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STANDING COMMITTEE ON DEFENCE

(2017-2018)

(SIXTEENTH LOK SABHA)

MINISTRY OF DEFENCE

DEMANDS FOR GRANTS (2018-19)

ORDNANCE FACTORIES, DEFENCE RESEARCH AND DEVELOPMENT ORGANISATION, DIRECTORATE GENERAL OF QUALITY ASSURANCE AND NATIONAL CADET CORPS

(DEMAND NO. 20)

FORTY THIRD REPORT

LOK SABHA SECRETARIAT

NEW DELHI

March, 2018 / Phalguna, 1939 (Saka)

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Presented to Lok Sabha on 13.03.2018

Laid in Rajya Sabha on 13.03.2018

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COMPOSITION OF THE STANDING COMMITTEE ON DEFENCE (2017-18)

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7. Smt Ambika Soni
8.# Dr Subramanian Swamy
9.***** Shri Vivek K. Tankha

*** Resigned w.e.f. 16.11.2017**
 # Resigned w.e.f. 07.03.2018

SECRETARIAT

1.	Smt. Kalpana Sharma	-	Joint Secretary
2.	Shri T.G. Chandrasekhar	-	Director
3.	Smt. Jyochnamayi Sinha	-	Additional Director
4.	Shri Rahul Singh	-	Under Secretary
5.	Shri Rajesh Kumar	-	Sr. Executive Assistant

REPORT

CHAPTER I

ORDNANCE FACTORY BOARD

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 fulfill 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.

1.2 They produce a wide range of arms and ammunitions for the Infantry, Armoured Corps, Artillery, Air Defence Artillery and Engineer 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. To summaries the role of Ordnance Factory Board include to provide a dedicated manufacturing base for military hardware, indigenization and TOT absorption, maintenance of `War Reserve' capacity and `Life Cycle' support to arms and ammunition supplied etc.

1.3 The Ordnance Factories Organization is a 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 manage 41 manufacturing units and 32 other establishments. Ordnance Factories have been continuously upgrading their infrastructure, with induction of state-of-art technologies to meet futuristic requirements of users.

'41 Ordnance Factories are divided into 5 operating divisions, based on the main products/technologies employed:

i) Ammunition & Explosives – 11 Factories.
ii) Weapons vehicles & Equipments - 11 Factories.
iii) Armoured vehicles – 6 Factories.
iv) Ordnance equipment - 5 Factories.
v) Materials & components – 8 Factories.'

Budgetary provisions

'The projection made by OFB and BE allocation for OFB for the Fy 2018-19 are as follows:

Financial Year 2018-19:

(Rs in Crore)

Army	BE 2018-19 (Projection)	BE 2018-19 (Allocation)
Revenue	8,844.79	6,397.20
Capital	6,027.63	5,345.22
Total	14,872.42 (excld.GST)	11,742.42

1.3 On the allocation of funds to various Ordnance Factories and the methodology being adopted for distribution of funds, the Ministry of Defence stated as under:-

'Following basis is adopted for allocation of fund to factories:

a) Target of production & supplies
b) Projections of factories
c) Past trends and statutory obligations
d) Planned investment on modernization

The allocated fund to a factory is further distributed in various heads and following methodology is adopted:

a) Pay & allowances and related expenditure based on manpower strength and production activities of factory.

b) Stores based on material estimates for the target of production, inventory status, committed liabilities and carry forward liabilities of factory.

c) Other expenditure based on past trend, statutory obligation, as well as changed requirement from time to time.

d) Expenditure on investment on modernization is based on planned procurement of P&M of factory and estimated cash flow'.

Budget for Modernization

1.4 The Ministry was asked to furnish the details of the steps have been/are being taken to modernise Ordnance Factories across the country through introduction of state-of-the-art technologies, the Ministry in its written reply has stated as under:-

'Modernisation in Ordnance Factories is a continuous process. To keep pace with the contemporary manufacturing technologies, OFB prepares a long term planning spread over a period of 5 years which started from 2007-08.

The approach towards modernisation is three pronged:

a) Renewal & Replacement (RR) of P&M which are beyond economical repair, with machineries of state of the art technologies.

b) Acquisitions of P&M under New Capital (NC) for additional capacity,

c) higher productivity, enhanced quality, focus on use of renewable energy and to address environmental issues etc.

d) Corresponding Civil Works (CW) infrastructure development.

The key technology intensive areas which have been identified for modernisation of Ordnance factories are:

i) Chemical process plants
ii) Small arms ammunition production
iii) Ammunition filling and assembly
iv) Foundry and extrusion
v) Metal forming, machining and fabrication
vi) Quality control and assurance'

1.5 The Ministry was asked to furnish the details of the outlay provided and spent by all Ordnance Factories along with complete details of each project/programme proposed, planned and implemented during the last five years, the Ministry in its written reply has stated as under:-

"The details of the outlay provided and spent by all Ordnance Factories & details of the project /programme proposed, planned and implemented during the last five years given as below:

Annexure I

Fund Utilisation during Last five years on Modernisation (2012-13 to 2016-17)

₹ in Cr

Expenditure Head	Financial Year	Capital outlay provided	Actual Expenditure
M&E	2012-2013	95.03	90.42
	2013-2014	236.09	239.21
	2014-2015	489.00	485.73
	2015-2016	305.00	312.29
	2016-2017	364.61	368.62
	Sub- Total	1489.73	1496.27
Works	2012-2013	268.95	265.13
	2013-2014	221.82	219.94
	2014-2015	314.96	300.66
	2015-2016	343.00	339.45
	2016-2017	339.67	337.84
	Sub- Total	1488.40	1463.02

Expenditure Head	Financial Year	OFB Target	Actual Expenditure
RR	2012- 2013	500.00	415.85
	2013- 2014	699.36	697.01
	2014- 2015	450.00	441.87
	2015- 2016	400.00	385.73
	2016-2017	450.00	451.77
	Sub- Total	2499.36	2392.23

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Reasons for delay of projects

1.6 On the schedules for various projects and delay of projects, reasons thereof, the Ministry has stated as under:-

'Major reasons for delay during this period were towards (a) procurement of plant & Machinery and (b) Delay in completion of civil works by MES -

(a) Procurement of P&M is a long lead time process. Problems were encountered at different stages as under :

Tendering Stage:

- Limited vendor base since majority of our machine requirement are for customised SPMs/tooled up machine, as very few offers are received and to have competition the TOD was extended.
- Non availability of technology like, Forging Plant, Chemical Plants, Metallurgical Plants indigenously. In such cases Global participation is required.
- Explosive plants have very limited Global sources.

- Retendering of cases to avoid RST situation.
- Because of financial crisis in Europe, during this period some of the European suppliers failed to respond to our TE leading to retendering the cases.
- The P&M Procurement Manual during that period had no provision for advance payment. Hence many suppliers of such machines which were cost intensive did not participate in TE.

Supply stage:

- Being customised SPMs/tooled up machines, delay occurred on the part of P&M supplier in design, manufacture & supply of the m/c.
- M/s HMT is a major supplier of machine tools to OFs. Because of financial crisis, HMT has not been able to supply all machine to OFB within stipulated delivery schedule.
- Because of financial crisis, during this period some of the suppliers in Europe failed to execute the supply timely.

Because of above reasons, i.e. (i) re-tendering of cases and (ii) delay in supply by the supplier, the actual execution could not be completed within schedule.

(b) Erection & Commissioning Stage

Availability of Building and Services was delayed due to delayed execution of civil works by MES, resulting in long time taken for erection and commissioning of various machines'.

1.7 On the current status of enhancement of capacity of OFs and what support is being provided by Ministry of Defence by way of budget outlay, the Ministry has stated as under:-

"The current status of various ongoing capacity augmentation/creation projects is enclosed as **Annexure-A.**

a) Budget provided by MoD by way of budget outlay for 2017-18

(Rs in Crore)

	BE 2017-18 (Approved)	**Actual Exp.up to Nov'17**
Machinery& Equipment	471.68	277.09
Works	302.00	238.52
Suspense	30.00	0.04
Total	803.68	515.65

b) Proposed Budget for 2018-19

(Rs in Crore)

	BE 2018-19 (Projection)
Machinery& Equipment	909.50
Works	550.00
Suspense	30.00
Total	1489.5

Expenditure on Research & Development

1.8 The Committee enquired about the in-house Research and Development conducted in Ordnance Factories for development of new products and the percentage of expenditure in Research and Development to the overall allocations during each of the last five years. The Ministry in its reply submitted as under:

"OFB takes up In house R&D projects for design & development & product upgrade of Armament, Ammunition and Equipment. OFB has developed 122 Armament & Ammunition items so far, out of which 61 items have been designed and developed by Ordnance Factories on their own In house R&D and rest items are developed in association with DRDO & OEM. Approx. 21% of the output value of OFB is from items developed by OFB's In-house R&D, R&D under foreign ToT and R&D with DRDO.

Percentage of expenditure in Research and Development during each of the last five years is as follows:

		2012-13	**2013-14**	**2014-15**	**2015-16**	**2016-17**
i)	R&D Expenditure (Rs. Crore)	48.02	42.72	55.82	87.97	59.86
ii)	Overall allocation to OFB (Rs in Crore)	11974	11123	11354	13047	14806
iii)	R&D Expenditure to overall allocation to OFB in %	0.40	0.38	0.50	0.67	0.40

13 Ordnance Development Centers (ODCs) are working in specific technological areas & Design Centers have been established in each of the OF, which help carry out Research & Development.

Ordnance Factories also take up collaborative R&D projects in association with Govt. Academic Institutions, Govt. Owned Laboratories and with other Indigenous Private Manufacturers".

1.9 On projection and allocation for Twelfth Plan and Thirteenth Plan in respect of Research and Development and if any decline, reasons for decline in the allocation the Ministry in its written note has stated as under:

"The projection and allocation for Twelfth Plan and internal plan of OFB for Thirteenth Plan Period in respect of Research & Development is as follows:

(Rs in Crore)

		12th Plan (Apr, 12 to Mar, 17)	**13th Plan (Apr, 17 to Mar, 22)**
i)	Projection of R&D	360.00	615.00
ii)	Allocation to R&D	352.12	105.00 * (**for 2017-18 only**)

***** Allocation for remaining years of 13th Plan will be made by MoD at appropriate stage.

Projection made by OFB for in-house R&D have been allocated by MoD over successive years.

The allocation made on Research and Development in OFB has not declined.

1.10. On being asked about about the progress made by the OFB in respect of Research & Development [R&D] in manufacturing the entire weapon system platform - along with its ammunition and related accessories, the domain of the R&D projects and the major products developed through in-house R&D by OFB. The Ministry in its written reply has stated:

i) "Progress made by OFB in Research & Development [R&D] in manufacturing the entire weapon system platform & its ammunition/ accessories, by own In house R&D, is as follows:

a) **Artillery Gun 155mm x 45 Calibre 'Dhanush'**: For Artillery modernization. Its ammunition is already manufactured by OFs. Dhanush Gun has undergone all field evaluation trials (FET), technical evaluation and firing trials and is presently undergoing battery firing trials.

b) **Upgunning of 130mm Gun to 155mm**: For enhancing the capability of Artillery Gun. Its ammunition is already manufactured by OFs. OFB

participated in AHQ RFP competing with two other private manufacturers, who fielded equipment in association with foreign OEMs. After extensive FET, OFB's gun has emerged as the only Gun System meeting all Quality Requirements.

c) **Assault Rifle 7.62x51mm and Protective Carbine 5.56x30mm**: For modernization of Infantry Weapons. Both these weapon systems (i.e. weapon and its ammunition) are under advanced stage of development.

d) **Futuristic Infantry Combat Vehicle (FICV)** : It will replace existing BMP-II. OFB has gone ahead with the development of this 'Complex High Technology' item after Integrated Project Management Team/ MoD conveyed that OFB to start Design & Development of FICV. OFB had participated in the EOI (Expression of Interest) issued by MoD for selecting Design Agency(s).

Preliminary design has been completed. Development of sub-systems will be completed within a year and 1st prototype for internal evaluation is scheduled to be manufactured by December, 2019.

Various varieties of its ammunition (i.e. 30mm Ammunition) are already manufactured by Ordnance Factories. OFB is further developing 30mm FSAPDS and 30mm PFFC ammunition to enhance the role of the weapon platform.

e) **Air Defence Gun:** A high rate of fire gun for defence of vulnerable area/ point against incoming enemy aircraft/ missile. First prototype has been developed and initial firing trial has been done internally by OFB.

Various varieties of its ammunition are already being manufactured by Ordnance Factories. The same is being augmented by developing 30mm PFFC ammunition.

f) **Assault Rifle 7.62 x 51mm:** It is being developed in association with Project Management Team (PMT) headed by DG (Infantry), Army Hqrs. First prototype has been demonstrated.

g) **Electronic Fuzes for 155mm Ammunition:** In house Tests & Trials of Electronic Point Detonating Fuzes have been done twice successfully and the same is now being offered for User Assisted Technical Trial.

h) **Extreme Cold Weather Clothing System:** Prototypes are under evaluation.

ii) Domain of the R&D projects is focused on Land Systems i.e. Artillery & Air Defence Gun Systems, Small Arms Weapon Systems, Armored Fighting Vehicles and futuristic smart ammunition systems.

iii) Following major products have been developed through in-house R&D by OFB:

a. Various types of Ammunition for Anti Material Rifle
b. Upgraded Air Defence Gun L-70
c. Mine Protected Vehicles
d. Nuclear Biological Chemical (NBC) Recce Vehicle

e. 7.62 x 39mm Assault Rifle 'Ghatak'
f. Chaff Launcher 'Kavach' and Chaff Decoys
g. Naval Gun CRN-91
h. Aerial (i.e. Aircraft) Bombs
i. Image Intensifier based night sight for Driver of all Armored Fighting Vehicles (BMP-II, T-72 & T-90) for night fighting capability
j. Thermal Imager based night sight for Commander of T-72 Tank
k. Non Prohibited Bore Pistol & Revolver (0.22 and 0.32 Calibre)
l. Under Barrel Grenade Launcher & Multi Grenade Launcher
m. Anti Submarine Rockets RGB-60 & RGB-12
n. A-7 Ammunition 7.62mm Calibre"

1.11 During the oral evidence on the issue of spending by OF on R&D, Chairman, OFB has stated:

"(DRDO is the major source of R&D and the technology developed by it goes for R&D Cable Product and price improvement, new item development has been limited and has been mentioned as 23 percent.)

Quality Check in Ordnance Factories

1.12 On being asked about quality check conducted by Ordnance Factories and second party inspection so as to avoid defective ammunition reach in the hands of Armed Forces, the Ministry in its written reply stated as under:-

"All products developed by the Ordnance Factories, after 1st Party test and evaluation by the factory during the development stage, undergo following 2nd party test and evaluation, during development, before being recommended for induction in the Services:

(a) Field Evaluation and Test '(FET) by the User including User Trial.
(b) DGQA Evaluation.
(c) Maintainability Evaluation Trial (MET).
(d) General Staff Evaluation as per the General Staff /Qualitative Requirements promulgated by the SHQ.

Apart from above, OFB supplies ammunition to Indian Army duly inspected by Quality Control department of factory as well as DGQA (2nd Party Inspection Agency). The ammunition batch is accepted and issued to Army only after it passes all the above tests. However, in spite of maintaining stringent checks of quality, during bulk exploitation of above ammunition by user some time some defects/accidents are observed.

OFB is responsible for manufacturing and up to dispatch of ammunition and is not aware of the storage/handling/maintenance conditions at Army's end that are equally responsible for defects/accidents. Ammunition is single-use item. For this reason, 100% inspection including dynamic proof cannot be carried out. A principle of Statistical Quality Control (SQC) is employed for final acceptance of ammunition. SQC is inherently associated with both Producer's risk and Customer's risk. Hence such problems may surface during the process of exploitation".

1.13 During oral evidence, Chairman, OFB also apprised the Committee on the issue as under:

"We are continuously working on quality improvement. In this direction we have started a new system in which there is a 'redbox' concept in our supplies. About 1200 items have been tested so far and in this only item have been found to be defective whereas all other items have been found to be in order".

He further stated:

"There was a talk about small Arms weapon) (As I was mentioning about ammunition, tests are being conducted and the overall quality rating is more than 99 percent. There was exploitation of about 1201 lots, in this there was problem in only one and rest all were found to be okay but not upto the mark".

Indigenisation

1.14 The Committee wanted to know about the effective steps taken by the Ministry of Defence to qualify the level of idigenization in defence equipment and details of indigenous production of defence equipment designed and developed by the OFs vis-a-vis the imported ones. The Ministry in written reply stated as under:-

'MoD is monitoring the progressive indigenization (i.e. indigenous content as percentage of the cost of weapon/ammunition) of items developed ex-ToT. Progressive indigenization is monitored at the highest level in OFB on quarterly basis. Further, MoD monitors the percent indigenous content of supplies ex-Ordnance Factories (i.e. value of indigenous content to value of supply), which is 87.30% at present.

List of Indigenously produced defence equipment –

a) Total 61 items, designed &developed by Ordnance Factories is enclosed as **Annexure-B**
b) Items designed & developed ex-ToT from foreign OEMs and DRDO is enclosed as **Annexure-C**.'

During the oral evidence, the Chairman, OFB has submitted as under:

"(We have 90 percent indigenous content and in the field of ammunition also it is only 3 percent. We are also making many products through inhouse R&D, almost one fourth products that we have are based on inhouse R&D. The major projects which have been shown now, in that like in the case of 130 artillery guns which is now in the range of 25 kms we will get 130 MM guns which will take to the range of 35 to 40 kms, about which you were inquiring. Likewise, SBMP which was being imported till now, from next year we have started indigenous production in Nalanda. Bridge laying tank which was mentioned, in the case of crossing capability about 22 bridge laying tanks have been given by us which we had mentioned in our presentation).

1.15 The Ministry was asked to furnish the details the progress made by the Ordnance Factories in respect of the indigenisation in manufacturing the entire weapon system platform along with its ammunition and related accessories, the Ministry in written reply stated as under:-

"Progress made in the indigenization of entire weapon system platform & its ammunition/ accessories is as follows:

Sl. No.	Weapon Platform/ Ammunition Item	2017-18	Associated Ammunition
1.	T-90 Tank	73.87%	125mm HE (High Explosive) and 125mm HEAT (High Explosive Anti Tank) ammunition are being manufactured indigenously. For the 125mm FSAPDS Ammunition, OFB has commenced manufacture from ToT ex-Russia in current FY2017-18 and further indigenization of the ToT has been planned. Indigenous Development of 125mm FSAPDS Ammunition technology in association with DRDO is also in progress.
2.	Naval Gun AK-630	92.77%	Ammunition of Naval Gun AK-630 and Dhanush Gun System is produced by OFB.
3.	155mmx45 Calibre Artillery Gun System "Dhanush"	84%	

1.16 On being asked about the capability of the Ordnance Factories to absorb the industry through transfer of technology and also, about the products which have been/being produced by absorbing the industry through transfer of technology and

supplied to Armed Forces, the Ministry in its written note furnished to the committee stated as under:-

"Ordnance Factories have been a regular recipient of World-class technologies through Transfer of Technologies. Technologies have been absorbed in full and indigenized through in-house R&D & Indian Private Industry. Technology has been received under ToT agreements, from foreign OEMs, in the following area and Ordnance Factories have absorbed the received technology in full. Indigenization of above 70% has been achieved in these, as furnished below:

Sl. No.	Item	Present Indigenous Content 2017-18 (As % of cost)
	Under ToT from OEMs	
1.	High Resolution Binocular	93.06%
2.	T-90 Tank	73.87%
3.	Naval Gun System AK-630	92.78%
4.	40mm PFFC (Pre Fragmented Franging Cubes) Ammunition	86.00%
5.	84mm High Explosive Anti-Tank (HEAT-551) Ammunition	85.87%

Absorption of ToT has imparted capability for in-house Design & Development, leading to their mass manufacture with the help of Indian Industry".

