

# Institute for Defence Studies and Analyses

No.1, Development Enclave, Rao Tula Ram Marg  
Delhi Cantonment, New Delhi-110010



## Journal of Defence Studies

Publication details, including instructions for authors and subscription information:

<http://www.idsa.in/journalofdefencestudies>

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To cite this article: Chandrika Kaushik (2017): Public–Private Partnership for MRO in Defence: Application to Aerospace and Land Systems, Journal of Defence Studies, Vol. 11, No. 3, July-September 2017, pp. 41-67

URL <http://idsa.in/jds/public-private-partnership-for-mro-in-defence>

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# Public–Private Partnership for MRO in Defence Application to Aerospace and Land Systems

*Chandrika Kaushik\**

*This article examines the various aspects of employing public–private partnership (PPP) for carrying out maintenance, repair and overhaul (MRO) activities for aerospace and land forces in India. PPP in MRO is expected to increase the uptime of the existing equipment, and enable their full exploitation. It would enable harnessing the efficiencies of the private sector while using the resources existing in the public sector. The broad concepts and operational philosophy of MRO for defence equipment are also covered. The enabling mechanisms implemented by the United States (US) for fostering PPP in MRO are discussed as a case study. The article seeks to build up a case for exploring possible exploitation of PPP for MRO in the Indian defence sector, for learning how to leverage the potential of the private sector and the facilities available in the public sector, while retaining overall control by the government.*

Public-private partnerships are arrangements under which the private sector supplies goods or services which were traditionally provided by the governments. The Government of India has already put in place broad guidelines regarding PPP, and these have been implemented extensively in the infrastructure sector in India. MRO of existing systems and facilities in defence is a key determinant of their effective exploitation and has been carried out mostly by the public sector or the foreign suppliers. Public–private partnership between the Indian public sector

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undertakings (PSUs), ordnance factories (OFs), agencies of defence forces and private sector companies will enhance the capabilities for the provision of MRO services for the existing equipment held with the armed forces of the country. Efficient MRO of defence equipment through PPP is expected to increase the uptime of the existing equipment in order to enable its optimum exploitation. Another advantage would be the harnessing of efficiencies of the private sector while using existing public sector resources.

The rationale and motivation behind focusing on PPP in the defence sector is the potential of PPP-based arrangements to address systemic problems, such as foreign dependency for defence equipment and insufficient integration of private sector for provisioning of defence goods and services, and other structural constraints in India's ability to provide sustenance and MRO for defence equipment. For the majority of the 70 years since India's independence, it has been solely the government that has taken up the mantle of provisioning defence goods and services, including the entire gamut of equipment sustenance services. Though many remarkable achievements are due to the state defence establishment, certain gaps have remained unfulfilled. To address these gaps, the government has sought the participation of the private sector and progressively removed many of the policy bottlenecks which impaired the participation of private sector in the defence domain. However, the role of the Indian private sector continues to be limited in defence and minimal in the MRO space.

In general, PPP models in defence provide a strong impetus for technological innovation and industrial deepening for domestic private manufacturing. Implementation of PPP models contribute to the evolution of a domestic 'techno-industrial' capability for the production of defence equipment and services. Moreover, PPP contracts enable the government to acquire management and technological capabilities often locked into the private sector. PPP arrangements benefit not only the government but also offer distinct advantages to the private sector, leading to win-win situations with mutual benefit for all participants. The private sector stands to benefit from the significant pool of built-up assets of the government that is already in existence.

Since the effectiveness of the armed forces depends on the timely availability of equipment, arms and ammunition, and their maintenance in battleworthy condition, the sustainment management system (SMS) for military equipment is a key determinant of the combat power of an

army. The various weapons and equipment, such as tanks, guns, aircraft, launch vehicles and other end items, require regular ‘maintenance, repair and overhaul’ to ensure their combat readiness, so as to enable the defence forces to operate efficiently and cost-effectively.

Allowing private sector access to the existing resources of the government can contribute to profitability and enhancement of capacity of the private sector, and this is especially relevant in the MRO sector. Also particular to the MRO sector is the fact that allowing private sector MRO companies to use the extant government MRO facilities would avoid duplication of capabilities between the government and private sector, and lead to significant cost saving which would otherwise have been spent on developing alternate capacity. This potential for collaboration between two traditionally exclusive and parallel approaches to providing service is a tremendous advantage of PPP arrangements in the MRO domain.

Public–private participation (of which PPPs are a type) is then, perhaps, the principal way in which the private sector—through financial investment, talent sharing, management skill transfer and provision of additional resources—can be pressed into service for furthering the national security of a country. The scope of the present article is, however, restricted to discussion in the domain of defence MRO only. In particular, PPPs fundamentally re-imagine and modify the relationship between public finance and public provision, and have ‘resulted in a reshaping of the boundaries between the state and the private sector’.<sup>1</sup>

A part of the rationale behind this study’s focus on the particular role of the provision of MRO services in aerospace and land systems is that the economic significance of this role for military aerospace alone is tremendous. With an estimated expenditure of US\$ 20 billion by India on the acquisition of military aircraft over the next 5–10 years,<sup>2</sup> there is a pressing need for a significant indigenous capability in order to support MRO activity for these aircraft. Substantial planned acquisitions by the Indian Air Force (IAF) over the coming 10 years imply that India will soon emerge as a dominant military MRO destination, providing a timely opportunity for indigenous private sector industries in the MRO domain. The other defence services (including the Indian Army, Indian Navy and Coast Guard) also operate a large number of air assets.<sup>3</sup>

Among the domestic industries, Hindustan Aeronautics Limited (HAL) is the most significant non-military provider of MRO services, being the sole provider for defence aerospace equipment. However, in

the absence of a well-developed and mature indigenous capacity for aerospace MRO, beyond defence services and HAL, it is the foreign MRO companies and original equipment manufacturers (OEMs) who stand to benefit from India's investment in military up-gradation. A principal advantage of bringing indigenous private sector into the defence MRO domain would be the economic exploitation of India's growing military aerospace market.

