

MP-IDSA

Issue Brief

Technology Development Fund: Opportunities and Challenges

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November 03, 2023

S*ummary*

There is a need to more competently ingrain global best practices as well review the implementation of the Technology Development Fund (TDF), so that its objectives can be more fully realised. This is especially so since no new project seems to have been conceived or accorded 'Acceptance of Necessity (AON)' approval under TDF so far under the enhanced financial powers of up to INR 50 crore per project.

Introduction

The Technology Development Fund (TDF) Scheme is a flagship programme of the Department of Defence Research and Development in Ministry of Defence, Government of India. It is being executed through the Defence Research and Development Organisation (DRDO), for meeting the requirements of the Tri-Services, defence production and DRDO itself. It seeks to create an ecosystem for promoting self-reliance by building indigenous state-of-the-art systems/cutting-edge technologies/emerging or futuristic technologies for defence applications through active participation of private industries, especially medium, small and micro enterprises (MSMEs) and start-ups. The TDF is supposedly the biggest Grant-in-Aid Scheme in defence sector for this purpose.

The 2011 Defence Production Policy¹ promulgated by MoD considered self-reliance in defence manufacturing as a vital strategic and economic imperative. It placed emphasis on utilising the emerging dynamism of the Indian Industry by leveraging domestic capabilities for the growth of the Indian defence industry. In pursuance of this policy, the government in the Union Budget 2014–15² announced the setting up of a ‘Technology Development Fund’, with a limited corpus of fund, with an aim to fund the Indian MSMEs and start-ups for development of defence technologies and dual-use technologies, which are currently not available or have not been developed so far.

The task of executing the TDF Scheme was initially entrusted to the Department of Defence Production (DDP) in the MoD.³ However, taking a pragmatic view for expediting the successful execution of the scheme, Committee of Secretaries chaired by the Cabinet Secretary on 30 September 2015 took a decision to develop TDF as a comprehensive scheme without limiting it for an expenditure target; and DRDO was tasked to execute it.

The TDF Scheme was approved by the Raksha Mantri in September 2016⁴ to promote self-reliance as part of the ‘Make in India’ initiative, and a detailed SOP⁵ was also formulated. Thereafter, TDF Directorate was created in DRDO HQ and massive efforts were made by DRDO officials to implement this scheme. Generating awareness in the industry about the scheme and attracting professional and capable industries and start-ups for participating in the technology-based competitive bidding process was not easy.

¹ [“Defence Production Policy 2011”](#), Department of Defence Production, Ministry of Defence, Government of India.

² [“Union Budget 2014-15”](#), *india.gov.in*

³ [“Modernisation Projects”](#), Lok Sabha, Unstarred Question Number 3371, 18 December 2015.

⁴ [“Startups in Space Tech”](#), Press Information Bureau, Ministry of Science & Technology, Government of India, 9 February 2022.

⁵ [“Standard Operating Procedure \(SOP\) for implementing Technology Development Fund \(TDF\) Scheme”](#), Ministry of Defence, Government of India.

DRDO initially partnered with Invest India,⁶ the National Investment Promotion and Facilitation Agency of India, a non-profit venture under the Department for Promotion of Industry and Internal Trade (DPIIT) to help in the implementation of the TDF scheme and further facilitate MSME and start-up participation.

Wider participation of interested and capable industries in a particular project was ensured through open Expression of Interest (EoI) mode. A marking system with an objective to remove any kind of subjectivity was introduced for capability assessment of the participating industries system. Later, Quality and Cost-Based Selection (QCBS) was also adopted to give the required weightage/preference to the technical and technological aspects.

Scheme Format

The Scheme enlists requirements of Service Headquarters (SHQs) for upgrading products/systems and futuristic defence technologies as *Project*, and awards *Grant-in-Aid* to the eligible industrial stakeholders. It extends financial support and expertise through DRDO set up to upgrade existing products/systems, processes and its applications, by reducing production costs, improving functionality and quality by promoting ‘Make in India’ programme, and the development of futuristic dual-use technologies (defence as well as civil uses).⁷

Under this scheme, eligible industrial partners are awarded projects with project cost of up to INR 10 crore. This limit has been subsequently enhanced to INR 50 crore since FY 2022–23 for developing innovative technologies or prototype of product having potential use for the Services with a typical development period of two years. For big ticket projects, enhanced timelines of up to four years may be considered. Funding for the projects is to be covered through provisions of Grant-in-Aid, subject to a maximum of 90 per cent of the total project cost. The funding is linked to mutually agreed milestones and funds are released based on the completion of pre-determined milestones.

