

Challenges of Capability Definition and Cost Efficient QR Formulation

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Services need to be very clear about their future requirements for the next 10 to 15 years based on an in depth analysis of the emerging threats and evolving technologies. While it is always desirable to seek extra capability that developed nations may be planning to acquire, but it must be kept in mind that finally the resources are limited and an increase in SQR from 90% to 95% would result in cost of equipment increasing two to three times. The cost of the technology exponentially rises with the increase in level of QRs. Cost effective QRs can be formulated by acquiring the knowledge of ROM cost of the technology and thereafter fine tuning the op requirement.

Introduction

The process of defence capital acquisition is driven by the operational requirements of the three services which flow from the need to establish their core operational capability. To ensure that the Forces retain their potency and maintain constant growth of capabilities, this has to be an on-going process. Capability definition is the first step in initiating the capital acquisition process. This flows from Raksha Mantri's Op Directive based on the National Security Perspective Plan.

Our capital acquisition process is based on the Defence Procurement Procedure (DPP). The DPP is periodically revised to evolve a better procedure catering to the dynamic environment of defence industry in the world and also the needs of the three services. The capability definition and formulation of the Service Qualitative Requirements (SQRs) for the desired acquisition are the most important steps in the defence procurement procedure.

Aim

The aim of this paper is to bring out the challenges of capability definition and cost efficient QR formulation for capital acquisition.

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Defence Procurement Procedures

Capability Definition

The capital procurements are meant for acquisitions towards building long term capabilities of the services. They are aligned with the capabilities as defined through the long term perspective plan catering to present and future threat perceptions.

According to DPP, Integrated Defence Staff (IDS) in consultation with the Service Headquarters (SHQ) is responsible for formulation of Long Term Integrated Perspective Plan (LTIPP) for the capital acquisitions. All the three services participate at the planning stage to contribute towards formulating LTIPP using their background and domain knowledge. The LTIPP is formulated with a clear view of acquiring the desired capability in next fifteen years. The five years Services Capital Acquisition Plan (SCAP) and two year Annual Acquisition Plan (AAP) flow from LTIPP.

Formulation of SQRs

The primary aim of SQR formulation is to initiate procurement of systems which can provide an edge over the adversaries. The SQRs are formulated by the SHQ for procurements which are specific to that Service. The first step in formulation of SQRs is to identify the core operational requirements. These broad requirements are circulated to Defence Research and Development Organization (DRDO) and Department of Defence Production (DDP) for their expert comments.

Based on operational requirement, the indigenous sources are explored by SHQ. Relevant information regarding the availability of similar equipment is obtained from all the possible sources like Internet, defence journals etc. Once it is established that the required capability cannot be indigenously procured or developed within the desired time frame, global market is explored by sending Request For Information (RFI). RFI are issued to various Original Equipment Manufacturers (OEMs) to establish the availability of the technology.

The related Directorates (Dtes) at the SHQ are involved in finalizing the SQRs. The SQRs are approved by the Service Equipment Policy Committee (SEPC) at the respective SHQ.

Formulation of SQRs is governed by following factors:-

- Core operational requirements.
- The technology potential of the defence industry within the country and abroad.
- The SQRs need to be comprehensive, structured and concrete, clearly expressing the user's requirements in terms of functional

characteristics.

- They are not prejudiced with the particular technical choices.
- As far as practicable SQRs need to be broad based and should result in a multi vendor situation.

After finalizing the SQRs, the SoC is processed through IDS and the procurement process is progressed in accordance with DPP.

Formulation of Joint Service Qualitative Requirements

If the equipment to be procured is common to two or more services, Joint Service Qualitative Requirements (JSQRs) are formulated under the aegis of IDS. The JSQRs are approved by the Integrated Service Equipment Policy Committee (ISEPC). The formulation of JSQRs is governed by the same principles as SQRs.

