5

STANDING COMMITTEE ON DEFENCE (2014-2015)

SIXTEENTH LOK SABHA

MINISTRY OF DEFENCE

DEMANDS FOR GRANTS (2014-2015)

ORDNANCE FACTORIES AND DEFENCE RESEARCH AND DEVELOPMENT ORGANISATION (DEMAND NO. 25 AND 26)

FIFTH REPORT

LOK SABHA SECRETARIAT
NEW DELHI
December, 2014/*Pausha*, 1936 *(Saka)*

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Presented to Lok Sabha on 22.12.2014
Laid in Rajya Sabha on 22.12.2014

LOK SABHA SECRETARIAT
NEW DELHI
December, 2014/*Pausha,* 1936 *(Saka)*

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Maj Gen BC Khanduri, AVSM (Retd.)—*Chairperson*

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*21. Shri Hemendra Chandra

**22. Shri Rajyavardhan Singh Rathore

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* Sad Demise on 05.09.2014.

** Ceased to be Member of the Committee on 09.11.2014.

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3. Shri D S Malha — *Director*
4. Shri Lovekesh Kumar Sharma — *Additional Director*

* Ceased to be Member of the Committee on 08.10.2014.
** Nominated *w.e.f.* 08.10.2014.

INTRODUCTION

I, the Chairperson of the Standing Committee on Defence (2014-15), having been authorised by the Committee to submit the Report on their behalf, present this Fifth Report on 'Demands for Grants of the Ministry of Defence for the year 2014-15 on Ordnance Factories and Defence Research and Development Organisation (Demand No. 25 and 26)'.

2. Due to impending elections to the Sixteenth Lok Sabha, Parliament had passed Vote on Account for the first four months of the Fiscal 2014-15 (April to July, 2014). The Demands for Grants of the Ministry of Defence were laid in Lok Sabha on 01 August 2014. The consolidated Demands for Grants were passed by the Lok Sabha on 21 July, 2014 after suspension of Rule 331G of the Rules of Procedure and Conduct of Business in Lok Sabha. After the Demands were passed, Hon'ble Speaker observed that although the Demands have been passed by the House, they stand referred to the Standing Committees after they are constituted for examination and Report so that their Recommendations are utilized in the preparation of Demands for Grants for the next Fiscal.

3. The Committee took evidence of the representatives of the Ministry of Defence on 08 October 2014. The draft Report was considered and adopted by the Committee at their sitting held on 17 December, 2014.

4. The Committee wish to express their thanks to the officers of the Ministry of Defence and representatives of the three Services for appearing before the Committee and furnishing the material and information which the Committee desired in connection with examination of the Demands for Grants.

5. For facility of reference and convenience, the recommendations/ observations of the Committee have been printed in bold letters in Part-II of the report.

NEW DELHI;
22 *December,* 2014
01 *Pausha,* 1936 *(Saka)*

MAJ. GEN. B.C. KHANDURI, AVSM (RETD.),
Chairperson
Standing Committee on Defence.

Part I

CHAPTER I

REPORT

ORDNANCE FACTORIES

Demands No. 25

Ordnance Factories are an integrated base for indigenous production of defence equipment and ammunition and form the backbone of the country's defence production. Defence production is a highly specialized sector full of complexities and challenges, where products have to be safe, reliable, consistent and capable of operating under varying terrains as well as climates and in extreme conditions. Accordingly, the technologies applied, which cover a wide spectrum of engineering, metallurgy, chemical, textile, leather, optical technologies etc. have to ensure high quality and productivity, apart from meeting the primary objective of self-reliance. Ordnance Factories also fulfil certain requirements of Paramilitary and Police Forces for arms, ammunition, clothing and equipment. Ordnance Factories endeavour to enhance their capacity utilization not only by securing orders from the defence forces but also through sustained efforts in diversification to non-defence customers and exports. However, priority of the Ordnance Factories is indigenous production of defence products only.

They produce a wide range of arms and ammunitions for the Infantry, Artillery, Air Defence Artillery and Armoured Corps of the Army. Ordnance Factories produce ammunition for Navy and Air Force and have taken up indigenous development of naval armaments. The factories produce military transport vehicles, infantry combat vehicles, armoured vehicles, optical and opto-electronic instruments, summer and winter uniforms, parachutes, miscellaneous leather goods and general stores.

The Ordnance Factories Organisation is a fine blend of old and state-of-the-art factories, with the first Ordnance Factory established in 1801 at Cossipore, near Kolkata, and two new ordnance factories are

coming up at Nalanda in Bihar and Korwa in UP. At present Ordnance Factories manages 41 manufacturing units, 32 other establishments and 31 residential townships. Ordnance Factories have been continuously upgrading their infrastructure with induction of state-of-the-art technologies to meet futuristic requirements of users.

Budgetary Provisions

1.2 The Committee wanted to know the details of the outlay provided and spent by the Ordnance Factories alongwith complete details of each project/programme proposed, planned and implemented during 11th Plan period as well as the first two years of 12th Plan for the Modernization. In this regard the following information was submitted by the Ministry of Defence:—

> "The outlay provided on modernization during 11th Plan period and first 2 years of 12th Plan was Rs. 3,666 crore and Rs. 1,934 crore respectively. The expenditure incurred against the above are Rs. 2,927 crore and Rs. 1,938 crore respectively.
>
> Ordnance Factory Project Nalanda was initiated in 10th Plan and has been carried forward to the 12th Plan. 31.37% of the sanctioned cost (Rs. 2088.32 crore) has already been spent till September, 2014.
>
> The project for creating capacity for manufacturing of Pinaka Rockets @ 1000 nos. per annum was approved and completed in the 11th Plan. The project was sanctioned in May, 2007 at a cost of Rs. 106.59 crore. OFB attained the production capacity of 1000 rockets per annum in 2011-12. The following projects were approved before the 11th Plan and were completed during the 11th Plan:—
>
> (i) The project for creation of capacity for manufacturing of MBT Arjun @ 30 nos. per annum was sanctioned in May, 2002 at a cost of Rs. 99.25 crore. The project was completed in Aug., 2011 with achievement of project capacity.
>
> (ii) The project for creation of capacity for manufacturing of T-90 tanks @ 100 nos. per annum was sanctioned in Dec., 2003 at a cost of Rs. 96.25 crore. OFB started manufacturing 100 nos. T-90 tanks per annum, inclusive of tanks manufactured from SKD (Semi-knocked down kits), from 2009-10.

The following projects have been initiated in the 11th Plan and the first 02 years of the 12th Plan. The details of the same are given as under:—

Project	Sanct-ioned cost (Rs. in crore)	Progress of Civil Work	Progress of P&M	Likely to be comple-ted by
1	2	3	4	5
Creation of capacity for manufacturing of T-72 Variants @ 50 nos. per annum. Date of sanction 25.08.2010	279.63	100%	47%	Mar., 2015
Augmentation of capacity for manufacturing of Armoured Vehicle Engines from 350 to 750 per annum. Date of sanction 06.10.2010	350.56	90%	50%	Dec., 2016
Augmentation of capacity for manufacturing of Spares required in overhauling of T-72 and T-90 Tanks. Date of sanction 06.10.2010	367.52	95%	39%	Dec., 2015
Augmentation of capacity for manufacturing of propellants for Akash Booster and Sustainer. Date of sanction 08.12.2011	105.78	Admin. Approval issued	33% Supply Order placed	Mar., 2017
Augmentation of capacity for manufacturing of Large Calibre Weapon System from 350 to 750 nos. per annum. Date of sanction 09.03.2012	376.55	Admin. Approval issued	45% Supply Order placed	Dec., 2016
Augmentation of capacity for manufacturing of Pinaka Rockets from 1000 to 5000 per annum. Date of sanction 05.04.2013	1388.80	Admin. Approval issued	22% Supply Order placed	Mar., 2017

1	2	3	4	5
Augmentation of capacity for manufacturing of T-90 Tanks from 100 to140 nos. per annum. Date of sanction 21.09.2011	971.36	Due to non-availability of funds in 2013-14, expenditure was prioritized and restricted to Rs.186 crore. Now, the project is being progressed.		
Ordnance Factory Korwa Project for manufacturing of small Arms. Date of sanction 25.10.2007	408.01	Cumulative expenditure till September, 2014 is Rs. 223.07 crore. Since Army is yet to decide on the carbine to be manufactured in this factory therefore, small production of alternate items has been started from Feb., 2013."		Mar., 2017

1.3 The Committee noted that there was under expenditure in modernization during the 11th Plan period. The outlay provided was Rs. 3,666 crore while the expenditure incurred was Rs. 2,927 crore. Also, there have been very long gestation periods in case of different projects. For example, the project for creation of capacity for manufacturing of MBT Arjun @ 30 nos. per annum was sanctioned in May, 2002 and the project was completed in Aug., 2011 with achievement of project capacity. Thus, it took almost ten years.

1.4 On the issue of inordinate delays taking place in supply of items to the Forces, the Ministry of Defence submitted as under:—

> "In general, OFB is able to meet the demand of Forces. However, only in respect of ammunition there exists a capacity constraint in several Ordnance Factories due to explosive safety limit restriction on buildings used for ammunition production. Accordingly steps are being taken to augment capacity in the concerned Ordnance Factories.

Apart from above in the past, OFB had some problem in meeting the target of T-90, Tank BMP-II and PINAKA Rocket due to various constraints such as delayed product support from the Original Equipment Manufacturer (OEM), discontinuity in production line due to non-availability of indents from Army and also certain issues involving modification of design."

Research and Development

1.5 One of the major concerns of the Committee was Research and Development work being undertaken in OFs. The Committee were informed that Ordnance Factory Board (OFB) is primarily a manufacturing organization engaged in manufacturing of defence products based on Transfer of Technology (ToT) from the Original Equipment Manufacturer (OEM) or DRDO. However, it is responsible for indigenization of the product being manufactured under ToT. Therefore, development of new products through in-house R&D is relatively a new concept in OFB. However, OFB is giving due emphasis to in-house R&D and has developed quite a few products through it.

In this regard, the information regarding various projects under progress in different factories was given as:—

(i) Armoured Recovery Vehicle

(ii) Tank T-72 Upgradation

(iii) Upgraded version of Mine Protected Vehicle

(iv) 155 mm/52 Calibre Upgradation of Artillery Gun

(v) Commander Thermal Imager Sight for tank T-72 and T-90

(vi) Upgradation of BMP (Infantry Combat Vehicle)

(vii) Ammunition for—

I. 105 mm Extended Range

II. 40 mm Multi Grenade Launcher/Under Barrel Grenade Launcher

III. Rocket RGB-12 HE Version for Navy.

Outsourcing in terms of Technical assistance/Consultancy is sought from various IITs, CIPET, SAMEER, DRDO Laboratories and assistance of DPSUs is obtained, as per requirement.

1.6 Expenditure on R&D as a proportion of total Value of Issues (VoI) during the last five years is given as under:—

(Rs. in crore)

Year	VOI	R&D Expenditure	% of VOI spent on R&D
2008-09	10905	29.2	0.267%
2009-10	8715	32.08	0.368%
2010-11	11215	39.95	0.356%
2011-12	12391	36	0.290%
2012-13	11975	48	0.400%

1.7 The Committee desired to know about the strategies being made by the Ordnance Factories Board to launch itself in the league of internationally reckoned companies to manufacture arms and ammunition. In this regard, the representatives of Ministry of Defence submitted as under:—

> "In 2002, OFB adopted a policy of in-house R&D resulting in the formation of 11 Ordnance Development Centres (ODCs) in diverse technical fields. OFB has decided to increasingly play the role of lead integrator of defence equipments. Accordingly OFB has initiated actions to jointly work with major DPSUs such as BEL, MIDHANI, BDL etc. Reputed institutes like IIT, Kanpur, Bombay, Chennai have also been roped in."

1.8 On asking whether the Government has taken any steps to provide requisite funds and cooperation to Ordnance Factories for manufacturing arms and ammunition with indigenous technology. The Ministry replied as under:—

> "Yes, adequate fund is made available to Ordnance Factories to carry out development of arms and ammunitions with indigenous technology. Besides, the Ministry has approved a number of capacity augmentation projects involving an investment of more than Rs. 4000 crore during the last 04 years in OFB."

1.9 With regard to the projection for Twelfth Plan in respect of Research and Development, the Committee were informed that a sum of Rs. 370.79 crore has been projected in 12th Plan under Research and Development.