India's civil airline industry is also poised to become among the top 10 worldwide, with an estimated size of US\$ 16 billion, and is likely to see investments of US\$ 21.1 billion during 2012–17, of which US\$ 9.3 billion is likely to be contributed by the private sector.<sup>4</sup> Civilian Indian carriers may well have a combined fleet size of nearly 1,200 aircraft by the year 2020. The Indian civil MRO market is presently estimated to be around US\$ 800 million, and with an expected growth in the Indian fleet size to 1,740 aircraft in the next 10 years, the Indian civil MRO market has been estimated to value US\$ 5.2 billion by 2026.<sup>5</sup> Therefore, a strong and efficient indigenous industry for aerospace MRO stands to benefit from both civil and military demand and from both domestic and foreign sources.

Moreover, India is preceded by many other advanced nations who have consistently and progressively augmented the role of the private sector in the defence domain through PPPs, notably the US, the United Kingdom (UK), France, Australia and others. Since a discussion on the utilisation of the PPP paradigm in defence production and acquisition is beyond the scope of the present article, attention is restricted to the application of PPP for MRO in the US, which is the only advanced nation to have used PPP extensively in the MRO sector. This article discusses those aspects of the US experience which may be instructive and have broad application in the Indian context. Overall, and in summary, the particular debate which this article addresses, and aspires to contribute to, is one exploring the potential benefits, and addressing the challenges, of the use of PPP models for the acquisition of MRO capabilities, particularly for aerospace and land systems, in the Indian context.

#### THE PPP MODEL OF PARTICIPATION

Defence is traditionally viewed as a public good. This, in the Samuelsonian typology, is a good or service which is both non-rival in consumption—that is, the provision of defence services to an individual does not reduce its availability to any other—and is non-exclusive—once a population

is provided with said service, it is not feasible to remove any individual from enjoying its benefit.<sup>6</sup> As is the case with most public goods, the provision of defence services was, therefore, traditionally the exclusive domain of the government.

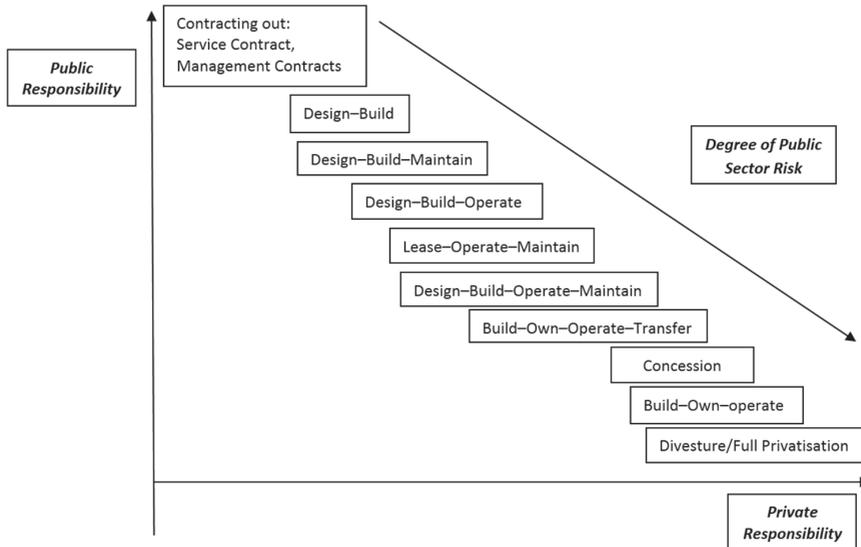
Renaud Bellais makes a distinction between the production and provision of defence goods and services, which is pertinent here. Bellais argues that, in the modern era, the government no longer has to be the sole prime mover when it comes to the production of defence goods and services since there is no relevant theoretical reason for the state to take sole charge of defence production, only of ‘provision’. In other words, ‘the core competency [of the government] consists of providing defence, but it can rely on private partners to reach this aim.’<sup>7</sup>

Moreover, Bellais argues that though defence ‘as a social function’ is a pure public good, its constituent elements are not. There must be a distinction between the social function of defence (which is a public good) and the means to the achievement of that function (which can be a joint effort between public and private sector industry). This brings forth the importance of the PPP format or model of defence provisioning. In his words, ‘the use of PPPs in defence represents an attempt to redefine the boundaries between the Ministry of Defence and the market, to deliver the best value for taxpayer’s money.’<sup>8</sup>

Further, Bellais contends that public choice analysis explains why PPPs can bring about greater allocation efficiencies than the public sector alone. This is because, he argues, the defence domain can be regarded as ‘a budget-maximising bureaucracy’, with the main reason for inefficient defence provisioning being the nature of contracts and informational asymmetries.

It has also been noted that by combining the expertise, assets and resources of the government with the ‘additional contributions from the private sector’,<sup>9</sup> PPPs can offer diverse advantages, such as the reduction of capital investments, creation of new capabilities and early influence of new technologies, all of which can allow the armed forces to more exclusively focus on their core missions. The PPP model for defence has many clear advantages, and the benefits of such a modern acquisition model are well documented.