1.17 On being asked about whether Ordnance Factories have indigenous industrial capability to manufacture and supply quality products to Armed Forces. The Ministry in its written note furnished to the Committee stated as under:-

"Yes, Ordnance Factories have crucial indigenous technological and industrial capability for supply of the Armament, Ammunition & Equipment items as follows:

Weapons	Artillery Guns 105/155mm, Tank Guns 120/125mm, Small Arms from 5.56 to 20mm including Assault Rifle, Protective Carbine, Pistol, Revolver etc., Mortars 51/81/120mm, Rocket Launcher 84mm, Under Barrel Grenade Launcher 40mm, Multi Shell Launcher
Military Vehicles	Mine Protected Vehicles, Military Vehicles
Ammunition, Explosives & Propellants	Around 150 types of Ammunitions including State-of-the-Art Pinaka Rocket, Bi-Modular Charge System for 155mm Ammunition, Artillery Ammunition, Air Defence Ammunition, Cannon Gun Ammunition, Naval Gun Ammunition, Signaling and related stores, Rockets, Bombs, Fuzes, Explosives & Propellants, Detonators, Igniters
Armoured Fighting Vehicles (AFV)	Tank T-90, Main Battle Tank Arjun, Variants of T-72, Infantry Combat Vehicle BMP-II and its variants, AFV Engines, Night Vision Devices, Sensors and Fire Control System

Equipment Stores	Brake Parachutes, Man dropping & Supply dropping Parachutes Combat Uniform, ECC clothing etc.

61 Armament and Ammunition items have been designed and developed through in- house Research & Development in OFB and these are being produced in India with the help/assistance of Indian Industry. The list of these items is enclosed as **Annexure-B**. It is worth mentioning that value-wise indigenous content in supplies of Ordnance Factories is 87.30%".

1.18 On being asked about **the original research & development done by each of the OFs and research & development carried out under licenced production, under ToT during the last five years,** the Ministry in written reply stated as under:-

During the last five years following items have been developed by Ordnance Factories through their own Original **in-house R&D projects**:

Sl. No.	Item	Factory
1.	Pistol Auto 9mm	Rifle Factory Ishapore (RFI)
2.	.32 Pistol	Gun & Shell Factory (GSF)+RFI
3.	.315 Sporting Rifle	RFI+Ordnance Factory Trichy (OFT)
4.	.22 Revolver	RFI
5.	.22 Revolver (Nidar)	RFI
6.	.22 Sporting Rifle	RFI
7.	7.62mm Sniper Rifle	RFI
8.	Tear Gas Gun	RFI
9.	Anti Riot Gun	RFI
10.	7.62 Mm Assault Rifle (Ghaatak)	RFI
11.	.32" Revolver (Nirbheek)	Field Gun Kanpur (FGK)
12.	.32 Revolver Mk-IV	Small Arms Factory (SAF)
13.	0.32" Revolver (Long Barrel) (Anmol)	SAF
14.	12 Bore Pump Action Gun (PB & NPB)	RFI
15.	Mine Protected Vehicle	Vehicle Factory Jabalpur (VFJ)
16.	L-70 Upgraded Weapon	Gun Carriage Factory (GCF)
17.	40mm MGL Weapon	OFT
18.	155/39 Upgraded Gun	GCF
19.	38mm Multi Shell Launcher	OFT
20.	.30-06" Sporting Rifle	RFI
21.	Kavach Mod-I	GCF
22.	Kavach Mod-II	Machine Prototype Factory (MPF)
23.	Cartg. SA 7.62mm Ball A-7 Ammn.	Ordnance Factory Varangaon (OFV)
24.	20mm Ammunition TPT (Target Practice Tracer)	Ordnance Factory Khamaria (OFK)
25.	20mm AMR TP (Target Practice)	OFK
26.	CRN-91	Ordnance Factory Medak (OFMK)
27.	12.7 mm Prahari	GCF

During the last five years following items have been developed by Ordnance Factories by **R&D under licensed production/ ToT from DRDO and foreign OEMs**:

Sl. No.	Nomenclature	Source of ToT	Factory
1	Commander Thermal Imager For Tank T-72	DRDO	OLF
2	250 Kg RDZ Aerial Bomb	DRDO	OFK
3	450 Kg RDZ Aerial Bomb	DRDO	OFK
4	40mm UBGL Weapon	DRDO	OFT
5	120 mm FSAPDS Ammn for MBT Arjun	DRDO	OFCH
6	Pinaka Rocket	DRDO	OFCH
7	Armored Ambulance	DRDO	OFMK
8	Bridge Laying Tank (BLT) on T-72 Chassis	DRDO	HVF
9	Main Battle Tank Arjun	DRDO	HVF
10	76/62mm SRGM Weapon	OEM	FGK
11	RBU 6000 LH	OEM	FGK
12	RBU 6000 RH	OEM	FGK
13	155mm ERFB BB/BT	OEM	OFCH
14	RGB-12(Practice)	OEM	AFK
15	Rocket RGB-60 HE	OEM	AFK
16	Cartg. 30mm for AK-630 Prac	OEM	OFK
17	Cartg. 30mm for Ak-630 HE/I	OEM	OFK
18	Cartg. 30mm for AK-630 Tracer	OEM	OFK
19	Cartg Ak-100 HEDA with Fuze B-429	OEM	OFK
20	Cartg Ak-100 Practice	OEM	OFK
21	Charge M4A2 for 155mm Ammn.	OEM	OFBA
22	40mm Ammn PFFC	OEM	OFK
23	40mm Ammn L/70	OEM	OFK
24	Shell 155mm Illuminating Ammn	OEM	OFDR
25	AK 100 Ammn for Navy	OEM	OFK
26	Cartg 76/62 SRGM (TP) Ammn	OEM	OFK
27	1 1/2" Signal Cartg. R/G/Y	OEM	OFDR
28	Short Range Chaff Rocket	OEM	AFK
29	Medium Range Chaff Rocket	OEM	AFK
30	Long Range Chaff Rocket	OEM	AFK
31	Rocket 140mm HE	OEM	OFCH
32	Rocket 140mm Practice	OEM	OFCH
33	Rocket 140mm Flash Filled	OEM	OFCH
34	Aerial Bomb 100-120 Kg Live	OEM	OFK
35	Aerial Bomb 100-120 Kg Pre-Frag	OEM	OFK
36	Aerial Bomb 100-120kg RDZ	OEM	OFK
37	1000 lbs RDZ Aerial Bomb	OEM	OFK
38	BMCS M-91 (Low Zone)	OEM	OFN
39	BMCS M-92 (High Zone)	OEM	OFN

1.19 On being asked about how the three services are ensured that they get the latest technologies in conformity with the competitive and dynamic international standards, the Ministry in written reply stated as under:-

> "The decision regarding specification of the product to be inducted into the services is taken by the respective Service HQs after scanning the contemporary military equipments/Defence Technologies worldwide. OFB also provides technical inputs to the Service HQs to assist them in their efforts to frame Qualitative Requirements of the defence equipments planned for induction.
>
> Induction of latest technologies in conformity with competitive and dynamic international standards is guided by the 'Technology Perspective & Capability Roadmap' issued by Army Hqrs and Acquisition Plan of the Service Headquarters in accordance with DPP.
>
> OFB has accordingly taken up in-house R&D projects for development of Armament, Ammunition & Equipment items of Land Systems pertaining to i.e. Artillery & Air Defence Gun Systems, Small Arms Weapon Systems, Armored Fighting Vehicles and futuristic smart ammunition systems".

Supply of quality products

1.20 On being asked about whether the OFB is also diversifying its product portfolio and expanding its base in the international export market as well as domestic civil trade sector and whether the OFB is capable of manufacturing and supplying adequate quality products to Armed Forces, the Ministry in its written note furnished to the Committee stated as under:-

> "Apart from supplying Armaments to Armed Forces, Paramilitary Forces and State Police Forces, Indian Ordnance Factory Organisation is making progress in broadening the customer base by promoting export of armaments to friendly countries and making supplies to Civil Market. This year OFB is taking a quantum jump in this arena by making all time high issue against export to the tune of Rs 250 Crore approx. Capability to obtain and execute export orders testifies the quality of OFBs products. OFB is committed to make continuous improvement in quality of its product.
>
> Towards "Make in India" initiative, OFB has developed 155mm x 45 calibre Artillery Gun 'Dhanush' in-house which is our major project to provide the user state-of-the art weapon comparable with the best available in the world. In addition to that another major outcome is the Pinaka multi Barrel rocket.
>
> Some of the new products developed by Ordnance Factories are Kavach Chaff Launcher, CRN 91 Naval Gun, Mine Protected Vehicle (Army version), Water Bowser, 155mm ERFB BB ammunition, Driver Sight T-72, BMP-II, Commander Sight T-55 to mention a few. Several weapons such as 5.56 CQB Carbine, 5.56mm Ex-calibre Rifle, Joint Venture Protected Carbine (JVPC), Multi Grenade Launcher

(MGL), Under Barrel Gun Launcher (UBGL), AGS-30 have been developed through In-house R&D of OFB. In addition 7.62mm Assault Rifle (Ghatak) & development of 7.62mm Trichy Assault Rifle (TAR), up gunning of 130mm to 155/45 mm MK-4 Gun.

OFB is developing Electronic Fuzes for Artillery Ammunition in association with IIT Bombay. OFB is further developing Precision Guided Kits for Artillery Shell.

OFB is doing many projects with Indian industries which are technically competent for defence products. We look forward to greater synergy with Indian industry to make India self-reliant and also for increasing export potential of OFB.

Another vivid example of "Make in India" initiative for OFB is OFB's light weight 0.22 Civilian revolver "NIDAR", 5.56 & 7.62 mm Assault rifle & 12 Bore pump action gun (PAG).

The Ordnance Factories are dedicated for manufacture of Arms, Ammunitions and Equipment for Defence Services. Defence production being highly specialised and complex, poses unique challenges. The defence products and equipment must be reliable, consistent and operational under varying and extreme conditions of terrain and climate. A very wide spectrum of engineering, metallurgy, chemical, textile, leather and optical technologies have been created in ordnance factories which are regularly upgraded as per the requirement with the primary objective of self-reliance. Quality products are produced by OFB as per laid down specification for all Indentors with quality assurance by Quality control of the factory as well as independent agency i.e DGQA".

Products developed by Ordnance Factories

1.21 The Ministry was asked to give the break-up of the total value of products supplied to the three Services, the Ministry in its written note has stated as under:

Supplies to the three Services made during the last 3 years are appended below:

(Value in RsCrore)

Year	2014-15	2015-16	2016-17
Services			
Army	9,097.78	10,496.98	11,867.46
Navy	215.27	299.95	294.35
Air Force	347.42	419.28	528.20
Total :	**9,660.47**	**11,216.21**	**12,690.01**

Exporting of Ordnance Factory Products

1.22 The Ministry was asked to what kind of steps have been/are being taken to increase the exports of arms and ammunitions and details of the total turnover of the Ordnance

Factories earned from exports of arms and ammunitions during the last five years, the Ministry in written note submitted as under:-

"Efforts put in by OFB to enhance export growth:

a) Strategic prices are being offered to some overseas customers in line with MOD's directive in order to become more competitive and to be able to grab future export orders.
b) Participation in Competitive bidding.
c) Taking Part as Indian Offset Partner (IOP) with other countries' vendor.
d) Participation in different National & International exhibitions in India & Abroad to showcase OFB's product.
e) Export efforts through DIP (via Defence Attaché) for OFB's products.
f) Involving Defence Attaches abroad to promote exportable items of OFB.
g) Bi-lateral talks/Inputs in Defence cooperation etc. through MoD.
h) Through export promotion agencies like M/s PEC Ltd, New Delhi etc.
i) MoU between OFB and L&T, Mumbai to explore export opportunities of OFB products of exportable nature, free from IPR issues.

1.23 The quantum amount earned from exports of arms and ammunitions during the last five years are as follows:

Year	**Value [in Rs .Crore]**	**Value [in USD]**
2013-14	20.24	33,21,482
2014-15	26.64	49,34,517
2015-16	6.51	3,99,403
2016-17	24.43	40,71,106
2017-18 **(upto 28.12.17)**	8.03	12,39,148

Development of Import-Substitution Products

1.24 The Committee enquired about the import of critical spares and equipment from Russia takes a long-time, affecting maintenance of military systems procured from that country. Delays in import of critical equipment severely affects the combat readiness of Armed Forces, steps taken by the OFB to evolve a strategy for indigenisation of key spares and components of tanks and other weapons systems to overcome delays in import of critical equipment severely affecting its combat readiness of Armed Forces the Ministry in written note submitted as under:-

"OFB is pursuing a planned strategy to enhance the indigenous content in weapon platforms developed under ToT from Russia. The sub systems required to be

developed in-house and those to be developed in association with the Indian Industry have been identified. Actions have been taken for their development. The roadmap for further indigenization for the two weapon systems of Russian ToT, which are under bulk manufacture by OFB, is as follows:

Regarding Indigenization of spares an ISC (Indigenization Sub-committee)meeting is held by the COD for identifying the spares/subsystems for indigenization in the area of core-competency to overcome delay in import of critical spares. OFB is actively participating in this meeting and trying to indigenize the critical spares.

In order to boost indigenization activities, OFB has actively participated in Regional Annual MGO Industry Co-Operation meeting (RAMICOM-2017) held on 21st April 2017 at Jabalpur organized by confederation of Indian Industry, Bhopal.

The indigenous content of Tank T-72 is around 95% whereas for T-90 it is 73.8%. Heavy Vehicle Factory (HVF), which is one of the main factory manufacturing equipment with Russian ToT, has taken the following actions to increase the indigenous content, widening of vendor base & development of MSMEs:

a) Pre bid meeting
b) Sharing of design, technological & process documents
c) Technical hand holding, sparing of samples, etc.
d) Participating in various seminars conducted by CII, FICCI, MSME, etc.

HVF has taken development action through Indian trade for all the items for which ToT is available. Pre-bid meeting with probable vendors are being conducted to make them understand the criticality of the item to be developed. HVF is also hand holding by deputing Factory experts/ Technologists during developmental process of critical items by the Industry. HVF is conducting/ participating in the Vendor development programmes being conducted at various places for inviting industry for indegenisation under “Make in India”. Further, HVF also initiated actions for development of items for which TOT is not available through Black Box concept.

Various efforts of OFB in this direction are bringing fruits as the following critical assemblies of engines [perennial Import items of Engines V92S2 (Tank T-90), V 46-6 (Tank T-72) and UTD-20 (Tank BMP-II)] have been indigenized or under the process of indigenisation:

Sl No	Nomenclature	Indigenisation Status
1	Turbo Compressor Engine V92S2 (Tank T-90)	Successfully supplied full qty. and accepted. Item approved by CQA(HV) for use in regular production
		5 nos. supplied. CQA(HV) acceptance trials are under progress.
		Sample expected in Jan 2018
2	Fuel Injection Pump Engine V92S2 (Tank T-90)	Under procurement action
		CQA(HV) acceptance trials are under progress.
3	Sprayer (Injector	Item Established in 2017

T	Assembly) Engine V92S2 (Tank T-90)	
4 h	Supercharger Engine V46-6 (Tank T-72)	Sample received. CQA(HV) acceptance trials are under progress.
e		Sample yet to supply
5 I	Fuel Injector Pump Engine V46-6 (Tank T-72)	Supplied 46 Nos. Item approved by CQA(HV) for use in regular production
n		CQA(HV) acceptance trials are under progress.
d		
6 i	Nozzle Assembly Sprayer Injector Engine V46-6 (Tank T-72)	50 Nos. Sample CQA(HV) acceptance trials are under progress
g		Item Established
e		13 Nos. Sample CQA(HV) acceptance trials are under progress
n		
o		
7 u	Spray Tip Assembly (Overhauling) Engine V46-6 (Tank T-72)	Item Established
s		Item Established
8 p	Casting for Cylinder Block Crank Case Engine UTD20 (Tank BMP-II)	Sample expected in March 2018
e		
r		
9 c	Fuel Pump Assembly Engine UTD20 (Tank BMP-II)	Sample expected in June 2018
e		Sample expected in June 2018
10 t	Injector Assy with Filter Engine UTD20 (Tank BMP-II)	Sample expected in June 2018
a		Sample expected in June 2018

ge in BMP-II vehicle is 96.5% out of the import content of 3.5% by value; approx. 2.1% from Russian sources.The items are:

(a) 7.62 MM PKT Gun

(b) Filtering & Ventilation System

(c) GPK-59 Gyro Direction Indicator

The following steps have been taken for Indigenization:

(a) 7.62 MM PKT Gun - This is under Indigenization at OF Trichy.

(b) Filtering & Ventilation Sys. - The system is under in-house development at OFMK. The In-House developed item will be inducted from 2018-19.

(c) GPK-59 GDI - The development order has been placed on ECIL, Hyderabad. Two proto type samples have been approved and bulk production clearance has been accorded to ECIL for manufacturing".

Cost Cutting of Ordnance Factory Products

1.25 On being asked about whether **any comparative cost study of weapon exporting countries has been conducted and also** provide the details of pricing mechanism adopted for the products manufactured for Armed Forces by Ordnance Factories**,** the Ministry in its reply submitted as under:

The comparative cost study of the following weapons which shows the International prices maximum, minimum and OFB price are tabulated as below:

In USD

Weapon	Max. International market price	Min. International market price	OFB price (FY 2017-18)
.32 Revolver	2,299.99	99.99	1,172.00
.32 Pistol	3,200.00	295.00	1,278.00
.22 Sporting Rifle	2,300.00	305.00	701.00
.30-06 Sporting Rifle	1,155.00	500.00	1,580.00

1.26 During the oral evidence, on the high cost of products manufactured by Ordnance Factories, the Chairman, OFB has submitted as under:

> "(We are constantly working on cost reduction. Our cost increases less than the inflation and about for 50 percent items the cost has not been increased. But this year a challenge came before us that we are told at the start of the year that goods worth about 15000 crores were required and in the last 3 months we were told that goods worth about 11000 crores would not be taken from us. We have already made a part of this order, some are in the process of making and for some goods we have already placed orders with the suppliers. There we are facing problems that we have already given orders of raw materials or components of these goods which we are not able to procure and due to this these kind of problems are coming. We have built some explosives, propellants, if we do not use them then it will be a problem also to store them safely. This year as well as the coming year our problem is that about 15000 crore rupees worth goods capacity out of which only 11000 crores worth goods will be taken from us due to which our capacity will be underutilized and we will not be able to fulfill the orders of arms and ammunitions already with us.)"

He further stated:

"(Why is the cost of small weapons different? They are different because their requirements are different. We are selling in the market. Now the market is open, everyone buy imported weapons and do not take our weapons. We are selling in the civil market. Our capacity is being underutilized. The orders from the army are nominal)"

Assault Rifles

1.27 During the oral evidence, on Assualt Rifles, Secretary(DP) has stated:

"(Sir, I would like to tell that now in S.C. 7.6 mm best technology, 7.5 lakh assault rifles have been approved which will be made in the country. Whatever is the requirement of the army, in that work of making about 7.5 lakh assault rifles will be done in the country. The OFB and Industries will built it together).

On the status and timeframe for producing of Assault Rifles, he further stated:

"(In S.D.A.C. approval it has been stated that the first order will be given in 2020-21).

