelfth Report to Congress", December 2007.

Multipliers

Multiplier is a "factor applied to the actual value of certain offset transactions to calculate the credit value earned." For example, if multiplier of, say, 2 is applied to an offset transaction of $10 million, then the credit value of such transaction amounts to $20 million.

Countries often provide multipliers towards the fulfilment of offset obligation by the foreign companies. Foreign companies see multipliers as inducements as it raises the credit value of offsets, and thus reduces the "dollar value" of their obligations. The buyer countries, on the other hand, use this as a tool to engage the overseas companies in a certain type of activities that they view important for their industrial or overall economic development. For instance, Denmark offers multiplier of maximum of 10 but restricts it to few cases such as R&D, Technology transfer, among others[11]. Globally the range of multipliers varies widely, from low of 0.3 to high of 30 (see Table). However, according to the BIS database, over the years the percentage use of multipliers in offset transaction is following a continuous declining trend, coming down from 16.6 per cent in 1993 to 4.3 per cent in 2006.

India's Defence Offset Policy

India's formal offset policy came for the first time under Defence Procurement Procedure 2005 (DPP 2005). The policy of 2005 was further elaborated in DPP 2006 and subsequently revised under DPP 2008. The offset policy as enunciated in DPP 2008[12] stipulates that all contracts worth three billion rupees or above would have defence-specific offsets amounting to 30 per cent. The offset obligations of the foreign vendors shall be discharged thorough any combinations of the following methods:

- Direct purchase of, executing export orders for, defence goods and services produced by any Indian defence industry.

- Direct foreign investment in Indian defence industrial infrastructure, leading to co-development and co-production of defence items.
- Direct foreign investment in Indian organisations engaged in research in defence R&D as certified by DOFA.

At presents, India's offset policy does not have the provision of multiplies. The policy categorically says that all offset offers satisfying the minimum eligibility conditions will be treated on par and no extra preference will be given beyond the minimum requirements.

Banking of Offset Credits

India's offset policy provides provision of banking of offset credit with effect form September 1, 2008. The provision allows two ways through which a foreign vendor can bank credits: one, through prior investment in the Indian defence industry (including in Defence R&D); and, two, by generating excess credits from the ongoing offset projects. In other words, the banking provision allows foreign vendors' prior as well as continuous opportunities in Indian defence industry, to discharge their future offset obligations. The banking period is allowed to remain valid for two financial years from the date of approval by the MoD. The banked offset credits are non-transferable except between the main contractor and his sub-contractor within the same acquisition programme.

Product List and Industrial Licensing

Under the offset provisions, foreign vendors are allowed to choose any Indian companies as their offset partner. To facilitate Indian companies' participation in offset-related work, the MoD has provided a list of defence products. The list is categorised along the following 13 groups:

- Small arms, mortars, cannons, guns, howitzers, anti tank weapons and their ammunition including fuze.
- Bombs, torpedoes, rockets, missiles, other explosive devices and charges, related equipment and accessories specially designed for military use, equipment specially designed for handling, control, operation, jamming and detection.
- Energetic materials, explosives, propellants and pyrotechnics.
- Tracked and wheeled armoured vehicles, vehicles with ballistic protection designed for military applications, armoured or protective equipment.
- Vessels of war, special naval system, equipment and accessories.
- Aircraft, unmanned airborne vehicles, aero engines and aircraft equipment, related equipment specially designed or modified for military use, parachutes and related equipment.
- Electronics and communication equipment specially designed for military use such as electronic counter measure and counter measure equipment surveillance and monitoring, data processing and signaling, guidance and navigation equipment, imaging equipment and night vision devices, sensors.
- Specialized equipment for military training or for simulating military scenarios, specially designed simulators for use of armaments and trainers.
- Forgings, castings and other unfinished products which are specially designed for products for military applications and troop comfort equipment.
- Miscellaneous equipment and materials designed for military applications, specially designed environmental test facilities and equipment for the certification, qualification, testing or production of the above products.
- Software specially designed or modified for the development, production or use of above items. This includes software specially designed for modeling, simulation or evaluation of military

weapon systems, modeling or simulating military operation scenarios and Command, Communications, Control, Computer and Intelligence (C_4I) applications.

- High velocity kinetic energy weapon systems and related equipment.
- Direct energy weapon systems, related or counter-measure equipment, super conductive equipment and specially designed components and accessories[13]."