The PPP model contrasts in a significant way from the traditional acquisition model. A typical, traditional contracting out gives the responsibility of project completion and delivery to the private sector party, whereas under a PPP regime the government retains full responsibility



**Figure 1** Types of Public-Private Partnerships

*Source:* Canadian Council for Public-Private Partnerships; (2012), available at [http://www.pppcouncil.ca/web/P3\\_Knowledge\\_Centre/About\\_P3s/Definitions\\_Models.aspx](http://www.pppcouncil.ca/web/P3_Knowledge_Centre/About_P3s/Definitions_Models.aspx), accessed on 12 April 2017.

for the project's success. Traditional procurement also involves limited or no sharing of control or risk between the two parties—the private sector is exposed to the risk but not the government. Under a PPP regime, risks and rewards are shared by the two parties. Finally, the nature of ownership rights is also different between the two regimes. In the traditional system, ownership rights are sold to the private partner, whereas under the PPP mode, the government retains legal ownership of the asset under consideration, though specific limited rights may be given to the concessionaire. Figure 1 shows the various types of PPP depending on the distribution of risks and responsibility between the public and private sectors.

## THE INDIAN DEFENCE SECTOR AND PPP

### Policy Framework in the Defence Domain

In India, the development, production and maintenance of defence equipment has been the domain of the government right from inception. At present, the Defence Procurement Procedure (DPP) and the Defence

Procurement Manual (DPM) are the governing procedural documents for acquisition of MRO through the capital and revenue routes, respectively. The continuous thrust of government policies and procedures has been on enhancing the role of the Indian private sector in defence through a stipulated increase in the required indigenous content. The concept of prioritisation and category preference was introduced in 2013, with higher preference given to ‘Buy (Indian)’, ‘Buy & Make (Indian)’, and ‘Make’ categorisation as brought out in the foreword of DPP 2013 by the Raksha Mantri.<sup>10</sup> The 2016 policy further introduced a new category, the ‘Buy (Indian-IDDMM)’, with the objective of promoting indigenous design, development and manufacturing.<sup>11</sup> This will also have a bearing on the sustainment of equipment through the indigenous route.

The evolving dynamism of the Indian private sector, coupled with increasing exposure to high technology from foreign sources, brings in the need for synergistic approaches to further the objective of realising substantial self-sustainment in the Indian defence sector.

### **Role of the Private Sector in Defence**

The private sector in India (and many other nations) has been restricted to the roles of sub-contractors and ancillary industry.<sup>12</sup> In other words, the role of the private sector has been restricted to the supply of raw materials, components and parts and other inputs to defence public sector undertakings (DPSUs) and OFs. It has also been a supplier of sub-components and parts to army base workshops, base repair depots (BRDs) of air force and the naval dockyards. The DPSUs and OFs are sourcing 20–25 per cent of their requirements from the private sector.<sup>13</sup>

The Standing Committee on Defence (2006–07) in its Fourteenth Report to the Lok Sabha has stated that, over the years, the private sector has also graduated in capabilities and reach. Therefore, emphasis must be placed on developing PPPs in defence research and development (R&D) on sharing basis.<sup>14</sup>

The Thirteenth Finance Commission Report<sup>15</sup> has similarly stated that there is scope for the improvement, in terms of quality and efficiency, of defence expenditure through greater participation of the private sector. Other significant variables that have been identified include indigenisation with an aim towards import substitution; enhancements to policies, procedures and practices; and more efficient project management. The report has further stated that efforts in this direction are expected to widen the fiscal space for defence expenditure.<sup>16</sup>

### **National PPP Policy 2011 of the Government of India**

The Government of India envisions a substantive role for PPPs aimed at employing private sector investment and operational efficiencies in the provision of public services. The National PPP Policy Draft for consultation (2011)<sup>17</sup> lays out the principles for implementing a larger number of projects across diverse sectors. The policy defines PPPs, elaborates on principles governing implementation of PPP and describes the PPP process. It also brings out the enabling frameworks and the institutional and governance mechanisms required for implementation.

The definition of the PPP model as provided by the Government of India in the National PPP Policy is as follows:

Public Private Partnership means an arrangement between a government/statutory entity/government owned entity on one side and a private sector entity on the other, for the provision of public assets and/or public services, through investments being made and/or management being undertaken by the private sector entity, for a specified period of time, where there is well defined allocation of risk between the private sector and the public entity and the private entity receives performance linked payments that conform (or are benchmarked) to specified and pre-determined performance standards, measurable by the public entity or its representative.<sup>18</sup>

In addition to these, some of the desirable conditions or good practices for a PPP are as follows:<sup>19</sup>

1. Allocation of risks in an optimal manner to the party best suited to manage the risks.
2. Private sector entity receives cash flows for their investments in and/or management of the PPP either through a performance-linked fee payment structure from the government entity and/or through user charges from the consumers of the service provided.
3. Generally a long-term arrangement between the parties but can be of shorter term dependent, for instance, on the sector or focus of the PPP.
4. Incentive and penalty-based structures in the arrangement so as to ensure that the private sector is benchmarked against service delivery.
5. Outcomes of the PPP are normally pre-defined as output parameters rather than technical specifications for assets to be built, though minimum technical specifications might

be identified. Such a structure is expected to leave room for innovation and technology transfer in project execution/implementation by the private sector entity.

The models where ownership of the underlying asset remains with the public entity during the contract period and project is transferred back to the public entity after the termination of contract are the preferred forms of PPP models. The final decision on the form of PPP is a determinant of the value-for-money analysis.

The Government of India has also set up the PPP Appraisal Committee (PPPAC) to streamline the evaluation and approval of projects, in addition to establishing transparent and competitive bidding processes. To provide a broader cross-sectoral fillip to PPPs, extensive support has been extended through project development funds, viability gap funding, user charge reforms, as well as institutional and individual capacity building.