1.28 On the order and production of Assault Rifles, Chairman, OFB apprised the Committee as under:

"I am ready for production. (Assault rifle is being developed in-house by this R&D in Rifle Factory, Ishapore. PMT has formed in it, in which army is the representative of user quality, all are working together on this)

1.29 During the oral evidence, on the question of not placing orders after the weapon finalised by the Army, DG, WE stated as under:

"Sir, this problem has been known for long years. The assault rifle or the carbine, which this Service is wanted, we have not been able to get".

He further stated:

I just explain that. For the past few years, whatever trials have gone for the assault rifles and carbines, we were not satisfied with them. So, we have not been able to get the weapons....Recently, in the Defence Acquisition Council, a very deliberate decision at the highest level has been taken on how to proceed ahead with the eight lakh plus rifles and carbines which we wanted. In that, we have gone for certain quantity to for the fast track procedure from import. But for the balance, that is, seven lakh plus, out of that, the Ordnance Factory Board is also going to participate. But, yes, Sir, like what you are pointing out, nobody is in a position to meet our requirement tomorrow.

Sir, it is not up to my requirement. How can I give order?"

1.30 During the oral evidence, on the QR and OF waiting for Orders, DG WE has stated that the Army has tried but the Assault Rifles failed in trials.

He further stated in this regard:

"Sir, QRs have been given to them. It was tried and tested a number of times. But, unfortunately, it did not meet our QR.

Sir, your point is very valid. For a rifle, I cannot have a diluted QR to be used on the frontline. So, what we are doing is that we are importing a certain quantity and for the rest, the work is in progress. Various prototypes of weapons have come to us for trials and they are being tested. It is not that we have not tested them".

1.31 During the oral evidence, on the issue of Ordnance Factory is not up to the mark to produce such weapons which the Army require, Secretary, Defence has stated as under:

"Sir, what happened for last few years is that we were unable to finalize a very big order for rifles and carbines for various reasons. (Q.R. was very stringent so some failed the testing process, we did not declare the signal tender due to which) for the last, maybe, seven-eight years, we have not been able to finalize our requirement for the rifles and carbines. In the meanwhile, the Army's operational need also underwent a change. They moved from 5.56 to 7.62. OFB was geared to prepare 5.56 and they were doing a decent job. (They made 7.62 mejo product. That was not acceptable to the army because they did not live up to the prescribed parameters. After this a decision was taken)

OFB will be specifically given a reserved order of about one lakh plus guns so that they acquire technology and they will make it up to the standards of Army's satisfaction and to match the prices that we get from international agencies. So, whatever concerns you have raised about efficiency, about prices and the adequate orders, we are trying to address them, maybe, not fully but effort has been started. We will make the OFB more competitive and if they produce the rifles of international standards, we will surely buy them. The Army has given this dispensation".

CHAPTER - II

DEFENCE RESEARCH AND DEVELOPMENT ORGANISATION

Defence Research & Development Organization 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 organization 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.

2.2 DRDO plays significant roles to provide scientific and technological advice on aspects of weapons, platforms surveillance 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; to carry out research and cutting edge technology development for building a strong indigenous technology base; to design, develop and lead to production state-of-the-art sensors, weapons systems, platforms and allied equipments for our Defence Services; to support National Cyber Security Architecture –testing capabilities, security solutions, testing hardware, indigenous NW systems, Defence tools, support operations. The Organization also advises the Government to make technical assessments of international security threats and the military capabilities of both current and potential adversaries.

Budgetary Provisions

2.3 Projected Amount, Budget Estimates (BE), Revised Estimates (RE) and actual allocations in respect of DRDO for the last five years along with the Projections and Budget Estimate allocation for the year 2018-2019 are given in the following table:

Year	BE Proposed	BE Approved	RE Approved	MA Approved
2013-14	16483.28	10610.17	10930.17	10934.17
2014-15	18495.46	15282.92	13447.19	13716.14
2015-16	19641.56	14358.49	12491.21	13540.11
2016-17	18782.86	13593.78	13454.54	13501.00
2017-18	19935.60	14818.74	15463.25	
2018-19	22203.74	17861.19		

Approval of RE 2017-18 & BE 2018-19 is still awaited.

2.4 On being asked about whether the budget provided is sufficient for the plans as envisaged by DRDO, the Ministry in written reply submitted as under:-

> 'The budget of DRDO has always been around 5-6% of the Defence Budget. Keeping aside pay and allowances and other non-salary revenue expenditure, each of which essentially keeps growing every year, the amount left for R&D activities is very less (~Rs. 9000 Crore). Of this, ~Rs. 5,000 Crore is for Strategic Schemes which is unavoidable expense because DRDO has the responsibility of design, development, operation and maintenance of these projects. Another ~Rs. 1,000 Crore is for our top priority CCS programs & ~Rs. 1,300 Crore is for essential non salary revenue expenditure, leaving only ~Rs. 1,400 Crore for S&T, TD and other MM projects. Since MM has higher priority, the quantum of funds left for TD/S&T is less than ~Rs. 500 Crore. This slab (TD/S&T) actually constitutes DRDO's efforts in blue sky research and futuristic technology which ideally is the bed-rock for any R&D organization. DRDO needs additional funds to take up projects in futuristic areas, significant/high-cost projects. Here quantum of funds substantially needs to be increased to about Rs. 3,000 Crore. CCS projects will require another Rs. 2,000 Crore as a number of new projects are on the anvil. Hence an additional Rs. 5,000 Crore is critically required for sustained R&D efforts/output'.

2.5 During the oral evidence, on the issue of additional budget, Secretary, Defence R&D submitted as under:-

> ''The Department is thankful to you for giving this enhanced Budget. In the consecutive two years in your Report you have requested for enhanced Budget. We could get a 20 per cent jump in our Budget with respect to last year. The increase in Budget is around Rs.2000 Crore in terms of capital and about Rs.200 Crore in the revenue. Though there is an increase, we have a small request in case it could be included in the Report.
>
> We have LCA Programme which is coming under grants-in-aid which requires funding. As of now, we have got the orders for about 123 aircraft and also Air Force is committed to take another 201 aircraft which means, Mark-II to be designed and developed, we are in the half way through. There are some expenditures involved. We request another Rs.800 Crore under grants-in-aid. If it could be provided we will be happy.
>
> Likewise, we are also having some strategic programme for which we need at least Rs.500 Crore civil capital. Last but not the least, another Rs.500 Crore, if it is possible, is our requirement in the stores revenue. In total about Rs.1,800Crore we will be requesting.
>
> Before I end, I once again thank you for the continued support because of which we got the enhanced amount. We had requested about Rs.4000 Crore and we could get at least Rs.2,500Crore. That is really good. Except this small change, in case it happens, we will be very comfortable".

Further, Defence Secretary stated in this regard as given below:

> **"**("Sir, with respect to the mention of Rupees One Lakh crore, the more the output generation, the better will be revenue generation, a part of which will be alloted to Defence, and further to Defence Research, thereby, making it a long, time-consuming process. Hence, the said fund of Rs. One Lakh crore is the not alloted instantly.)

Budgetary Allocation

2.6 The Ministry was asked about the plans made by DRDO for development of new weapon systems in this year's Budget, the Ministry in its written reply stated as under:-

> "DRDO is involved in the development of new technologies & systems in domain areas of missiles, aeronautical systems, armaments & combat engineering systems, naval systems, electronics & communication systems etc. Some of the new weapons systems in testing phase are: new generation anti radiation missiles (NGARM), quick reaction surface to air missile (QRSAM), man-portable anti-tank guided missile (MPATGM), Kautilya, Pralay, advanced towed array advanced towed artillery gun systems (ATAGS), 500 kg general purpose bomb, advanced light weight torpedo, ALTAS, NBC products to name a few.
>
> Additionally new projects have also been sanctioned in 2017 for the development of weapon systems for e.g. Guided Pinaka Rocket System, Infantry Combat Vehicle Command (ICV Command), LRSAM Weapon System for Indigenous Aircraft Carrier (IAC) for Indian Navy, Medium Range Surface to Air Missile (MRSAM) system for Indian Army, Long Range Glide Bomb, Next Generation Explosive Reactive Armour (NGERA), Naval Anti Ship Missile-Short Range (NASM-SR) to name a few. The total cost of these sanctioned projects is Rs. 19,353 Crore*(including User share)*. About 65-70% of DRDO budget is expected to cater to new weapon system development".

EXPENDITURE ON RESEARCH & DEVELOPMENT

2.7 The Ministry was asked to furnish the details percentage of expenditure on Research and Development to the overall GDP during each of the last five years and how does this percentage compare with that of the developed countries, the Ministry supplied the following information:

TOTAL GDP Vs R & D EXPENDITURE			
YEAR	**TOTAL GDP**	**D R & D EXPENDITURE**	**DR&D EXPDR AS % OF TOTAL GDP**
2013-14	11233522	10868.88	0.10
2014-15	12445128	13257.98	0.11
2015-16	13682035	13277.27	0.10
2016-17	15183709^{PE}	13364.76	0.09
2017-18(BE)	Not available	14818.74	
2018-19			

In comparison to Defence funding in countries such as the US, Russia, and China, our Defence R&D spending is very less. As per published data, India funding 6% on Defence R&D of the Defence Budget whilst, USA and China are spending approximately 12% and 20%, respectively on Defence R&D as compared to their Defence Budget. Vibrant economy is possible only when both saving and spending go hand in hand. Spending the tax payers money wisely is as important as saving if not more for the stimulation of growth in Defence R&D capability.

2.8 On being asked about the new projects being formulated, the Ministry in its written replies submitted as under:-

"Major new projects being formulated and planned to be taken up by the technology groups in next few months are:

Aeronautics: Ghatak Aircraft Programme, Multi Mission Maritime Aircraft (MMMA) Programme, Aerostat Platform System for Surveillance Large Size (Prahari), Rotary UAV for Snow Cover Evaluation, High Efficiency High Temperature Turbine, Land Attack Cruise Missile.

Armament &Combat Engineering (ACE): Universal Armoured Recovery & Repair Vehicle (UARRV), 600 HP Engine, Landing Gear for 3T class Unmanned Aerial Vehicle, Surveillance using Multilayer Intelligent Tracking Response Analysis 'SUMITRA', Wheeled Armoured Personnel Carrier for UN Mission-UN APC 8x8, Swarm Robotics, Extended Range Anti-submarine Rocket ER-ASR, TerraINT as Force Multiplier for Military Operational Planning (DHARASTRA), Mechanical Mine Layer-AT, Integrated Console for Network Surveillance.

Electronics & Communication Systems (ECS): Internal RWR & Self Protection Jammer Pod for LCA Mk1A, Digital Active Phased Array Radar (DAPA Radar), L-Band Long Range (900 km) Phased Array Radar, Digital Active Phased Array, Data-links for Airborne Platforms, Advanced SATCOM Technologies & Systems, Next Generation Integrated EW System (ROSHINI), Estimator & Compensator Modules for Laser Weapon Systems (EsCom).

Life Sciences: Bio Agent Detector System, Next Generation Protective Ensemble (NGPE), Next Generation CBN Defence Technologies.

Micro Electronic Devices & Computational System (MED &CoS): Next Generation Microwave GTechnologies (NEXGEM), Multi Petaflop Computing System, GaN MMIC for applications up to X-band.

Missile and Strategic System (MSS): Air to Surface Missile DHRUVASTRA for IAF, Astra Mk-II, Enabling Technologies for Explosive driven High Power Microwave System (EDHPMS).

Naval System and Materials (NS&M): High Endurance Autonomous Underwater Vehicle (HEAUV), Technology Development for SiCFiber (TDSiCF), Multi Influence Ground Mine, Chaff Payload for Naval Applications (CHAFF-N)".

2.9 The Ministry was asked to furnish the details of the projection for Twelfth Plan in respect of Research and Development, the Ministry supplied the following information:

The projections for Twelfth Plan vs. allocation are presented in the Table below:

(Rs. in Crore)

Year	Defence* Expenditure	Projection	Budget allocated to R&D	%age of Defence Expenditure
2012-13	181776.00	14463.66	9794.80	5.39
2013-14	203499.35	16483.28	10868.88	5.34
2014-15	222370.00	18495.46	13257.98	6.05
2015-16 *(RE)	224636.00	19641.56	13277.27	5.91
2016-17*(BE)	249099.00	18782.86	13365.30	5.37

2.10 The Ministry was asked to furnish the reasons for decline, if any , in the allocation made on Research and Development to the total Defence Budget during the Twelfth Plan period and projects which have suffered due to reduced allocation, if any, the Ministry supplied the following information:

> "The budget of DRDO over the 12th FYP period has always been around 6% of the Defence Budget. Keeping aside pay and allowances and other non-salary revenue expenditure, each of which essentially keeps growing every year, the amount left for R&D activities during the last 3 years has been progressively decreasing (Rs. 9,742.94 Crore; 9,563.26 Crore and Rs. 8,830.08 Crore respectively). Of Rs. 8,830.08 Crore (allocated in2015-16); Rs. 5,200 Crore is for Strategic Schemes which is unavoidable expense because DRDO has the responsibility of design, development, operation and maintenance of these projects. Another Rs. 930 Crore is for our top priority CCS programs &Rs. 1,314 Crore is for essential non salary revenue expenditure, leaving only Rs. 1,386.08 Crore for S&T, TD and other MM projects. Since MM has higher priority, the quantum of funds left for TD/S&T is less than Rs. 500 Cr. This slab (TD/S&T) actually constitutes DRDO's efforts in blue sky research and futuristic technology which ideally is the bed-rock for any R&D organization. **DRDO needs additional funds to take up projects in futuristic areas, significant/high-cost projects**. Here quantum of funds substantially needs to be increased to about Rs 3,000 Crore. Even CCS projects will require another Rs. 2,000 Crore as a number of new projects are on the anvil. Hence an additional Rs. 5,000 Crore is critically required for sustained R&D efforts/output. The above was also presented to Standing Committee of Parliament during Apr 2016.
>
> Effect of reduced funding vis-à-vis projections will be reflected in delay in completion of project activities which will subsequently result in a time overrun in projects".

2.11 On being asked about the number of projects initiated by Defence Research and Development Organisation, date of initiation and the share of a project/scientist/technical manpower in normal circumstances, the Ministry in written reply submitted as under:-

"As per the available records, 1031 projects (excluding Special Schemes/TS/Build-up & short closed/stage closed/cancelled projects) have been sanctioned till date at a total cost of Rs. 87,305.08 Crore (including User share).

The total no. of projects sanctioned by DRDO in 12thFYP and XIII FYP (Cost ≥ Rs 2 Crore) including cost are provided below:

Plan Period	No. of Projects	Cost of Projects(Rs in Crore)
12th FYP (2012-2017)	298	32976.88
13thFYP (2017-till date)	37	2159.26

The key projects which have been taken up in the 12thFYP are: New generation anti-radiation missile (NGARM), solid fuel ducted ramjet (SFDR) technology, quick reaction surface-to-air missile (QRSAM), man-portable anti-tank guided missile (MPATGM), ASB-Glide, smart anti-airfield weapon (SAAW), Kautilya, Prahaar, Akash Mk-1S, Akash NG, Anvesha, RudraM-II, stand-off anti-tank guided missile (SANT), liquid fuel ramjet engine, HEAT- Abhyas, autonomous rotary unmanned aerial vehicle 'RUAV'-10 kg, unmanned small airship system (USAS), small turbo fan engine (STFE), IFF Mk 12th(A) system variants, advanced towed artillery gun system (ATAGS), 500 kg preformed fragmentation bomb, 1500 HP engine (National Mission), landing gear system for 2-Ton class UAV, BMCS for 155 mm artillery gun, Advanced Daksh platform-CBRNe platforms, wheeled armour platform (WHAP), ATGM for MBT Arjun Mk-II, corner shot weapon system for pistol and UBGL, electric gun and turret drive system (ELEGANT),AIP system on P-75 submarines, sonars (ALTAS, Abhay, HUMSA UG, Tushar),supersonic missile assisted release of torpedo (SMART), Internal RWJ system for Jaguar DARIN III upgrade aircraft, S-band hub and ground SATCOM terminals, Himshakti (Girishakti), EW System 'Samudrika', Ground based mobile ELINT station 'Himraj', national open air range (NOAR), ground based electronic counter measures against GNSS receivers 'GYPSY', submarine periscope, AESA radar 'Uttam' for LCA, air defence fire control radar 'Atulya', air defence tactical control radar, ANURouter, new operating system, S-band digital multimedia broadcast terminal for satellite communication, MEMS packaging facility, multi-agent robotics system (MARS), microwave chaff for Defence applications.

The plan period also saw the completion of a number of projects viz. Integrated Aerostat Surveillance System - Medium Size (Nakshatra), Aerostat Platform 2000 cum (Akashdeep), Inflatable Radome, Heavy Drop System – 16T, Enhanced Range Rocket 'Pinaka' Mk-II, Penetration-cum-Blast (PCB) and Thermo-baric (TB) Ammunition for 120 mm Arjun Tank, Multi Caliber Individual Weapon System (MCIWS), Air Bursting Grenade (ABG) for Individual Weapon, 46m Military Load Class (MLC-70) Modular Bridge, Mountain Foot Bridge, Conversion of BMP into Tele-operated & Autonomous Vehicle, Satellite based Surveillance (SBS) and Reconnaissance System, EW Suite for Fighter Aircraft (EWSFA), Dual Colour Missile Approach Warning System (DCMAWS) for Fighter Aircraft (Su-30 MKI), Medium Power Radar (MPR) 'Arudhra', Electro-Optical Fire Control System for Naval Ships (EON-51), Electro-Optical Sensors for Airborne Platforms (UAV & Aerostat), Modern ESM System 'VARUNA', S-Band Hub and Ground SATCOM Terminals, NBC Defence Technologies, Life Support System for Services (LSSS), MEMS Technology (MEMSTECH), AlGaN/GaN High Electron Mobility Transistors Material and Device Development, Ku Band MPM based Transmitter for Airborne Radar, Technologies for TAC C^{3}I Integration, Missile Launched Precision Guided Munitions (MLPGMs), Imaging Infra Red (IIR) Seeker for Supersonic/Hypersonic

Guided Missiles, ASB Glide Weapon System, Open Range Test Facility for Radar Cross-Section and Antenna Measurements (UHF to W BAND) – ORANGE, Track Extension and Rail Track Rocket Sled (RTRS) Augmentation, Advanced Torpedo Defence System 'Maareech', High Speed Heavy Weight Ship Launched Torpedo 'Varunastra', Low Frequency Dunking Sonar (LFDS), Seakeeping&Manoeuvering Basin (SMB), Bullet Proof Jacket and Materials & Technologies for Stealth Applications (STEP) to name a few prominent ones.

Typically project manpower depends upon cost, scope & category.

However, most of the labs follow a matrix structure of manpower allocation for projects. Each lab has multiple technology groups based on the area of the work of the lab. The project has a small core team and most of the technical activities associated with the project is assigned to the technology group in the lab or even in other system labs.

Thus a scientist in a technology group may be working on multiple projects wherein that particular technology goes into it. Further, these projects can also be from other DRDO labs. It is also not possible to have a % time allocation for each project for an individual scientist in a technology group.

With this working structure it is difficult to indicate the share of project/scientist/technical manpower".

Quality Control

2.12 On the quality check conducted for the products developed by DRDO and whether these projects are state of the art technology, the Ministry supplied the following information:

"DRDO develops products based on Qualitative Requirements (QRs) issued by the Services. Latest technologies are adopted in development of these systems by DRDO. These systems are developed as per state of the art technologies and normally at par with international standards.