Manpower

1.10 The data with regard to the authorised and existing strength of all Ordnance Factories both technical and non-technical, for the last five years is given below:—

Authorised and Existing	Sancti-oned Strength	Existing Strength as on 1st of				
		Apr.-10	Apr.-11	Apr.-12	Apr.-13	Apr.-14
Industrial Employees	106486	65411	65306	63572	63902	62350
Chargeman (T)	10320	6134	6494	7083	7186	7249
JWM (T)	6911	5115	5049	5505	5561	5424
Para – Medical	1409	—	—	—	—	1250
Total (Tech.)	125126	76660	76849	76160	76649	76273

Non—Technical (NT)

	Sancti-oned Strength	Existing Strength				
		Apr.-10	Apr.-11	Apr.-12	Apr.-13	Apr.-14
Non-industrial Employees	20354	18082	15521	16034	15442	15161
Chargeman (NT)	1765	1714	1789	1717	1644	1633
SR PA&PS	154	115	102	124	116	134
JWM (NT)	783	615	645	711	727	696
Hindi Officer	39	32	19	24	21	21
Total (NT)	23095	20558	18076	18610	17950	17645

Note: Apart from above, the existing strength of Group A (IOFS&IOFHS) Officers is 1671 as against the sanctioned strength of 2000.

Quality Assurance

1.11 The Committee have always been concerned about quality of products manufactured by Ordnance Factories as sometimes defective ammunition reaches in the hands of Army. In this connection, the Committee enquired about the quality check conducted for the products developed by Ordnance Factories and also whether there is any second party inspection also. On this issue, the Ministry replied as under:—

> "Products manufactured by Ordnance Factories are 100% inspected by the factories. Subsequent to it, sample inspection is done by Directorate General of Quality Assurance (DGQA) on behalf of the User as Second Party Inspection.

On an average, 21 laboratory tests are conducted by Ordnance Factory and DGQA and 4% rounds of every lot are proof fired by DGQA before acceptance and issue of ammunition to Indian Army.

Probable reasons for detecting defects in the hands of Army may be as follows:—

(i) Improper handling and storage in ammunition depots

(ii) Improper maintenance of weapon system

(iii) Improper handling of ammunition and weapon during firing

(iv) Design deficiency"

1.12 With regard to the quality assurance the representatives of Ministry of Defence further submitted as under:—

"Sir, we provide quality assurance to all the stores which are supplied by the Ordinance factories, Defence PSUs and trade firms. Our establishments are co-located with the ordinance factories and they provide intimate quality assurance cover to the products which are being manufactured by the ordinance factories. Earlier there were certain quality problems with the ordinance factories, the products which were being manufactured, now along with the ordinance factories we have taken a lot of initiatives in ensuring that everything is manufactured as per the process schedule. In case there are any problems which we find during the manufacture, we carry out process audit of that particular process which is giving a defective product."

CHAPTER II

DEFENCE RESEARCH AND DEVELOPMENT ORGANISATION

Defence Research and Development Organisation has come a long way since its modest beginning in 1958. Starting with only 10 laboratories, DRDO has grown multi-dimensionally and has evolved to be a core research organisation with a vast network of 52 laboratories and establishments spread across the country. With a vision to empower India with cutting-edge technologies and equip our Services with internationally competitive systems, DRDO has proven its competence to produce state-of-the-art strategic and tactical military hardware and related technologies in diverse disciplines such as Aeronautics, Armaments, Combat Vehicles, Combat Engineering, Electronics, Missiles, Life Sciences, Materials and Naval Systems. At the core of this technological strength of DRDO is its expertise in system design, system integration, testing and evaluation and project management built over the last five decades, which has enabled it in developing indigenous capabilities in weapons and their delivery systems.

DRDO plays significant roles, like providing scientific and technological advice to the Ministry of Defence in support of defence policy; as evaluator of defence equipment for the military operational requirements; and generating new technological knowledge to be transferred for development of state-of-the-art weapon systems by the defence industries. The Organisation also advises the Government to make technical assessments of international security threats and the military capabilities of both current and potential adversaries.

Budgetary Provisions

2.2 Defence Research and Development Budget for the last five years and the current year including projections, allocations and expenditure incurred is given below:—

Year	Projection	Allocation	Expenditure (Actual)	Expenditure (%age)
1	2	3	4	5
2009-10	9516.63	8514.81	8475.38	99.54

1	2	3	4	5
2010-11	11754.41	10210.33	10148.92	99.41
2011-12	14848.87	10014.31	9893.84	98.80
2012-13	14463.66	9884.94	9794.80	99.35
2013-14	16483.28	10930.17	10859.04	99.32
2014-15	18495.46	15282.92		

Share of R&D vs Defence Expenditure

2.3 In connection with the examination of Demands for Grants (2014-15), the Committee were supplied the following information in regard to the expenditure made for R&D activities:—

(Rs. in crore)

Year	Defence Expenditure	R&D Expenditure	%age of Defence Expenditure
2009-10	1,41,781.00	8,475.38	6.98
2010-11	1,54,117.00	10,148.92	6.59
2011-12	1,70,913.00	9,893.84	5.79
2012-13	1,81,776.00	9,794.80	5.39
2013-14	2,03,672.00	10,859.04	5.37
2014-15 (BE)	2,29,000.00	15,282.92	6.67

2.4 In regard to the percentage of expenditure in relation to GDP during the last three years is as under:—

Total GDP vs Defence R&D Expenditure

(Rs. in crore)

Year	Total GDP	Defence R&D Exp	Defence R&D Exp. (as % of Total GDP)
2009-10	6457352.00	8475.00	0.13
2010-11	7674148.00	10149.00	0.13
2011-12	8912178.00	9894.00	0.11
2012-13 (RE)	10028118.00	9884.94	0.10
2013-14 (BE)	11371886.00	10610.17	0.09

New Projects

2.5 When asked about the new projects, the Ministry in a written note submitted the following information:—

(Rs. in crore)

S.No.	Project Title	Cost
1.	Medium Altitude Long Endurance (MALE) Unmanned Aerial Vehicle (UAV) and Development of Aeronautical Test Range (ATR) Phase-I	1540.74
2.	Quick Reaction Surface to Air Missile (QR-SAM)	476.43
3.	Active Electronically Scanned Array Radar (AESAR) for LCA (Uttam)	459.65
4.	Satellite based Electronic Intelligence (ELINT) Payload "Kautilya"	432.80
5.	Electronic Warfare System for Ships, Aircraft and Helicopters for Navy "Samudrika"	342.29
6.	Post Development Support of Airborne Early Warning and Control (AEW&C) System	314.32
7.	Electronic Warfare (EW) Suite for Jaguar Upgrade	268.27
8.	Development of 155/52 Towed Artillery Gun system (ATAGS)	247.90
9.	Dornier based Flying Test Beds (Fixed wing, Rotary wing)	173.48
10.	Development of Submarine Periscope	163.77
11.	Augmentation of Environmental Test Facility for Warheads and Electronics Systems	121.17
12.	Advanced Light Weight Towed Array Sonar (ALTAS)	114.42
13.	Girishakti	56.80
14.	Smart Anti-Airfield Weapon (SAAW)	56.58
15.	Prahaar for PGAD	56.30

2.6 As informed by the Ministry, overall XII Plan outlay, the planned cash outgo and carry forward to XIII Five Year Plan under different technology disciplines are given in Table below:—

(Rs. in crore)

Discipline	New Projects		Ongoing Projects		Carry Forward to XIII FYP
	Plan Outlay	Cash Outgo	Plan Outlay	Cash Outgo	
1	2	3	4	5	6
Aeronautics	28647	19573	5299	4906	9467

1	2	3	4	5	6
Armaments	2774	2762	382	354	40
Combat Vehicle & Engineering	3254	3080	661	612	223
Electronics and Communication Systems	8003	7658	1068	989	424
Microelectronic Devices and Computational Systems	7303	6939	194	180	378
Life Sciences	1165	1147	324	300	42
Advance Materials	246	203	210	194	59
Missiles	51489	50832	10539	9758	1438
Naval Systems	2048	1690	269	249	378
ADA	15000	8400	-	-	6600

(Above data does not include strategic systems)

It was further informed by the representatives of DRDO that every year budget requirement is projected by DRDO based on the ongoing projects/programmes and futuristic requirements. Nearly, 80% of total budget is utilised on Mission Mode Projects with deliverables for Armed Forces. Short falls in budget affect Technology Development, Science and Technology, and Development of Infrastructure and Facilities related Projects. Due to shortage of funds, projects and other ongoing activities are re-prioritized. Hon'ble Raksha Mantri directed concerned officials to make all possible efforts to meet the budgetary requirement of DRDO so that its flagship programmes do not suffer due to lack of funds.

Manpower

2.7 As regard to the authorised and existing strength of Scientists in DRDO, the Ministry in a written note furnished to the Committee:—

> "At present, 7809 number of scientists (including Service Officers and Works Officers) are working in Defence Research and Development Organisation (DRDO) against the sanctioned strength of 7932 (including 7255 Scientists, 623 Service Officers and 54 Work Officers) (as per Government Orders in 2001). There has been no enhancement of scientific manpower in DRDO since 2001 while the number of projects have grown multi-fold in terms of size and technological complexity keeping in view India's strategic and tactical defence requirements. A Cabinet Note for augmentation of additional posts of scientists has been forwarded for consideration of the Government."

2.8 The Committee also desired to know about the number of scientists who have left DRDO during the last five years with reasons, the Ministry replied as under:—

"Number of scientists who resigned from DRDO during the last five years and current year along with the reasons for their resignations are given below:—

Year	No. of Scientists Resigned
2009	65
2010	63
2011	86
2012	67
2013	57
2014 (till 1st Oct.)	23

Scientists, who have resigned, have indicated their personal/ domestic grounds as the reasons for leaving DRDO. However, it is assumed that increased opportunities/incentives available in other organisations/industries is also a main reason for such resignations."

2.9 On the steps being taken by Defence Research and Development Organisation to put a check on the ever-increasing brain drain from DRDO and to make a career for scientists in DRDO an attractive option, the Ministry through written note submitted as under:—

"The trend of resignations of scientists from Defence Research and Development Organisation (DRDO) has declined considerably after the implementation of recommendations of Sixth Central Pay Commission. The number of resignations have now come down to less than 1% of the total strength of scientists in DRDO. Government has introduced a comprehensive 'Incentive Scheme for DRDO Scientists', details are given in the succeeding paragraphs. This has also helped in checking the brain drain of scientists from DRDO.

Financial Incentives

- Additional Increments: Two additional increments are given to Scientists (Recruitees/Promotees) in the Pay Band-3 (Rs.15600-39100) with Grade Pay of Rs. 6600 and Rs. 7600 and to those in the Pay Band-4 (Rs. 37400-67000) with Grade Pay of Rs. 8700 and Rs. 8900.

- Professional Update Allowance: Scientist 'B', 'C' and 'D' are granted Rs. 12,500 p.a., Scientists 'E' and 'F' Rs. 25,000 p.a. and Scientists 'G' and above Rs. 37,500 p.a. as Professional Update Allowance.

- Variable Increments: Upto the maximum of six increments are granted to deserving Scientists at the time of promotion.

Growth related Incentives

To give better growth and promotional avenues to the Scientists in DRDO, Merit based Flexible Complementing Scheme (FCS) is in place, where promotions are based on assessment and not on available vacancies. Under the FCS, Scientist recruited at the level of Sc. 'B' in Pay Band-3 with grade pay of Rs. 5400, can move upto the level of Scientist 'H' in HAG scale (Rs. 67000-79000). Thereafter the level of Distinguished Scientist in the HAG+scale of Rs. 75500-80000 is achievable on personal up-gradation basis.

Qualification/Skill Improvement

Scientists in DRDO are being sponsored for M.E./M.Tech programmes at IITs, IISc and other reputed institutes under the Research and Training Scheme at Government expense so that they can up-grade their knowledge and skills. Further, scientists are also encouraged to complete Ph.D. in their respective field, for which necessary assistance is provided.

Recognition of Contributions

The contributions made by DRDO Scientists are recognized by the Government through various types of Awards being given to these Scientists at the Organization as well as National level. They are nominated to represent the country in Seminars/Conferences Internationally. Scientists are also nominated to Fellowship of various Professional bodies.

Improvement of Working Environment

Mentoring and guiding is a constant interactive process for maintaining a constant level of research standards. Infrastructure and State-of-the-Art lab/equipment test facilities etc. are provided to them."

Performance audit of the work of scientists of DRDO

2.10 When specifically asked about the performance audit of the work of scientists of DRDO, the Ministry of Defence in its written reply is stated below:—

> "The performance of scientist is assessed through the Annual Performance Appraisal Report of each scientist which contains details of specific targets set for him for the year and his accomplishment by end of the year. Progress is also reviewed during the year through mid-term review. The scientist is also required to make presentation of his achievements before Assessment Boards for his career progression in the service."

Indigenisation Research and Development Activities

2.11 The Committee wanted to know about the indigenous production of defence equipment designed and developed by the DRDO. In this connection, the Ministry in written reply intimated as under:—

> "India's defence requirements in terms of indigenous systems are being taken care of by the Defence Research and Development Organisation (DRDO) which works in providing cutting-edge technologies and systems for the Armed Forces. DRDO has given the country a vast range of products and systems, ranging from the strategic Agni class of missiles, a family of radars and sonars for virtually every platform/application, Electronic Warfare (EW) systems, Main Battle Tank (MBT), combat aircraft and so on.
>
> As we know that technologically advanced countries do not part their critical technologies with developing countries. These countries offer only "Buy" category of systems to countries, like India. Therefore, we have to develop each system, sub-system, component *ab-initio* including infrastructure and testing facilities at our places. DRDO has made enormous efforts to bring out high level of self-reliance in defence technologies. The following are some of the major products/systems indigenously developed by DRDO, which has resulted in substantial decrease in import of defence systems.
>
> **Missiles**
>
> - Agni Series of Missiles (Range up to 5000 km plus).
> - Akash: Medium Range Surface to Air Missile (Range: 25 km).