The PPPs are now seen as the preferred execution mode in many sectors such as highways, ports and airports. Increasingly, PPPs are being adopted in the urban sector and in social sectors. Over the years, an elaborate ecosystem for PPPs has developed, including institutions, developers, financiers, equity providers, policies and procedures.<sup>20</sup> In fact, 1,575 large PPP projects with a combined cost of nearly INR 11,55,539.23 crore in the areas of transport, energy, water, sanitation and social and commercial infrastructure are underway in India.<sup>21</sup> However, this model has seen little implementation in the domain of defence MRO. The following sections highlight the possible reasons why this is the case, and make an argument for the immediate implementation of PPP in defence MRO, for sustainment activities in all three services, of which this article focuses mainly on sustainment for land systems and aero-platforms for defence forces.

## MRO FOR AEROSPACE AND LAND SYSTEMS IN DEFENCE

### Conceptual Framework for MRO

Maintenance, repair and overhaul or MRO is defined as: 'All actions which have the objective of retaining or restoring an item in or to a state in which it can perform its required function. The actions include the combination of all technical and corresponding administrative, managerial and supervision actions.'<sup>22</sup> Alternatively, maintenance can be understood as a process that ensures that a system continually and

safely performs its intended functions at a minimum specified level of reliability.<sup>23</sup> Other authors note that ‘maintaining complex systems such as aircraft fleets, rail systems, and production facilities can often exceed the cost of research, development, and production’<sup>24</sup> and that ‘the aircraft fleet maintenance plays the most important role to guarantee the safety and reliability of the fleet in commercial airlines and military air forces’.<sup>25</sup>

The MRO is an integral component of product life-cycle management (PLM), which focuses on the management of an industrial product, right from conceptualisation and prototyping to manufacture, including the service and maintenance of the product as well as design and plans for phasing out or disposal. Therefore, MRO is a part of PLM; in general, MRO takes over once a new product, say, a new defence technology, has been developed, manufactured and inducted.

### **MRO Determinants**

The MRO activities are influenced and determined by the following factors:

1. operational deployment and exploitation;
2. lifespan of equipment;
3. technological content;
4. skill levels and infrastructure availability;
5. life-cycle cost;
6. contractual obligations and commitment of OEM;
7. repair philosophy in vogue;
8. matching logistics;
9. national policies and programmes; and
10. policy on obsolescence management.

### **Global Multi-tier Approach to MRO**

#### *Land Systems: Four-tier Approach*

The maintenance philosophy the world over follows a four-tier approach for maintenance of the equipment, namely, unit, direct support, general support and depot.<sup>26</sup>

#### *Indian Implementation of Global Principles*

Sustenance management for the Indian Army at various levels, namely, at the unit level where direct support, general support and depot-level maintenance is normally carried out under the echelons of the Corps

of Electronics and Mechanical Engineers (EME) through a dedicated setup created for the purpose. The EME is responsible for achieving and maintaining 'the operational fitness of all electrical, mechanical, electronic and optical equipment of the Army, ranging from light vehicles to tanks, guns, missiles, radars, computers, helicopters, communication equipment, night vision devices, simulators, etc.'<sup>27</sup>

The global four-tier approach adopted in India translates to light repair workshops (LRWs) for R1-level repairs; field workshops (FWs) for R2-level repairs; intermediate workshops (IW) for R3-level repairs; and finally, base workshops (BWs) for R4-level repairs. The forward repair teams (FRTs), which are based around customised equipment/systems, function on a battlefield by 'recovering equipment casualties from their point of collapse'.<sup>28</sup> Once the retrieved equipment and assets are evacuated to the BW, the asset is stripped, salvaged or rebuilt, from fighting vehicles to minor electronic components or sub-systems.

The FRT functions in various axes of the battlefield by providing on-site repair, if it is possible for the repair to take place within a specified time. Otherwise, the FRT backloads the equipment to the nearest FW for repairs. If the repair work is beyond the capability of the FW, the equipment is backloaded to an IW. If the repair work is beyond the capability of even the IW, the equipment is backloaded to the BW for repair or overhaul.

There are eight army base workshops (ABWs) and two advance base workshops in India that are responsible for sustenance activities, and also undertake procurement of critical spares. The ABWs can be thought to be analogous to the depot-level modules in the United States (US) MRO regime. The ABWs function under the direct control of the Director General Electronics and Mechanical Engineers (DGEME), whose office, in turn, operates under the Master General of Ordnance (MGO).<sup>29</sup> Also, the Headquarters Base Workshop Group coordinates the functions of the ABWs in consonance with the policy laid down by Army Headquarters. The ABWs are located on-site with the ordnance depots. This ensures a constant supply of repairables, and gives them the ability to meet demands for spares in a timely manner. The repaired equipment is received by these depots and forwarded for use to the user units. In addition to these, the two advance base workshops provide immediate repair cover to the Command.

Support for MRO activities to the FRTs, FRs, IWs and ABWs is generally provided by the industries that are involved in the production

and supply of equipment. In case of indigenously designed and developed equipment, support is provided by the Indian production agencies and there is no critical dependency for spares Engineering Support Package on a foreign OEM.

However, when MRO of defence equipment is done in India by an Indian industry based on technology from a foreign OEM, the Indian MRO agency gets only the service know-how, while the technology know-how and 'know-why' continues to remain with the OEM. In such cases, the Indian agency remains dependent on foreign OEMs for provision of spares of critical equipment and knowledge (for providing specialised maintenance support) throughout the life cycle of the equipment, as the supply chain for these critical items is not available indigenously.