DRDO Labs have an internal R&QA group for checking reliability and quality during the development phase itself.Post development, DRDO has a mechanism of "Internal Evaluation" in which all systems are subjected to quality checks prior to offering the same for user evaluation.

However, the quality check is conducted for the products developed by DRDO by the following Government QA agencies:-

S No.	Details	QA Agency
(a)	**Indigenous Missile System**	Missile System Quality Assurance Agency, Hyderabad (MSQAA)
(b)	**Products for Indian Army**	Directorate General of Quality Assurance (DGQA).

(c)	**Products for Indian Air Force**	Directorate General of Aeronautical Quality Assurance (DGAQA).
(d)	**Products for Indian Navy**	(i) **Armament –** Directorate General of Naval Armament Inspection (DGNAI) (ii) **Others (Equipments/Systems) –** Directorate of Quality Assurance (Warship Projects [DQA(WP)]& Directorate of Quality Assurance (Naval) [DQA(N)]
(e)	**Strategic Systems**	Strategic System Quality Assurance Group (SSQAG)

Indigenisation

2.13 The Committee wanted to know about the indigenous production of Defence equipment designed and developed by the DRDO vis-a-vis the imported ones. In this connection, the Ministry in written reply stated as under:-

> "DRDO develops products based on Qualitative Requirements (QRs) issued by the Services. Latest technologies are adopted in development of these systems by DRDO. These systems are developed as per state of the art technologies and normally at par with international standards. These systems are subjected to comprehensive trials and evaluation involving various terrain and climatic conditions during summer, winter, MET, QA trials compared to the limited trials at OEM premises and OEM certification for acquisition of foreign systems.
>
> However, it can be stated with a fair degree of certainty that the indigenous systems are cheaper than the import variants in terms of direct cost, besides the larger saving in opportunity cost in terms of the availability of technology and support within the country, boost of industrial growth, savings in foreign exchange and availability of critical know-how within the country.
>
> The production value of DRDO developed systems/equipment for the Services is over Rs. 2.65 Lakh Cr today. Products/Systems/Technologies developed by DRDO & Inducted/Under Induction into Services are enclosed as **Annexure 'D'.**

2.14 Ministry was asked to furnish details of LCA Mk 1 and Arjun Main Battle Tank (MBT) Mk I & Mk II produced by the DRDO and also their compatibility to meet present and future conflict requirement of Armed Forces. The Committee also desired to know about the improvements suggested by the Army in case of MBT Arjun and IAF in case of LCA Tejas.The Ministry replied as under:-

"Yes, Tejas & Arjun MBT Mk-I & Mk-II, which are designed & developed by DRDO are compatible to meet the present and future conflict requirements of Armed forces.

Tejas would form an important component of a viable air-defence system efficiently and cost-effectively. With Final Operational Clearance (FOC) features of Air to Air refuelling, Derby and Python missile integrated, the LCA is expected to be a true Air superiority Air defence weapon of war, light, agile and manoeuvrable.

IAF has proposed a few improvements like Digital RWR and External SPJ Pod, Active Electronically Scanned Array (AESA) Radar, Combined Interrogator and Transponder (CIT), ASRAM – Close Combat Missile and Beyond Visual Range (BVR) Missile and like a few Maintainability Improvements . All these are being addressed in the next version of LCA i.e. LCA Mk-1A. MoD has approved the procurement of 83 LCA Mk-1A.

Subsequent Arjun MBT Mk-I & Mk-II, to induction of Arjun MBT Mk-I & comparative trials with T-90, the GOC-in-C reported that Arjun not only performed creditably and can be employed for both offensive & defensive role as T-90, but also recommended certain specific improvements to make it into a SUPERIOR WEAPON PLATFORM. These specific improvements led to the forming of a Steering Committee, which in turn constituted a Core Committee with Director CVRDE as Chairman and members from User, OFB, DGQA etc. as stakeholders, for the development of Arjun MBT MK-II. As a consequence, all improvements were discussed threadbare and approval obtained from all stakeholders during various core committee meetings. Based on the above approval, CVRDE/DRDO developed & fielded for user trials the first prototype of Arjun MBT Mk-II in a record time of 2 years with 73 tank fit-able improvements, which includes 15 major improvements as listed below:

1. Missile firing through main gun
2. Commander Panoramic Sight (CPS) with Thermal Imager
3. Containerisation of Ammunition Bin with Individual Shutter (CABIS)
4. Roof Mounted Driver's Seat (RMDS)
5. New final drive with increased reduction ratio
6. Un-cooled Thermal Imager (Driver's Night Sight)
7. Track Width Mine Plough (TWMP)
8. Incorporation of ERA panels
9. AD weapon remote firing (360 degrees)
10. Effective Alternate to MRS
11. Laser Warning Countermeasure System (LWCS)
12. Advanced Land Navigation System (ALNS)
13. Automatic Target Tracking (ATT) Gunner's Main Sight
14. Advanced Running Gear System (ARGS)
15. New Track with increased horn height

The User has approved all the improvements, except missile, based on the trials (July 2012 to September 2015) and DGQA / MET evaluation are being carried out. USER field intensive trials of the Arjun MBT Mk-II were completed successfully. Although the missile firing capability from Arjun MBT Mk II was proven, the missile

fell short of its performance as per the User's ATP, which are being addressed through development indigenous Anti-Tank Guided Missile [ATGM] & as well as improvised LAHAT missile of M/s IAI, Israel. As the missile can be retrofitted like any other ammunition on production vehicle, the User is being requested to release the production indent for the DAC approved quantity of 118 Nos., as the productionisation will take minimum of 3 – 4 years time to roll out the first Arjun MBT Mk-II production vehicle. During the intervening time, all the issues related will be resolved either through indigenous missile from ARDE/DRDO Lab or by improvised LAHAT missile.

As such, DRDO has successfully developed & incorporated all the improvements on Arjun MBT Mk-II as suggested by Army and confident of overcoming performance issues observed in the missile ammunition".

Delay in Defence Projects

2.15 On being asked to furnish the position of the major projects of DRDO indicating name of project, date of sanction, original estimated cost of the project, likely date of completion, revised cost of the project, revised date of completion and the money spent on these projects, including laboratory-wise categorization, the Ministry in written reply stated as under:-

"The details i.e. date of sanction, cost and PDC of ongoing projects (Cost >Rs. 100 crore) that are delayed is enclosed as **Annexure 'E'**. (This does not include strategic projects)".

2.16 The Ministry was asked to furnish the reasons for the major projects which have 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 OngoingCabinet Committee on Security (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 : December 2008
- Revised Date of Completion : 30 June 2019

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 at HAL 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 waslaunched 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 March, 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 TejasProgramme are achieved without any further cost and time overrun.
- In addition to the weekly reviews conducted at ADA and the Governing Body & 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 3000 flights have been completed till date. 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 RakshaMantri in Bengaluru. First Series Production aircraft has been handed over to chief of Air Staff by RakshaMantri on 17th Jan 2015).

(b) Full Scale Engineering Development Programme of Naval Light CombatAircraft (LCA-Navy) – Phase – I

- Original Date of Completion : March 2010
- Revised Date of Completion : December 2014 (Approval forexpenditure beyond PDC taken up).

Reasons for Delay

- The LCA Navy 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 by DRDO and Navy.

LCANavyTrainer(NavalPrototype-1):*Aircraft has been manufactured and already undergoing flight evaluation. Maiden flight carried out on 7 February, 2015 and completed 5 successful flights within a span of 10 days. So far, 38 flights have been carried out.*

LCANavyFighter (NavalPrototype-2: *StructuralassemblyofAircrafthasbeen completedandequipping isInfinalstage.*

Shore Based Test Facility (SBTF): *The facilityhas been commissioned at Naval Air Base at Goa. MiG-29K trials have already been carried out at the facility.*

(c) Aero Engine - Kaveri

- Original Date of Completion : December 1996
- Revised Date of Completion : December 2009 (Under Revision)

Reasons for Delay

- Original Probable Date of Completion (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 was conceived as the first indigenous aero-engine development 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 & cost. However, this has provided a platform for design, development & 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 from 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. However, based on the recommendations of the Certification Agency and Air Force, FTB programme wasincluded.
- 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 up to 12 km maximum altitude and maximum forward speed of 0.7 Mach No. As on Nov 2016, 2771 hours of engine testing have been completed).

Remedial Measures

- Consortium approach has been used for design, development and fabrication of critical components.
- Three tier 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 : June 2017 (PDC extension is in progress)

Reasons for Delay

- 27 Months delay due to ion of additional operational requirements by IAF and finalization by issue of mutually agreed Operational Requirements compliance document.
- Due to additional requirement of Certification of aircraft for operation under icing certification which in turn has necessitated additional design work on Aircraft and Mission Systems thereby delaying the delivery of aircraft.
- A delay of 12 months in reception of first aircraft and 14 months delay in delivery of 2nd aircraft from foreign vendor.
- Estimated 12 months delay in delivery of 3rd aircraft as on date.

(Aircraft was demonstrated (both static and flight display) in Aero India 2015 during 18 – 22 February, 2015 at Bengaluru. Flight campaign of AEW&C carried out at Jodhpur during 10-14th May, 2016 and 6-10th June, 2016 to benchmark against the performance of the system.

Remedial Measures

- Progress of activities in parallel.
- Working in multiple shifts.
- Close monitoring of.

(e) Air-to-Air Missile System – Astra

- Original Date of Completion : February, 2013
- Revised Date of Completion : December, 2018

Reasons for Delay

- Delay in receiving first batch of seekers.
- Contract was signed in Aug 2006, however, Russian Presidential approval came only in Nov 2007. Contract effective date commenced from 10 Dec 2007.
- Technology problems leading to major mid-course redesign
- is progressing as per revised schedule.
- (Captive flight trials on Su-30 Mk-I for avionics integration have been conducted successfully).

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.

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

- Original Date of Completion : May 2012
- Revised Date of Completion :31st Dec 2017 (PDC extension is in progress)

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 Israel Aerospace Industries (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.
- 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 projects by Secretary Defence R & D".

2.17 The Ministry was asked tom furnish the reasons for the cost & time overruns in the DRDO projects and remedial measures adopted to check the cost and time overruns, the Ministry in written reply stated as under:-

"There are many factors which lead to increase in the development period for R&D projects. Some of them are:

- Ab-initio development of state-of-the-art technologies
- Technological/technical complexities
- Lack of availability of:
  - Critical equipment; special materials
  - Infrastructure and testing facilities like wind tunnel, floating test range
  - Technically skilled and specialized manpower
  - Manufacturing base like Aero engines, FPA Fab
-
- Mid-term revision in Qualitative Requirements (QRs)
- Extended and repeated trials, non-availability of platforms (Su-30, ALH, Ship) for trials
- Delay in production of systems by designated production agencies
- Sanctions imposed by the western countries/MTCR
- Denial of technologies by the technologically advanced countries
- Legal problems in setting up of infrastructure including acquisition of land and environmental issues
- Problems in absorbing high-end technologies by the production agencies.

2.18 The steps taken/being taken by DRDO for strengthening the functioning of DRDO and expediting the completion of Defence projects are:

- Organisational re-structuring
  - Decentralization of authority and responsibility with labs/cluster DGs
  - High empowerment and accountability
- More stringent review mechanisms in place - various high level committees including, Steering Committees, Advisory Committees and Monitoring Boards
- Involvement of Services & Production Partners during development process and reviews - To know their views in advance including finalisation of GSQRs.

- Synergy among stakeholders – Quarterly interactions
- Close monitoring of key result areas
- While undertaking new projects pre-project activity including preliminary design is being given greater focus.
- The periodicity of review is enhanced for projects which have taken more than two PDC extensions.

2.19 The following additional initiatives have been taken by DRDO to restrict future time-overruns in projects:

- Revised Procedures for Project Formulation and Management (PPFM-2016) has been launched with mandatory focus on pre-project activity including completion of preliminary/configuration design and procurement plan before project sanction. This will help in proper planning & then cut down on time delays.
- Tracking of timely completion of reviews – Monthly alerts are being provided to DG cluster on reviews due".

2.20 The Ministry was asked to furnish the details of the projects delayed and the system in place to bring accountability in case of such delay, the Ministry in written reply stated as under:-

"The details of projects that are delayed is enclosed as **Annexure 'E'**.

Project Directors are responsible for project execution. The projects are reviewed by DGs/Secretary. Only those delayed projects are granted PDC extension in which the delay is due to certain unforeseen factors beyond control of DRDO like technological bottlenecks, procurements/integration/manufacturing delay by industry, delay in international contracts/MOU, denial of license by certain countries, dependence on trial platforms to be provided by services, QR changes etc.

However it may be noted that research and development is an area of uncertainty where certain unknowns are explored. In addition to taking of design projects where the sub-systems are already matured, DRDO also has to undertake technology projects and science and technology projects where the technology readiness level worldwide may be at intermediate and low level respectively increasing the risk of delays. Certain high risk and high pay off projects and blue-sky research has also to be undertaken where there are extremely high chance not only of delays but also failures".

2.21 The Ministry was asked to state the extent to which the delays have affected the Defence preparedness of the country, the Ministry in written reply stated as under:-

"The delay in DRDO projects have not affected Defence preparedness of the country due to the following reasons:

1. DRDO does not stop import of products by Services even for those items that are under development.
2. Even if a product is delayed the final product that is delivered to the services is contemporary and comparable to best in the world.

Closed Projects

2.22 The Ministry was asked to furnish the details of closed projects and the money spent on these closed projects, specific reasons for closed projects/dropped projects and the system in place to bring accountability in case of such closed projects, the Ministry in written reply stated as under:-

"All the DRDO projects on attainment of the desired objectives are closed after due audit and issue of closure letter. These are the category of projects which can also be termed as "Successfully completed"/closed.

As per the digitized data of projects, 713 projects (≥ Rs 2 Crore) have been closed/completed (excluding short closed/stage closed/cancelled projects) till date at a total cost of Rs 20,338.52 Crore. A total of 156 no. of projects were closed by DRDO in 12thFYP (2012-2017) at a total cost of Rs. 3656.40 Crore (This does not include strategic projects)".

2.23 The Ministry was asked to furnish the specific reasons for closed projects the Ministry in written reply stated as under:-

"All the projects were closed successfully after achieving the project scope".

2.24 The Ministry was asked to furnish the details of the projects closed and the system in place to bring accountability in case of such closed projects, the Ministry in written reply stated as under:-

"A sanctioned DRDO project may be closed before its PDC or without achieving its objective under the following conditions:

Cancelled Project: The project has been approved and project no. allotted but where the work on the project has not commenced and no expenditure has been incurred.

Short Closed Project: Where the work on a project has already commenced and certain amount of expenditure has been incurred but for certain reasons (to be specified) it is decided to short close the project.

Stage Closed Project: Pre-mature closure of project is where considerable effort and funds have been spent yet no concrete results have been achieved. Stage closing of a project is only resorted into extra-ordinary circumstances.

A total of 6 no. of projects have been short closed/stage closed/cancelled by the DRDO during the last three years and the current year. The reason for abandoning such projects is mentioned below:

S. No.	Project Title (Lab)	Date of Sanction	Current PDC	Cost (Rs in Crore)	Expenditure (Rs in Crore)	Reason
1	Missile Mass Properties Measurement System (RCI)	05-06-2009	04-06-2013	10.00	5.7779	Monitoring committee recommended short closure due to uncertainty of importing/realizing a critical component viz. air bearing
2	Development of Four Stroke Horizontally Opposed Four Cylinder Engine for UAV (VRDE)	01-11-2010	31-10-2015	45.80	2.7617	Change in User requirements.
3	Dev. of Technology for Light Weight, Washable NBC Protective Suits for the Paramilitary and Army	04-02-2011	03-12-2012	4.75	2.37	Project stage closed as most of the technical activities completed. It was decided that production of 250 nos. NBC suits can be taken up by industry after User trials
4	Fabrication of Fifty Five Numbers of Sudershan Mark-1 Kits for Evaluation Trials (ADE)	25-01-2012	24-01-2016	85.13	To be obtained from DBF&A	Change in User requirements.

5	Multi Mission Radar (LRDE)	14-02-2012	13-06-2015	193.44	6.6033 (Outstanding commitments of Rs. 3.9773 Crore transferred to Project 'QRSAM)'	Activities subsumed to Project QRSAM
6	Semantic Service Oriented Architecture (CAIR)	25-06-2012	25-12-2014	4.90	0.1856	Project reformulated with a revised scope and comprehensive definition. A new project Multi-Agent Robotics System (MARS) taken thereafter

For short closure of the project, the highest review/monitoring board has to recommend for short closure of the projects during its last held meeting after due justification is provided by the project team.

Further, all the projects which are short closed (before PDC or attainment of its objectives) have to be duly approved by Secretary DD R&D for short closure even if the approving authority for the project is Director or Cluster DG/CC.

NUCLEAR, BIOLOGICAL AND CHEMICAL(NBC)

2.25 The Ministry was asked to furnish the details regarding efforts are being made by the Defence Research labs to focus on Nuclear, Biological and Chemical (NBC) weapons detection system, the Ministry replied as under:-

"DRDO, through its R&D effort over the last two decades developed several products for NBC detection, protection, decontamination and medical management to continue the sustainment of the indigenous NBC defence capabilities. In line with the question only details pertaining to CBRN detection technologies are brought out below:-

Under the 10thFYP project DRDO had developed various radiation detection equipment and colorimetric based chemical detection equipment. Under the 11thFYP projects state of the art chemical detection equipment were developed along with new generation of radiation detectors. Under the 12thFYP projects biological detection has been identified as a thrust area. This has been done keeping in view the evaluation of NBC detection technologies in developed countries.

Radiological Detection Technologies Developed by DRDO

Inducted in Services

- Pocket Dosimeter (PDM)
- Portable Dose Rate Meter (PDRM)
- RPL Dosimeter and Reader
- Gamma Flash Sensor
- Roentgenometer

Recently Developed

- Water/Liquid Radiation Contamination Monitoring System (WLRCMS)
- Food Radiation Contamination Monitoring System (FRCMS)
- Automatic Source Search System (ASSS)
- Laundry Monitor and Mobile Station for Personnel Monitoring
- Integrated Radiation Monitoring System (IRMS)
- Remote Radiation Monitoring & Transmitting System (RRMTS)
- Airborne Dosimetry System (ADS)
- Radiation Monitoring Portal

Chemical Agent Detection System developed by DRDO

Inducted in Services

- Portable Gas Chromatograph (PGC)
- Residual Vapour Detection Kit (RVDK)
- Water Poison Detection Kit (WPDK)
- Three Colour Detector Paper (TCD)

Recently Developed

- Ion Mobility Spectrometry based chemical agent detectors
- Gas-Chromatograph- Surface Acoustic Wave based chemical agent detector
- Flame Photometry based chemical agent detector

Biological Detection System developed by DRDO

Inducted: No such system is inducted as on date.

Recently Developed: Prototypes of electrochemical biosensors

Development planned in NBC Ph II

- Biologicalpoint detection system based on laser fluorescence and flame photometry principles.
- Field based bio agent identifier based on real time PCR.
- Lab on chip bio sensor using micro-fluidics".

During the oral evidence, Secretary, Defence R&D further clarified on this issue:

'Yes, Sir. We call it Chemical Biological and Nuclear Warfare. We have got a complete system where in the event of any indication, this nuclear indication is the responsibility of Department of Atomic Energy. They have centres all over the country where they use imported sensors. We have got our own sensors and nowadays, we are providing that also to them. Those sensors are almost in every police station. They have chosen to keep it there. From there, they get information to a central place in Mumbai and from there, they transmit to the High Command. They in turn tell us where DRDO is involved to go and inspect the places. There are some vehicles which are totally protected from nuclear radiation and the vehicles can go. There is a robotic arm which will move on its own, go and bring the samples and bring them to the lab for testing. In addition to that, the person who travel in that vehicle completely will wear a nuclear suit and even otherwise also, contamination can be totally removed.

