



ROLE OF DEFENCE RESEARCH AND DEVELOPMENT ORGANISATION IN INDIAN DEFENCE SECTOR

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ABSTRACT The Defence Research and Development Organisation (DRDO) is the premier agency under the Department of Defence Research and Development in Ministry of Defence of the Government of India, charged with the military's research and development, headquartered in Delhi, India. It was formed in 1958 by the merger of the Technical Development Establishment and the Directorate of Technical Development and Production of the Indian Ordnance Factories with the Defence Science Organisation. Subsequently, Defence Research & Development Service (DRDS) was constituted in 1979 as a service of Group 'A' Officers / Scientists directly under the administrative control of Ministry of Defence. With a network of 52 laboratories, which are engaged in developing defence technologies covering various fields, like aeronautics, armaments, electronics, land combat engineering, life sciences, materials, missiles, and naval systems, DRDO is India's largest and most diverse research organisation. The organisation includes around 5,000 scientists belonging to the DRDS and about 25,000 other subordinate scientific, technical and supporting personnel.

KEYWORDS : Defence, Development, armaments, aeronautics, scientific and technical.

INTRODUCTION

DRDO is the R&D wing of Ministry of Defence, Govt of India, with a vision to empower India with cutting-edge defence technologies and a mission to achieve self-reliance in critical defence technologies and systems, while equipping our armed forces with state-of-the-art weapon systems and equipment in accordance with requirements laid down by the three Services. DRDO's pursuit of self-reliance and successful indigenous development and production of strategic systems and platforms such as Agni and Prithvi series of missiles; light combat aircraft, Tejas; multi-barrel rocket launcher, Pinaka; air defence system, Akash; a wide range of radars and electronic warfare systems; etc., have given quantum jump to India's military might, generating effective deterrence and providing crucial leverage. 'Balasya Mulam Vigyanam'- the source of strength is science-drives the nation in peace and war. DRDO has firm determination to make the nation strong and self-reliant in terms of science and technology, especially in the field of military technologies.

DRDO was formed in 1958 from the amalgamation of the then already functioning Technical Development Establishment (TDEs) of the Indian Army and the Directorate of Technical Development & Production (DTDP) with the Defence Science Organisation (DSO). DRDO was then a small organisation with 10 establishments or laboratories. Over the years, it has grown multi-directionally in terms of the variety of subject disciplines, number of laboratories, achievements and stature.

Today, DRDO is a network of more than 52 laboratories which are deeply engaged in developing defence technologies covering various disciplines, like aeronautics, armaments, electronics, combat vehicles, engineering systems, instrumentation, missiles, advanced computing and simulation, special materials, naval systems, life sciences, training, information systems and agriculture. Several major projects for the development of missiles, armaments, light combat aircrafts, radars, electronic warfare systems etc are on hand and significant achievements have already been made in several such technologies.

Vision & Mission of DRDO

- **Research and Development:** DRDO is responsible for conducting research and development of cutting-edge technologies that are vital for the Indian Defence sector. It focuses on developing new and advanced systems in areas such as missile technology, radar systems, electronic warfare, and more.
- **Indigenous Production:** DRDO has been instrumental in promoting indigenous production of defence equipment in India. It has developed a wide range of defence systems that are now produced within the country, reducing India's dependence on foreign suppliers.
- **Collaboration with Industry:** DRDO collaborates with the Indian industry to develop and produce defence equipment. It works closely with public sector undertakings as well as private companies to promote the development of indigenous defence technology.

- **Testing and Evaluation:** DRDO is responsible for testing and evaluating defence equipment developed in India. It has a network of test ranges and facilities across the country where new equipment is tested before being inducted into service.
- **Strategic Partnerships:** DRDO has established strategic partnerships with other defence organizations across the world. It collaborates with various international agencies to access the latest defence technology and develop new systems.

Role of DRDO in Indian Defence Sector

DRDO is the R&D (Research and Development) wing of the Ministry of Defence with a vision to empower India with cutting-edge defence technologies. Its pursuit of self-reliance and successful indigenous development and production of strategic systems and platforms such as Agni and Prithvi series of missiles, Light Combat Aircraft, Tejas, multi-barrel rocket launcher, Pinaka, air defence system, Akash, a wide range of radars and electronic warfare systems, etc. have given quantum jump to India's military might, generating effective deterrence and providing crucial leverage.

DRDO started its first major project in surface-to-air missiles (SAM) known as Project Indigo in the 1960s. Indigo was discontinued in later years without achieving full success. Project Indigo led to Project Devil, along with Project Valiant, to develop shortrange SAM and ICBM in the 1970s. Project Devil itself led to the later development of the Prithvi missile under the Integrated Guided Missile Development Programme (IGMDP) in the 1980s. IGMDP was an Indian Ministry of Defence programme between the early 1980s and 2007 for the development of a comprehensive range of missiles, including the Agni missile, Prithvi ballistic missile, Akash missile, Trishul missile and Nag Missile. In 2010, defence minister A. K. Antony ordered the restructuring of the DRDO to give a major boost to defence research in the country and to ensure effective participation of the private sector in defence technology.