An Indian company producing any of the above products is eligible to become offset partner of a foreign vendor. However, the Indian "offset partner shall, besides any other extant regulations in force, also comply with the guidelines / licensing requirements for the defence industry issued by the Department of Industrial Policy and Promotions.

Defence Offset Facilitation Agency (DOFA)

Consequent to the announcement of India's offset policy, a dedicated body, Defence Offset Facilitations Agency (DOFA), has been set up under the Department of Defence Production, Ministry of Defence. DOFA, as the name suggests, is a facilitation agency, tasked to perform the following functions[14]:

- Facilitate implementation of the offset policy.
- Assist potential vendors in interfacing with the Indian defence industry.
- Assist in vetting offset proposals technically.
- Assist in monitoring the offset provisions.
- Suggest improvements in the policy and procedures.
- Interact with Headquarters Integrated Defence Staff and Service Headquarters.
- Advise, in consultations with the Headquarters Integrated Defence

Staff, Services and Defence Research and Development Organisation, areas in which offsets will be preferred.

- Promote exports of defence exports of defence products and services.

Notes

1. According to the US Department of Commerce, subcontracts are only direct offset. Others, however, differ from this usage, arguing that subcontracts could also be indirect offsets if they are not directly related to the procured items.
2. Elisabeth Sköns, The Economic Aspects of Defence Offsets: Experience from Sweden and Finland.
3. Jurgen Brauer and J. Paul Dunne, "Arms Trade and Economic Development: Theory, Policy and Cases in Arms Trade Offsets", Routledge, New York, 2004, pp.2.
4. U.S. Department of Commerce, Bureau of Industry and Security, "Offsets in Defense Trade: Twelfth Report to Congress", December 2007, pp. 2-1 to 2-14.
5. Ibid.
6. Ibid, pp. 2-3.
7. This is on account of "one large weapon system export... with an offset percentage of more than 170 per cent"
8. The figures represent average of 14-year period covering 1993 to 2006.
9. "Offsets in Defence Trade: Twelfth Report to Congress", n.4.
10. E. Anders Eriksson et al, "Study on the effects of offsets on the Development of a European Defence Industry and Market", available at http://www.eda.europa.eu/documents.aspx. Accessed on July 10, 2008.
11. See Danish Enterprise and Construction Authority, Multipliers, at http://www.deaca.dk/multipliers
12. See Government of India, Ministry of Defence, Defence Procurement Procedure: Capital Procurement 2008, at http://mod.nic.in/
13. Ibid, pp. 54.
14. Ibid, pp.44.

Guidelines for Contributors

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Contributors are requested to follow the guidelines below:-

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- The first sheet should carry details of the author's biodata (a brief resume of about 50 words), institutional affiliation and the mailing address.
- A signed declaration of originality and conformance to research ethics should accompany the paper; also, that the paper has not been sent to any other journal for publication.
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- If actual statements or phrases are taken from another paper, the name of the author should be mentioned in the text and the chosen material should be placed within quotation marks with an appropriate reference. Alternatively, if another author's views are to be summarised, use the formulation: 'The views of xyz are summarised'; give a crisp summary. It is a good practice to reference sources of information extensively and effectively.
- Author's acknowledgement(s) may be included at the end of the paper and before References/Endnotes begin.
- The paper should have sub-headings to make it more reader-friendly.
- Hyphens should never appear in typescript at the end of lines.

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- Use short, crisp sentences; they add to readabilty.
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- Write dates by beginning with the month, followed by the date and the year (e.g.: September 11, 2001).
- In the text, write numbers in words till the number nine and then in numerals (e.g.: two, four, nine; then 10, 11, 12 and so on).
- Write 'per cent' and not % or percent.
- Acronyms should carry the full form at the first mention with the acronym in bracket; and thereafter, the abbreviated version.
- Names of books, journals, newspapers and foreign terms in the body of the text should appear in italics, eg: *Asian Security in the 21st Century; Strategic Analysis; The Hindu; de facto.*
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- Use lower case while referring to establishments like the government, the army, and so on. Use upper case if these are accompanied by the name of the country (e.g: the Indian Government or the Chinese Army). The president or prime minister stays lower, unless they are accompanied by the name (eg: Prime Minister Tony Blair or External Affairs Minister Natwar Singh).