There are many other methods also. Even using laser, from a far away distance, we can measure and find out the nuclear effect. These things are existing. In addition to this, wherever we suspect, where there is a question of likely radiation, they have some tablets which will have probably some sort of immunity for some time. That is also manufactured and handed over to the services at this point of time. I can give a note on this area'.

Collaboration with Universities/Academic Institutions

2.26 On the issue of research programmes being sponsored through universities by the DRDO during 12th Plan and the benefit accrued to DRDO and defence services, Ministry submitted that that DRDO has established five centres of excellence at various institutions/Universities for creating strong academic links:

"683 research projects costing 496 Crs were sponsored to various universities and academic institutions (100 nos approx.) during 12th Plan. The benefits accrued to DRDO and defence services are summarized at **Annexure 'F'**.

DRDO has established 6 centers of excellence; 1.Center of Propulsion Technology at IIT Bombay (CoPT), 2.Joint Advanced Technology Center at IIT Delhi (JATC), 3.Jagdish Chandra Bose Center for Advanced Technology (JCBCAT) at Jadavpur University, Kolkata, 4.Research Innovation Center (RIC) IIT Madras, 5.Advanced Center for Research in High Energy Materials (ACRHEM), University of Hyderabad and 6.DRDO-BU Center of Life Sciences at Bharatiyar University. Three centers at IIT Bombay, IIT Delhi & at Jadavpur University are recently established, earlier established 3 other centers are also operational. The details are attached as **Annexure 'G'**

2.27 On the budgetary provision given to the Universities, their actual allocation and system of monitoring thereon, Ministry submitted:

Budget Allocation F.Y. 2017-18:	Rs. 250.00 Crore
Expenditure as on date:	Rs. 211.90 Crore
Additional Likely Expenditure till Mar 2018:	Rs. 39.10 Crore

Monitoring System:

There is a SoP for monitoring the progress of the projects and release the funds thereon. Funds of the next year are disbursed only upon the receipt of expenditure statements, utilization certificates and interest accrues in SB accounts. Audited statements are submitted by PI on closure of projects.

Projects are reviewed periodically by the experts from academia, DRDO & other R&D Organizations through Research Boards (NRB, RAMREB, LSRB& AR&DB), Apex Boards, Research Advisory Boards, General mentoring and monitoring committee.

CHAPTER III

DIRECTORATE GENERAL QUALITY ASSURANCE

The Directorate General of Quality Assurance (DGQA) is under Department Of Defence Production, Ministry of Defence. This organisation provides Quality Assurance (QA) cover for the entire range of Arms, Ammunitions, Equipments and Stores supplied to Armed Forces. Apart from QA activities, the organisation is responsible for import substitution and associates with Defence Research and Development Organisation (DRDO) in the development projects. It also ensures Documentation, Codification and Standardisation Action for minimizing the variety of components / equipments. The other services rendered are promotion of small scale industries, Post procurement services, Defect Investigations and Technical Consultancy to the users, Ministry and the Production Agencies. The establishments under this organisation are spread all over the country where mainly the Ordnance Factories, Defence Public Sector undertakings and Industrial base exist. DGQA organisation carries out inspection of Defence stores supplied by Ordnance Factories, DPSUs, Trade Firms and ex-import. These inspections are done at various stages of manufacture and at Final Acceptance stage. On an average DGQA Organisation carries out approx 18,000 inspections per month.

Budget 2018-19

3.2 The DGQA projected it budgetary requirements as under:-

BUDGET ESTIMATES

(Values in Crores)

YEAR	HEAD	PROJECTED	BE	MA	EXPENDED
2016-17	Revenue	1090.99	1068.10	1139.72	1075.30
	Capital	9.00	7.27	9.00	8.83
	Total	1099.99	1075.37	1148.72	1084.13
2017-18	Revenue	1292.14	1163.54	-	794.43
	Capital	15.00	7.97	-	7.35
	Total	1307.14	1171.51	-	801.78*
2018-19	Revenue	1310.81	1137.02	-	-
	Capital	12.00	9.96	-	-
	Total	1322.81	1146.98	-	-

(Values In Crores) BE – Budget Estimates MA – Modified appropriations

* Exp till Jan 2018

9

Role of DGQA

3.3 During oral evidence, Committee want to know about there is any changes in the role of previous model of DGQA, DG, DG, QA, apprised the Committee as under:

> "Our role has undergone a major change in 1987 when DGI became DGQA. Initially, it used to be inspection and, now, we are carrying out stage interstate inspection as well. Complete inspection was done by DGQA but in 1987, after implementation of Rajadhyaksha Committee recommendations, this was converted into quality assurance. From inspection, we switched over to quality assurance which involves the process audit and least amount of product audit. the role has been shrinking because earlier, when we used to carry out the inspection part, that time, the manpower requirement was much more than we require today. Even now also, in 2005, the input material inspection has been transferred to the Ordnance Factories. We had categorised the input material into two categories – critical and non-critical. For non-critical, we do not carry out any inspection. The Ordnance Factories, i.e. the procuring agencies, carry out the inspection. We carry out the document audit only. But in case of critical input material, we jointly draw the samples and then, we carry out the testing."

3.4 During the oral evidence, on the issue of complaints from the users of supply of low quality products even after the inspection of DG, QA, replied as under:-

'महोदय, कोईभीइक्विपमेंट्सजबहमखरीदतेहैंऔरजोभीइंस्पेक्शनयाक्वालिटीशेड्यूलहै, उसकेतहतहमपूरीचैकिंगकरतेहैं।जबखरीदनेकेबादयूजर्सकेपासजाताहैऔरकोईडिफेक्टहोताहै, तोहमउसकीडिफेक्टइनवेस्टीगेशनकरतेहैं'। (Sir, no store can be 100% defect free. When we conduct defect investigation, then whatever shortcomings come to our notice, we return them for improvement purposes.....)

महोदय, कोईभीस्टोर 100 प्रतिशतडिफेक्टफ्रीनहींहोसकताहै।जबहमडिफेक्टइनवेस्टीगेशनकरतेहैंऔरउनमेंजोकमियांसामनेआतीहैं, उन्हेंसुधारनेकेलिएहमवापसभेजतेहैं"

(Sir, whenever we buy any equipment and whatever is the inspection schedule, according to that we conduct the entire re-checking procedure. After procurement, when it reaches the users and in case there are any defects, then we investigate the reasons for the defects)

3.5 During the oral evidence, Committee wanted to know before a product goes to the user is there is any defect test, and whether any recovery had been made, DG,QA replied as under:-

'There are numerous cases in which defects are detected at the time of Pre-dispatch Inspection and JRI after it has reached our ordnance depots. The liability of the suppliers or the firm is evoked at that point of time and certain amount of damages or claims are proffered against the company. In some cases, they repair it; in some cases, they change the item; in some cases, they pay the damages. But I totally agree with the sentiments being expressed here that this is an on-going process. We keep detecting inadequacies and problems in various types of equipments'.

Quality Check

3.6 During the oral evidence, on the issue of quality check, the Committee wanted to know whether there was any change in the process in today's context from what it was in 1969. The committee wanted to know the steps they are taking in the field of quality assurance. The Committee also wanted to know whether some serious issues in relation to quality have come to their notice including those, if any, which warranted blacklisting of the concerned party, Lt. Gen. DGQA replied in this regard

"सर, पहलासवालथाकिवर्ष 1869 सेअभीतकक्वालिटीमेंकोईइम्प्रूवमेंटहुआहैयानहीं।इससंबंधमें, मैंबतानाचाहूँगाकिमैन्यूफैक्चरिंगमेंइवोल्यूशनरीप्रोसेसेजहैं, जोप्लांटमशीनरीकेमॉडर्नाइजेशनकेसाथ-साथआगेबढ़तेजातेहैं।पहलेलेथमशीनहोताथा, आजकलसीएनसीमशीनआगयाहै, उसकेहिसाबसेइम्प्रूवमेंटहोरहाहैऔरप्रोडक्शनरेटआदिबढ़रहेहैं।इसतरहसेक्वालिटीइम्प्रूवहोरहीहै।हमारेजोस्टाफहैं, हमउनकोइसकेसाथहीट्रेंडकरतेहैं।स्टाफकीट्रेनिंगकेलिएस्लाइडकेमाध्यमसेटेक्नीकलडायरेक्टोरेट्सदिखाएगयेथे।उनमेंट्रेनिंगस्कूल्सहैं, जहाँउनकोक्वालिटीएसपेक्ट्सपरट्रेनिंगदीजातीहै।ऑफिसर्सट्रेनिंगकेलिएडिफेंसइंस्टीट्यूट्सऑफक्वालिटीएश्योरेंस, बैंगलोरमेंहै।

(Sir, the first question was that from 1869 till now whether there has been any improvement in the quality or not. In this regard, I would like to state that there are evolutionary processes in manufacturing, the plants machinery move forward in consonance with the modernization process, Earlier, there used to be lathe machines but now the CNC machines have come and

according to that there is improvement and production rate in increasing. Like this, quality improvement is also taking place. Our staff are being trained as per the requirements of this new machines. For the training of the staff, technical directorates that were shown through slides have training schools where training is imparted on quality aspects. For officers training, there is Defence Institute of Quality Assurance in Bangalore.

कंप्लेंट्सकेसंबंधमेंभीएकमाननीयसदस्यनेप्रश्नकियाथाऔरसभापतिजीनेभीइससंबंधमेंसवालकियाथा, मैंदोनोंप्रश्नोंकोकंबाइनकरकेबतानाचाहूँगा।पहलीबातहैकिकोईनयाआइटमइंट्रोड्यूजहोताहैऔरदूसराहोताहैइंट्रोडक्शनकेबादरेगुलरमैन्यूफैक्चरिंगहोताहै ।जबकोईचीजनयाइंट्रोट्यूजहोताहै, तोस्लाइडमेंदिखायेगयेप्रोसेसकेअनुसारफॉलोकियाजाताहै।यदि रेगुलरमैन्यूफैक्चरिंगहोतीहै, तोआर्डनेंसफैक्ट्रीजमेंएकक्वालिटीकंट्रोलडिपार्टमेंटहोताहै।वहहरसामानकोसौप्रतिशतचेककरतेहैं।डीजीक्यूएवालेइसेसैम्पलिंगबेसिसपरचेककरतेहैं।उसमेंएटीपीकेहिसाबसेसैम्पलसाइज़, एक्सेप्टेंसक्राइटिरिया, क्रिटिकल, माइनरऔरमेजरडिफेक्ट्सआदिसभीक्लासिफाइडहैं।उसकेहिसाबसेहमलोगचेककरतेहैं।

(An hon. member also raised a question on complaints and Hon. Chairperson has also raised a question on this aspect. I would like to give a combined reply to both these question. First things is that when a new item is introduced then there is regular manufacturing of that item. When a item is newly introduced, then the process is followed as shown on the slide. If there is regular manufacturing, then Ordinance Factories have a quality control department. They check every item on 100% basis. DGQA checks this on sampling basis. |n this as per ATP sample size, acceptance criteria, critical, miner and major defects etc. all are classified. We check the items accordingly.

दूसरा, एम्युनिशनमेंडेस्ट्रक्टिवटेस्टिंगहोतीहै।जबफायरकरतेहैं, तोउसकेवहखत्महोजाताहै।इसलिएहमकोसैम्पलिंगबेसिसपरकरनापड़ेगा।

(Secondly, in ammunition there is destructive testing. When there is firing, they get exhausted. That is why we will have to do this on sampling basis.)

एकस्टैंडर्डहैएमआइएससीयाआइएस 2500, इसमेंजोतरीकेदियेहुएहैं, हमउनकेअनुसारचेककरतेहैं, उनकेएक्सेप्टेंसक्वालिटीलेवलहोतेहैं।मानलीजिएकि 20 कासैम्पलउठातेहैं, डबलसैम्पलिंगप्लानमें, यदिउसमेंमेजरडिफेक्टहै, तो 01 होताहै।यदिकोईज़ीरोडिफेक्टहै, तोवहएक्सेप्टेबलहै।यदिवनडिफेक्टहै, तो 20 केडबलसैम्पलनिकालेजातेहैं।फिरउसेफायरकियाजाताहै।इसतरहसे, 01, 1, 2 मतलबएकजोडिफेक्टहोचुकाहै, उसकेअलावाऔरकोईडिफेक्टनहींआनाचाहिए।यानी 40 मेंसेएक्यूएलकेअनुसारएकडिफेक्टएक्सेप्टेबलहोगा।एक्यूएलकेतहतहमेंजानाजरूरीहै, हमहन्ड्रेडपर्सेंटकीफायरिंगहमनहींकरसकतेहैं।

(There is a standard of MIL STD or IS - 2500, whatever methods have been prescribed in this, we check according to that, there acceptance quality level mentioned therein. Assume that we draw 20 samples, in double sampling plan, if in that there is major defect, then it is 01. If there is zero defect then that is acceptable if it is one defect, then we take another sample of 20 Nos. Then it is fired. In this manner, 01, 1, 2 meaning a defect that has happened there should be no other defect besides that. This means in 40 samples, one defect will be acceptable. |t is necessary for us to follow AQL as we cannot do 100 percent firing.

जहाँतकब्लैकलिस्टिंगकीबातहै, तोक्वालिटीएश्योरेंसडिपार्टमेंटकीओरसेहमारेसाथऐसाकोईनहींआयाहै, जिसनेहमेंधोखादियाहोऔरडीजीक्यूएकीतरफसेब्लैकलिस्टिंगकीकोईबातआयीहो"।

(As far as blacklisting is concerned, in the quality assurance department no case has come to our notice where we have been cheated or any blacklisting issue had been reported by DGQA.)

CHAPTER - IV

NATIONAL CADET CORPS

National Cadet Corps (NCC) was established under the NCC Act, 1948. NCC aims at developing character, comradeship, discipline, a secular outlook, the spirit of adventure and ideals of selfless service amongst young citizens. Further, it aims at creating a pool of organized, trained and motivated youth with leadership qualities in all walks of life, so that they become useful citizens and serve the Nation with all their might regardless of the career they choose. Needless to say, the NCC also provides an environment conducive to motivating young Indians to join the armed forces. The motto of NCC is 'Unity and Discipline'.

4.2 NCC has a dual funding pattern where both the Central and State Governments meet the expenditure on NCC activities in a properly specified manner. The idea behind sharing of expenditure by the State Governments is to ensure that they too have a sense of participation and belonging in the various activities undertaken by the NCC cadets towards nation building. The Central Government bears expenditure on the following items:-

(a) Pay & Allowances of Services and Civilian personnel
(b) Transport expenses
(c) Expenditure on office accommodation and contingencies in Directorate General, NCC, State NCC Directorates and Training Academies
(d) Expenditure on equipment, vehicles and clothing
(e) 75% expenditure on Camp training in all States (except J&K and NER – Sikkim, where it is 100%).

The State Government bears expenditure on:

(a) Pay & Allowances of State Government Civilian employees posted to NCC
(b) Office accommodation and Contingencies in NCC group Hqrs and Units
(c) Allowance for NCC cadets and Associated NCC Officers(ANOs)
(f) Institutional training in all states (except J&K and NER - Sikkim)
(g) 25% of camp expenditure in all States (except J&K, NER and Sikkim).

Today it has presence in 710 out of 716 districts of the country with authorised cadet strength of 15 lakhs. As on date 16597 institutions have been covered. 57% are Urban/Semi-Urban and 43% are Rural. There is an increase in Girl Cadets from 14.6 % in 2008 to 30.3% in 2017 of the total strength of NCC.

Budget

4.3 The budget allocated to NCC from 2013-14 to 2018-19 as informed during the presentation of the Committee is as under: -

Budget - an overview

(Rupees in crore)

Year	Stage	Revenue	Expenditure	Capital	Expenditure
2013-14	**BE**	881.62	873.35	5.50	0.68
	RE	1039.46		1.00	
2014-15	**BE**	1019.67	965.47	5.50	0.37
	RE	953.10		1.00	
2015-16	**BE**	1016.39	1112.58	5.00	1.17
	RE	1083.27		1.10	
2016-17	**BE**	1188.23	1136.75	1.15	7.8
	RE	1200.80		11.00	
2017-18	**BE**	1291.03	1105.88	12.40	12.94
	RE	1490.03		13.40	
2018-19	**BE**	1561.81		22.40	

4.4 During oral evidence, the Committee desired to know about the additional requirement of budget, the DG, NCC replies:

> "NCC is expanding its plan and the Government has sanctioned an additional 2 lakh cadets for the NCC. There is some requirement of additional funds and we will project that"

During oral evidence, on the issue of waitlisted institutions and expansion of NCC, the DG, NCC replied as under:

> "We have enhanced our footprints in 710 districts. There is an addition of seven districts from the past year. We have also got NCC in 16,000 colleges and schools but still we have got a waiting list of 8000 schools and colleges. That means while we are spreading our footprints in remote areas, we are getting additional demand for NCC. Recently, in July, 2017, the Government has approved our past five years demand of clothing for the NCC cadets. So far we have been suffering because of lack of uniforms to the cadets. This is the basic motivation factor. That has been approved. Things are going on as desired".

4.5 On being asked about the demand, requirement of the NCC and how it benefit the society and how we improve the NCC within the limited resources, the DG, NCC replied as under:

> "Regarding NCC, when we say demand and requirement for NCC, it is a function of two elements. Firstly, the hon. Member said that there is requirement and that there is a waitlist. The NCC was started in 1948 with 20,000 cadets. After the 1962 war, the Government felt very strong and said NCC should be made compulsory. Thereafter, the strength of NCC went to 1.68 crores. But then it had a very huge toll on the infrastructure and the quality of training".

OBSERVATIONS/RECOMMENDATIONS

Budgetary Provisions

1. The Committee note from the data supplied by the Ministry that in BE 2018-19, against the projected allocation of Rs. 8844.79 crore, Rs. 6397.20 crore has been allocated under the Revenue Head for Ordnance Factory Board. Under the Capital segment, the allocation is Rs. 5345.22 crore against the projection of Rs. 6027.63 crore. The total allocation is Rs. 11,742.42 crore against a projection of Rs. 14,872.42 crore (excluding GST).

2. The Committee note that the Ordnance Factory Board plays a very crucial role in indigenous production of arms, ammunition, vehicles etc for the Services through its 41 manufacturing units. To match the growing requirement of Armed Forces of arms, ammunition and vehicles of international standards, this would require regular upgradation of infrastructure and induction of state-of-art technologies. Therefore, the Committee desire that essential funds shall be provided to OFB for maintenance, overhaul, capacity enhancement and upgrading of Ordnance Factories.