- BrahMos Supersonic Cruise Missile (Range: 290 km).
- Dhanush: Naval Version of Prithvi Surface to Surface Missile (Range: 250 km).
- Prithvi: Surface-to-Surface Missile (SSM) (Range: 150 km – 350 km).

Armaments

- 105mm FSAPDS ammunition Vijayanta and T-55 (UG) MBTs
- 105mm Indian Field Gun (IFG) and family of ammunition
- 105mm Light Field Gun (LFG)
- 120mm FSAPDS MK I ammunition for Arjun Tank
- 120mm HESH ammunition for Arjun Tank
- 120mm Main Armament System—MBT Arjun
- 122mm Grad Rocket for BM-21 MBRL
- 125mm FSAPDS MK I ammunition for T-72/T-90 Tanks
- 125mm FSAPDS MK-I KE Ammunition for T-72 MBT
- 125mm FSAPDS MK-II Ammunition for T-72 Tank
- 30mm AGS-17 HE Grenade 'Rudra'
- 450 kg/250 kg HSLD Bomb with RTU and BTU
- 5.56mm INSAS Family: Rifle, LMG and Ammunition
- 5.56mm INSAS Weapons (Rifle and Light Machine Gun)
- 51mm Infantry Platoon Mortar and Family of Ammunition
- 7.62mm Self Loading (Ishapore) Rifle
- Bund Blasting Device
- Family of Mechanical, Electronic and Proximity Fuze
- Family of smoke ammunition for Mortars and Guns

- Fire Detection and Suppression System.
- Fuze FBRN 2I, FBT 3I and 4I for A/C Bombs
- Illuminating ammunition for 51, 81 and 120mm Mortar and IFG
- Influence Mine, Adrushy.
- Influence Munition MK-II
- Limpet Munition
- Medium and Short Range ECCM Rockets
- Multi Barrel Rocket Launcher (MBRL), Pinaka (Range: 10 km – 38 km)
- Multi-Mode Hand Grenade
- PF, Incendiary and Submunition Warheads for 'Prithvi'
- Portable Handled and Backpack Water Mist System
- Short Range ASW Rocket
- Under Barrel Grenade Launcher (UBGL)
- Warheads for Surface to Air Akash Missile

Combat Vehicles and Engineering Systems

- Aircraft Mounted Accessory Gear Box for LCA Tejas
- Armoured Ambhibious Dozer
- Armoured Ambulance Tracked (on BMP)
- Armoured Engineer Recce Vehicle (AERV)
- Battery Command Post
- Bridge Layer Tank T-72
- Bullet Proof Light Vehicle
- Carrier Command Post Tracked (CCPT) on BMP

- Carrier Mortar Tracked
- Combat Improved Ajeya (CIA) Tank
- Gunnery Task Training Simulator
- Launcher
- Light Armoured Troops Carrier
- Main Battle Tank (MBT) Arjun MK-I
- Mobile Decontamination System
- Multispan Mobile Bridging System, Sarvatra
- NBC Recce Vehicle
- Operation Theatre on Wheels
- Replenishment Vehicle
- Riot Control Vehicle
- Unmanned Ground Vehicle
- Water Cannon

Aeronautical Systems

- Airborne Early Warning and Control (AEW&C) System
- Aircraft Arrester Barriers
- Electronic Warfare Suite for Fighter Aircraft for MIG 27 and Tejas Aircraft
- Heavy Drop Systems
- Light Combat Aircraft (LCA), Tejas
- Medium Sized Aerostat 2000 m^3 "Akashdeep"
- Parachutes
- Pilotless Target Aircraft (PTA), Lakshya-I
- Remotely Operated Vehicle (ROV), Daksh

- Remotely Piloted Vehicle (RPV), Nishant
- Technology for Identification of Friends or Foe
- Unmanned Aerial Vehicle (UAV) Rustom-I

Electronics and Communication Systems

- 2D-Low Level Light Weight Radar (LLLWR), Bharani
- 3D-Central Acquisition Radar, Revathi
- 3D-Low Level Light Weight Radar (LLLWR), Ashlesha
- 3D-Medium Range Surveillance Radar, Rohini
- 3D-Tactical Control Radar (TCR)
- Artillery Combat Command and Control System (ACCCS)
- Battle Field Surveillance Radar-Short Range (BFSR-SR)
- Combat Net Radio
- Command Information Decision Support System (CIDSS), Samvahak
- Electronic Warfare System, Samyukta for Army
- Electronic Warfare System, Sangraha for Navy
- Electronic Warfare System, Varuna for Navy
- Inertial Navigation System
- Interception, Monitoring, Direction Finding and Analysis System, Divya Drishti
- Multifunction Phased Array Radar, Rajendra
- Night Vision Devices
- Pulse Compressor Radar, Indra
- SATCOM Terminals
- Secured Telephone

- Servo Valves
- Supervision 2000 Radar
- Weapon Locating Radar (WLR)

Naval Systems

- Active cum Passive Towed Array Sonar, Nagan
- Advanced Panoramic Sonar Hull Mounted (APSOH)
- Airborne Dunking Sonar, Mihir
- Ground Mines
- Hull Mounted Sonar HUMSA
- Hull Mounted Variable Depth (HUMVAD), Sonar
- Integrated Submarine Sonar System-USHUS
- Integrated Submarine Sonar-Panchendriya
- Low Frequency Dunking Sonar (LFDS)
- Moored Mines.
- New Generation Hull Mounted Sonar HUMSA-NG
- Torpedo Advanced Light (TAL)
- Torpedo Decoy System
- Underwater Telephone

Materials, NBC and Life Sciences Systems

- Armour and Special Steels
- Bio-digester Toilets
- Combat Free Fall Equipment
- Flame Retardant
- Heavy Alloys

- High Altitude Pulmonary Odema (HAPO) Chamber
- Integrated Shelters
- NBC Detection and Protection Items
- Permafrost Facility
- Submarine Escape Suit
- Textiles and General Stores
- Various types of food products
- Water Purification System

Microelectronic Devices and Computational Systems

- Artificial Intelligence Technologies
- Cyber Security Products
- Data Encryption Technologies
- Microwave Power Modules
- Technologies for Network Management System
- Technologies for Secured Communication

Over the past five decades DRDO has developed a number of systems/products/technologies, a large number of which have been productionised. The value of systems/products/technologies developed by DRDO and inducted into the Services or in the process of induction stands at over Rs. 1.74 lakh crore. This figure does not include Strategic Systems.

Products/Systems/Technologies Developed by DRDO Inducted/ under Induction into Services as on 15 Oct. 2014

(Rs. in crore)

Systems	R&D Cost	Inducted	Under Induction
1	2	3	4
Missile Systems	4150.19	23863.25	41725.73
Electronics and Radar Systems	1504.07	10642.70	22826.18
Advanced Materials and Composites	126.53	3504.96	138.84

1	2	3	4
Armament Systems	108.80	8362.38	4259.44
Aeronautical Systems	12433.68	598.76	18872.04
Combat Vehicles and Engg. Systems	776.02	13692.59	17882.67
Life Sciences Systems	12.51	246.91	286.29
Naval Systems	327.20	1038.76	802.13
MED and Computational Systems	195.46	1450.64	4649.41
Total	19634.46	63400.95	111442.72
Grand Total (Inducted + Under Induction) Rs. 174843.67 crore			

Besides above, DRDO is developing advanced versions of many systems like MBT-Mark-II, Rustom-II, LCA Mark-II, Long Range Missiles, etc. Trials of such systems are already going on. Some other major projects are nearing completion. After induction of these systems our dependency on import will be further reduced. As far as costs of imported systems equivalent to indigenously developed systems are concerned, their costs are considerably higher as compared to indigenous systems."

Delay in Defence Projects

2.12 The Ministry was asked to give the details of DRDO's about 530 ongoing projects with 136 of them being in mission mode some of these include Agni V, Agni IV, Nirbhay cruise missile, K-15, Nag, Astra, AWACS, Arjun main battle tank, Tejas LCA, etc. The Ministry supplied the information as per given below:—

"Details of major ongoing projects (Cost above Rs. 100 crore) of DRDO with name of project, developing agency/laboratory, date of sanction, original estimated cost of the project, likely date of completion, revised cost of the project and revised date of completion are given at **Annexure "A"**

2.13 The Ministry was asked to furnish details about the projects selected during 10th, 11th Plan and 1st two years of 12th Plan, their present status of these projects and how much money has been spent on them, the Ministry supplied the following information in this regard:—

"Details of major projects (cost more than Rs. 50 crore) sanctioned during 10th, 11th and 12th Plan (from 01 April 2002 to 15 Oct.

2014) with date of sanction, sanctioned cost and present status are given at **Annexure "B."**

2.14 When asked about the reasons for the major projects not been completed on time and the steps taken to complete the projects within a stipulated period, the Ministry replied as under:—

"Reasons for the Major Ongoing (CCS) Projects running behind schedule and remedial measures/steps taken by DRDO to avoid any further delay are given below:—

(a) Light Combat Aircraft (LCA): Full Scale Engineering Development (FSED) Programme—Phase II

- Original Date of Completion: Dec. 2008
- Revised Date of Completion: Dec. 2015

Reasons for Delay

- First time development, integration and flight testing of a world class fighter aircraft.
- Complexity of system design and very high safety standards leading to extensive testing to ensure flight safety.
- Due to non-availability of indigenous 'Kaveri Engine' design changes were carried out to accommodate GE404 engine of USA.
- US Sanctions imposed in 1998 also led to delay in importing certain items and developing alternate equipment, since vendors identification and development to production cycle took time.
- Change in the development strategy of radar and associated changes on the aircraft.
- Incorporating configuration changes made by the user [for example R60 Close Combat Missile (CCM) was replaced by R73E CCM which required design modifications] to keep the aircraft contemporary.
- Major development activity of avionics was undertaken in order to make aircraft contemporary, which took time but yielded results.

Remedial Measures

- LCA (Tejas) Programme is progressing satisfactorily as per the schedules mutually agreed with IAF to meet their requirements. Establishment of Tejas production facilities for a production rate of eight aircraft per annum is progressing concurrently with development activities.

- Phased development approach was changed to concurrent development approach with a view to reduce overall development time. FSED Phase 2 Development Programme was launched concurrently with FSED Phase 1 Programme in Feb. 2000 and also LCA Series Production Programme has been launched concurrently with FSED Phase 2 Programme in Mar. 2006.

- Outsourcing development activities extensively.

- Formation of LCA Induction Team (from Indian Air Force) at ADA to improve the interfaces with programme and expedite decision making.

- Deputy Chief of Air Staff is reviewing every month to ensure that the objectives of Tejas Programme are achieved without any further cost and time overrun.

- In addition to the weekly reviews conducted at ADA and the Governing Body and Annual Meetings, the Hon'ble RM has set up an Empowered Committee with the Chief of Air Staff reviewing the programme once in every quarter.

- The issue of Kaveri engine has been delinked from Tejas Production Programme.

- Formation of quick response teams for on-site and shop floor resolution of issues.

- Aircraft production line has started.

  (More than 2700 flights have been completed utilizing 15 Aircraft. Initial Operational Clearance (IOC-I) was achieved in Jan. 2011. An important milestone in the long journey towards indigenization and Self-Reliance was attained in Dec. 2013 by obtaining Initial Operational Clearance-II wherein "Release to Service Certificate" was

handed over to the Chief of Air Staff by Raksha Mantri in Bengaluru. Final Operational Clearance (FOC) is likely to be obtained in Mar. 2015).

(b) Full Scale Engineering Development Programme of Naval Light Combat Aircraft (LCA-Navy)—Phase - I

- Original Date of Completion : Mar. 2010
- Revised Date of Completion : Dec. 2014

Reasons for Delay

- The LCA Navy Project being a developmental extension to Air Force trainer, was delayed due to the overall delay in Air Force Programme.
- As the LCA Navy is the first naval carrier borne aircraft being designed and developed in the country by HAL and ADA, it had to overcome following changes:—
  - — Design for larger structural loads
  - — Heavier under carriage
  - — Arrester Hook design
  - — Front fuselage redesign
  - — Inclusion of Levcon Flying Surface.

Remedial Measures

- Phased Development Approach has been changed to Concurrent Engineering Approach.
- Outsourcing the development activities extensively.
- Multi-shifts work.
- Close interaction among developing agency, user and production agency.
- Periodic review of project by DRDO and Navy.

(LCA Navy Trainer (Naval Prototype-1) Aircraft has been manufactured and already undergoing flight evaluation. More than 20 flights have been carried out, till date.