In case the Maintenance Transfer of Technology (MToT) has been taken along with the equipment, the agency which has taken the MToT (army unit/DPSU/Ordnance Factory Board [OFB]) would be in a position to provide major maintenance support. However, for systems where inventory is small and MToT has not been acquired and established within the country, major overhauls and depot-level repairs are likely to happen at the OEM locations.

The equipment held in the inventory of the Indian armed forces is either sourced from the global OEMs or the defence PSUs or the OFB. Very few systems, if any, are supplied by the private sector. Presently, private sector participation in the MRO space for land systems is negligible. The facilities and infrastructure for carrying out major overhauls also correspondingly exists either with the army, the PSUs, or with OFB.

### *Military Aerospace*

The maintenance philosophy the world over follows a multi-tier approach for maintenance of aerospace equipment. All aerospace equipment maintenance can be categorised as 'scheduled' maintenance, which is a preventive action taken to ensure that a product functions properly at pre-determined intervals; or as 'unscheduled' maintenance, which is not planned to take place in a determinate manner, but required as and when an item has failed or malfunctioned. Scheduled maintenance includes predictable inspections called transit, 48 h, 'A', 'B', 'C' and 'D' checks, each of which is sub-divided into line and base categories.<sup>30</sup>

### *Indian Implementation of Global Principles*

The indigenous capacity in military aerospace MRO is limited to the IAF and the respective OEMs, with a few civil MRO providers currently in the market. Presently, most military aerospace MRO work is undertaken by the IAF or HAL, the defence PSU. While the line checks and daily checks such as A and B-level maintenance are carried out by the designated service units, the base checks at levels C and D are carried out at the premises of the OEM itself. In general, the first level is at the unit level, the second level of maintenance is handled by the base repair facility (BRF), with third and fourth-level maintenance usually taking place at the OEM premises. In addition, Air India Engineering Services Limited also has significant involvement in military MRO work as well. The HAL's transport division is certified by the Directorate General of Civil Aviation (DGCA) for the MRO of Dornier 228 and Avro 748 aircraft for civil operators.<sup>31</sup>

However, third-party Indian MRO firms, like Max MRO, Air Works India, Taneja Aerospace and some others, are now emerging as small but viable MRO providers in the civilian space. Air Works, an International Air Transport Association (IATA) certified safety auditor, for example, was founded in 1951, and today has a presence in 11 countries, including Ireland, the US, Nigeria and Hong Kong. The company started out as a business aviation MRO, but expanded to avionics and defence MRO in 2011 and 2012, respectively, and, in 2014, began turnkey maintenance operations as well. Air Works is one of the success stories of indigenous MRO provision in the civilian sector, where an initial civil sector interest was organically expanded to include a comprehensive portfolio of capabilities, including MRO for the defence sector.<sup>32</sup>

#### **PROBLEM AREAS IN CURRENT SYSTEM OF MRO IN INDIA**

One of the major challenges for logistics providers in the army is to keep major equipment and weapon systems in mission-capable condition. Timely availability of combat-ready equipment has become a major challenge for the army due to the harsh ambient conditions, climatic extremes and the enhanced lifetime of these systems. This, coupled with extended deployments, has resulted in extensive wear and tear of equipment and pushed them to the limits.<sup>33</sup>

The existing system of MRO is leading to high downtime of critical equipment. The 'mean time to repair' (MTTR) and the 'mean time

between failure' (MTBF) is high, which is leading to non-availability of key resources and critical equipment. The cost for maintenance is high, leading to an overall high life-cycle cost of the asset or equipment. The rapid obsolescence rate of high-technology items and lack of modularity further makes it difficult to upgrade defence equipment in time.

The proliferation of complex weapon systems and aerospace platforms from OEMs of various countries, demand variability, managing shared resources and physical restriction on work movement pose additional challenges to the structuring of an efficient MRO framework.<sup>34</sup> In aerospace MRO, other unique challenges can be seen to hinder the progress of indigenous civil MRO providers. One of the reasons why domestic civil MRO providers are failing to thrive is that the Indian MRO market is very fragmented and there is a need for a consolidation or even conglomeration of interests in this field so that the numerous small players can achieve a sustainable and profitable scale of operation.

There is also a lack of competitive environment in the domestic MRO industry. In the absence of a push to make the present domestic MRO industry more competitive and financially viable, many small non-OEM MRO suppliers have floundered. Increased competition in the MRO domain could also lead to greater consolidation because weaker and less efficient players will be weeded out of the market, or subsumed and taken over by better and more efficient MRO providers. The complexity of the domestic supply chain in the aerospace industry needs to be addressed by encouraging the establishment of an integrated supply chain service provider in India, preferably by a domestic private sector player.

Since the global civil aerospace MRO industry alone was worth more than USD 60 billion in 2016<sup>35</sup> it is in the interest of the Indian armed forces as well as the government and domestic private sector industry to attempt to develop a greater indigenous capacity for MRO. Many steps have been taken to address some of the entrenched problems facing the industry in recent years, most notably with the government focusing on policy initiatives to help the fledgling MRO industry. The 2016–17 budget contained many provisions that stand to benefit the domestic MRO sector, especially in terms of allowing civil MRO contractors to cut costs by easing restrictions and red tape. Some of the important provisions to facilitate growth of indigenous MRO sector are as follows:

1. Exemption on customs duties on toolkits used by domestic civil MRO providers.

2. Automatic single-window clearance for import of aircraft parts by a one-time certification by the DGCA.
3. Extension of storage period for aircraft spares wherein the MRO provider does not incur fees or duty increase up to three years.
4. Ease of issuance of visa and other travel permits for foreign MRO/OEM experts.
5. Provision for adequate land for MRO in all extant and future airports.