Budget for Modernization

3. Modernisation of Ordnance Factories is a continuous process. To keep pace with the contemporary manufacturing technologies, OFB prepares a long term planning spread over a period of 5 years which started from 2007-08. Ordnance Factories have been adopting three pronged approach for modernisation viz.(a) Renewal & Replacement (RR) of P&M which are beyond economical repair, with machineries of state of the art technologies.(b)Acquisitions of P&M under New Capital (NC) for additional capacity,(c) higher productivity, enhanced quality, focus

on use of renewable energy and to address environmental issues etc.(d) Corresponding Civil Works (CW) infrastructure development etc

The key technology intensive areas which have been identified for modernisation of Ordnance factories are:

vii) Chemical process plants
viii) Small arms ammunition production
ix) Ammunition filling and assembly
x) Foundry and extrusion
xi) Metal forming, machining and fabrication
xii) Quality control and assurance'

4. Under the Capital segment, the allocation is Rs. 5,345.22 crore against projection of Rs. 6027.63 crore. The allocations for Research and Development work for Ordnance Factories at the BE stage of 2017-18 was Rs.105.00 crore. It was reduced to Rs 100.00 crore at RE stage. The allocation at BE 2018-19 is Rs.105.00 crore. The Committee is disappointed to note that there is no increase in the allocations for R&D of Ordnance Factories. Also, the inflation rate has not been factored into. With this allocation, the Committee are apprehensive whether the key technological intensive areas as mentioned above are going to be materialized or not. Ordnance Factories play a significant role in 'Make in India' drive of the Government of India at least in Defence Sector. However, it is of utmost importance that the products being manufactured in Ordnance Factories are of global standards so that they can compete with private players also who are now joining the Defence sector. To reach this objective it is imperative that the production related infrastructure and capacity in OFs are enhanced up to required standards. Therefore, the Committee desire that essential steps should be taken towards modernization of OFs in a planned manner and essential budget for the same shall also be provided by Ministry of Defence and appropriately spent by OFB.

Research & Development

5. The Committee view that R&D has to be an integral component of all the production units. The same holds true for OFs also. In this connection, the Committee were informed that OFB has taken up in-house R&D projects for design & Development & product upgrade of Armament, Ammunition and equipment. OFB has developed 122 Armaments & ammunition so far, out of which 61 items have been designed and developed by Ordnance Factories through in-house R&D. In all, 25% of the output value of OFB is from in-house R&D, and R&D under foreign Transfer of Technology (ToT) & R&D with Defence Research & Development Organisation. The Committee note that design centers have been established in each of the OFs to carry out R&D and collaborative R&D projects are also taken up. However, while glancing at the percentage of expenditure in R&D to overall allocation during last five years, the Committee have found that it was 0.40% in 2012-13, 0.38% in 2013-14, 0.50% in 2014-15, 0.67% in 2015-16 & 0.40% in the year 2016-17. The Committee are of the view that the data is indicative of a somewhat apathetic attitude towards the R&D drive of OFB. On this account, the Committee would like to observe that considerable attention & emphasis should be given to R&D activities by OFB and the Committee be intimated of the measures taken in this regard.

Delay in Projects

6. From the reply submitted by the Ministry, the Committee note that various projects of OFB have been delayed. The OFB has given many reasons for delays including those relating to procurement of plants & machinery and delay in completion of civil works by MES. The Committee note in this regard that both OFB & MES function under the control of Ministry of Defence. Therefore, Ministry of

Defence should direct both the organizations to co-ordinate and plan all the procedures with complete sync amongst the organizations.

7. At the same time, the Committee would like to emphasize that OFB has to introduce stringent discipline in project execution which seems to be lacking. Efforts at shifting the blame to the other organizations or citing procedural aspects as a cause for delays do not augur well.

Quality of products

8. One more aspect that has come to the notice of the Committee while examining the Demands for Grants of the Ministry of Defence for the year 2018-19 pertains to quality of products being manufactured by OFB. As regards Assault Rifles being manufactured for Indian Army, the Committee have found that despite providing prescribed GSQR, OFB could not deliver Assault Rifles to Army. The Committee are distressed to note that the Assault Rifle developed has failed at the trial stage.

9. The Committee are of the view that OFB should find out the reasons for failure and take all measures to improve the quality of weapons for the satisfaction of the user. The Committee feel that OFB should strive towards manufacturing of products which qualitatively qualify for induction in the Defence Forces. At the same time, OFB should ensure financial priority in manufacturing procedures. The steps taken in this direction may be brought to the knowledge of the Committee.

Cost cutting

10. Along with quality, OFB shall also work towards cost cutting measures so that the products of OFB are capable of countering financial competition as well. The Committee have found that the cost of products being manufactured at OFs are not competitive with the same GSQR products manufactured in private sector or

international market. Therefore, the Committee feel that in order to sustain the competitive environment OFB must leave no stone unturned to achieve an edge over the rival competitors or private players operating in the market.

Export

11. From the data supplied to the Committee, it is noted that in the year 2013-14, Ordnance Factories exported Rs. 20.24 crore worth of arms and ammunition. This figure remained static till 2016-17, with the exception of the year 2015-16, where it went down to Rs. 6.51 crore. The Committee view that improvement in technical & financial qualifications will not only be helpful in providing quality products to our Defence Forces but also boost export of products being manufactured at OFs. This will also help OFB to shift gear from being merely dependent of our Armed Forces for order book. During the course of evidence, the Committee also found that OFs need orders to keep their machines running. OFB has to strive to make use of their infrastructure optimally and financial propriety has to be observed in manufacturing process.

DEFENCE RESEARCH DEVELOPMENT ORGANISATION

Budgetary provision

12. The Committee found that there has been shortfall in budget provided to DRDO. The budgetary allocation projected, and actually allocated in each of the years since 2013-14 is shown in the table below :

(Rs. In crore)

Sl. No.	Year	Projection	Allocation
1.	2013-14	16,483.28	10,934.17
2.	2014-15	18,495.46	13,716.14
3.	2015-16	19,641.56	13,540.11

4.	**2016-17**	**18,782.86**	**13,593.78**
5.	**2017-18**	**22,203.74**	**14,818.74**

The Committee note from the afore-mentioned table that there has been a considerable shortfall in budgetary allocation over the years.

13. Further, on this issue, the Committee, during the deliberations on Demands for Grants discovered that out of the total DRDO budget, keeping aside obligatory expenses like pay & allowances and other non-salary revenue expenditure, the amount left for R&D activities is less than Rs. 9,000 crore. Out of the remaining amount, Rs. 5000 crore is dedicated for strategic schemes and another Rs.1,000 crore for top priority CCS programmes there by leaving merely Rs. 1,400 crore for Science &Technology, Technological Demonstration and other Mission Mode projects(TD&ST). The Technological Demonstration and other Mission Mode projects(TD&ST) constitutes 'blue sky research' and involves futuristic technology which ideally is the bed rock for any R&D Organisation. In view of the facts mentioned above, DRDO would need additional funds to take up futuristic projects.

14. The Committee also found that for the current year, 2018-19, DRDO has received a 20 per cent jump in their budget as compared to the previous year. This is a welcome step. However, it has also been observed that owing to the LCA programme that is underway, which is funded by the way of grant-in-aid, the DRDO would require additional funding to the tune of Rs. 800 crore.

15. Like-wise, for some other strategic programmes, there is a requirement of another Rs. 500 crore as a part of civil capital account. In addition to this, the Committee have also been intimated that Rs. 500 crore is an additional requirement for the revenue requirement of the stores.

16. The Committee recognise the significance that Research and development holds for the welfare and progress of the Defence Forces. Therefore, the Committee wish that requisite funds be given to DRDO for their research activities.

17. At the same time, it is equally important that disciplined expenditure pattern and stringent financial propriety be observed by DRDO in project execution and research activities. DRDO needs to endeavour towards curtailing the extraneous expenditure to the extent possible. The Committee may be kept apprised of the steps taken in this direction.

<u>Projects abandoned/closed by DRDO</u>

18. While going through the details submitted by the Ministry, the Committee noted that there are many projects which get closed following a few years of operation. This results in immense financial burden with no eventual fruitful results. Such wastage of exchequer's money needs to be checked. Defence Research and Development Organisation, therefore, needs to undertake research oriented programmes with great concern and care. The Committee desire that at the initial stage itself, before the project is sanctioned, all the possible constraints and bottlenecks that are likely to arise need to be assessed with care.

19. The Committee express their deep concern on the wasteful expenditure incurred by DRDO on account of closure of major projects. The Committee understand that research activity is an open end programme and closing a project midway is a possibility. Nevertheless, it needs to be ensured that closure of projects before culmination should not be allowed to become a regular practice.

20. The Committee recommend that it would be preferable to have a scientific, technical and concurrent audit of every ongoing project carried out preferably by an

independent agency so that such midway closure of projects is avoided in future. The Committee also strongly feel that the Ministry should re-evaluate the reasons and also seek expert advice before taking a decision towards closing down any project of DRDO in future so as to avoid wastage of public funds and to help in sustaining the project(s), which can possibly prove to be beneficial to the country.

Delay in Projects

21. The Committee, while examining the Demands for Grants, discovered that delays in completion of projects is a part and parcel of DRDOs functioning. For instance, Light Combat Aircraft (LCA) was supposed to be completed in 2008 but the revised date of completion is June, 2019. In the case of Aero engine, Kaveri, the original date of completion was 1996 but was revised to December, 2009. Further revision of the completion schedule continues to be under process. Similar is the case with LCA-Navy, Airborne Early Warning and Control (AEW&C) System, Air to Air Missile system-Astra, Long Range Surface to Air Missile etc. to name a few. The extent of delay in the execution of above mentioned projects varies from project to project. Although various reasons have been attributed for project delays by the representatives of DRDO, the Committee take very serious note of this unwarranted and unsavoury phenomenon. These delays not only place a burden of unnecessary cost implications but also deprive the Services of critical capabilities. The Committee wish to be kept apprised on the progress made in regard to each of the above mentioned projects.

22. In view of the above, the Committee opine that accountability has to be bestowed at some level for the continued delays. Such a dismal scenario cannot be allowed to go on perpetually and wastage of resources cannot be taken for granted as a routine phenomenon. The Committee have also been informed that various measures are being taken to curb delays that are a regular feature. However, the

Committee would like to emphasise that the efforts should bear the desired results. Therefore, an inherent system needs to be developed where specific roles and responsibilities are demarcated and specified within the organisational structure of DRDO. The progress made in the direction may be brought to the knowledge of the Committee.

Indigenisation of Research and Development Activities

23. The Committee observe that even today the country is heavily dependent on imports to meet its Defence requirements. Given the fact that technologically advanced countries are reluctant to part with their critical technologies with developing countries like India, it becomes all the more essential for our labs to develop each system, sub-systems, components etc. 'ab-initio' including information, infrastructural and testing facilities. The Committee are also of the view that as undertaking original research is a lengthy and time consuming process, DRDO may also think of developing products through the process of reverse engineering. The Committee recommend that the Ministry of Finance provide adequate budgetary support in this regard so that indigenization of R&D activities can be taken up by DRDO on a war footing.

Quality Control

24. The Committee feel that one of the important factors for quality management is the extent of knowledge of a user of the product to be produced and made available for a specific project. So is the case of the extent of the end users involvement in the conceptualization stage of the project so that defects, if any, may be rectified during production stage itself and delivery of the product to the user may not get delayed for a long time. In this way, there is a better scope for fixation of accountability, if the user does not suggest corrective measures/improvements and the product is not developed as per the GSQR stipulations. The Committee desire

that instead of aiming for perfection in developing a project from the very beginning, DRDO should, at first, develop a product and later on, keep improving on the same by categorising them as Mark I, II, III, IV or so on. This would enable the Services in having some products at hand to carry on with their assigned tasks without waiting endlessly for perfection in the products.

Nuclear, Biological and Chemical (NBC) Research

25. The Committee are aware of the threats of nuclear, biological and chemical warfare in the current times. In this connection, the Committee have discovered that DRDO, through its R&D effort, over the last two decades, has developed several products for NBC detection, protection, decontamination and medical management to continue the sustainment of the indigenous NBC defence capabilities. The Committee appreciate the initiatives taken in this connection and desire that pro-active exercises on the issue shall be continued.

Collaboration with Universities/Academic Institutions

26. The Committee have learnt that DRDO conducts many research programmes in collaboration with different universities/institutions. In this connection, they have further been informed that during the 12th plan, 683 projects costing Rs.496 crore were sponsored to various universities and academic institutions. This has accrued benefits to DRDO's research programmes. The Committee also note in this regard that universities and academic institutions are full of budding talent. Therefore, more such collaborations need to be encouraged with a view to advancing research in the country.

27. In this regard, the Committee also found that DRDO has established 6 centers of excellence viz., Center of Propulsion Technology at IIT Bombay (CoPT), Joint Advanced Technology Center at IIT Delhi (JATC), Jagdish Chandra Bose Center for

Advanced Technology (JCBCAT) at Jadavpur University, Kolkata, Research Innovation Center (RIC) IIT Madras, Advanced Center for Research in High Energy Materials (ACRHEM), University of Hyderabad and DRDO-BU Center of Life Sciences at Bharatiyar University. The Committee wish that more such centres be established in the future and fruitful research efforts may be used for the benefit of Defence Services and the country.

DIRECTORATE GENERALOF QUALITY ASSURANCE

Budget 2018-19

28. During the year 2018-19, against the projection of Rs.1322.81 crore the allocation for DGQA is Rs.1146.98 crore. This accounts to a shortfall of Rs.175.83 crore. The Committee view that DGQA plays a significant part in ensuring the quality of products being supplied to the Defence Forces. DGQA carries out inspection of Defence stores supplied by Ordnance Factories, Defence Public Sector Undertakings and Industry. These inspections are done at various stages. The Committee came to know that on an average DGQA carries out approx. 18,000 inspections per month. Considering the significance that DGQA holds in ensuring qualitative value of equipments including arms and ammunition, the Committee desire that adequate funds are provided to them for mandatory sustenance and operational requirements.

Quality Check

29. The Committee are concerned about the fact that despite checking at DGQA, some ammunition or other equipments reaching out to Defence Services turns out to be faulty. In this connection, the Committee found that sample testing is carried out by DGQA and the whole lot of material may not be unflawed. Further, on this aspect

the Committee found that DGQA mainly conducts process audit and product audit is very little. In this context, the Committee would like to recommend that DGQA carry out some random sample testing also so that the quality of products can be ensured to the maximum possible extent.

Training Upgradation

30. The Committee found that with the evolutionary processes in manufacturing sector, the plants machinery also 'move forward'. Also, production rate is increasing. To carry out testing and quality check, the officials of DGQA need to be trained accordingly. In this regard, the Committee have been informed by the representatives of DGQA that there are training schools and institutes where training on quality aspects is given. The Committee feel that with change in new requirements of production commensurate modifications in training of officials in DGQA has to be incorporated. The changes incorporated in training curriculum shall be brought to the knowledge of the Committee.

NATIONAL CADET CORPS

31. National Cadet Corps (NCC) was established under the NCC Act, 1948. NCC aims at developing character, comradeship, discipline, a secular outlook, the spirit of adventure and ideals of selfless service amongst young citizens. Further, it aims at creating a pool of organized, trained and motivated youth with leadership qualities in all walks of life, so that they become useful citizens and serve the Nation with all their might regardless of the career they choose. Needless to say, the NCC also provides an environment conducive to motivating young Indians to join the armed forces.

32. In BE 2018-19, NCC projected an amount of Rs. 1910.42 crore but was allocated Rs.1584.21 crore, including the Revenue and Capital funds. The Committee has been given to understand that NCC is enhancing its footprints in 710 districts, which is seven more than the previous year. There is a waitlisting of 8948 schools & colleges for NCC. The Committee also found that Government has sanctioned additional 2 lakh cadets for NCC. The expansion programme of NCC would require infusion of adequate funds. The Committee express the hope that the expansion programme does not come at the cost of compromising quality of training and infrastructure. Therefore, it is necessary that the Government make requisite allocations to NCC during the upcoming financial year.

33. While examining the subject, the Committee found that in July 2017 the Government has approved clothing for NCC Cadets. The Committee feel that this is a positive step and would be beneficial in attracting cadets .However, provision of uniforms and expansion of NCC's footprints would indeed require infusion of adequate funds. During the course of oral evidence, the representatives of NCC confided to the Committee that shortage of uniforms has been a problem. The Committee desire that the issue of shortage of uniforms be taken up at the level of Ministry of Defence with due concern and priority. The Committee desire that provision of sufficient funds to NCC be ensured by the Ministry of Defence and the Committee kept apprised.

34. The Committee wish that a system of receiving feedback from cadets of NCC is developed so that first hand and realistic opinions on improvement in institutions and operations of NCC can be received by the higher authorities. The methodology developed in this regard shall be brought to the information of the Committee.

New Delhi
12 March, 2018
21 Phalguna, 1939 (Saka)

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

Annexure A

Annexure-III

Current Status of On going Projects Of OFB

₹ in Cr

Sl. No.	Project	Annual Capacity		Saction		completion date as per sanction	Anticipated Dt. of Completion	Expenditure till Nov'17	Current status of comletion. CW (Physical) P&M (Reciept)	Remarks
		From	To	Date	Cost					
1	T-72 Variants	0	50Nos	25.08.10	279.63	Mar'2013	Aug'18	200.87	CW - Physically completed P&M -92%	Due to financial crisis, the P&M suppliers in Europe failed to execute the supplies timely, resulting in re-tendering of cases.SO placed for 50 m/c out of 51 Nos. Works completed.
2	Spares for T-72&T-90	T-72Tanks-72 set&T-90Tanks-0set	T-72Tanks72-120 set&T-90Tanks-50set	06.10.10	367.52	Dec'2013	Aug'18	221.20	CW - Physically completed. P&M -96%	M/S Gearspect, Czech republic failed to execute the supply of critical m/cs due to rejection during PDI. SO placed for all major m/cs. Works completed . Project will be completed within sanctioned cost.
3	Augmentation of capacity of Engines for 'A' Vehicle	353Nos	750Nos	25.08.10	350.56	Mar'2013	Sept'18	96.50	CW - Physically completed. P&M -90%	Proposal for procurement of 1 No. FMS was forwarded to MoD in Dec'2014and was approved in Aug'2015. SO placed for FMS (67% of total cost of project)in Aug'2015. DP Aug'2017, M/c recvd in Dec'17. thereafter commissionning 9months after reciept. Works completed.
4	Aug of T-90 Tanks(100-140)	100Nos	140Nos	21.09.11	971.36	Mar'2014	Dec'18	285.60	CW -55%. P&M - 56%	Based on diective from MoD to review the demand of Army, investment on various projects was prioritised. Scope of the project was restricted to 186Cr. in Feb'2014. After withdrawal of restrictions in Oct'2014, procurement action as per original scope was re-initiated by Fys.

Sl. No.	Project	Annual Capacity		Saction		completion date as per sanction	Anticipated Dt. of Completion	Expenditure till Nov'17	Current status of comletion. CW (Physical) P&M (Reciept)	Remarks
		From	To	Date	Cost					
5	Ammonium Perchlorate	0	220MT/Anmm	29.11.10	26.48	Jul'2012	Dec'17	19.27	Turn -Key project. Project under completion	Earlier contract with M/S Ogene Systems ,Hyderabad was terminated in Apr'12.SO placed to M/S Nuberg Noida in Jun'15. DP-15 months from the completion of contract. Plant under commissioning.
6	HMX Plant	0	45MT/Anmm	01.03.12	59.96	Dec'2016	Dec'17	48.44	Turn -Key project. Project under completion	Plant under commissioning.
7	Akash Booster& Sustainer	150Nos	500Nos	08.12.11	105.78	Mar'2014	Jun'19	17.91	CW-30 % P&M - 30%	MOEF approval for tree cutting received in Nov'15 only, after appx 2yrs 6 months. Works started by MES. PDC - Apr'18. Orders placed for critical P&M. MoD approval for Vertical Planetary Mixer received in Oct'16. SO Placed in Nov'16 on CMTI bengaluru. DP- 24 months due to limitation of capacity with OEM.
8	Pinaka@5000	1000Nos	5000Nos	05.04.13	1262.55	Oct'2015	Dec'18	621.7	CW - 94% P&M -60%	MOEF approval for tree cutting received in Nov'15 only, after approx 2 yrs. Works by DRDO - PDC - Apr'2018. Orders placed for critical P&M. MoD approval for Vertical Planetary Mixer received in Oct'16. SO Placed in Nov'16 on CMTI bengaluru. DP- 24 months due to limitation of capacity with OEM.
9	LCW	300Nos	500Nos	09.03.12	376.55	Mar'2015	Dec'18	228.51	CW - 85% P&M -90%	Buildings will be completed by Sept'18. SO placed for 53 major m/cs out of 57. Approval In Principle awaited from MoD for 3000 Ton Forging press (FGK). CW related to forging press kept on hold.