Eligibility for Participation in TDF Scheme

The following are the eligibility conditions for participation in the TDF scheme:

- The industry must be a public limited company, a private limited company, a partnership firm, a limited liability partnership, one-person company, sole proprietorship registered as per applicable Indian laws;

⁶ [“Technology Development Fund”](#), Defence R&D Organisation, Government of India.

⁷ [“Funding under Technology Development Fund scheme of DRDO enhanced to Rs 50 crore per project from Rs 10 crore”](#), Press Information Bureau, Ministry of Defence, Government of India, 8 June 2022.

- The industry should preferably be an MSME or a Start-up, registered in India;
- The industry must be owned and controlled by a Resident Indian citizen;
- Entity with excess of 49 per cent foreign investment will not be eligible;
- Industry may work in collaboration with academia or research institutions. The work involvement of academia cannot exceed 40 per cent of the total project cost.

TDF Scheme for Start-ups

It aims to provide financial assistance to Start-ups for prototype development and trials, with an estimated development cost of up to INR 1 crore, inclusive of funding support of up to 20 per cent to the incubators associated with the Start-up, subject to the following conditions:

- Start-up must be recognised by the DPIIT and should not be incorporated for more than three years from the date of submission of application;
- Start-up should not have received any grants/grants-in-aid by any government scheme for a similar technology;
- Any industry which is a public limited company, a private limited company, a partnership firm, a limited liability partnership, one-person company, sole proprietorship registered as per applicable Indian laws;
- The industry must be owned and controlled by a Resident Indian citizen with a shareholding of at least 51 per cent;
- Start-up should be incubated at one of the Central/State government assisted incubators;
- The incubator should have assisted at least 25 Start-ups, and at least five amongst these must be from the defence and aerospace sector.

The scheme aims to provide a big stimulus to the defence manufacturing sector by encouraging the industry to innovate on defence technologies, in order to place India on the self-reliance trajectory. In addition to providing the Grant-in-Aid for the development of indigenous technologies, the scheme also provides the industry with the following benefits:

- Technological handholding by DRDO set up and its support system;
- Joint ownership of Intellectual Property Rights (IPR) along with DRDO;
- Sales opportunity to primes as subcontractors;
- Nurturing of young minds;

- Opportunity of being a part of the defence ecosystem;
- Direct channel of sales in the private marketplace for the development of dual-use technology and spin-offs.

The nature of the proposals that are supported under TDF scheme are as follows:

- Significant up-gradation/improvements/further developments in the existing products/process/application etc.;
- Technology Readiness Level (TRL) up-gradation from TRL3 onwards to realisation of products as per Tri-Services requirements;
- Development of futuristic technologies/innovative products which can be useful for the defence applications; and
- Import substitution of components whose technologies does not exist with the Indian industry.

Selection Criteria⁸

The application process for the TDF scheme is completely digitised. Post successful completion of registration and application process, a three-tier evaluation and assessment of the industry is done based on the following parameters:

- Design capability
 - Principal Investigator and Team; Technical capability/Qualification/Quality of the Team (Start-ups/Incubator)
 - Proposed configuration
 - Approach to meet functionalities
 - Indigenous design capability in subject field (Percentage of Indigenous Content in the proposed technology development and percentage of proprietary items)
 - Total number of patents translated into product in the subject field and total number proposed to be utilised for the project
 - R&D expenditure as per cent of turnover on Strategic/Defence Systems and R&D Infrastructure existing related to subject field
 - Execution of projects pertaining to critical technology area

⁸ **“Technology Development Fund (TDF) Scheme: Building an Ecosystem for Enhancing Cutting Edge Technology Capability for Defence Manufacturing”**, Defence Research & Development Organisation (DRDO).

- Fabrication and manufacturing capability
 - Indigenous manufacturing capability (plant and machinery) (with Start-ups/Incubator Partner)
 - Potential to meet defence needs/innovative/Unique Solution as per the Project requirement
 - Presentation/Potential Impact/Overall Assessment
 - Inter-operability across the Services/Potential for dual use/Export Potential
 - Execution of projects in India/abroad
 - ToT with Indian Partners and Foreign Partners
- Maintainability and life cycle support
 - Proposed methodology for life cycle support
 - Indigenous Content (Components and others) in execution of the project
 - Adherence to timelines, minimisation of slippages, cost overruns
 - For past executed projects
 - Plan proposed for executing current project
- Commercial viability
 - Net Profit
 - Turnover
- Capacity and profile of the company
 - Nature of the Company/Start-ups
 - Nature of the Incubator

Services' Involvement

Services as users are also involved at all stages of TDF Project Development process, including at the stage of requirement projection. The User representative is an integral part of Project Monitoring and Mentoring Group (PMMG). This group finalises or vets the Technical Parameters Requirements (TPR)/Project Definition Documents (PDD). It undertakes industry evaluation and periodic review and mentoring, including PDR (Preliminary Design Review), CDR (Critical Design Review), Trials, Testing and certification processes.