Considerable initiatives are being taken by the government to increase the ease of doing business for the MRO industry in India. However, the success of these measures will lie in their effective implementation. The following section aims to fill in this gap by looking at the experience of the US with defence sector MRO. The US is the largest market and provider of MRO services, for both land systems and aerospace, and has a long history of using the PPP model to leverage the private sector efficiencies and the public sector resources.

#### EXPERIENCE OF THE US DEPARTMENT OF DEFENSE WITH PPP IN MRO

The US has been using PPPs mainly to manage defence bases and depots or infrastructure modules. The PPPs for the MRO of land systems in defence have been successfully implemented in a major way by the US Department of Defense (DoD). The US DoD has an elaborate policy and procedural framework for PPPs for depot-level maintenance.

#### **US Policy Framework Enabling PPP in Defence**

In November 1997, the Secretary of Defense, US DoD, put forth the Defence Reform Initiative (DRI) Report which highlighted the need for private sector participation in maintenance activities being performed by the depots.<sup>36</sup>

This was followed by 1998 National Defense Authorization Act (NDAA), and various addendums, that designated depots as Centers of Industrial and Technical Excellence (CITE) in their primary capabilities and allowed them to form PPPs in these domains.<sup>37</sup> There were three key changes in policy that opened the door for PPPs:<sup>38</sup>

1. The NDAA of 1998 sanctioned a two-year pilot programme under which army industrial facilities could sell defence goods and services to persons outside the US DoD in support of DoD

weapon systems, even if such systems were commercially available outside the DoD.

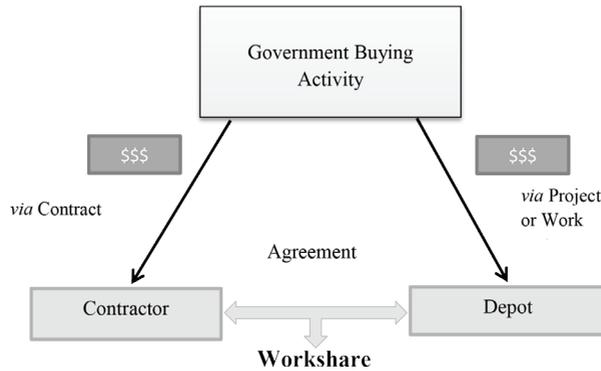
2. Section 141 of the 1998 NDAA was amended to include Section 2474 to Title 10, which formally established depots as CITE at existing depots according to their primary capabilities and competencies, and further allows them to arrange PPPs in these domains of excellence. Furthermore, depots were permitted to credit receipts from such PPPs directly to their accounts.
3. Section 361 of the 1998 NDAA amended Section 10 USC 2471 to allow the 'proceeds from leases of excess equipment and facilities to be used by the leasing military department'.

### **Regulatory Environment for Sustainment in US**

Primary regulatory guidance and additional regulatory guidance for MRO can be found in the 'United States Army Organic Industrial Base Strategic Plan 2012–2022'.<sup>39</sup> It can be seen that the US regulatory guidance is a comprehensive framework which covers the full range of activities, beginning right from a complete definition of MRO capabilities, and provides the necessary robustness and dynamism to the system that is essential for proper decision-making and successful implementation. It stipulates that a core logistical capability must always be preserved in government hands, at the depot level and in support of 'direct' or 'front-line' MRO needs.

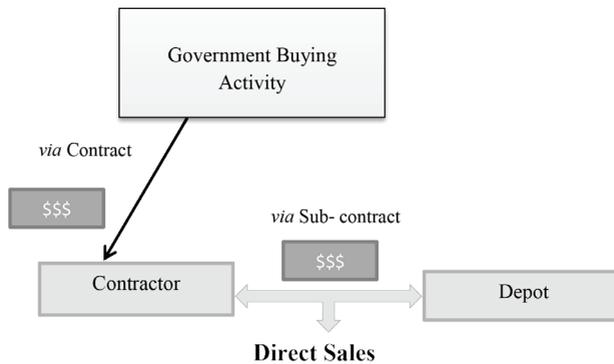
Moreover, all funding sources and processes are clearly spelt out, and limitations thereon well defined. The responsibilities of the decision-making authorities at various levels are appropriately defined and allocated, and little room is left for misinterpretation of expectations from both government and private contracting partners. Adequate safeguards are built in to ensure that public interest is the prime driver of decision making, and competition is encouraged at all levels to bring in efficiencies in the system; and the flexibility built into the system has corresponding oversight mechanisms. Flexible human resource management driven solely by the workload is a key characteristic. Differential pricing schemes for different customers is acceptable. Government-owned factories can enter into agreement to perform commercial work for the private sector contractor.

In the US, two different funding arrangements are employed for PPP models in the defence space. Figures 2a and 2b depict the difference in funding between a workshare PPP arrangement, wherein the public



**Figure 2a** Workshare Sales PPP Agreements

Source: David Floyd and Tom Gorman, 'Public-Private Partnerships: The Key to Retaining Government and Industry Capabilities', *Defence AT&L*, January-February 2013, p. 34, available at [http://dau.dodlive.mil/files/2013/02/Floyd\\_Gorman.pdf](http://dau.dodlive.mil/files/2013/02/Floyd_Gorman.pdf), accessed on 3 July 2017.



**Figure 2b** Direct Sales PPP Agreements

Source: David Floyd and Tom Gorman, 'Public-Private Partnerships: The Key to Retaining Government and Industry Capabilities', *Defence AT&L*, January-February 2013, p. 34, available at [http://dau.dodlive.mil/files/2013/02/Floyd\\_Gorman.pdf](http://dau.dodlive.mil/files/2013/02/Floyd_Gorman.pdf), accessed on 3 July 2017.

sector agency assumes some part of the responsibility for carrying out the contract, and a direct sales PPP agreement, wherein the private contractor assumes full responsibility for the execution of the contract.