(Structural assembly of LCA Navy Fighter (Naval Prototype-2) Aircraft has been completed and equipping is in final stage).

(Shore Based Test Facility (SBTF) has already been commissioned. MiG-29K trials have already been carried out at the facility. LCA trials will commence soon).

(c) Aero Engine—Kaveri

- Original Date of Completion : Dec. 1996
- Revised Date of Completion : Dec. 2009 (Under revision)

Reasons for Delay

- Original PDC was quite challenging and not pragmatic, as the assessment of development effort required was inadequate due to lack of experience. At that point of time, this project was conceived as the first indigenous aero-engine development project in the country. Till date, all the aero-engines were either outright purchased or manufactured under license-production and did not provide the required database for estimating realistic time and cost. However, this project has provided a platform for design, development and testing of an indigenous aero-engine and its variants.

- Non-availability of special materials, like nickel and titanium based alloys.

- Lower priority from foreign manufacturing agencies in view of Minimum Order Quantity *vis-a-vis* the production order quantity from other engine houses.

- Lack of required manufacturing infrastructure at Indian Vendor's facilities

- Any modification in component/system has a lead time of 18-24 months, due to inherent delays of the procurement process

- Delayed delivery of components and systems by agencies abroad due to lower priority

- Induction of Kaveri core engine development and its altitude testing was not envisaged in the beginning but was added at a later stage of the programme.

- Flying Test Bed (FTB) trials was not originally included as a milestone in the project. However, based on the recommendations of the Certification Agency and Air Force, FTB programme was included.

- US Sanctions imposed during 1998 affected the delivery of critical systems.

- Lack of infrastructure for engine testing and component/ system level testing within the country.

- Engine and component failure during testing.

  (Kaveri Engine was integrated with IL-76 Aircraft at Gromov Flight Research Institute (GFRI), Russia and flight test was successfully carried out upto 12 km. maximum altitude and maximum forward speed of 0.7 Mach No. Twenty Seven flights for 57 hours duration have been completed).

Remedial Measures

- Consortium approach has been used for design, development and fabrication of critical components.

- Three tier project monitoring approach is being followed.

- Phased Development Approach has been changed to Concurrent Engineering Approach.

- Outsourcing development activities extensively.

(d) Airborne Early Warning and Control (AEW&C) System

- Original Date of Completion : Apr. 2011

- Revised Date of Completion : Oct. 2014

Reasons for Delay

- The programme was sanctioned in Oct. 2004 which envisaged procurement of 3 modified Embraer 145 aircraft. These were to be installed with the indigenous mission systems developed by DRDO. Operational requirements were however finalized only in Feb. 2007. Hence order for aircraft was place in Aug. 2008. Subsequently, user further projected complementary

ground system requirements and hence a revised sanction for extension of PDC was obtained and cost was revised to Rs. 2157 crore.

Remedial Measures

- Progress of activities in parallel.
- Working in multiple shifts.
- Close monitoring of project.
  (Two systems are undergoing flight evaluation).

(e) Air-to-Air Missile System – Astra

- Original Date of Completion : Aug. 2012
- Revised Date of Completion : Dec. 2016

Reasons for Delay

- Delay in receiving first batch of seekers.
- Contract was signed in Aug. 2006, however, Russian Presidential approval came in Nov. 2007. Contract effective date commenced from 10 Dec. 2007.
- Technology problems leading to major mid-course redesign.
- Project is progressing as per revised schedule. (Undergoing tests from Su-30).

Remedial Measures

- Phased Development Approach has been changed to Concurrent Engineering Approach.
- Consortium approach has been used for design, development and fabrication of critical components. (Trials from Su-30 is going on).

(f) Long Range Surface-to-Air Missile (LR-SAM)

- Original Date of Completion : May 2012
- Revised Date of Completion : Dec. 2015

Reasons for Delay

- Delay in finalization of Installation Control Document and Interface Design Specifications.
- Failure encountered in prototype during hang Fire Test.
- Complexity in technologies.
- Ab-initio development.
- Change in design requirement from Design Authority IAI.
- Technology problems in developing a State of the art pulse motor.
- Redesign of Vertical Launch Unit as per Navy Ship Build requirements.
- Flight testing was linked to delivery of components and equipment.
- Project is progressing as per revised schedule.

Remedial Measures

- Outsourcing the development activities extensively.
- Multi-shifts work.
- Close interaction among user and production agency.
- Periodic review of project by SA to RM.

  (Home on Target (HoT) Tests are planned in November 2014 and March 2015)

2.15 The Ministry was again asked to give reasons for the cost and time overruns in the DRDO projects and remedial measures taken to check the cost and time overruns. The Ministry replied as under:—

"The following are some of the reasons for the cost and time overruns in the DRDO projects:—

- *Ab-initio* development of the state-of-the-art technologies.

- Non-availability of trained/skilled manpower in respect of *ab-initio* development projects.
- Non-availability of infrastructure/test facilities in the country.
- Technical/technological complexities.
- Non-availability of critical components/equipment/materials and denial of technologies by the technologically advanced countries.
- Enhanced User's requirements or change in specifications during development.
- Increase in the scope of work.
- Extended/long-drawn user trials.
- Failure of some of the components during testing/trials.

The following are some of the important remedial measures taken by DRDO to check the cost and time overruns in ongoing projects DRDO has instituted several review mechanisms to monitor programmes and projects regularly, right from their inception, with active participation of the Services, production agencies, academic/ research institutions, etc.

Three tier management and monitoring mechanism has been adopted for all major projects. In case of mega programmes, inter-ministerial apex board has been constituted to manage and monitor them. DRDO has Apex Management Board, Executive Board, Project Monitoring and Review Committee (PMRC), and Project Review Committee to monitor and review ongoing projects. These Boards and Committees are represented by the developers, users, production agencies, inspection agencies, financial authorities, senior scientists from other scientific organizations, etc. and they review and monitor projects periodically.

For all major programmes/projects, there are multi-tier "Programme Management Boards", having representation from the Services, DRDO laboratories and in some cases from academic institutions and other national research laboratories. These Boards periodically monitor and review the programmes and help in early detection

of bottlenecks and suggest mid-course corrective actions, as deemed appropriate. VCOAS reviews Staff Projects for Army, twice a year. DCAS is a member of the Engine Development Board; VCOAS, VCNS and DCAS are members of Missile Development Board. LCA Programme is being closely monitored and reviewed by the Governing Body and General Body of ADA. CAS and CNS are members of General Body of ADA, whereas, CAS, VCNS, DCNS and DCAS are members of Governing Body of ADA. Similarly, major naval programmes are reviewed by Senior Naval Officers like, VCNS, COM and FO-C-in-C."

2.16 On the issue to bring accountability in the delayed projects, the Ministry submitted the following:—

"DRDO has observed that there have been delay in development, trials and production of DRDO developed systems due to various reasons explained in this document while replying to points raised by the Standing Committee (Point Nos. 16 and 17). After implementation of recommendations of Rama Rao Committee, seven Technology Clusters have been created. Concerned Director General of Technology Cluster have been delegated adequate financial and administrative powers to carry out research and development as per mandate of DRDO. All CCS projects are being monitored by the Cabinet Secretariat through monthly report submitted before 10th of every month on status and progress of each CC Project. "DRDO Management Council" (DMC), chaired by the Scientific Adviser to Raksha Mantri, reviews the progress of ongoing projects on every alternate Tuesday at DRDO HQrs. in which all Director Generals, Additional Financial Advisor, Integrated Financial Advisor are the members of DMC. Problems faced by Project Directors are sorted out then and there to complete projects as per schedule. Online monitoring of projects are being carried out at DRDO HQrs. level as well as DG Cluster level to complete ongoing projects ontime."

Closed projects

2.17 The Ministry was also asked to give the details of dropped projects with reasons and cost involved, the Ministry supplied the following information:—

"The details of major projects which were undertaken by DRDO and later on dropped/abandoned, along with the reasons and cost

involved, are given below:—

- Development of Airborne Surveillance Platform: It was sanctioned in May 1997 at a cost of Rs. 10 crore with a Probable Duration of Completion (PDC) of 30 months as a concept demonstrator. Following the fatal accident of the AVRO aircraft on 11 January 1999 at Arrakkonam, the project was short closed in November 1999. The cost incurred at closure of the Project was Rs. 2.145 crore.

- Development of Cargo Ammunition: The project was sanctioned in January 1998 at a cost of Rs. 16.35 crore. During the initial stages of development, it was felt that bomblet developed for Prithvi missile with certain modification can be adopted for Cargo system. However, this was not possible as design of bomblet and its fuze required total redesign and posted certain technological constraints. All the technological constraints were overcome and the design of 130 mm Cargo Shell, bomblet, bomblet fuze with SD element, packing system and ejection system were worked out. The project was short closed at the stage since PDC extension was not approved and expenditure of Rs. 2.78 Cr was made.

- Development of GPS Based System as an Alternative to Fire Direction Radar: The Technology Development Programme was sanctioned in August 1999 at a cost of Rs. 12.20 crore Two parallel methods, AGAPS and GPS, were worked out for Pinaka system, out of which AGAPS was found more suitable. Hence the project of developing GPS based system was short closed and Rs. 46.70 lakh was spent till that date.

- Development of 30 mm Fair Weather Towed AD Gun System: The project was sanctioned in September 2000 at a cost of Rs. 17.70 crore VCOAS in January 2001 said that the existing fleet of AD guns *i.e.* 40 mm L/70 and 23mm ZU guns in the service are still in good condition with a residual life of 10-15 years, further during 9th and 10th Plan these guns are proposed to be upgraded and after upgradation the characteristic of these guns will be superior than that specified in GSQR No. 767. It was, therefore, decided that the QR for future AD Gun should be reviewed as de-induction of the existing guns will start only in 2015. Accordingly, in May 01

new draft GSQR was issued, which was entirely different from that issued earlier. In view of the change in GSQR, the project was short closed after spending Rs. 14.50 lakh.

- Development of 30 mm Light Towed AD Gun System. The project was sanctioned in August 1997 at a cost of Rs. 9.85 crore. Since the scope of development work was entirely different as compared to what was planned, it necessitated additional funds and extension of PDC to design/ develop the system to meet the new QR. In view of the change in QR, decision was taken to close this project and Rs. 51.18 lakh was spent till the closure of the project."

2.18 The Committee desired to know about the procedure to update the weapons system designed and developed under Transfer of Technology (ToT) and in how many projects the defence labs have updated the system. In this regard, the Ministry made the following submission:—

"Transfer of Technology (ToT) happens in acquisition cases, under **'Buy and Make with ToT'** where the ToT is acquired by MoD from foreign OEMs by paying a cost for the ToT duly negotiated by MoD. DRDO is not involved in these cases as the technology transfer happens directly to the nominated agency under DDP (DPSUs/ Ordnance Factories). Any upgrades of weapons systems and the technology are handled by respective Production Agencies directly. However, in a few cases where the problems are faced in the ToT by the Nominated Production Agency, the issue is referred to DRDO by MoD to look into the problems either to resolve the ToTs issue or to take up the upgrades for *e.g.* Bi Molecural Charge System (BMCS), Su-30 Avionics Upgrades, etc."

Nuclear, Biological and Chemical (NBC)

2.19 With regard to the efforts being made by the Defence Research labs to focus on Nuclear, Biological and Chemical (NBC) weapons detection system, the following information was given:—

"Nuclear, Biological and Chemical (NBC) warfare threat is a global concern. To counter this threat, it is of utmost importance to equip the troops with equipment/systems which can detect, decontaminate and offer protection against NBC threats. DRDO has been involved in protecting our troops against NBC warfare by developing NBC defence technologies that are in regular use in the Services. Life

Sciences laboratories have been involved in development of NBC equipment for the last two decades and over the years large number of items have been developed. These are in regular use in the Services.

Over the last two decades, thirty-eight NBC systems/products have been developed by DRDO laboratories. These products essentially cover the areas like detection, individual and collective protection, decontamination and medical and first aid systems, which have been delivered to the Army.

Chemical Agent Detectors

Chemical agent detectors are used for detection of chemical agents present in the environment. These agents include Nerve, Blister, Blood, Choking agents and selected TICs (Toxic Industrial Chemicals). DRDO is developing chemical agent detectors based on IMS (Ion Mobility Spectrometry) and GC-SAW (Gas Chromatograph – Surface Acoustic Wave) technologies for Service deployment in the form of ACADA (Automatic Chemical Agent Detection and Alarm) and CAM (Chemical Agent Monitor). Currently the IMS sensors are undergoing qualification testing and the GC-SAW sensor is undergoing performance testing.

NBC Reconnaissance Vehicle

A BMP II tracked ICV based NBC Recce Vehicle has been developed to carry out detection and demarcation of NBC contaminated area and to transmit the relevant data to command and control centre. This is used by Armed Forces for ground recce of nuclear and chemical contaminated zones and marking the contaminated areas for quick mobilization of the troops. This vehicle has a provision for collecting soil and water samples for subsequent analysis at mobile/offline analysis stations. 8 nos. of NBC RV (tracked) have been supplied to Army at a cost of Rs. 59 crores. Order for 16 more nos. placed.