The key measures to make DRDO effective in its functioning include the establishment of a Defence Technology Commission with the defence minister as its chairman. The programmes which were largely managed by DRDO have seen considerable success with many of the systems seeing rapid deployment as well as yielding significant technological benefits. Since its establishment, DRDO has created other major systems and critical technologies such as aircraft avionics, UAVs, small arms, artillery systems, EW Systems, tanks and armoured vehicles, sonar systems, command and control systems and missile systems.

For another, the lack of such capacity directly contributed to the inordinate delay in both these projects. In the absence of a design interface between the users and developers, it proved exceedingly difficult to reconcile their competing views and imperatives of the users and the designers. Indeed, in both projects the absence of design capability within the services meant that they were seriously involved in the projects only after the prototypes had been rolled out by the

DRDO and DPSUs. Thereafter too their ability to translate their operational requirements into design hobbled the projects.

To be sure, the DRDO and the DPSUs have to take the bulk of the blame for being overambitious in conception and extraordinarily tardy in delivery. But the army and air force contributed to these. The government can supplant the DRDO and DPSUs by bringing in private entities, but unless it consciously attempts to build organic capability for design and development within the services, the problems that plagued the MBT and LCA might persist.

Integrated Guided Missile Development Programme

The IGMDP stands for the Integrated Guided Missile Development Programme. It is a programme that is undertaken by the Defence Ministry of India. This Programme was the brainchild of the late President of India and an eminent scientist Dr A.P.J Abdul Kalam. His dream was to make India attain self-sufficiency in Missile technology. Dr Kalam was the director of the Defence Research and Development Laboratory (DRDL). The team consisted of the members from the Defence Research and Development Organisation, the Army, Navy, Air Force and the Defence production. Keeping in mind the requirements, the team suggested the development of five missile systems. They were named as Prithvi, Agni, Trishul, Akash and Nag. This programme was developed during the tenure of Prime Minister Indira Gandhi. The Integrated Guided Missile Development Programme was designed by Abdul Kalam who previously was the project director of SLV3 and ISRO. He became the Director of Defence Research and Development Laboratory in 1983. The title 'Missile Man' of India has been conferred to Abdul Kalam.

On 8 January 2008, the DRDO formally announced the successful rated guided missile programme was completed with its design objectives achieved since most of the missiles in the programme had been developed and inducted by the Indian armed forces. DRDO's major achievements were made possible by working in close synchronization with all its major partners which include tri-Services, industries and academia.

Today over 1000 industries including Defence Public Sector Undertaking (DPSUs) and Ordnance Factory Board (OFBs) are vital partners in DRDO's development programmes. In addition, DRDO collaborates with other S&T organisations like Department of Space (DoS), Department of Atomic Energy (DAE) and Council of Scientific and Industrial Research (CSIR) for common requirements and applications. DRDO has also selectively chosen its global partners and has MoUs signed with over 30 countries worldwide for joint collaboration in requisite areas with complementary work share.

Achievements of DRDO

- it has achieved significant milestones in various areas. Some of its notable achievements include:
- Agni Missile System: DRDO developed the Agni missile series, which includes Agni-I, Agni-II, Agni-III, and Agni-IV. These are intermediate-range ballistic missiles capable of delivering nuclear weapons to targets over a distance of up to 5,000 km.
- BrahMos Missile System: DRDO developed the BrahMos missile system, a supersonic cruise missile jointly developed with Russia. It is one of the fastest cruise missiles in the world and has a range of 290 km.
- Tejas Fighter Aircraft: DRDO developed the Tejas, an indigenously designed light combat aircraft. It is a fourth-generation fighter and is equipped with modern avionics and weapon systems.
- Electronic Warfare Systems: DRDO has developed various electronic warfare systems, including radar warning receivers, electronic countermeasures, and electronic intelligence systems.
- Light Combat Helicopter: DRDO developed the Light Combat Helicopter (LCH), which is designed for attack and reconnaissance missions. It is equipped with a 20 mm gun, rockets, and missiles.
- Advanced Towed Artillery Gun System: DRDO developed the Advanced Towed Artillery Gun System (ATAGS), which is a 155 mm towed howitzer. It has a range of 48 km and is one of the world's most advanced artillery systems.
- Ballistic Missile Defense: DRDO has developed a Ballistic Missile Defense (BMD) system, which is designed to intercept incoming ballistic missiles. The system consists of radars, missiles, and command and control centers.

CONCLUSION

The Defence Research and Development Organization is undoubtedly one of the major pillars of the Indian Defence forces. The Indian Army, Navy and Air force are all looking forward to the organization to help them get their hands on the latest technological innovations and advancements. It is actively working on multiple projects which will help the country indigenously develop all the defence infrastructure it needs. DRDO is growing at a rapid pace and it will be interesting to see how it transforms India's position at the global level.

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