### Strategic Planning for MRO in the US

The importance and primacy of strategic planning aspects of MRO is evidenced by the focus of the US government and other stakeholders on

**Table I** Mutual Advantages from PPP Projects for MRO

<i>Why Partner with a Depot</i>	<i>Why a Depot would Partner with a Contractor</i>
Leverage depot capabilities	More responsive product support
Access to knowledgeable workforce	Increase facility utilisation
Use of existing facilities and equipment	Improved depot processes and technology
Access to process permits	Reduced cost of ownership
Minimise process flows	Avoid investment in duplicative capabilities
Long-term contracts	Single-point accountability
Avoid investment in duplicative capabilities	Preserve skilled workforce
Compliance with government regulations	Enhance operating efficiency
Increase profits	Access to technical support
Reputation associated with partnerships	Leverage commercial best practices

*Source:* Reproduced from Kate Vitasek, Jerry Cothran and Steve Rutner, 'Best Practices of Public-Private Partnering', University of Tennessee and Supply Chain Visions, 2007.

PPP, and by the identification of partnership between the government and private sector as the key driver leading to increase in the efficiency of operations at depots. The key driving forces for depots and contractors to partner with each other are identified in Table 1.

#### EXPLORING THE POTENTIAL OF PPP IN INDIAN MRO SECTOR

The growing availability of expertise in engineering services across the private sector provides the right ambient conditions for MRO to grow as a specialised vertical in all relevant fields. The experience of other nations with PPP in MRO shows that given the right environment for the private sector to participate in the MRO vertical at the depot level, they can become a potent force multiplier. A number of Indian companies have been granted licence by the Government of India for overhaul of armoured vehicles of all types, in addition to their design, development and manufacture. These companies have been aggressively trying to get a toehold in this space, but have not had much success till date.<sup>40</sup>

With the focus of the Indian government on 'Make in India' and the accompanying changing environment encouraging the private sector to take on a bigger role in the Indian defence market, new models involving the private sector aimed towards reducing cycle time for repair and reduction in costs need to be evolved and implemented quickly. The involvement of the private sector in a collaborative manner shall enable existing resource utilisation (both technical know-how and infrastructure) of the public sector, risk sharing between public and private sector and facilitate delivery of cost-effective solutions in a timely manner for the defence forces.

It is proposed that the potential of the Indian private industry be explored for exploitation in the MRO sector for defence through the PPP models. The beginning can be made for overhauls being done by the private sector industries at depot levels and at OFB/DPSU premises. Different models and workshare agreements can be explored for implementing the partnerships. The private sector industry can use the facilities established within the existing BWs and provide service by doing repairs and overhauls of the equipment. The private sector partner may also be allowed to use the spare capacity existing in these depots for their commercial exploitation to ensure commercial viability and a business-like approach in sustainment management. This will bring in the efficiencies of the private sector while facilitating the services, PSUs and the OFs to become leaner and meaner, and also ensure control over the availability of the equipment at the same time. However, the necessary policies, procedures and legal framework and structural adjustments required to enable participation of private sector industries in the MRO of defence equipment are required to be established.

The Indian defence sector is a monopsony wherein the government is the only customer. Private industry shall be unwilling to invest in a big way without a clear business case or firm commitment for business because of the capital-intensive nature of the sector. The ideal solution for bridging this gap between the existing and the desired levels of private sector participation in this space would be by forming PPPs where the existing infrastructure resources in the public sector and the efficiencies of the private sector can be leveraged jointly to provide necessary services in time at a competitive price. The policies are required to be amended to allow utilisation of assets created by the government, by agencies outside the government, with the former still retaining control over them.

The PPPs can provide the necessary vehicle for harnessing the best of both public and private sectors in the shortest time frame. An efficient and transparent PPP policy, along with the necessary legal framework, is the first step towards employing PPP for MRO for defence systems. This should be followed by laying down detailed procedures for implementing these policies. It shall enable minimising downtime of critical equipment and lead to enhancement of combat potential of the soldier. It will also enable the participation of private sector in the defence of the country, leading to a win-win situation for all the stakeholders.

#### CHALLENGES IN IMPLEMENTATION OF PPP FOR MRO

Successful implementation of a PPP model in defence cannot proceed without a thorough understanding of the problems and flaws in the extant system. The following sub-sections highlight some of these gaps and identify four focus areas which will need to be addressed. Future directives will need to be issued to bring in clarity on the subject.

##### **Policy Framework**

Though policies and other regulatory agencies already exist in the Indian scenario, such as the DPP and the PPPAC, the legal framework for implementing PPPs in defence sector needs further elucidation, along with the provision of clear guidelines governing the defence sector, including the MRO domain. The defence sector poses unique operational challenges not only to manufacturers but also to equipment service units. Therefore, the risks and liabilities accruing to the different parties in the PPPs being formed during various eventualities will need to be spelt out. Guidelines on the roles of constituent partners in these partnerships, along with the rules of engagement, will need to be clarified, for both peace-time scenarios as well as during war-time contingencies.

##### **Procedures**

Current guidelines on procedures for implementing PPP models are well defined for the domain of infrastructure, but the absence of similarly well-defined procedures and guidelines for defence services results in a conflict of interpretation and execution of the contract. This absence needs to be addressed immediately. In order to translate the existing PPP policies into uniformly implementable procedures—which would create a win-win situation for both public and private sector—detailed articulation of the extant procedures is required. The new procedural

guidelines should also take measures to ensure an optimal utilisation of existing resources, both in the public and private sector, which would be especially efficient for the MRO sector where significant duplication of capabilities could thus be avoided. Due diligence will have to be exercised to ensure an optimal balance between the capability existing in the public sector and new capabilities which are sought to be created in the private sector, keeping operational considerations in mind. Another important measure is the setting up of an autonomous control structure which can play a broad coordinating role and act as a dispute resolution mechanism, such as the Telecom Regulatory Authority of India (TRAI) in the telecom sector.