Formulation of PSQRs

As laid down in DPP, the strategic and security sensitive systems are to be developed indigenously by DRDO. The development of these systems is carried out in accordance with the DRDO procedures. The operational requirements for such projects are prepared by SHQ in the form of Preliminary SQRs (PSQRs). The Design and Development (D & D) of such projects is initiated with preparation of Detailed Project Report (DPR) and project sanction by the Govt. In accordance with recommendations of Kelkar Committee on review of DPP, such projects are off-loaded to Raksha Udhog Ratna (RUR)/Indian Industry/Defence Public Sector Units (DPSU)/Ordnance Factory Board (OFB). For these systems, the PSQRs are prepared by the SHQ. The technology scan, feasibility study and identification of the source or sources are carried out by HQ IDS. The cost involved in R & D is shared by Government and the industry.

Challenges in Formulation of Qualitative Requirements (QR)

The procurement procedure of the Ministry of Defence (MoD) has matured over the years through concentrated efforts towards building the desired capability of three services. Over the period of time the three services have gained enough experience in formulation of SQRs.

In procurement procedure of single stage two bid system of soliciting the offer, all the SQRs are laid down as essential. These SQRs are the minimum which every offered system has to qualify. Non compliance to even a single SQR renders the offered system non-compliant. Moreover, there is no extra

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weightage given to capability or performance which is superior to the minimum laid down SQRs unlike prevailing system in many other countries. Of all the compliant proposals, at the second stage, the lowest quoted system is selected for commercial negotiation. Thereby, the cost efficiency is already built in the procedure of formulation of SQRs.

The process of SQR formulation as laid down in DPP has been simplified through various reviews from time to time and provides adequate clarity and transparency. Notwithstanding, the SHQs still faces many challenges while formulating the SQRs. Some of these challenges faced by IAF while formulating SQRs for Airborne and Aviation related equipment are elaborated in subsequent paragraphs.

Threshold of SQRs

As brought out, the SQRs have to be so framed that the expected proposal of vendors meets each and every laid down SQR. Making SQRs very stringent would defeat the purpose of multi-vendor situation while downgrading SQR would compromise the need for which the operational capability is being acquired. Hence the threshold for pitching SQRs should be such that it should neither result in low vendor base nor there be any compromise of the desired operational capability.

Defence procurements of IAF, especially major aviation items involve high technology equipment that are expensive to develop and have a relatively limited volume of sales. Therefore, there are not always many vendors, even in the global market, to meet the requirements of the services.

Military equipment is developed by various countries primarily to meet the operational requirements of their own defence forces and hence equipment has performance specifications that could be unique to the war fighting philosophy of that country. A global search for a defence capability often results in equipment being available with significantly varying specifications. Therefore SQRs, while being broad based enough to ensure adequate vendor base should also meet the core operational requirements of the IAF.

Pegging the SQRs at the lowest level of globally available technology, may result in the equipment not able to perform the operational task desired. Similarly, keeping the technological requirements at a relatively higher level would eliminate much low end equipment and result in inadequate vendor base.

Low Vendor Base

Most of the military equipment procured for the services is exclusive and specialized but the technology of the equipment under procurement can be differentiated as low technology e.g. Cranes, Generator sets etc and high end technology like tanks, artillery, ships, radars, weapons and Aircraft. The

yardstick and procedure of formulating the SQRs are common for all systems. Low technology systems are easily available but in case of high technology systems, there is a scarcity of source and the technology is concentrated in few pockets, mainly in developed countries. A global RFP for systems like generator set would receive wide response from the vendors but as we proceed towards specialized technology like aircraft, the vendor base gets limited. For example, there are only three to four OEMs in the world for the advanced systems like Advanced Warning and Control System (AWACS), In-Flight Refueller aircraft and advanced Precision Guided Munitions (PGMs).