Water Poison Detection Kit

The kit is housed in an aluminum container having reagent bottles and impregnated filter paper stripes, essential glassware and miscellaneous items. Rs. 1.866 crore Orders Executed for Army, Navy and PMF through SME's.

Residual Vapour Detection Kit

The Kit has been designed to detect Chemical Warfare (CW) agents in the field. It comprises six different types of specially made tubes with chemical reagents which change colour upon reaction with CW agents. Orders worth Rs. 1.71 crore executed for Army, Navy Air Force and PMF through SME's.

Three Colour Detector Paper

This is a suitably treated adsorbent paper with different dyes for detecting CW agents. A booklet has 10 peelable leafs. Orders worth Rs. 12.344 crore executed for Army, Navy Air Force and PMF through SME's.

NBC Filter

It comprises two main components *i.e.* Particulate filter and Gas filter. This filter is used in ventilation systems to provide collective protection for Personnel in ships against NBC warfare agents by supplying breathable air. Orders worth Rs. 6.4911 crore executed for Army and Navy through SME's.

Personal Decontamination Kit

The Kit is used for the decontamination of CW agents by physical adsorption from human body, clothing, gloves, shoes, personal weapons, etc. Orders worth Rs. 6.836 crore executed for Army and Navy through SME's.

Decontamination Solution (DS-2)

It is used for external decontamination (by spraying) of surface, vehicles, equipment and arms, when contaminated by CW agents. Orders worth Rs. 4.25 crore executed for Army and Navy through SME's

Portable Decontamination Apparatus

The apparatus is portable and used for decontamination of equipment. It has an in-built pump and can be used from a vehicle compressor also. Orders worth Rs. 6.94 crore executed through SME's for Army and Navy.

Integrated Field Shelter

The Integrated Field Shelter is a self contained shelter for underground deployment with protection for 30 persons in a NBC environment. It is made of pre-fabricated galvanized steel and is modular in construction. It has an overall diameter 2.5m and is 28 meters long. It can sustain a blast pressure of 52 psi when buried underground; withstand 7.5 t/m^2 circular pressure for earth covered portions and 15 t/m^2 longitudinal pressure for portions not covered by earth. It is portable in a 3 ton vehicle. It has a NBC filtration and blower system with pre-filter and composite HEPA filter integrated with flash sensor. The shelter has a power supply of 2 DG sets of 5 KVA each and 2 nos. 1000 liter tanks for water supply apart from sewage disposal facility and chemical toilets. 177 of these shelters have been supplied to Service at a cost of Rs. 126 crore. 339 more shelters are planned to be procured by the Services.

Mobile Decontamination System

The Mobile Decontamination System (MDS) is developed for the decontamination of vehicles, equipments, personnel and terrain against biological, radiological and chemical warfare agents. The system consists of a Pre-Wash Equipment, Chemical Mixing Equipment, Automatic Emulsion Mixing and Feeding Equipment, Post-Wash Equipment and Personnel Decontamination Equipment. All these equipments are run by electric motors. A 45 KVA Gen Set supplies power to all these equipments even when they are running simultaneously. The water required for the equipments is drawn from a 3000 Liter Stainless Steel Water tank, which can be filled in 10 min. by a feed pump. All these equipments, their accessories, Gen Set, water tank and feed pump etc. are mounted on a TATRA 8x8 VVN vehicle that has excellent cross country mobility.

NBC Individual Protective Equipment (IPE)

As per the classification used by Indian Army, NBC individual protective Equipment (NBC IPE) comprise of a set of nine items *viz*. NBC Suit, Over boots, Gloves, Respirator Mask, Integrated Hood Mask, Canister, Haversack, Personal Decontamination Kit and Three Color Detector Paper. All of these IPE components were developed by DRDO and supplied to Services in large numbers.

NBC Suit Permeable protects the wearer from CBR agents and consists of jacket (Smock) with integrated hood and trousers. NBC Suit Permeable MK-IV can provide protection up to 24 hrs and withstand three wash cycles without losing its functional properties. The Suit uses an activated carbon sphere laminated fabric as the filter layer and has a flame retardant and water repellent outer fabric. Respiratory masks are used to protect respiratory tract against CBR agents with a protection time of up to 24 hrs. (limited by canister) and weights only 600 g. The integrated hood mask has a hood for use of the mask by bearded personnel.

The over boots and gloves provide protection against CBR agents for up to 6 hrs. the canister used activated carbon filter to provide protection of 2 hrs. against nerve and blister agents and can filter out radiological dust and bio agents. Haversack is used for keeping and carrying the IPE not worn by the soldier. Personal Decontamination Kit is used for decontamination of skin and small arms and equipment. Three color detector paper detects nerve and blister agents in liquid form by change of color upon exposure to droplets.

First Aid Kits Type A and B

The First Aid Type A kit contains medicine and materials to provide first aid for the service personnel before they are brought to regimental aid post in the event of CW attack. Tablets, PDK, Three color detector paper etc. The First Aid Type B is used to provide medical resources to CW casualties in the event of attack. The furnished medicines in this kit are used for the treatment of wounded service personnel at base camp in the event of CW attack.

NBC Protective Items

These include Respiratory Mask, Integrated Hood Mask, Resuscitator and Lead Tester. Varying numbers of orders costing 113.53 Cr. were executed through SMEs to Army.

NBC Canister, Neelkantha

This canister is used for individual protection against NBC warfare agents by supplying breathable air. It is used to remove particulates (Nuclear dust, biological agents such as bacteria, viruses, chemical

aerosol and gases). Orders worth Rs. 21.366 Cr. executed for Army, Navy and PMF through SME's.

Auto Injector (Atropine Sulphate and Pam Chloride)

This product is used for self administration of Nerve agent antidotes by affected Service Personnel. Orders worth Rs. 7.822 Cr. executed for Army, Navy and PMF through SME's."

Collaboration with universities/academic institutions

2.20 When the Committee asked to State the details of the research programmes being sponsored through universities by the DRDO during 11th and 12th Plan and the benefit accrued to DRDO and defence services. It has been stated that DRDO has established seven centres of excellence at various institutions/universities for creating strong academic links. When and where these centres have been established and what has been the results so far and the major achievements. The Ministry of Defence informed as given:—

"DRDO has instituted Grants-in-Aid schemes to nurture available research talents in universities, academia and other research centres, including industries in the country. The identified projects/ programmes are being funded by DRDO through the followings:—

1. Extramural Research (ER).
2. Aeronautical Research and Development Board (AR and DB).
3. Life Sciences Research Board (LSRB).
4. Naval Research Board (NRB).
5. Armament Research Board (ARMREB).

2.21 Basic objectives of the above Schemes/Boards are:—

- To foster knowledge-based growth of defence related discipline in the country, strengthening and integrating national resources of knowledge, know how, experience, facilities and infrastructure.
- To catalyze the much needed cross-fertilization of ideas and experiences between DRDO and outside experts in scientific and technical fields that contribute to defence technology.

- To launch and coordinate research in specified areas of defence in academic institutions.

- To create conditions suitable for attracting talent through research collaborations and other academic exchanges and adopt synergic approach towards National needs and priorities in the field of defence technology.

- To lead the technological innovations useful for Combat Multiplier both for the near and long term.

Details of the number of projects sanctioned under each Scheme/ Board, amount sanctioned to various research agencies including academic institutions during 11th and 12th Plan (till 15 Oct. 2014) are given in the following tables:—

(Rs. in crore)

Sl. No.	Name of Scheme/Board	No. of Projects Sanctioned	Total Cost of Sanctioned Projects
1.	Extramural Research (ER)	600	348.55
2.	Aeronautical Research and Development Board (AR&DB)	26	24.52
3.	Life Sciences Research Board (LSRB)	156	37.83
4.	Naval Research Board (NRB)	216	70.89
5.	Armament Research Board (ARMREB)	77	17.93

2.22 In this connection it was further asked to State the budgetary provision given to the Universities, their actual allocation and system of monitoring thereon. The Ministry informed as under:—

"The budgetary provision given to the Universities (under Extramural Research), their actual allocations and release of grants since 2007-08 till 15 Oct. 2014 are given below:—

(Rs. in crore)

Year	Allotment	Released Grant
1	2	3
2007-08	31.00	30.9873
2008-09	30.00	27.5541
2009-10	30.00	22.1616

1	2	3
2010-11	36.50	33.7783
2011-12	46.00	43.0471
2012-13	50.00	46.9628
2013-14	60.00	57.5998
2014-15 (till 15 Oct. 2014)	65.00	22.0146

System of monitoring:—

- Projects costing less than Rs. one Cr. are being monitored by Project Review Committee meetings held yearly.

- Projects costing more than Rs. one Cr. are being monitored by Project Advisory Committee meetings held yearly and Research Programme Implementation Group meetings held half yearly."

2.23 As to the contribution of services towards the Research and Development of high Technology Military Projects, in terms of budget and providing inputs for their operational requirement, the following information was given:—

"Services have provided document on Long Term Integrated Perspective Plan (LTIPP), which has given wide idea about the requirements of Services. Considering the LTIPP, DRDO has prepared a document on Long Term Technology Perspective Plan (LTIPP), which highlights the expected new technology developments in various areas. It is aligned with LTIPP of the Services. The technology development plan covers the 12th, 13th and 14th Five Year Plans (FYP) (2012-2027). The document also covers the new technologies which are not mentioned in LTIPP but will be useful for interest to Services and covers a period beyond 2027.

Services have provided valuable inputs to DRDO through following ways of reviews and interactions:—

- Quarterly Interaction Meetings (QIM)

- Project Monitoring and Review Committee (PMRC)

- Executive Board Meeting (EBM)

- User Assisted Technical Trails (UATT)
- User Trials

In most of the Mission Mode (MM) Projects, especially all Strategic programme projects Users *i.e.* Service Personnel are involved right from the execution. It ensures on job training, immediate modifications as per requirements and perfect product.

For naval projects, DRDO depends upon Indian Navy to provide platforms such as ships, helicopters and submarines and other logistic support for installation and final sea trials. Navy is also part of different levels system acceptance, like Factory Acceptance Test (FATs), Harbor Acceptance Trials (HATs) and Sea Acceptance Trials (SATs), etc. Similarly, Army and Indian Air Force also provide platforms for trials and actively involve in development trials and training activities.

Many Mission Mode Projects are being funded by Services and costs are shared between DRDO and Services."

PART II

RECOMMENDATIONS/OBSERVATIONS

Under expenditure

1. Indian Ordnance Factories were provided a fund of Rs.3,666 crore during 11th Five Year Plan from 2007-12 for modernization against which an expenditure of Rs. 2,927 crore was incurred. Hence, Rs. 739 crore was left unutilized. The Committee observe that Ordnance Factory Board manages 41 manufacturing Units and 32 other establishments, nevertheless around 20% amount allocated for modernization remained unutilized during the 11th plan period. The under utilization of fund also indicate that Ordnance Factory Board has not been so forthcoming in modernizing Ordnance Factories. The issue of augmenting capacity for manufacturing has not been properly addressed which has resulted in delays of many projects like T-90 tanks, Pinaka Rocket system, etc. The Committee express their anguish over the under utilization of Nations funds. This shows sheer callousness on the part of the Ordnance Factory Board. The Committee are opinion that had there been less allocations, this amount could have utilized in some other head. The Committee opine that alongwith adequate budgeting, optimum utilisation should also be given due importance. The Committee also desire that funding and expenditure pattern should be promptly dealt with under intimation to this Committee.

Budgetary Provisions

2. During the deliberations, it was revealed that due to non-availability of funds in 2013-14, expenditure was prioritized and restricted to Rs. 186 crore for augmentation of capacity for manufacturing of T-90 Tanks from 100 to 140 numbers per annum. The Committee are surprised at this meagre allocation for such an ambitious project. While seeking clarifications for such lesser allocation the Committee desire that enough allocation should be provided to augment the capacity of T90 tanks so that adequate supplies are made to Army within the stipulated timeframe. Accordingly, this Committee be intimated about the initiatives taken in this regard.