Users representatives are members of Empowered Committee (EC) and Technical Committee (TC). The EC consists of the three Vice Chiefs and Chief of the Integrated Defence Staff (CISC). The TC consists of the representatives of coordinating Directorates from Services. All Acceptance of Necessity (AoNs) are vetted by Vice-Chiefs of respective Services. All PDC extensions/Milestone closures/Project Reviews are recommended/approved by Services in TC and EC as per their charter.

Dare to Dream

TDF is focused on supporting development of indigenous technologies also through the ‘Dare to Dream Innovation Contest’, launched by the Ministry of Defence on the fifth death anniversary of renowned scientist and former President of India, Dr APJ Abdul Kalam. This is a competition under TDF intended to scout for technologies from individuals, researchers and Start-ups, for innovations in defence sector, with an objective to unearth disruptive ideas and concepts in emerging technologies identified by DRDO for enhancing defence capabilities. The competition provides a unique opportunity for start-ups and innovators to solve some key challenges in emerging technologies that can help boost India’s defence and aerospace capabilities.

Progress so far

The progress so far under execution of TDF scheme⁹ is quite evident. Till 2022, more than 160 technology gap areas have been identified and around 70 projects have been awarded to the industry for more than Rs 291 Cr (approx.). More than 2,000 experts and 5,000 companies have been associated. So far, four rounds of contests have been held under ‘Dare to Dream’ programme¹⁰ under the ambit of TDF with a grand success in attracting talents and 60 innovators have been identified.

The core areas for R&D and innovations under TDF pertains to deep technologies and cyber domains, including relating to Avionics, Composite Materials, Propulsion System, Load Carrying Drones, Exoskeleton, Health Technology, AI, Block Chain, Space & Cyber Security, 5G Communications, Quantum Computing, Photonics, Robotics, Marine Technology, Line Replaceable Units (LRUs), Sensor Technology, Telemetry and Instrumentation, among others. Further, on 14 October 2022, Naval Innovation and Indigenization Organization (NIIO) signed a MoU with TDF for Indigenization of Naval Sub-Systems.

Many of the technologies developed under TDF, viz. Composite (Carbon) Materials Sea Water Pumps (40TPH & 125 TPH), Video Processing/Switching Board for an Advanced Military Aircraft (AVPSM Card), Prussian Blue Formulations (for

⁹ [“Technology Development Fund”](#), n. 6.

¹⁰ [“DRDO - Dare to Dream Innovation Contest”](#), DRDO.

radiological and nuclear emergencies), Self-Regulating JT Cooler for Missile Seeker, Futuristic high-Performance Propulsion System for small Satellite EOR and Station Keeping, Avionics Antennas, Drones for carriage of stores at high altitude (Hybrid Aerial Vehicle), etc., have got significant commercial opportunities. Moreover, wherever technologies have been developed under TDF successfully for import substitution, a huge saving to the exchequer on account of foreign exchange is also expected.

Opportunities and Future of TDF

In June 2022, after observing satisfactory progress in implementation of the scheme, the Raksha Mantri approved the enhancement of funding limit for one project from INR 10 crore to INR 50 crore to attract R&D by private industries in high-value technology areas. Dare to Dream 4.0 is also in progress; and the response from potential incubators has been very encouraging so far.

The DRDO HQ has signed an MoU for Bilateral Innovation Programme/Agreement with Israel's Directorate of Defence Research and Development (under Israel's Ministry of Defence) to facilitate R&D projects to be taken up on pre-determined technology gap areas, on joint venture (JV) basis by Indian and Israeli Industries. Indian Industries will be funded through TDF scheme. DRDO HQs may plan for similar MoUs with other friendly countries for innovations in the field of futuristic technologies.

Meanwhile, in the Annual Budget of 2022-23, it was announced that defence R&D will be opened up for Industry, Start-up and Academia and 25 per cent of the defence R&D Budget has also been earmarked for this purpose. So far, no Standard Operating Procedures (SOP) or any firm guidelines have been declared by the Ministry of Defence or by the Finance Ministry to observe the progress on this important announcement.

Progress of TDF scheme's execution has been deliberated and reviewed at many forums. MANTHAN 2022 (TDF Directorate's Seminar with Services and Industries) discussed important issues viz. roadmap for TDF after enhancement in fund limits for a project up to INR 50 crore, acceptance of failure, write-off of the cost for failure, Grant-in-Aid mode for TDF projects, etc., and made suitable recommendations duly registering the satisfaction with the implementation of TDF scheme.