On a reference scale of 1 to 100, if we increase the level of SQRs from 60% to even 95%, for low technology equipment we still have sufficient vendor base but increasing the SQR level from 60% to just 75% itself for the fighter aircraft procurement, the vendor base could shrink to just two or less. Therefore, for a low end technology equipment, the threshold of the SQRs could be varied from 95% to 60% making it very broad based but still adequate vendor base would be available and the operational requirement would also be met. The restricted performance band, for high technology systems, for laying down the SQRs poses a big challenge in formulation of the SQRs. The opinion that the SQR should be broad based cannot be followed in its spirit, for cases of high end technology procurement as further dilution of SQRs would result in some critical operational requirement not being met.

Single Vendor Situation

The SQRs are formulated to be broad based so as to encompass wide vendor base. The cost efficiency is built in such SQRs due to competitive market. However, there are instances where the core requirements, based on which broad based SQRs are evolved, are such that only one vendor has the capability to meet the specific core requirements. The services cannot dilute their operational requirements below a certain level, otherwise the desired capability cannot be ensured.

For such special cases DPP has provisions for procurement of state of art equipment manufactured by only one vendor if the acquisition is likely to give a qualitative edge over our adversaries.

A typical example is the procurement of Very Heavy-lift Transport Aircraft (VHETAC). Based on RM's op directive for dual task force contingency, IAF narrowed down to procurement of a 50-70 Ton class of aircraft. The aircraft is required to bridge the deficiency of heavy lift and rapid response capability in mountainous terrains of the north and north-east sector. The operational requirements are essential and cannot be diluted. This led to formulation of QRs in terms of Short Take Off and Landing (STOL), steep approach, high altitude performance and take off from high altitude airbases. After scrutinizing the information from various sources and through RFIs, it was discovered that only one aircraft in the world has desired capabilities. It is the

only aircraft under production at present and in near future which fulfils our specific operational requirements. Other available aircraft have either heavy lift capability or short field landing capability but not both. Accordingly, IAF has decided to progress the case on single vendor basis.

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Peculiarity of Indian Terrain

The operating conditions in India are vastly varying due to the terrain and the atmospheric conditions. The airbases for fixed wing aircraft are situated at altitudes ranging from sea level at Goa or Carnic to 3.5 km in J & K and helipads for rotary wing aircraft are located at even 5.4 km altitude. To add to this, the Indian tropical conditions are grossly different from the internationally accepted criteria of International Standard Atmosphere (ISA) for measuring/comparing performance parameters that are affected by the atmospheric conditions. The operating conditions are generally ISA+15 to ISA+30. All the main aircraft OEMs are located in Europe or America. They design their aircraft for conditions prevailing in their country which conform to ISA conditions. SQRs formulation must result in procurements which are optimum for operational usage in Indian terrain conditions. Since the operational requirement at certain conditions cannot be compromised, SQR formulation becomes challenging.

Availability Vs Op Requirement

The aim of formulation of SQR is to fulfil our operational requirement. But the OEMs usually manufacture the equipment for the operational requirement of defence forces of their country being their main customer. The war fighting philosophy and thus operational requirement of the country of origin need not be the same as ours. For example, OEMs may have various tactical weapons for different ranges below 100 km and strategic weapons for ranges above 300 km. This would be suitable for their defence forces. However, we may like to have tactical weapon of 150 km range suiting to our operational requirement. Under these circumstances the systems meeting our operational requirement are not readily available in the market. In such a dichotomy while formulating the SQRs, it is challenging to analyse the suitability of the systems available in the market which can optimally fulfil the core operational requirements.

Lack of Response

At times, it is experienced that many vendors do not respond to RFP since their system is superior and the technology is costlier than other competitors. They are apprehensive of investing in the procurement process but eventually losing out in a single stage two bid system where no advantage is available for the superior system. Such a situation is difficult to predict during formulation of the SQRs thereby posing a challenge.

Govt Sanctions

The state of art technology is possessed by the developed nations who do not part with the information with the developing nations. Also, certain systems are available through Foreign Military Sales (FMS) or require a Technical Assistance Agreement (TAA) to be signed. The Self Protection Suite (SPS) on VVIP BBJ aircraft and Gen III Night Vision Goggles (NVG) are a few examples of the systems which are available only through the FMS route under Inter Government Sales Agreement from USA.