Delays in projects' executions

3. While examining the subject, the Committee noted that there have been very long gestation periods in case of different projects. For example, the project for creation of capacity for manufacturing of MBT Arjun @ 30 numbers per annum was sanctioned in May, 2002 and the project could be completed only in August, 2011. This resulted in a time overrun of ten years. Also, Ordnance Factory project, Nalanda was initiated during the 10th Plan and has been carried forward to the 12th Plan. Besides this, the project for creation of capacity for manufacturing of T-90 tanks @ 100 numbers per annum was sanctioned in December, 2003. Ordnance Factory Board started manufacturing 100 tanks per annum, inclusive of tanks manufactured from SKD (Semi-knocked Down Kits) from 2009-10. Besides these, many projects which started in 2010 such as creation of capacity for manufacturing of T-72 variants @ 50 numbers per annum, augmentation of capacity for manufacturing of armoured vehicles engines from 350 to 750 per annum, augmentation of capacity for manufacturing of spares required in overhauling of T-72 and T-90 tanks have not even attained 50% completion even after a lapse of 4-5 years. The Committee take serious note of the position with regard to long gestation of periods and delays in project executions of Ordnance Factories projects and desire that all-out efforts be made to streamline the project execution. Any kind of indecisiveness or callousness is not acceptable to the Committee. The Committee want this that matter should be looked into by a high powered fact finding Committee so that accountability of the all concerned be fixed. In this context the Committee are given to understand that certain Ordnance Factories are facing capacity constraints due to explosive safety limit restrictions on building used for ammunition production. They have been further informed that steps are being taken to augment capacity of certain Ordnance Factories. Besides this in the past also Ordnance Factory Board had problems in meeting the target of manufacturing the T-90 tanks, BMP-II and Pinaka Rocket due to various constraints such as delayed product support from the Original Equipment Manufacturer (OEM), discontinuity in production line due to non-availability of indents from Army and also certain issues involving modification of design. The Committee are not happy with such a sorry state of affairs prevalent in respect of project executions. They are of the opinion that these problems could have been envisaged at the planning stage itself. Hence the Committee want that adequate steps should be taken to adhere to the targets both in terms of quality and time under intimation to them.

Research and Development

4. The Committee were concerned about the R&D work being taken in Ordnance Factories. In this regard, the Committee were informed that Ordnance Factory Board (OFB) is primarily a manufacturing organization engaged in manufacturing of defence products based on Transfer of Technology (ToT) from the Original Equipment Manufacturer (OEM) or DRDO. Expenditure on R&D is very minimal *i.e.* less than even 17 of Value of Issues (VoI) during the last five years. With regard to strategies/initiatives for R&D enhancement, the Committee were informed that in 2003, Ordnance Factory Board adopted a policy of in-house R&D resulting in the formation of 11 Ordnance Development Centres (ODCs) in diverse technical fields. OFB has decided to increasingly play the role of lead integrator of defence equipments. Accordingly, OFB has initiated actions to jointly work with major DPSUs such as BEL, MIDHANI, BDL etc. Reputed institutes like IITs at Kanpur, Mumbai and Chennai have also been roped in for R&D indigenization. Adequate fund is made available to Ordnance Factories to carry out development of arms and ammunitions with indigenous technology. Besides this, the Ministry has approved a number of capacity augmentation projects involving an investment of more than Rs. 4000 crore during the last 04 years in the Ordnance Factory Board. However, it is regretted that no substantial R&D work are being taken at Ordnance Factories. Unless strategies towards restructuring and in 2 house R&D work are undertaken in Ordnance Factories. It will not be possible for Ordnance Factories to position itself in the league of internationally reckoned companies to manufacture arms and ammunition. Therefore, the Committee wish that strategic efforts be made to kickstart and set rolling the R&D activities in Ordnance Factories. The initiatives taken in this regard be intimated to the Committee.

Manpower

5. The Committee found that against a sanctioned strength of 1,25,126 personnel in technical category, there is an existing strength of 76,273 personnel in various Ordnance Factories. As far as non-technical staff is concerned, the sanctioned and existing strength are 23,095 and 17,645 respectively. The above figures show a huge gap in sanctioned and existing strength for both technical and non-technical personnel in Ordnance Factories. The existing strength of Group A officers is 1,671 as against the sanctioned strength of 2000. The

Committee are deeply concerned about the fact that the shortage of personnel in Ordnance Factories is escalating over the years. In this regard, the Committee desire that essential measures should be taken to fill the sanctioned posts so that ordnance factories are able to deliver as per the requirements and inordinate delays in delivery is checked and progressive enhancement of infrastructural base takes place. The Committee should be intimated about the steps taken in this regard.

Quality Assurance

6. The Committee opine that besides timely production, it is also equally pertinent to have quality production. During the deliberations, it was revealed that earlier there were certain quality problems with the ordnance factory products. However, the representatives of Ministry of Defence assured that now they are taking a lot of initiatives in ensuring that everything is manufactured as per the process schedule. As regard the defects due to improper handling and storage in ammunition depots, improper maintenance of weapon system, improper handling of ammunition and weapon during firing or design deficiency, the Committee opine that quality of products has to be ensured at all levels. Excellent quality is absolutely necessary in achieving indigenization and self-reliance in respect of different high-end technology systems and sub-systems. The OFB should take responsibility of training it's end users (the Service Personnel) in proper handling of ammunition and weapon. Inspite of these remedial measures, if the lacuna continue to exist, then accountability should be fixed and Committee be informed about the steps taken.

Budgetary provisions for Defence Research and Development

7. The Committee note that the Defence Research and Development Organization (DRDO) projected an amount of Rs. 18495.46 crore, however, it has been allocated an amount of Rs. 15282.92 crore only thereby a shortfall of Rs. 3212.54 crore. The Committee also note that out of the total defence budget the share of DRDO was 6.98% in 2009-10, which reduced to 5.37% in 2013-14.

However, this share has slightly improved to 6.67% in 2014-15. The share of Defence Research and Development Budget to GDP is also declining over the years. It has reduced to 0.09 per cent in 2013-14 from 0.13 per cent in 2009-10. The Committee also note that DRDO gives its budgetary projection, based on the ongoing projects/

programmes and future requirements, but it has been allocated a meagre amount and out of which nearly 80% is utilised for Mission Mode Projects with deliverables for Armed Forces. The Committee feel that shortfalls in budget affects the pace of technological and infrastructural development since ongoing developmental activities have to be re-prioritized. Now-a-days there is a need to lay emphasis on indigenization of defence products but it can only be achieved with adequate budgetary support. The Committee desire that all possible measures should be taken to meet the budgetary requirement of DRDO. The Committee may be informed about the measures so taken.

Manpower

8. The Committee note that at present 7809 number of scientists (including Service Officers and Work Officers) are working in Defence Research and Development Organisation (DRDO) against the sanctioned strength of 7932 (including 7255 Scientists, 623 Service Officers and 54 Work Officers) (as per Government Orders in 2001). The Committee also note that while the number of projects have grown multi-fold in terms of size and technological complexity keeping in view India's strategic and tactical defence requirements but there has been no increase of scientific manpower in DRDO since 2001. The Committee feel that scientific manpower in DRDO should commensurate with the R&D requirements and projects undertaken. As intimated by the Ministry that a cabinet note for augmentation of additional posts of scientists had already been forwarded for consideration of the Government. The Committee desire that the matter may be pursued vigorously at the highest level and they are apprised of the same within three months of presentation of this report.

9. The Committee also observe that on an average of more than 65 scientists have been resigning from DRDO since 2009. Till 1st October, 2014, 23 scientists have left the organisation. The reasons given for their exodus are indicated as their personal/domestic grounds. However, the Committee opine that conducive work environment, invigorated growth opportunities and suitable incentives can control such resignations. The Committee would like to be informed about the steps taken in this regard by the Ministry.

Performance audit of the work of scientists of DRDO

10. The Committee have also observed that there are many projects, undertaken in different DRDO labs, which are not attaining completion due to shortage of manpower. The Committee desire that

all out efforts should be made by DRDO to ensure that projects undertaken by it are not delayed on account of shortage of manpower.

Indigenisation of Research and Development Activities

11. The Committee are happy to note that the country's defence requirements in terms of indigenous systems are being taken care of by the Defence Research and Development Organisation (DRDO). The Committee see that although DRDO has given the country a vast range of products and systems, ranging from the strategic Agni class of missiles, a family of radars and sonars for virtually every platform/ application, Electronic Warfare (EW) systems, Main Battle Tank (MBT), combat aircraft, etc. yet the country is still dependent on imports. Even after five decades of the establishment of DRDO, in 1958, having a vast network of 52 laboratories across the country, the Nation is still importing large chunk of its technological requirements in Defence Sector fully knowing that technologically advanced countries do not part their critical technologies with developing countries and offer only 'Buy' category of systems to countries like India. Therefore, our labs have to develop each systems, sub-systems, component *ab-initio* including information infrastructural and testing facilities. For this, adequate budgetary support is required. The Committee desire that necessary reforms in this regard should be undertaken and a detailed concept paper be prepared to ensure that there is no dearth of funds. The Committee also desire that they may be apprised about the same.

Delay in Projects

12. The Committee note that there are about 530 ongoing projects in different DRDO labs and out of it 136 in mission mode. Some of these include Agni IV, Agni V, Nirbhay Cruise Missile, K-15, Nag, Astra, AWACS, Arjun Main Battle Tank, Tejas LCA, etc. The Committee also note that out of 44 major ongoing projects (more than 100 crore), there have been cost revisions and time revision in case of 8 and 12 projects respectively. Besides, 10 projects are more than 5 years old *i.e.* sanctioned before 2009. Eighteen major projects (more than 50 crore) sanctioned during 10th Five Year Plan (April, 2002 to March, 2007) but none has yet been completed. Moreover, two of them have been closed, five awaiting closure and one under evaluation. Out of 43 major projects (more than 50 crore) initiated during 11th Five Year Plan (2007-12) none has reached completion. The Committee are perturbed to observe that the projects being undertaken are not executed according to their

schedule and inordinate delays in execution of almost all the projects is a common phenomena. While deploring this attitude, the Committee desire that some concrete steps should be taken to put in place a mechanism to oversee the project execution so that they are implemented in stipulated time-frame. Although, the Committee note that some measures have been taken to decimate delays such as creation of seven technology clusters and the concerned Director Generals of technology clusters have been delegated adequate financial and administrative powers to carry out research and development as per mandate of DRDO, monitoring of all Cabinet Committee on Security (CCS) projects by the Cabinet Secretariat through monthly report submitted before 10th of every month on status and progress of each project. The Committee note that despite such an elaborate mechanism in place, the projects are being delayed. The Committee are not happy with the situation. They opine that this mechanism is not being followed scrupulously. The Committee desire that more effective efforts are required to be made for timely completion of each project. The Committee also desire that efforts so made may be apprised to them.

Closed Projects

13. The Committee note that many projects including development of cargo ammunition, development of GPS Based System as an Alternative to Fire Direction Radar, development of 30 mm Fair Weather Towed AD Gun System, development of 30 mm Light Towed AD Gun System have been closed thus wasting a considerable amount of public money. The Committee desire that they be informed about the basis on which these were included and specific reasons which forced the Government to close these projects. In this connection, the Committee feel that before commencing a project and channelising money towards it though calculation should be made for the project so that it may not be dropped before its completion and not even a single penny of the public is wasted in the name of country's defence.

Nuclear, Biological and Chemical (NBC) warfare

14. The Committee are happy to note that to counter the threat of conventional warfare and to equip the troops with equipments/ systems which can detect, decontaminate and offer protection against NBC threats, DRDO is developing NBC defence technologies that are in regular use in the Services. Life Sciences laboratories have been involved in the development of NBC equipment. Over the last two

decades, thirty-eight NBC systems/products have been developed by DRDO laboratories. These products essentially cover the areas like detection, individual and collective protection, decontamination and medical and first aid systems, which have already been delivered to the services. Some of these developments include chemical agent detectors, NBC reconnaissance vehicle, water poison detection kit, residual vapour detection kit, three colour detector paper, NBC Filter, personal decontamination kit, decontamination solution (DS-2), portable decontamination apparatus, integrated field shelter, mobile decontamination system, NBC Individual Protective Equipment (IPE), first aid kits, NBC protective items, NBC canister, neelkantha and auto injector, etc. While appreciating the efforts of DRDO, the Committee recommend that the Ministry of Defence and DRDO should be pro-active in foreseeing the future challenges of NBC threat and work towards decimating is menace.

Collaboration with universities/academic institutions

15. The Committee are happy to note that DRDO has instituted Grants-in-Aid schemes to nurture available research talents in universities, academia and other research centres, including industries in the country. The Committee commend this initiative as this will foster knowledge-based growth of defence-related discipline in the country, strengthen national resources of knowledge, know-how, experience, facilities and infrastructure and catalyze the much needed cross-fertilization of ideas and experiences between DRDO and outside experts in scientific and technical fields that contribute to defence technology. In this regard, DRDO has established seven centres of excellence at various institutions/universities in Bangalore, Chennai, Hyderabad, Coimbatore, Mumbai and Kolkata. The Committee recommend that such centres should be opened at more places across the country. The Ministry of Defence should take initiatives in this regard under intimation to this Committee.

NEW DELHI;
22 *December,* 2014
01 *Pausha,* 1936 *(Saka)*

MAJ GEN B C KHANDURI, AVSM (RETD),
Chairperson
Standing Committee on Defence.

APPENDIX I

STANDING COMMITTEE ON DEFENCE (2014-15)

MINUTES OF THE FOURTH SITTING OF THE STANDING COMMITTEE ON DEFENCE (2014-15)

The Committee sat on Wednesday, the 8th October, 2014 from 1100 hrs. to 1645 hrs. in Committee Room 'D', Parliament House Annexe, New Delhi.