### **Intellectual Property Rights (IPR) Issues**

The IPR issues arising due to equipment and assets coming from various global OEMs will need to be addressed with alacrity and purpose if India is to gain from her involvement in defence sector PPPs. These issues assume a very important role for India due to the fact that a significant proportion of our equipment is imported from foreign OEMs. The world over, nations safeguard their interest by maximising the commercial exploitation of IPR regimes. India will need to set up a decision-making structure to ensure that the PPP contracts in the defence sector are aligned with, and reflect, national and domestic interests, rather than foreign corporate or national interests. Nonetheless, as long as India is dependent on imports and foreign OEMs to meet her MRO capability needs, there will be little de facto control over the long-run direction or vision for technological innovation and evolution for the Indian defence forces.

By favouring the acquisition of defence services from indigenous service providers in MRO the Indian armed forces would gain the wherewithal and capability for indigenous maintenance at all levels. This will provide the industry with exposure to repairing and maintaining equipment as required; provide domestic manufacturers experience in upgrading, enhancing or retrofitting equipment and assets to suit the present contingency; and help to independently pursue an agenda of the equipment's modernisation and the overall evolution of military equipment. This could pave the way for India to occupy the position of an innovator, rather than being a mere consumer in the global defence MRO market with little say over the distribution of technical knowledge and know-how.

### **Good Governance**

Decision-making by the government entities responsible for taking decisions will have to be expedited. The efficiencies brought in by the private sector will get nullified in case the government is not able to take decisions at a corresponding pace. A considerable degree of delegation, along with accountability, will need to be built in into the government system to get the desired level of service in the timelines envisaged. These suggestions are coincident with many of the overall insights of new public management, which are aimed at bringing the managerial efficiencies of the private sector into the public domain.

### **CONCLUSION**

In the Indian context, the broad guidelines for PPPs are already in existence, and have seen extensive implementation in the infrastructure sector due, in part, to many special measures taken by the Government of India. In the specific context of the defence sector, the government has already taken a number of measures for expediting the involvement of private industry. The Department of Defence Production has brought out the Defence Production Policy, and the Ministry of Defence has issued the revised Defence Procurement Procedure, which governs defence MRO in India.

In spite of the government formulating various policies and procedures for the increased participation of private sector in defence, the private sector has not yet reached a critical mass, and the public sector and the foreign OEMs continue to dominate the defence industrial space. This is also in spite of the fact that there is a consensus that the domestic private industry now has the capability to manufacture and service the kind of sensitive and reliable equipment a modern military demands.

To search for lessons and correctives, we can look at the experience of the US armed forces with PPP projects for MRO. The PPP model has been most successfully implemented in the US where the PPPs perform the necessary MRO in the government-owned facilities at the depot level. This has been enabled by well-articulated and comprehensive legislation, along with detailed procedures to facilitate the participation of the private sector with the public sector.

In the Indian context, whereas there has been an extensive discussion on the appropriate guidelines and procedures for governing PPP projects with private industry, little has come by way of a policy regime on the provisioning of defence-related services, of which MRO is a major

component. An important first lesson from the US experience is the utmost importance of having in place clearly formulated rules and guidelines. India needs to address the lack of policies, detailed procedures and legal frameworks for a PPP model for MRO, to govern the private acquisition of defence-related services. Proper guidelines must include the necessary legal framework, institutional mechanisms and departmental policies to stimulate acquisition of MRO through PPPs.

There are other important takeaways for India. Since MRO is an independent vertical, it is a good place to start an exploration of the benefits of PPP models of acquisition. The US sources the majority of its equipment domestically. The exploitation of the existing capacity in the government sector by the private sector for MRO and for future development is an important lesson for India. India has already established a vast network of MRO capability under public sector ownership. By drawing in domestic private industry to partner with the government in the provisioning of MRO services, the government could address its problem of under-utilisation of extant resources and give a boost to domestic services and manufacturing with spare capacity being used for the development of advanced technology systems. Moreover, performance of MRO by domestic private industry rather than foreign OEMs would enable a gradual absorption of technical know-how by the Indian industry involved in the provisioning of MRO.

The PPPs between the Indian PSUs, OFs, other government facilities and the private sector companies in defence can be expected to provide MRO services for the existing equipment available with the land forces of the country. The efficient and cost-effective MRO of existing equipment through PPP would increase the uptime of the existing equipment, and enable their better utilisation. It would enable the harnessing of the efficiencies of the private sector using the resources currently existing in the public sector, along with an optimal sharing of risks.

These are the short-run benefits which may accrue with the adoption of PPP contracts in MRO. In the long run, a focus on PPP with domestic private industry may lead to a more motivated and involved domestic industry, as well as greater self-reliance in defence and concomitantly lower foreign dependence. For both the short-run and the medium- to long-term perspective, the costs and benefits of PPPs for MRO as an effective contracting tool must be judiciously exploited by comparing against the costs and benefits of the traditional maintenance model, especially for front-line and mission-critical operations. Given its

success with the most admired military force in the world, domestically biased PPP contracts in MRO may be the optimal strategy for the post-induction life-cycle management of the equipment stock of the Indian armed forces. It could also be a stepping stone towards the adoption of PPP for production of defence systems and their acquisition.

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