Small Order Size (Qty)

Often it is experienced that the small order size does not generate adequate vendor interest. The difficulty is specifically faced when the systems required are complex military Aviation equipment. When the order quantity is small, some vendors find the investment towards the no cost-no commitment field trials and preparation of Techno-commercial proposals, excessive and the risks of not being declared the L1 too high.

Misinformation by Vendors

The RFI is one direct source of information available for formulating the SQRs. There are instances when vendors aspire to achieve claims of competitors despite lack of actual capability. Such vendors tend to promise high while responding to RFI. They intend to utilize the time between RFI and Field Evaluation Trials (FET) to develop the system according to the requirements. This may not work out in all the cases. Many of them get disqualified during FET, leading to single vendor situation. Therefore, formulation of the accurate SQRs based on knowledge of pre-RFP vendor response (RFIs, presentations, brochures etc.) remains a challenge.

Challenges in JSQR Formulation

- JSQR formulation has always been perceived as a challenging job. IAF specifically faced difficulties in formulation of JSQRs for the airborne systems. There had been instances in the past when it took two years to formulate consensual JSQRs for a system.

- At times the reps of other two services being from procurement Dtes did not have adequate knowledge of aviation and airborne systems. The reps were not capable of taking participative decisions without consulting the concerned Dtes at their HQ. The process involved excessive lead time in finalizing the JSQRs.
- The operational requirements for aircraft of Navy and Army/Air Force grossly differ. For example, Navy requires an aircraft with optimum performance and load carrying capability at low altitudes as their operations are at sea level. IAF/Army needs an aircraft with optimum performance at high altitude with a certain minimum load. Similarly, Navy essentially required a twin engine helicopter for safety reasons while the IAF/Army insists on service ceiling of over 6000 m, rather than the need of twin engine.
- However, off late, the experience has taught us to formulate JSQRs in a short span of time, which are optimum for all the three services. For example, requirement for a replacement of 'Igla' Surface to Air Missile (SAM) was initially different for the Army and Air Force. Army wanted higher portability and a simpler system for their troops to carry & deploy. While Air Force wanted additional passive sensors to be integrated with the system. It took a while before both the services agreed to common requirements, resulting in a system that meets requirement of both the services and with due care of the need to have a wide vendor base.

Indigenous R & D

For the projects which are identified for indigenous development by DRDO/DPSUs, the PSQRs are finalised in consultation with DRDO/DPSUs. The PSQRs are formulated with due regard to the capability projected by the concerned agency. On many occasions, it is experienced during the evaluation that the projected capability turns out to be higher than the achieved capability. There is lack of clarity on actually achieved capability projected by the concerned agency. The capability projection is invariably inflated. The concerned agency enthusiastically takes it as a challenge to develop the proposed system without availability of the matured technology. In such cases, the PSQRs are revised downwards during the developmental stage. The revision of PSQRs is modulated by the actual R & D capabilities of DRDO/DPSUs. There are chances that the product output does not qualify the operational requirement thereby defeating the purpose of PSQR formulation. Such issues are gradually being resolved by real time interactive process to obtain best possible results through Project Management Teams (PMTs) and regular reviews. For example, development of Light Combat Aircraft (LCA) has now been closely monitored by Air Force and Navy. PMT of Air Force is closely interacting on day to day basis with reps of DRDO and HAL giving encouraging results.

Dedicated QR Formulation Agency

Some of the developed countries have dedicated agencies responsible for formulation of QRs. These agencies while having representation of the services, remains independent with the requisite domain knowledge and focused objective of creating realistic SQRs. In these countries the aviation industry is well developed and competitive. The QR formulation agency closely monitors the capability of the defence industry in their country. The QRs are therefore accordingly formulated with the clear knowledge of the capability of the industry. In India we do not have a well developed defence industry. Though DPSUs are limited to one in each field, there is still no clarity on their capability. During development process of every system the agency has encountered various challenges to fulfill the laid down operational requirements.