PRESENT

Maj Gen B C Khanduri, AVSM (Retd)—*Chairperson*

MEMBERS

Lok Sabha

2. Shri Shrirang Appa Barne
3. Col Sonaram Choudhary (Retd)
4. Shri Ramesh Jigajinagi
5. Dr. Murli Manohar Joshi
6. Km. Shobha Karandlaje
7. Shri Vinod Khanna
8. Dr. Mriganka Mahato
9. Col Rajyavardhan Singh Rathore (Retd.)
10. Shri Malla Reddy

Rajya Sabha

11. Shri Anand Sharma
12. Shri Rajeev Chandrasekhar
13. Shri A.U. Singh Deo

14. Shri Vinay Katiyar
15. Shri Madhusudan Mistry
16. Smt. Ambika Soni
17. Shri Tarun Vijay

SECRETARIAT

1. Shri D.S. Malha — *Director*
2. Shri Lovekesh Kumar Sharma — *Additional Director*
3. Shri Rahul Singh — *Under Secretary*

Representatives of the Ministry of Defence

1. Shri G. Mohan Kumar, Secy. (DP)
2. Shri A.K. Gupta, AS (DP)
3. Shri A.K. Bishnoi, AS (B)
4. Shri Arunav Dutt, FA (DS)
5. Dr. Avinash Chander, SA to RM
6. Shri Navin K. Chaudhary, JS (E)
7. Shri Deepak Anurag, JS (C&W)
8. Shri Sanjay Garg, JS (DIP)
9. Shri K.K. Pant, JS (AS)
10. Smt. Kusum Singh, JS (P&C)
11. Shri Nitin Chayande, Dir. (L&C)
12. Shri M.C. Bansal, DGOF and Chairman OFB
13. Shri R.J. Bhattacharya, DDG/Budget
14. Shri Ravi Kant Chopra, Director General
15. Dr. D.K. Malik, Addl. DG (C&CRD)
16. Shri D.K. Mahapatra, Secretary/OFB
17. R. Adm. (Retd.) N.K. Mishra, Chairman and MD, HSL
18. Shri P. Dwarakanath, C&MD, BEML

19. Shri M. Narayana Rao, C&MD, MIDHANI
20. R. Adm. (Retd.) A.K. Verma, CMD, GRSE
21. R. Adm. R.K. Shrawat, CMD, MDL
22. Shri S.N. Mantha, BDL
23. R. Adm. (Retd.) Shekhar Mital, CMD, GSL
24. Shri S.K. Sharma, CMD, BEL Ltd.
25. Dr. R.K. Tyagi, Chairman, HAL
26. Lt. Gen. J.P.S. Dalal, DG QA
27. R. Adm. Sanjeev Kale, ADGQA (N)
28. Brig. Sanjay Chauhan, DDGQA (PP&T)
29. Shri P.K. Kataria, JS&Addl. FA
30. Dr. J.P. Singh, Dir.
31. Shri Ajay Kumar Sharma, Addl. DG (Lands/Lands Audit)
32. Shri P. Daniel, Addl. DG (Admin/Vig)
33. Shri G.S. Rajeswaran, Addl. DG (Acq/Recq/Hrg)
34. Shri K.V. Nagi Reddy, Dy. DG (C&CRD)
35. Dr. K. Tamilmani, DG (Aero)
36. Dr. V.G. Sekaran, DG (MSS)
37. Dr. V. Bhujanga Rao, DG (NS&M)
38. Dr. G. Malakondaiah, CCR&D (HR)
39. Shri S.S. Sundaram, DG (ECS)
40. Dr. K.D. Nayak, DG (MED&CoS)
41. Dr. Manas K. Mandal, DG (LS)
42. Shri A.M. Datar, DG (ACE)
43. Dr. Sudershan Kumar, CCR&D (PC&SI)
44. Shri Sudhir Kumar Mishra, CR&D and CEO, BrahMos

45. Shri R.G. Vishwanathan, JS&Addl. FA

46. Smt. Nabanita R Krishnan, Dir. Dte. of Plan and Coord.

2. At the outset, the Chairperson welcomed the Members of the Committee and informed them about the agenda for the sitting. The Committee then invited representatives of the Ministry of Defence, Indian Ordnance, DGQA and DPSUs. The Chairperson welcomed the representatives to the sitting of the Committee and drew their attention to Direction 58 of Directions by the Speaker, Lok Sabha. The Chairperson initiated the discussion and requested the representatives of the Ministry of Defence to brief the Committee on various issues in agenda which included huge jump in Revenue Head of DGOF, capacity enhancement of Ordnance Factories, quality assurance initiatives by DGQA and R&D programme undertaken by OFs and DPSUs.

3. The representatives of the Ministry commenced their briefing through a power point presentation on Indian Ordnance Factories. This was followed by detailed deliberations on various issues in the context which included indigenization efforts by OFs, measures taken for capacity augmentation and optimum budget utilization, arresting thefts, difficulties in getting skilled manpower, etc.

4. thereafter, a presentation on DGQA was made which was followed up by queries from Members including those on delayed timelines, lackadaisical approach towards quality assurance leading to constant increase in number of accidents of aircraft and vessels, parameters for quality check.

5. Subsequently, a presentation on DPSUs was made by the representatives of the Ministry and pursued with deliberations on the subject. Members posed various queries such as need for reorganization and restructuring of DPSUs, cost effectiveness, dependence of foreign products, quality production, efforts to attract scientific talent, etc. The representatives of the Ministry of Defence replied to various queries/ observations of members. Nevertheless, members desired that a well drawn out vision for defence production may be furnished to the Committee.

The Committee took break for lunch and resumed the sitting at 2:30 P.M.

6. The Ministry gave presentation on Defence Research and Development Organization. Members asked questions on delayed programmes of DRDO, inefficiency and need for more vigorous R&D in DRDO.

7. Thereafter, a presentation was given on Directorate General, Defence Estates (DGDE). Vibrant discussions were held on the subject including use of land for resource generation, compatibility between civilians and defence establishments, use of barren land as playgrounds for children, checking erection of religious structures in vicinity of defence lands, etc. The representatives of the Ministry of Defence submitted their replies to queries/observations of members.

8. The Chairperson directed the representatives of the Ministry of Defence to furnish written replies to the queries which were not readily available at the earliest.

A copy of verbatim record of the proceedings has been kept.

The Committee then adjourned.

STANDING COMMITTEE ON DEFENCE

MINUTES OF THE EIGHTH SITTING OF THE STANDING COMMITTEE ON DEFENCE (2014-15)

The Committee sat on Wednesday, the 17th December, 2014 from 1500 hrs. to 1550 hrs. in Committee Room 'E', Parliament House Annexe, New Delhi.

PRESENT

Maj Gen B C Khanduri, AVSM (Retd.)—*Chairperson*

MEMBERS

Lok Sabha

2. Shri Suresh C. Angadi
3. Shri Shrirang Appa Barne
4. Shri Dharambir
5. Shri Thupstan Chhewang
6. Shri H.D. Devegowda
7. Shri G. Hari
8. Km. Shobha Karandlaje
9. Shri A.P. Jithender Reddy

Rajya Sabha

10. Shri A.U. Singh Deo
11. Shri Harivansh
12. Shri Tarun Vijay

SECRETARIAT

1. Shri P.K. Misra — *Additional Secretary*
2. Shri R.K. Jain — *Joint Secretary*
3. Shri D.S. Malha — *Director*
4. Shri Lovekesh Kumar Sharma — *Additional Director*
5. Shri Rahul Singh — *Under Secretary*

2. At the outset, the Hon'ble Chairperson welcomed the Members to the sitting of the Committee. The Committee than took up for consideration and adoption of the following draft Reports on Demands for Grants 2014-15 of the Ministry of Defence:—

(i) General Budget (Demand No. 20, 21 and 27);

(ii) Army (Demand No. 22);

(iii) Navy and Air Force (Demand No. 23 and 24); and

(iv) Ordnance Factories and Defence Research and Development Organisation (Demand No. 25 and 26).

3. After deliberations the Committee adopted the above reports with slight modifications in respect of recommendations.

4. The Committee, then, authorized the Chairperson to finalise the above draft Reports and present the same to the House on a date convenient to him.

The Committee then adjourned.

ANNEXURE 'A'
(Annexure to Point No. 13)

Details of major ongoing projects (Cost above Rs. 100 crore) of DRDO with name of project, developing agency/lab, date of sanction, original estimated cost of the project, likely date of completion, revised cost of the project and revised date of completion

Sl.No.	Project Name	Developing Agency/Lab	Date of Sanction	Original Estimated Cost (Rs. in crore)	Revised Cost (Rs. in crore)	Original Likely Date of Completion	Revised Date of Completion
1	2	3	4	5	6	7	8
1.	Medium Range Surface-to-Air Missile (MRSAM)	RCI	Feb. 2009	10075.68	No revision	Aug. 2016	No revision
2.	Light Combat Aircraft (LCA): Phase-II	ADA	Nov. 2001	3301.78	5777.76	Dec. 2008	Dec. 2015
3.	Airborne Warning and Control System (India) AWACS (I): Phase I	CABS	Feb. 2013	No revision	5113.00	Feb. 2020	No revision
4.	Kaveri Engine	GTRE	Mar. 1989	382.81	2839.00	Dec. 1996	Dec. 2009
5.	Long Range Surface-to-Air Missile (LRSAM)	DRDL	Dec. 2005	2606.02	No revision	May 2012	Dec. 2015
6.	Light Combat Aircraft (LCA): Phase-II	ADA	Nov. 2009	2431.55	No revision	Dec. 2018	No revision
7.	Airborne Early Warning and Control (AEW&C) System	CABS	Oct. 2004	1800.00	2275.00	Oct. 2011	Oct. 2014
8.	Naval Light Combat Aircraft (LCA Navy Phase-II)	ADA	Dec. 2009	1921.11	No revision	Dec. 2018	No revision
9.	Naval Light Combat Aircraft (LCA Navy Phase-I)	ADA	Mar. 2003	561.67	1714.98	Mar. 2010	Dec. 2014

1	2	3	4	5	6	7	8
10.	Medium Altitude Long Endurance (MALE) Unmanned Aerial Vehicle (UAV) and Development of Aeronautical Test Range (ATR) at Chitradurga	ADE	Feb. 2011	1540.74	No revision	Aug. 2016	No revision
11.	Air-to-Air Missile System 'Astra'	DRDL	Mar. 2004	955.00	No revision	Feb. 2013	Dec. 2016
12.	USHUS Augmentation for Reliability (Tushar)	NPOL	Jun. 2014	786.00	No revision	Jun. 2017	No revision
13.	Quick Reaction Surface-to-Air Missile (QR-SAM)	DRDL	Jul. 2014	476.43	No revision	Jul. 2017	No revision
14.	National Open Air Range	DLRL	Aug. 2014	468.00	No revision	Feb. 2018	No revision
15.	Active Electronically Scanned Array Radar	LRDE	Jan. 2012	459.65	No revision	Jul. 2016	No revision
16.	Kautilya	RCI	Jul. 2012	432.80	No revision	Jul. 2016	No revision
17.	Development of 1500 hp Engine	CVRDE	Dec. 2013	398.02	No revision	Dec. 2018	No revision
18.	Solid Fuel Ducted Rocket Ramjet Technology for Air Launched Tactical Missiles (SFDR)	DRDL	Feb. 2013	366.00	No revision	Feb. 2018	No revision
19.	Hypersonic Wind Tunnel (HWT)	DRDL	Oct. 2010	352.00	No revision	Oct. 2015	No revision
20.	EW Systems for Capital Ships, Aircrafts and Helicopter of Indian Navy "Samudrika"	DLRL	Jul. 2012	342.29	No revision	Jul. 2017	No revision
21.	New Generation Anti Radiation Missile (NGARM)	DRDL	Dec. 2012	317.20	No revision	Dec. 2017	No revision
22.	Post Development Support of AEW&C System (PDSAS)	CABS	Sep. 2013	314.32	No revision	Sep. 2018	No revision
23.	EW Suite for Fighter Aircraft (EWSFA)	DARE	Sep. 2005	279.62	330.31	Mar. 2013	Dec. 2014