References/Endnotes

- References/Endnotes should be sequentially numbered.
- The authors are responsible for accuracy of the references.
- While referring to a book, follow the example below:

Padmaja Murthy, *Managing Suspicions: Understanding India's Relations with Bangladesh, Bhutan, Nepal, Sri Lanka*, Knowledge World, New Delhi, 2000, pp. 59-67.

- While referring to a chapter in a book:

Meena Singh Roy, 'Building a Peaceful Asia,' in Jasjit Singh (ed.), *Reshaping Asian Security*, Knowledge World, New Delhi, 2001, pp. 348-61.

- While referring to a paper in a journal:

P.R. Rajeshwari, 'Bill Richardson's Visit to South Asia: A New Phase in US-South Asia Relations,' Mainstream, 36 (19), May 2, 1998, pp. 23-26.

- While referring to a paper presented at a conference:

R.V. Phadke, 'Security of Energy,' Paper presented at the International Conference on Oil and Gas in India's Security, New Delhi, 2001, pp. 82-86, Institute for Defence Studies and Analyses, New Delhi, 2001.

- While referring to an article in a newspaper:

Kulbir Krishan, 'The Pearl Abduction: Who and Why?' Pioneer, New Delhi, February 12, 2002, p. 7.

- While referring to a website:

'Excerpts to remarks of Prime Minister Nawaz Sharif on Nuclear Policies at the CTBT,' at www.clw.org/pub/clw/coalition/sharif052099.htm (Accessed February 2, 2005)

- If two successive citations/references refer to the same source, use Ibid.
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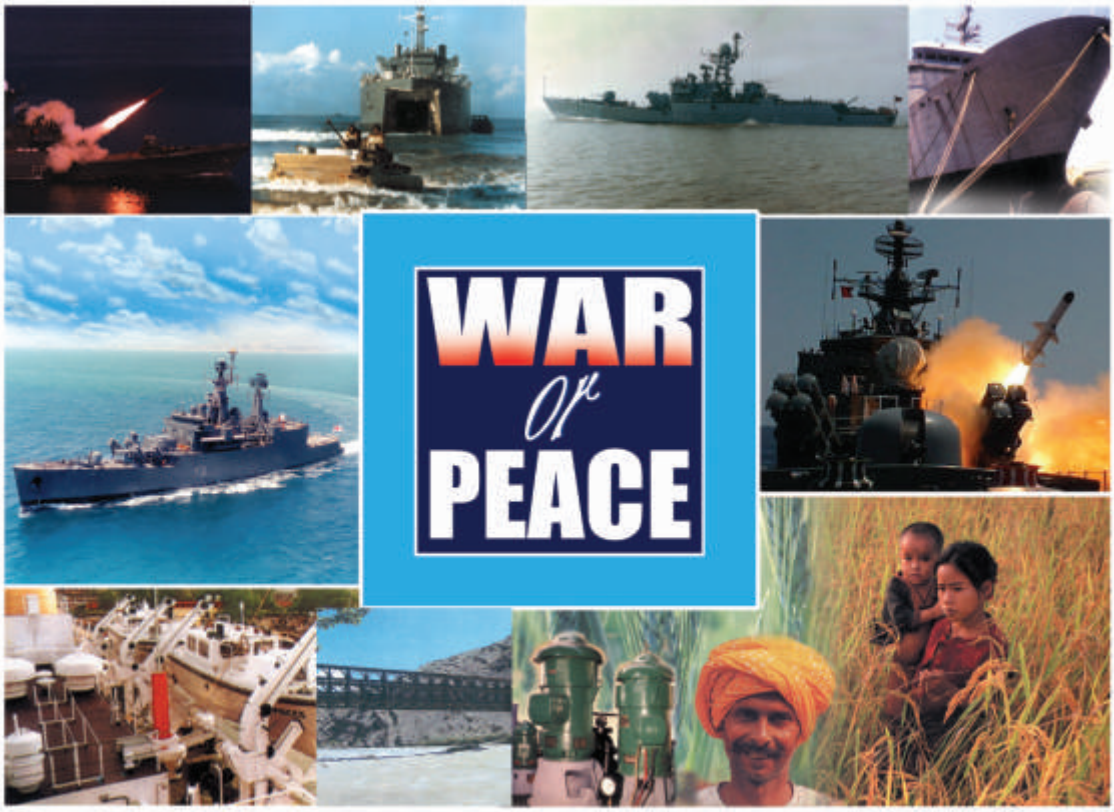

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