Empowered Committee (apex body for handling TDF matters) also constituted a committee under the chairmanship of Director General of Life Sciences (DGLS) Cluster to further simplify and fast-track mechanisms for TDF projects. The Kakodkar-Saraswat Committee was also constituted to work with a mandate to suggest suitable mechanism for utilising 25 per cent of defence R&D Budget for funding to Industry (including Start-ups) and Academia and for simplification of TDF scheme.

Constraints, Challenges and Suggestions

Since TDF is focused primarily to direct funding to the industry, it has potential not only to strengthen R&D culture among private defence industries, but also to generate employment and entrepreneurship opportunities for scientists, and to create wealth for the nation by providing import substitution and export expansion.

However, it is pertinent to note that no new project seems to have been conceived or accorded ‘Acceptance of Necessity (AON)’ approval so far under the enhanced financial powers (up to INR 50 crore per project). The reasons, why this is so, need thorough examination by the experts, when the SoP duly approved by MoD for awarding projects under TDF on Grant-in-Aid mode is already in place.

Moreover, General Financial Rules (GFR) 2017 now have enabling provisions to award technology projects to private industry under Grant-in-Aid category, after Rule 233 has been amended. In relaxation of the extant provisions of the rule, Scientific Departments are allowed to extend the provisions of Rule 233 (i) & (ii) of GFRs 2017 (Funding of Sponsored Projects or Schemes) to private sector/NGOs, who are commissioned to execute projects or schemes. The Scientific Ministries/Departments defined are Department of Science and Technology, Department of Biotechnology, Department of Scientific and Industrial Research, Department of Atomic Energy, Department of Space, Ministry of Earth Sciences and Defence Research and Development Organisation.¹¹

The reason perhaps for no new TDF project being approved could be issues relating to interpretation of Rule 233 and its addendum as mentioned above. This addendum being self-explanatory, though, doesn’t leave any room for any confusion or misinterpretation. Even so, if required, suitable clarification from the Department of Expenditure (DoE), Ministry of Finance (MoF) may be sought to resolve the deadlock on the issue of handling TDF projects under Grant-in-Aid. Separate detailed chapter may also be included in GFR 2017 for this purpose, if felt necessary. Till then, the approved SoP for TDF (treating it Grant-in-Aid Scheme) should continue to be followed.

The insistence on awarding R&D projects on Contract mode (like Procurement) may not be advisable, as R&D is not always a success. Moreover, there is never a failure in R&D projects and every ‘not-successful effort’ is either a learning or a next step for future success. Expenditure incurred on ‘not a fully successful R&D project’, therefore, should not be treated like a Loss. Similarly, it should also be accepted that many a times, R&D cost for developing a technology might be higher than import cost. It is also, however, a fact that R&D in such cases may proliferate in various other echelons of research and widen the doors for self-reliance and future capability development.

¹¹ “[General Financial Rules 2017](#)”, Department of Expenditure, Ministry of Finance, Government of India, Updated up to 31 July 2023.

Despite Services being involved in TDF projects at every stage since inception till trials/completion, the observations that Services do not take ownership of TDF projects of DRDO or Services need separate TDF schemes for meeting their requirements are actually infructuous. Further, Services should also propose minimum quantities to be ordered for an item to be developed under TDF to motivate the Development Agency from commerce point of view.

Similarly, finance authorities are also involved at every stage from estimated costing of the project till deciding the final cost of the project, which brings due financial prudence also in handling TDF projects. Moreover, given that MoD has delegated the financial powers to undertake projects under TDF, it will be inappropriate to assume that the Projects under TDF need AoN approval to be accorded by the Defence Acquisition Council (DAC).

Good practices from the United States Defence Advanced Research Projects Agency (DARPA) model for encouraging/involving industries through TDF may be adopted. TDF should be focused only on disruptive/futuristic/emerging defence or dual-use technologies or applications.

More active handholding and technological support to the industry by DRDO through its nodal labs and more active involvement of Services are also required with TDF Projects from inception to final stage, with personnel and institutional level synergy. For big ticket projects, enhanced timelines of up to four years may also be considered. For undertaking higher TRL level projects under TDF, adopting Special Purpose Vehicle (SPV) model with due involvement of DRDO set-up may be considered with the approval of the Raksha Mantri as Competent Financial Authority.

In this regard, feasibility for creation of a Section 8 Company (Not for profit) directly under DDR&D for managing 25 per cent of defence R&D budget for funding industry and Start-ups—including TDF Scheme of DRDO and the Innovation for Defence Excellence (iDEX) (Scheme of DDP, MoD) and academia can also be explored. This will not only obviate various bureaucratic hurdles and inhibitions for handling failures while undertaking TDF projects, but also will facilitate commercialisation of various technologies and applications.

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