Sl. No.	Project	Annual Capacity		Saction		completion date as per sanction	Anticipated Dt. of Completion	Expenditure till Nov'17	Current status of comletion. CW (Physical) P&M (Reciept)	Remarks
		From	To	Date	Cost					
10	MPV	0	300Nos	06.09.10	21.06	Jun'2013	Mar'17	18.65		Project physically completed-
11	O F Nalanda	0	8Lakhs BMCS	original sanc. Dt.29.11. 2001 (Revised) 05.02.09	2160	Nov'2005 (original)	Mar'19	669.1	CW - 71% P&M -75%	SO Placed on IMI Israel for BMCS plant was cancelled in 2012. Procurement through indigenous source failed due to non reciept of technically suitable offer . GTE floated . Extended TOD of Tripple Base Propellent Plant and NC-NG paste Plant on Jan'18
12	O F Korwa	0	45,000Nos	25.10.07	408.01	Oct'2010		297	CW- 95% P&M- 74%	Due to non-finalisation of weapon by Army, steering committee has decided not to take further tendering action for P&M. Production for components of alternative items started since Feb'2013
13	125mm FSAPDS (MANGO)	0	12000 each CKD & SKD assy in India & idigenous prodn of @ 24k rounds per annum for 10 yrs.	11.09.15	484.41 +487.00	-	Nov'18	248.14	Equipment for assembly of SKD/CKD received.	

Annexure-B

LIST OF ITEMS DEVELOPED IN ORDNANCE FACTORIES THROUGH DRDO TOT AND INDIGENISATION OF FOREIGN OEM'S TOT

Sl. No.	Nomenclature	Category	Indentor	Factory
1	Commander Thermal Imager For Tank T-72	DRDO TOT	ARMY	OLF
2	250 Kg Rdz Aerial Bomb	DRDO TOT	AIR FORCE	OFK
3	450 Kg RDZ Aerial Bomb	DRDO TOT	AIR FORCE	OFK
4	40mm UBGL Weapon	DRDO TOT	ARMY+MHA+IFD	OFT
5	Rifle 5.56mm INSAS (Fixed Butt)	DRDO TOT	MHA	RFI+SAF+OFT
6	81mm Mortar Bomb Smoke	DRDO TOT	ARMY	OFDR
7	Bomb 120mm Illg	DRDO TOT	ARMY	OFDR
8	Bomb 120mm Mortar HE	DRDO TOT	ARMY	OFK, OFDR
9	Bomb 81mm Mortar HE	DRDO TOT	ARMY	OFK, OFDR
10	Bomb Mortar 51mm HE Mk-II	DRDO TOT	ARMY	OFK, OFDR
11	Bomb Mortar 51mm Illg	DRDO TOT	ARMY	OFDR
12	Bomb Mortar 51mm Smoke	DRDO TOT	ARMY	OFDR
13	Mortar Bomb 51mm Red	DRDO TOT	MHA	OFDR
14	Mortar Bomb 51mm Green	DRDO TOT	MHA	OFDR
15	Mortar Bomb 51mm Orange	DRDO TOT	MHA	OFDR
16	5.56mm Ball Ammn	DRDO TOT	ARMY	AFK
17	120mm FSAPDS Ammn for MBT Arjun	DRDO TOT	ARMY	OFCH
18	Pinaka Rocket	DRDO TOT	ARMY	OFCH
19	Armored Ambulance	DRDO TOT	ARMY	OFMK
20	Bridge Laying Tank (BLT) On T-72 Chassis	DRDO TOT	ARMY	HVF
21	Main Battle Tank Arjun	DRDO TOT	ARMY	HVF
22	76/62mm SRGM Weapon	Indigenisation of foreign ToT	NAVY	FGK
23	RBU 6000 Lh	Indigenisation of foreign ToT	NAVY	FGK
24	RBU 6000 Rh	Indigenisation of foreign ToT	NAVY	FGK
25	155mm ERFB BB/BT	Indigenisation of foreign ToT	ARMY	OFCH
26	RGB-12(Practice)	Indigenisation of foreign ToT	NAVY	AFK
27	Rocket RGB-60 HE	Indigenisation of foreign ToT	NAVY	AFK

28	RGB-60(Practice)	Indigenisation of foreign ToT	NAVY	AFK
29	Cartg. 30mm for AK-630 Prac	Indigenisation of foreign ToT	NAVY	OFK
30	Cartg. 30mm for AK-630 HE/I	Indigenisation of foreign ToT	NAVY	OFK
31	Cartg. 30mm for AK-630 Tracer	Indigenisation of foreign ToT	NAVY	OFK
32	Cartg AK-100 HEDA with Fuze B-429	Indigenisation of foreign ToT	NAVY	OFK
33	Cartg AK-100 Practice	Indigenisation of foreign ToT	NAVY	OFK
34	Charge M4A2 for 155mm Ammn.	Indigenisation of foreign ToT	ARMY	OFBA
35	40mm Ammn PFFC	Indigenisation of foreign ToT	ARMY	OFK
36	40mm Ammn L/70	Indigenisation of foreign ToT	ARMY	OFK
37	Shell 155mm Illuminating Ammn	Indigenisation of foreign ToT	ARMY	OFDR
38	AK 100 Ammn for Navy	Indigenisation of foreign ToT	NAVY	OFK
39	Cartg 76/62 SRGM (TP)Ammn	Indigenisation of foreign ToT	NAVY	OFK
40	1 1/2" Signal Cartg. R/G/Y	Indigenisation of foreign ToT	NAVY	OFDR
41	Short Range Chaff Rocket	Indigenisation of foreign ToT	NAVY	AFK
42	Mediam Range Chaff Rocket	Indigenisation of foreign ToT	NAVY	AFK
43	Long Range Chaff Rocket	Indigenisation of foreign ToT	NAVY	AFK
44	Rocket 140mm HE	Indigenisation of foreign ToT	NAVY	OFCH
45	Rocket 140mm Practice	Indigenisation of foreign ToT	NAVY	OFCH
46	Rocket 140mm Flash Filled	Indigenisation of foreign ToT	NAVY	OFCH
47	Aerial Bomb 100-120 Kg Live	Indigenisation of foreign ToT	AIR FORCE	OFK
48	Aerial Bomb 100-120 Kg Pre-Freg	Indigenisation of foreign ToT	AIR FORCE	OFK
49	Aerial Bomb 100-120kg RDZ	Indigenisation of foreign ToT	AIR FORCE	OFK
50	1000 LbsRdz Aerial Bomb	Indigenisation of foreign ToT	AIR FORCE	OFK
51	BMCS M-91 (Low Zone)	Indigenisation of foreign ToT	ARMY	OFN
52	BMCS M-92 (High Zone)	Indigenisation of foreign ToT	ARMY	OFN

Annexure-C

LIST OF ITEMS DEVELOPED THROUGH IN HOUSE R&D OF ORDNANCE FACTORIES ON ITS OWN

Sl.No.	Nomenclature	Indentor	Factory
1	Pistol Auto 9mm	A+MHA	RFI
2	0.32" Pistol	CT	GSF+RFI
3	.315" Sporting Rifle	CT	RFI+OFT)
4	.22" Revolver	CT	RFI
5	.22" Revolver (Nidar)	CT	RFI
6	.22" Sporting Rifle	MHA+CT	RFI
7	Rifle 5.56mm Excalibur	MHA	RFI
8	7.62mm Sniper Rifle	MHA	RFI
9	Tear Gas Gun	MHA	RFI
10	Anti Riot Gun	MHA	RFI
11	7.62mm Assault Rifle (Ghaatak)	MHA	RFI
12	.32" Revolver (Nirbheek)	MHA	FGK
13	.32 Revolver Mk-III	CT	FGK
14	.32 Revolver Mk-III	CT	MPF
15	.32 Revolver Mk-III	CT	SAF
16	.32 Revolver Mk-IV	CT	SAF
17	0.32" Revolver (Long Barrel) (Anmol)	CT	SAF
18	12 Bore Pump Action Gun (PB & NPB)	MHA+CT	RFI
19	2KL Water Bowser	ARMY	VFJ
20	Mine Protected Vehicle	MHA	VFJ
21	L-70 Upgraded Weapon	ODD	GCF
22	105 LFG Gun	ARMY+N	GCF
23	Spare Barrel For Art. 2A46 (T-72) Modified Chemistry	ARMY	GCF
24	Tank Mule Aluminium	ARMY	GCF
25	40mm MGL Weapon	MHA	OFT
26	155/39 Upgraded Gun	ARMY	GCF
27	5KL Water Bowser	ARMY	VFJ
28	38mm Multi Shell Launcher	MHA	OFT
29	5.56mm Amogh Rifle	MHA+IFD	SAF
30	.30-06" Sporting Rifle	CT	RFI
31	Kavach Mod-I	NAVY	GCF
32	Kavach Mod-II	CT	MPF
33	Ordnance For 155mm Dhanush	IFD (GCF)	FGK
34	Cartg. SA 7.62mm Ball A-7 Ammn.	ALL IND.	OFV
35	20mm AMR TPT (Target Practice Tracer)	MHA	OFK
36	20mm AMR TP (Target Practice)	MHA	OFK
37	Detonator 36m Grenade 4 Sec Delay	ARMY+MHA+N	OFCH
38	Detonator 36m Grenade 4 Sec Delay	ARMY+MHA+N	OFK
39	Buoyant Smoke Orange	NAVY	OFDR
40	Hand Flare Red	NAVY	OFDR
41	Para Flare Red	NAVY	OFDR

42	Shell 105mm IFG Colour Smoke Blue	ARMY	OFDR
43	Driver Sight TVNE-4B (M1) For T-72	IFD	OLF
44	Commander Sight Passive TKN-3 For T-72	ARMY +IFD	OLF
45	Driver Night Sight Passive TVNE-1PA (M1) For BMP-II(SARATH)	ARMY +IFD	OLF
46	Commander Sight Passive TKN-3B For BMP-LI	IFD	OLF
47	Driver Sight TVNE-4B(M2) For T-90	IFD	OLF
48	CRN-91	ODD+CT	OFMK
49	Coat ECC	ARMY	Ordnance Clothing Factory Avadi (OCFAV)+ Ordnance Equipment Factory Hazratpur (OEFHZ)+ Ordnance Clothing Factory Shajahanpur (OCFS)
50	Jacket Combat Army Logo	ARMY	OCFAV+OEFHZ+OCFS+Ordnance Parachute Factory (OPF)
51	Trouser Combat Army Logo	ARMY	OCFAV+OEFHZ+OCFS+OPF
52	Jersy V Neck Woolen DK OG	ARMY	OCFS
53	ECAD SD Parachute 8.5m White	ARMY	OEFHZ+OPF
54	Trouser ECC	ARMY	OCFS+OPF
55	Rain Cap Multipurpose(Poncho)	ARMY	Ordnance Equipment Factory Kanpur (OEFC)+OEFHZ
56	Overall Mazri	ARMY	OCFAV
57	Modified Kit Bag	ARMY	OEFC+OEFHZ
58	Boot High Ankle DVS	ARMY	OEFC
59	Blanket Superior OG	ARMY	OCFS
60	Blanket AF Blue	AF	OCFS
61	Gaiters Glacier	ARMY	OEFHZ

Annexure 'D'

Products/Systems/Technologies Developed by DRDO Inducted/Under Induction into Services as on 15 Dec 2017

Systems	Cost (Rs in Cr)	
	Inducted	Under Induction
Missile System	23005.86	72480.38
Electronic and Radar Systems	12819.67	20682.09
Advanced Materials and Composites	4637.18	1666.97
Armament Systems	8406.67	19254.26
Aeronautical Systems	1261.84	77801.67
Combat Vehicles & Engg Systems	5261.91	11539.88
Life Science Systems	329.18	278.37
Naval Systems	1392.37	3957.15
Med and Computational systems	229.13	2.61
Total	57343.81	207663.38
Grand Total (Inducted + Under Induction)	265007.19	

Note: Strategic Systems not included.

Supply order Number reflecting dates of production not available.

Annexure 'E'

S. No.	Name of Project	Date of Sanction	Original Cost (Rs in Crore)	Original PDC	Revised Cost (Rs in Crore)	Revised PDC	Reasons for Delay
1	Full Scale Engineering Development of LCA Tejas (LCA AF FSED Phase II)	Nov 2001	3301.78	Dec 2008	7046.16	Dec 2012* *(1. Sanction for expenditure beyond Dec 2012 obtained) (2. CCS approval for PDC extension is in progress)*	• Technological challenges/ Embargoes • Flight test program restrictions
2	Full Scale Engineering Development of Naval Light Combat Aircraft (FSED Navy Phase I)	Mar 2003	948.90	Mar 2010	2103.21	Dec 2014 *(1. Sanction for expenditure up to Dec 2016 obtained) (2. CCS approval for PDC extension is in progress)*	• Due to co-dependence of basic infrastructure in Air Force and Naval versions • Un-anticipated complexities faced in structural design
3	Indigenous Development of Medium Altitude Long Endurance (MALE) Unmanned Aerial Vehicle (UAV) 'Rustom-II' and Development of Aeronautical Test Range (ATR) at Chitradurga	Feb 2011	1540.74	Aug 2016	1649.41	Feb 2018	• Design modifications/ iterations in sub-systems which led to development delays • Delay in availability of certified LRUs and associated software • Export denial of critical items and delay in procurement of imported payloads • Delay in completion of ATR facility at Chitradurga
4	Nirbhay Development Flight Trials	Dec 2010	18.10	May 2013	102.28	Jun 2018	• Additional work which includes design and development of 10 additional new configuration missiles
5	Design & Development of 155 mm/52 Caliber Advanced Towed Artillery Gun System (ATAGS)	Sep 2012	247.90	Sep 2015	282.49	Sep 2018	• Delay in realization of ordnance and recoil system • Delays in placing supply orders due to procedural issues for manufacturing of sub-systems.
6	Airborne Early Warning and Control System (AEW&C)	Oct 2004	1800.00	Apr 2011	2425.00	Dec 2017 (PDC ext. till Dec 2018 is in progress)	• Delay in finalizing operational requirements & platforms including additional requirements by IAF
7	Post Development Support of AEW&C System (PDSAS)	Sep 2013	314.32	Sep 2018	450.42	Dec 2019	• Continuous support to AEW&C Programme
8	Development of 1500 hp Engine	Dec 2013	398.02	Dec 2018	-	Dec 2022	• Identification of development partner
9	Development of D-Jag System (Internal RWJ System for Jaguar DARIN III Upgrade	Aug 2012	134.68	Jun 2015	268.27	Jun 2018	• Critical changes in main systems

	Aircraft)						
10	Development of D-29 System (Internal EW system for MiG-29 Upgrade Aircraft)	Mar 2010	118.20	Dec 2012	168.85	Dec 2017	• Delay in structural modifications tasks for MiG-29 aircraft being done at RAC MiG, Moscow.
11	Development of EW Systems for Capital Ships, Aircrafts & Helicopter of Indian Navy titled as 'Samudrika'	Jul 2012	342.29	Jan 2016 (SAM-S) Jul 2017 (SAM-A)	-	Jan 2019	• Change in scope of ship-borne segment of the programme to include UETs and EA coverage from 180^{o} to 360^{o} for Project 'Shakti'
12	Qualification and Certification of DMR-249 Grade Steels, Plates, Bulb Bars and Weld Consumables	Dec 2012	159.30	Dec 2016	-	Dec 2018	• Certification procedure through Russian partners
13	Consultancy for AB3 Steel and Establishment of Indigenous Production	Jan 2013	148.50	Jan 2016	188.08	Dec 2018	• Certification procedure through Russian partners
14	Joint Development of Solid Fuel Ducted Rocket Ramjet Technology for Air Launched Tactical Missiles (SFDR)	Feb 2013	366.00	Feb 2018	494.00	May 2020	• Consultancy procedure through Russian partners
15	Development of High Speed Anti Radiation	Dec 2012	317.20	Dec 2017	-	Dec 2019	• Technology challenges
16	Quick Reaction Surface to Air Missile (QRSAM)	Jul 2014	476.43	Jul 2017	-	Jul 2018	• Technology challenges
17	Long Range Surface-to-Air Missile (LRSAM)	Dec 2005	2606.02	May 2011	3028.46	Dec 2017 (PDC extension is in progress)	• Mid-way major upward revision of performance requirements by IAI (Design Authority) • Number of new technologies developed first time • Number of technical iterations required to establish Transmit-Receive Module technologies for RADAR. • Design challenges in development of sub-systems by DRDO and foreign partner.
18	BVR Air to Air Missile System (Astra)	Mar 2004	955.00	Feb 2013	-	Dec 2018	• Technology/ design challenges • Delay in availability of critical components
19	Kaveri Engine for LCA	Mar 1989	382.81	Dec 1996	2839.00	Dec 2009	• Development effort was underestimated, due to lack of experience • Kaveri Core (Kabini) Engine development was initially not envisaged but added later based on experience of other engine houses • Flying test bed trials was added as an additional project milestone as

							recommended by IAF and CEMILAC • Lack of infrastructure for engine & component/ system level testing in India • 1998 US sanctions: Delay in delivery of critical components & systems
20	Submarine Periscope	Mar 2014	163.77	Mar 2019	467.25	Mar 2024	• Enhancement in scope
21	Active Electronically Scanned Array Radar	Jan 2012	459.65	Jul 2016	-	Jan 2019	• Technological challenges
22	Land Based Prototype for AIP	Aug 2010	191.60	Feb 2015	216.60	Jun 2018	• Delay in testing
23	Marinised Engineered AIP Energy Module (MAREEM)	Jun 2016	74.00	Dec 2018	181.68	Aug 2020	• Scope enhancement
24	System Definition & Engineering of DRDO AIP System on P-75 Submarines and Development of Deliverable LOX System	Jun 2014	162.00	Jun 2017	162.32	Jun 2018	• Scope change
25	Development of Advanced Light Weight Torpedo	Feb 2008	194.53	Aug 2013	-	Jun 2019	• Indigenization development of 120 kW warshotbattery has taken time by the development agency HBL, Hyderabad. • Non availability of testing platform. • Restriction in time slots for sea trials.
26	Kautilya	Jul 2012	432.80	Jan 2016	498.61	Jul 2019	• Technological complexities
27	Pralay	Mar 2015	332.88	Mar 2018	-	Mar 2020	• Technological complexities
28	Medium Range Surface-to-Air Missile (MRSAM)	Feb 2009	10075.68	Sep 2016	-	Sep 2017 (Case for PDC ext is in progress)	• During the development stage, systems/sub-systems has undergone multiple iterations during design, development and hardware realization. • Changes in system configuration. • Three verification flight trials included (not originally in the scope).