1	2	3	4	5	6	7	8
24.	NBC Defence Technologies	DRDE	Mar. 2010	284.96	No revision	Mar. 2015	No revision
25.	Dual Colour Missile Approach Warning System	DARE	Nov. 2008	228.80	273.80	Jun. 2013	Jun. 2015
26.	AIP System on P-75 Submarines and Development of Deliverable LOX system	NMRL	Jun. 2014	270.00	No revision	Jun. 2017	No revision
27.	D-Jag System Internal RWJ System for Jaguar DARIN III Upgrade Aircraft	DARE	Aug. 2012	268.27	No revision	Jun. 2015	No revision
28.	Low Vulnerable High Performance Propellant with Low Temperature Co-efficient and Improved Shelf Life of Ammunition	HEMRL	Sep. 2014	267.02	No revision	Mar. 2018	No revision
29.	155 mm/52 Caliber Advanced Towed Artillery Gun System (ATAGS)	ARDE	Sep. 2012	247.90	No revision	Sep. 2015	No revision
30.	Land Based Prototype for AIP	NMRL	Aug. 2010	216.60	No revision	Feb. 2015	No revision
31.	40 GHz Upgradation of MMIC Facility	SSPL	Feb. 2012	198.72	No revision	Aug. 2015	No revision
32.	Advanced Light Weight Torpedo	NSTL	Feb. 2008	194.53	No revision	Aug. 2013	Dec. 2015
33.	Multi Mission Radar	LRDE	Feb. 2012	193.44	No revision	Jun. 2015	No revision
34.	Flying Test Bed	LRDE	Sep. 2012	173.48	No revision	Sep. 2017	No revision
35.	D-29 System (Internal EW system for MiG-29 Upgrade Aircraft)	DARE	Mar. 2010	168.85	No revision	Dec. 2012	May 2015
36.	Submarine Periscope	IRDE	Mar. 2014	163.77	No revision	Mar. 2019	No revision
37.	DMR-249 Grade Steels, Plates, Bulb Bars and Weld Consumables	DMRL	Dec. 2012	159.30	No revision	Dec. 2016	No revision

1	2	3	4	5	6	7	8
38.	Consultancy for AB3 Steel and Establishment of Indigenous Production	DMRL	Jan. 2013	148.50	No revision	Jan. 2016	No revision
39.	Sea keeping and Maneuvering Basin (SMB)	NSTL	Sep. 2007	84.00	168.58	Sep. 2011	Jun. 2015
40.	Medium Power Radar (MPR)	LRDE	Nov. 2008	134.14	No revision	May 2013	May 2014
41.	Instrumented Airborne Platform for Real-time Snow Cover, Avalanche and Glacier Monitoring	SASE	Sep. 2011	125.94	No revision	Sep. 2016	No revision
42.	Augmentation of Environmental Test Facility for warheads and Electronic System	TBRL	Sep. 2013	121.17	No revision	Oct. 2018	No revision
43.	Experimental Technology Modules for Directed Energy Laser Systems	CHESS	Feb. 2014	114.86	No revision	Jul. 2017	No revision
44.	Advance Light Towed Array Sonar (ALTAS)	NPOL	Apr. 2012	114.42	No revision	Apr. 2016	No revision

ANNEXURE 'B'
(Annexure to Point No. 15)

Details of major projects (Cost more than Rs. 50 crore) sanctioned during 10th FYP (01 Apr. 2002 to 31 Mar. 2007) along with date of sanction, sanctioned cost and status of projects

Sl.No.	Project	Date of Sanction	Sanctioned Cost (Rs. in crore)	Status
1	2	3	4	5
1.	Long Range Surface to Air Missile (LR-SAM) System for Indian Navy	Dec. 2005	2606.02	Ongoing
2.	Airborne Early Warning and Control (AEW&C) System	Oct. 2004	2275.00	Under Evaluation
3.	Naval Light Combat Aircraft (LCA-Navy Phase-I)	Mar. 2003	1714.98	Ongoing
4.	Air-to-Air Missile System 'Astra'	Mar. 2004	955.00	Ongoing
5.	Interception, Monitoring, Direction Finding and Analysis System (IMDFAS)—Divyadrishti	Aug. 2002	757.70	Awaiting Closure
6.	EW Suite for Fighter Aircraft (EWSFA)	Sep. 2005	330.31	Ongoing
7.	Creation of New Composite Propellant (CP) facility at Nasik	May 2005	324.00	Closed
8.	L-Band Solid State Active Array Radar (L-STAR)	Apr. 2003	110.00	Awaiting Closure
9.	Augmentation of Propellant Processing Facility at SFC	Mar. 2007	100.00	Awaiting Closure
10.	Open Range Test Facility for Radar Cross-Section and Antenna Measurements (UHF to W BAND) (ORANGE)	Aug. 2006	99.73	Ongoing

1	2	3	4	5
11.	Vehicle Mounted High Power Laser Directed Energy System Against RPVs/UAVs/DRONES (Aditya)	Jun. 2003	97.40	Awaiting Closure
12.	Engineering Applications of Stealth Technologies (EAST)	Mar. 2007	90.36	Ongoing
13.	High Speed Heavy Weight Ship Launched Torpedo (Varunastra)	Aug. 2002	74.90	Ongoing
14.	Prithvi life cycle product support and product upgradation	Jul. 2005	73.48	Ongoing
15.	DRDO photonics programme phase-II on systems and devices	Sep. 2004	64.20	Awaiting Closure
16.	Conversion of BMP into Tele-operated and Autonomous Vehicle	Mar. 2007	60.00	Ongoing
17.	Trajectory Correction System (TCS) for Pinaka (Phase-I)	Feb. 2007	59.88	Closed
18.	Advanced Torpedo Detection System	Jun. 2003	58.89	Ongoing

Details of major projects (Cost more than Rs. 50 crore) sanctioned during 11th FYP (01 Apr. 2007 to 31 Mar. 2012) along with date of sanction, sanctioned cost and status of projects

Sl.No.	Project	Date of Sanction	Sanctioned Cost (Rs. in crore)	Status
1	2	3	4	5
1.	Medium Range Surface to Air missile (MRSAM) System for Indian Air Force	Feb. 2009	10075.68	Ongoing
2.	Light Combat Aircraft (LCA)Development Programme : Phase-Ill	Nov. 2009	2431.55	Ongoing
3.	Naval Light Combat Aircraft (LCA-Navy Phase-II)	Dec. 2009	1921.11	Ongoing
4.	Medium Altitude Long Endurance (MALE) Unmanned Aerial Vehicle (UAV) code named Rustom and Development of Aeronautical Test Range (ATR) at Chitradurga (Rustom-II)	Feb. 2011	1540.74	Ongoing
5.	Active Electronically Scanned Array Radar	Jan. 2012	459.65	Ongoing
6.	Hypersonic Wind Tunnel (HWT)	Oct. 2010	352.00	Ongoing
7.	NBC Defence Technologies	Mar. 2010	284.96	Ongoing
8.	Dual Colour Missile Approach Warning System For Fighter Aircraft	Nov. 2008	273.80	Ongoing
9.	Land Based Prototype for AIP	Aug. 2010	216.60	Ongoing
10.	40 GHz Upgradation of MMIC Facility	Feb. 2012	198.72	Ongoing
11.	Advanced Light Weight Torpedo	Feb. 2008	194.53	Ongoing
12.	Multi Mission Radar	Feb. 2012	193.44	Ongoing

1	2	3	4	5
13.	D-29 System (Internal EW system for MiG-29 Upgrade Aircraft)	Mar. 2010	168.85	Ongoing
14.	Seakeeping and Manoeuvring Basin (SMB)	Sep. 2007	168.58	Ongoing
15.	Medium Power Radar (MPR) for IAF	Nov. 2008	134.14	Under Evaluation
16.	Instrumented Airborne Platform for Real-time snow cover,avalanche and glacier monitoring	Sep. 2011	125.94	Ongoing
17.	Arjun Armoured Recovery and Repair Vehicle (Arjun ARRV)	Sep. 2011	99.40	Under Evaluation
18.	Integrated Development of Software Defined Radio for Navy	Jul. 2010	98.97	Ongoing
19.	Integrated Coastal Surveillance System	May 2011	98.5	Ongoing
20.	Track Extension and RTRS Augmentation	Sep. 2010	97.5	Ongoing
21.	Construction and Commissioning of a Torpedo Launch and Recovery Vessel (NSTL-TLRV)	Aug. 2010	94.4	Ongoing
22.	Materials for Hypersonic Vehicles (HYPERMAT)	Nov. 2010	94.21	Ongoing
23.	Missile Launched Precision Guided Munitions (MLPGMs)	Jul. 2010	93.78	Ongoing
24.	New Family of Munitions (NFMS)	Jun. 2009	92.42	Under Evaluation
25.	Feasibility Studies of Design and Development of Advanced Medium Combat Aircraft (AMCA)	Oct. 2010	90.5	Ongoing
26.	MEMS Technology 'MEMSTECH'	Sep. 2009	88.6	Ongoing

1	2	3	4	5
27.	Fabrication of Fifty Five Numbers of Sudershan Mark-1 Kits for Evaluation Trials (SDN-55)	Jan. 2012	85.13	Ongoing
28.	Enhancing Troop Health Through Radiation Science Approach	Jun. 2009	84.89	Closed
29.	Critical Technologies and Systems for Futuristic Weapons Like Torpedo, Mines and Decoys	Mar. 2010	79.51	Ongoing
30.	Gas Turbine Enabling Technology	Oct. 2009	78.00	Ongoing
31.	Enabling Technologies for Armour	Apr. 2009	76.83	Ongoing
32.	Low level Transportable Radar (LLTR)	Jun. 2009	73.95	Under Evaluation
33.	Enhanced Range Rocket (PINAKA Mk-II)	Nov. 2011	72.00	Ongoing
34.	7+ km third generation anti-tank Guided Missile for Advanced Light Helicopter - WS1 (Army) - Helina	Mar. 2008	72.00	Ongoing
35.	Integrated Arjun MBT MK-II Development Programme (IAMDP)	Nov. 2010	69.99	Ongoing
36.	Realisation of Hypersonic Vehicles, Integration, Check-out and Flight Demonstration	Dec. 2009	69.08	Ongoing
37.	Extendible Nozzle Exit Cone for Dia. Rocket Motors	Jun. 2008	61.00	Ongoing
38.	LWIR Type Two Super Lattice Detector (T2SL) and Thermal Imager Under I2MC (T2SL_TI)	Jan. 2012	60.58	Ongoing
39.	Materials and technologies for Stealth Applications (STEP)	Jan. 2011	59.74	Ongoing -
40.	Product Support and Product Improvement and Induction of 'MAG' Weapon System	Feb. 2011	59.06	Ongoing

1	2	3	4	5
41.	Infrastructure for Aspheric and Freedom Components Fabrication and Testing (IFOT)	May. 2011	59.05	Ongoing
42.	Integrated Aerostat Surveillance System -Medium Size (NAKSHATRA)	Jul. 2011	58.80	Ongoing
43.	Nirbhay Development Flight Trials	Dec. 2010	56.93	Ongoing

Details of major projects (Cost more than Rs. 50 crore) sanctioned during 12th FYP (01 Apr. 2012 till 15 Oct. 2014) along with date of sanction, sanctioned cost and status of projects

Sl.No.	Project	Date of Sanction	Sanctioned Cost (Rs. in crore)	Status
1	2	3	4	5
1.	USHUS augmentation for reliability (TUSHAR)	Jun. 2014	786.00	Ongoing
2.	Quick reaction surface to air missile (QR-SAM)	Jul. 2014	476.43	Ongoing
3.	Kautilya	Jul. 2012	432.80	Ongoing
4.	Development of 1500 hp Engine	Dec. 2013	398.02	Ongoing
5.	Solid Fuel Ducted Rocket Ramjet Technology for Air Launched Tactical Missiles (SFDR)	Feb. 2013	366.00	Ongoing
6.	EW Systems for Capital Ships, Aircrafts and Helicopter of Indian Navy titled as 'Samudrika'	Jul. 2012	342.29	Ongoing
7.	New Generation Anti Radiation Missile (NGARM)	Dec. 2012	317.20	Ongoing
8.	Post Development Support of AEW&C System	Sep. 2013	314.32	Ongoing
9.	System definition and engineering of DRDO AIP system on P-75 submarines and development of deliverable lox system	Jun. 2014	270.00	Ongoing
10.	D-Jag System Internal RWJ System for Jaguar DARIN III Upgrade Aircraft	Aug. 2012	268.27	Ongoing
11.	155 mm/52 Caliber Advanced Towed Artillery Gun System (ATAGS)	Sep. 2012	247.90	Ongoing
12.	DRDO - Flying Test Bed	Sep. 2012	173.48	Ongoing

1	2	3	4	5
13.	Submarine Periscope	Mar. 2014	163.77	Ongoing
14.	Qualification and Certification of DMR-249 Grade Steels, Plates, Bulb Bars and Weld Consumables	Dec. 2012	159.30	Ongoing
15.	Consultancy for AB3 Steel and Establishment of Indigenous Production	Jan. 2013	148.50	Ongoing
16.	Augmentation of Environmental Test Facility for warheads and Electronic System	Sep. 2013	121.17	Ongoing
17.	Experimental Technology Modules for Directed Energy Laser Systems	Feb. 2014	114.86	Ongoing
18.	Advance Light Towed Array Sonar -ALTAS	Apr. 2012	114.42	Ongoing
19.	Advanced Technologies for Rotary Engine	Jan. 2013	69.23	Ongoing
20.	Airborne Active Electronically Scanned Antenna for Surveillance of Primary and IFF Radar in AWACS (I)	Jul. 2014	58.45	Ongoing
21.	Critical Entity Constituents and System Software for Himshakti (Girishakti)	Apr. 2012	56.80	Ongoing
22.	Smart Anti Air Field Weapon (SAAW)	Sep. 2013	56.58	Ongoing
23.	Prahar surface-to-surface missile (SSM)	Jun. 2013	56.30	Ongoing

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