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Often it had been suggested that a permanent team consisting of Bureaucrats, Scientist and Service officers may be formed to take care of the process to formulate SQR. It is argued that permanency of tenure would help such an agency gain higher expertise. Such a system may not be advisable. It is essential for service officers to have currency in field and domain knowledge. The service officer permanently posted to such agency is likely to lose insight into operational requirements due to lack of recent field experience. Presently, in the IAF the pool of officers with good experience of SQR formulation and acquisition process are rotated between field and SHQ. This ensures that their field experience and domain knowledge is updated and their experience in SQR formulation is optimally utilised during their SHQ tenure. The concerned Dte in Air HQ responsible to formulate SQRs in conjunction with Operations and Maintenance Dte is hence found to be the most competent body to formulate SQRs for IAF procurements.

Cost Efficient Qualitative Requirements

Although operational requirements have to be achieved, cost constraints remain an important factor while formulating the QRs. It is very well understood by the SHQ that the cost of acquisition rises exponentially if the threshold of SQRs is raised. Services need to be very clear about their future requirements for the next 10 to 15 years based on an in depth analysis of the emerging threats and evolving technologies. While it is always desirable to seek extra capability that developed nations may be planning to acquire, but it must be kept in mind that finally the resources are limited and an increase in SQR from 90% to 95% would result in cost of equipment increasing two to three times.

The cost effectiveness can only be achieved with a well developed indigenous defence industry and competitive market. In the developed countries which have dedicated agencies for QR formulation, the cost effectiveness is taken care by the knowledge of the capability of the indigenous industry. Since we don't have a well developed defence industry and most of the specialized procurements are from the international market, the cost effectiveness of QRs can only be ensured by a better knowledge of the cost dynamics of global market.

Recommendations of Kelkar committee and review of DPP to include 'MAKE' category are steps in right direction in promoting the Indian industry. To encourage the Industry, Govt is willing to share the R & D cost. Positive development is already visible. DRDO and DPSUs have been able to tap the civil industry potential by developing and productionising some of the critical aviation systems like Mission and Radar Computers of Su-30 MKI aircraft, display panels for MiG-27 aircraft, aircraft simulators, sub systems for Radars & EW systems and some of the aviation equipment.

The cost efficiency is also taken care by initially defining the broad technical requirements. These broad requirements include the core operational requirements for the desired capability. The Rough Order of Magnitude (ROM) cost is obtained through possible sources. With the knowledge of the ROM cost, the broad requirements are thereafter fine tuned to optimize the op requirements and the budgetary constraints.

Conclusion

While formulating the QRs, the technology information is gathered by exploiting all the available sources. The vetting of QRs is carried out by experts of DRDO and DPSUs. The expertise of service officers with experience in QR formulation is utilised. Despite a well laid down procedure, there are certain challenges faced by the SHQ while formulating the Qrs.

The threshold of the QRs needs to be fixed at the right level so that sufficient vendor base is available. The QRs must encompass the potential of the existing market. Although the yardstick for QR formulation of low and high technology systems is same, care has to be taken about the limited vendor base available for high technology systems.

The cost of the technology exponentially rises with the increase in level of QRs. Cost effective QRs can be formulated by acquiring the knowledge of ROM cost of the technology and thereafter fine tuning the op requirement.

We have gained enough experience in optimum QR formulation. There have been rare occasions when RFP had to be withdrawn due to inappropriate QRs.

The procurement process of Medium Multi Role Combat Aircraft (MMRCA) is an example of formulation of good QRs by a matured team. Despite being highly complex QRs, we have received the widest possible response from the OEMs. The Technical Evaluation of all the proposals had been completed with satisfactory response from all the OEMs proving that our SQR formulation process is sound and matured.

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