Annexure 'F'

The major benefits accrued to DRDO and defence services by the projectes sponsored during 12th Plan are:

1. "Tissue Culture" for burn wound healing developed by College of Veterinary and Animal Sciences, PI: Dr. VN Vasudevan and Dr. PrashantVarkey, Jubilee Medical College utilized by INMAS and DIPAS.
2. CL 20 molecule for use in rockets and explosives given to HEMRL.
3. Carbon nanotubes based Radar absorbing materials developed by IIT, BHU is being used by DL, Jodhpur.
4. Diode-Pumped, Compact Kilowatt-Level Fiber Laser developed by IIT, Madras is used by IRDE, Dehradun.
5. Hot salt stress corrosion cracking of three classes of materials viz; stainless steel (S-80), Ti-alloys (Ti64, IMI 834 and Ti6242S) and Ni-alloys (IN 718) were studied by IIT Bombay and is being used in Kaveri engine.
6. Design and development of a five axis friction stir welding machine by IISC Bangalore, the technology will be used in missiles.
7. Nanocomposites of grapheme and size select Pd, Pt and Pd-Pt alloy nanoparticles developed by IIT Delhi is being used by SSPL for hydrogen senors.
8. Studies on weapon system and war deterrance by NIAS has given pointers to DRDO for strategizing the development, prioritization and employment of our own defensive and offensive capabilities and is useful for supplementing the database being created for Integrated Air Defence System (IADS) modelling.
9. Projects sanctioned for creation of Centre for "Structure and Chemistry of Materials at Atomic Scale" at IISc at a cost of Rs. 52.54 crore which will help in Nano electronic materials characterization, nano material based micro wave absorption materials and nano structured materials for structural and functional applications to be used for stealth and next generation aircrafts.
10. Spin stablization using BLDC motor for bombs for ADRE.
11. Semantic analysis and opinion mining in the open data at Amrita Vishwa Vidhyapeetham. software installed at Special Cell, Delhi.
12. Elliptic curve cryptography on FPGA's based PKI for defence communication.

Annexure 'G'

Reply to Point SCOD received from D(Parl)/ MoD for examination by parliamentary Standing Committee on Defence for year 2018-2019

Sl. No. 30 sentence No. 02

Query:it has been stated that DRDO has established five centre of excellence at various institutions/ universities for creating strong academic links. When and where these centres have been established and what have been the results so far?

Reply: The following Six Centre of Excellence/ Advanced technology Centres have been established for creating strong academic links:

S. No.	Centre Name	Location	Year of inception	Thrust Areas	Salient achievements
1.	Advanced Centre for Research in High Energy Materials (ACRHEM)	University of Hyderabad	2005	a) Quantum Chemistry and Molecular Modeling b) Synthesis of High Energy Materials c) Application of Laser Technology for High Energy Materials d) Nano-materials for HEM e) Fuel Air Explosion and Detonation Modeling etc.	• 200 new molecules designed • Synthesis & characterization of - Large no. of molecules - Nitrogen rich, Borane based ionic Salts - Ammonium Dinitramide (ADN) oxidizer • Development of Energetic Binder - HTPB- DNCB Polymer • Patents filed: 7 • Publications: 330
2.	DRDO-BharthaiyarUniversity- Centre of Life Sciences	Bharathiyar University, Coimbatore, Tamilnadu	2005	a) Molecular approaches for improving human performance at high altitude b) Dev of Biosensors, Micro –fuel cells & gas sensors c) Environmental toxicity & Management	• Establishment of State of the art Laboratories • Patents filed : 4 • Publications: 111
3.	Research & Innovation Centre(RIC)	IIT Madras, Chennai	2012	a) Piezoelectric materials & devices b) Fault Tolerant and Trusted Computing Platform based sys c) Drive by Wire & Autonomous ArmouredVehicles d) Underwater Composite Materials & NDT	• 64 bit microprocessor board • Navigational system for airships • Electric driven I C engine test setup

S. No.	Centre Name	Location	Year of inception	Thrust Areas	Salient achievements
				of its Structures e) Wave Glider, UUV Technologies for U/W Surveillance & Ocean monitoring	• Patents filed : 7 • Publications : 31
4.	Centre of Propulsion Technologies (CoPT)Bi-nodal centre of IIT Bombay & IIT Madras	IIT Bombay	2016	a) Futuristic Aero Engines b) Hypersonic propulsion for long duration flight c) Solid Propellant Combustion Modeling d) Morphing Wing Aircraft Technology	• The centre has been seeded with 39 projects under the above thrust areas in alignment with the current and futuristic technological requirement of Long term Technology Perspective Plan (LTTPP) of DRDO. The achievement will emerge in due course.
5.	Joint Advanced Technology Centre (JATC)	IIT Delhi	2016	a) Advanced Ballistics, Special Structures & Protection Technologies b) Electromagnetic devices & Terahertz technologies c) Smart and Intelligent Textiles d) Brain Computer Interface and Brain Machine Intelligence e) Photonics, Plasmonics& Quantum Photonics	• The centre has been seeded with 23 projects under the above thrust areas in alignment with the current and futuristic technological requirement of Long term Technology Perspective Plan (LTTPP) of DRDO.The achievement will emerge in due course.
6.	Jagadish Chandra Bose Centre for Advanced Technologies (JCBCAT)	Jadavpur University, Kolkata	2016	a) Unmanned & Robotics b) Directed Energy c) Secure Systems & Cognition	• The centre has been seeded with 06 projects under the above thrust areas in alignment with the current and futuristic technological requirement of Long term Technology Perspective Plan (LTTPP) of DRDO. The achievement will emerge in due course.

STANDING COMMITTEE ON DEFENCE (2017-18)

MINUTES OF THE FIFTH SITTING OF THE STANDING COMMITTEE ON DEFENCE (2017-18)

The Committee sat on Thursday, the 15th February, 2018 from 1100 hrs. to 1520 hrs. in Committee Room No. 53, Parliament House, New Delhi.

PRESENT

Maj Gen B C Khanduri, AVSM (Retd) - Chairperson

MEMBERS

LOK SABHA

2. Col Sonaram Choudhary(Retd)
3. Shri Thupstan Chhewang
4. Shri H D Devegowda
5. Shri Sher Singh Ghubaya
6. Dr Mriganka Mahato
7. Shri Kalraj Mishra
8. Shri Partha Pratim Ray
9. Shri A P Jithender Reddy
10. Smt Pratyusha Rajeshwari Singh

RAJYA SABHA

11 Shri Harivansh
12 Shri Basawaraj Patil
13 Smt Ambika Soni

SECRETARIAT

1. Smt Kalpana Sharma - Joint Secretary
2. Shri TG Chandrasekhar - Director
3. Smt Jyochnamayi Sinha - Additional Director
4. Shri Rahul Singh - Under Secretary

LIST OF WITNESSESS

MINISTRY OF DEFENCE

SNO	NAME OF OFFICER	DESIGNATION
1.	Shri Sanjay Mitra	Defence Secretary
2.	Dr Ajay Kumar	Secretary (DP)
3.	Dr S Christopher	Secretary DR&D
4.	Lt Gen Sarath Chand	VCOAS
5.	Lt Gen SK Dua	CISC
6.	Shri SK Kohli	FA(DS)
7.	Shri Apurva Chandra	DG(Acq)
8.	Shri Jiwesh Nandan	Additional Secretary
9.	Shri Sanjiv Mittal	FA (Acq)
10.	Lt Gen RR Nimbhorkar	MGO
11.	Lt Gen Sanjay Verma	DG WE
12.	Lt Gen PN Rao	DG FP
13.	Lt Gen SK Patyal	DCOAS
14.	Lt Gen BS Sehrawat	DGNCC
15.	Vadm AK Jain	DCIDS (PP&FD)
16.	Vice Admiral G Ashok Kumar	DCNS
17.	Dr Zakwan Ahmed	DG(R&M)
18.	Sh AN Das	Addl FA & JS
19.	Shri Subir Mallick	Addl FA & JS
20.	Shri Rajib Kumar Sen	Economic Adviser
21.	Shri R K Karna	Addl FA & JS
22.	Shri Ashwini Kumar	Addl FA & JS
23.	Rear Admiral Sanjay Vatsayan	ACNS (P&P)
24.	Ms Dhartiri Panda	Addl FA & JS
25.	Shri V Anandarajan	Joint Secretary
26.	Shri Rajeev Singh Thakur	JS (Army)
27.	Smt Nidhi Chibber	Joint Secretary
28.	Maj Gen KJS Dhillon	ADG PP ‘A’
29.	Maj Gen Shantanu Dayal	ADG Proc
30.	Maj Gen HS Shanbhag	Technical Manager (LS)
31.	Maj Gen Sanjay Thapa	ADG FP
32.	RAdm KM Dhir	ACIDS
33.	IG VD Chafekar	DDG (P&P)
34.	Maj Gen Pankaj Saxena	ACIDS (FP)
35.	Rear Adm B Dasgupta	ADG (A)
36.	Brig Deepak Obhrai	DDG P&M Cell
37.	Brig Dhiraj Seth	DDG PP (Plans)
38.	DIG Alankar Singh	PD(SA)
39.	Cmde G Rambabu	Inspecting Officer SSC
40.	Cmde Vineet McCarty	PDNP

41.	Captain Prakash Gopalan	DNP
42.	Mrs Maulishree Pande	Director (Fin/Budget)
43.	Col Rajeev Kapoor	Offg DACIDS (Budget)
44.	Shri TD Diwivedi	Dir (Air-II)
45.	Smt Vibha Sood	PD P&F
46.	Brig Shivender Singh	DDG (Lgs)
47.	Col SK Vohra	Dir Lgs(A)
48.	Col Chetan Gurbax	Dir Coord
49.	Col Sudhanshu Arya	Inspecting Officer SSC
50.	Col Puneet Aggarwal	Dir PP(Lgs)
51.	Col PG Sankpal	Dy MA to VCOAS
52.	Sh Vipul Gupta	Addl Dir DPA
53.	Smt Poornima Rajendran	DS(Trg) & Hony Secy (SSC)

2. At the outset, the Chairperson welcomed the Members of the Committee and informed them of the agenda for the Sitting. The Committee then invited the representatives of the Ministry of Defence and the Defence Services. The Chairperson welcomed the representatives to the fifth Sitting of the Standing Committee on Defence and drew their attention to Direction 55(1) of the Directions by the Speaker, Lok Sabha.

3. Thereafter, the Chairperson requested the representatives of the Ministry of Defence to brief the Committee on various issues included in the agenda for the day. The Defence Secretary initiated the discussion by briefly touching upon Defence Services Estimates and other Demands for Grants of the Ministry of Defence. He also apprised the Committee about non-reduction of amount at Revised Estimates stage by Ministry of Finance due to healthy expenditure pattern of Ministry of Defence.

4. The Committee were informed about delegation of powers to Coast Guard, NCC, BRO, Services Headquarters for post contract management and perimeter security aspects. Thereafter, A power Point Presentation on General Defence Budget was made before the Committee. This was followed by detailed deliberations on the following issues:

(i) Issue relating to non procurement of Bullet Proof Jackets.

(ii) Procurement of Ammunition and Weapon System.

(iii) Low Allocation to Army.

(iv) Escalation in the cost of equipment nullifying the increase in the budget.

(v) Non availability of adequate Capital Budget.

(vi) Continuous reduction of Defence Budget in terms of percentage of GDP of the Country.

(vii) Making capital budget as 'Roll on and Non-Lapsable'.

(viii) Measures for adequately equipping being taken for the Forces.

5. Thereafter, a Power Point presentation on Defence Procurement Policy was made. This was followed by extensive discussion on the following points:

(i) Steps taken to achieve timely, effective and efficient procurement.

(ii) Impact analysis of newly-formulated Defence Procurement Procedure (DPP 2016).

(iii) Strategic Partnership with Private Sector.

(iv) Impact of 'Make in India' policy on existing production policy.

(v) Issues relating to huge committed liabilities and non availability of budget for new schemes owing to ceiling from the Ministry of Finance.

(vi) Support to Medium, small and Micro Enterprises (MSME) in area of Defence production.

The Committee took break for lunch and resumed the Sitting at 1400 hrs.

6. Thereafter, the Chairperson invited the representatives of Army. The representatives of the Army commenced their briefing through a Power Point presentation. This was followed by detailed deliberations on following issues:

(i) Status of present operational preparedness of Army;

(ii) Issues relating to deficiencies of weapons, stores and ammunition;

(iii) Non availability of capital budget for Committed Liabilities and New Schemes;

(iv) Break up of utilisation of Army Budget i.e. 63 per cent for salaries, maintenance; operational requirement; 20 per cent for modernisation, 14 per cent for other matters etc.

7. Thereafter, the Chairperson invited the representatives of NCC. The representatives of the NCC commenced their briefing through a Power Point presentation. This was followed by discussion on following issues:

(i) Issues relating to Introduction of NCC in more schools;

(ii) Need for creating infrastructure and improving quality of training with the increase in strength of cadets.

8. Thereafter, the Chairperson invited representatives of Sainik Schools. The representatives of the Sainik Schools also commenced their briefing through a Power Point presentation. This was followed by discussion on following issues:

(i) Opening of more Sainik Schools in the States;

(ii) Making Sainik Schools co-educational/separate Sainik Schools for girls; and

(iii) Measures taken to improve standard of training in Sainik Schools so as to increase the intake of cadets of Sainik Schools in NDA.

9. The Chairperson directed the representatives of the Ministry to furnish written replies/information on the points raised by the Members at the earliest.

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

The Committee then adjourned.

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STANDING COMMITTEE ON DEFENCE (2017-18)

MINUTES OF THE SEVENTH SITTING OF THE STANDING COMMITTEE ON DEFENCE (2017-18)

The Committee sat on Monday, the 19th February, 2018 from 1100 hrs. to 1515 hrs. in Committee Room No. 53, Parliament House, New Delhi.

PRESENT

Maj Gen B C Khanduri, AVSM (Retd) - Chairperson

MEMBERS

LOK SABHA

11. Shri Shrirang Appa Barne
12. Col Sonaram Choudhary(Retd)
13. Shri Thupstan Chhewang
14. Shri Dharambir Singh
15. Shri A P Jithender Reddy
16. Smt Pratyusha Rajeshwari Singh

RAJYA SABHA

8 Shri Basawaraj Patil
9 Shri Sanjay Raut
10 Smt Ambika Soni

SECRETARIAT

1. Smt Kalpana Sharma - Joint Secretary
2. Smt Jyochnamayi Sinha - Additional Director
3. Shri Rahul Singh - Under Secretary

LIST OF WITNESSESS

MINISTRY OF DEFENCE

SNO	NAME OF OFFICER	DESIGNATION
1.	Shri Sanjay Mitra	Defence Secretary
2.	Dr. Ajay Kumar	Secretary (DP)
3.	Smt Sanjeevanee Kutty	Secretary DESW
4.	Dr. S. Christopher	Secretary Defence R&D
5.	Lt Gen Sarath Chand	VCOAS
6.	Shri S.K. Chourasia	DGOF & Chairman/OFB
7.	Shri S.K. Kohli	FA(DS)
8.	Shri Jiwesh Nandan	Additional Secretary
9.	Shri Sanjiv Mittal	FA (Acq)
10.	Lt Gen Ashwani Kumar	Adjutant General
11.	Lt Gen RP Singh	DG(DC&W)
12.	Lt Gen SK Patyal	DCOAS
13.	Lt Gen PS Rajeshwar	DGPP
14.	Lt. Gen Shamsher Singh	DGQA
15.	Lt Gen PN Rao	DG FP
16.	Lt Gen Sanjay Verma	DG WE
17.	Dr. G Satheesh Reddy	DG (MSS) (Special Secretary level)
18.	Dr. CP Ramanarayanan	DG(Aero) (AS level)
19.	Dr Samir V Kamat	DG (NS &M)
20.	Ms. J. Manjula	DG (ECS)
21.	Dr. G Athithan	DG (MED & CoS)
22.	Dr. Shashi Bala Singh	DG (LS)
23.	Shri. Pravin K Mehta	DG (ACE)
24.	Dr Zakwan Ahmed	DG (R&M)
25.	Sr. S. Guru Prasad	DG(PC&SI)
26.	Dr. Hina A Gokhale	DG(HR)
27.	Dr. Chitra Rajagopal	DG (SAM)
28.	Shri Sudhir Mishra	DG (BrahMos)
29.	Shri Sudhir Gupta	DGTM
30.	Shri AK Bhateja Director	BF&MM
31.	Ms. Nabanita R Krishnan	Director P&C
32.	Sh. A.N. Das	Addl. FA & JS
33.	Shri Subir Mallick	Addl FA & JS
34.	Sh. Pudi Hari Prasad	Joint Secretary DESW
35.	Ms. Santosh	Joint Secretary Res-II DESW
36.	Maj Gen Jagatbir Singh	DGR
37.	Maj Gen Ashok Kumar	MD (ECHS)
38.	Maj Gen Shantanu Dayal	ADG Proc
39.	Maj Gen KJS Dhillon	ADG PP 'A'
40.	Maj Gen GJS Grewal	ADGQA (PP&T)
41.	Maj Gen Sanjay Thapa	ADB FP
42.	Shri Vijayendra	JS(NS)

43.	Shri Chandraker Bharti	JS (Aero)
44.	Dr Amit Sahai	JS(P&C)
45.	Shri Rajib Kumar Sen	EA
46.	Shri Sanjay Prasad	JS(LS)
47.	Shri V Udaya Bhaskar	CMD
48.	Shri T. Suvarna Raju	CMD
49.	Shri M. V Gowtama	CMD
50.	RAdm (Retd) L V Sarat Babu	CMD HSL
51.	Shri D.K. Hota	CMD
52.	RAdm (Retd) Shekhar Mital	CMD
53.	RADM V K Saxena	CMD
54.	Cmde Rakesh Anand (Retd).	CMD
55.	Shri Sanjay Chawla	ADGAQA
56.	Smt. S Gupta	ADG (Adm)
57.	Rear Adm SP Pal	ADGQA (WP)
58.	Brig Avtar Narayan	DDG AFMS(stdn)
59.	Brig Mrigendra Kumar	Secretary(KSB) DESW
60.	Cmde Gangesh Kumar	Principal Director DGR
61.	Shri Sanjeev Singhal	Director (Fin)
62.	Shri RK Sharma	Director DPA
63.	Shri Ravin Kulshrestha	Dir(P&C)
64.	Shri S.R Agrawal	Dir(Aero)
65.	Shri Shekhar Prasad	Dir(HR)
66.	Shri V Gurudatta Prasad	Dir(Prod)
67.	Shri M.M Joshi	ED
68.	Brig Deepak Obhrai	DDG P&M Cell
69.	Brig Dhiraj Seth	DDG PP
70.	Brig MK Vashist	DDG QA(PP&T)
71.	Gp Capt Sumit Dutta	Dir AFMS(Stdn)
72.	Gp Capt Hari Srinivas	Dir (P&FC)
73.	Gp Capt R K Padhi	Jt Dir (P&FC)
74.	Col Gurbir Singh	Offg Dir PP(Lgs)
75.	Col Puneet Aggarwal	
76.	Col PG Sankpal	Dy MA to VCOAS
77.	Shri V.M Chamola	Director(HR)
78.	Shri D.K. Venkatesh	Director (Engg R&D)

2. At the outset, the Chairperson welcomed the Members of the Committee and informed them of the agenda for the Sitting. The Committee then invited the representatives of the Ministry of Defence and the Defence Services. The Chairperson welcomed the representatives to the Sitting of the Committee and drew their attention to Direction 55(1) of Directions by the Speaker, Lok Sabha.

3. The Chairperson initiated the discussion and requested the representatives of the Ministry of Defence to brief the Committee on various issues included in the agenda for the day.

4. The representatives of the Ministry of Defence commenced their briefing through a Power Point presentation on Defence Public Sector Undertakings and Ordnance Factories Board (OFB). This was followed by extensive discussion on the matters which included the following:

i) Outsourcing and vendor development by the PSUs and OFBs;

ii) Steps taken to promote 'Make in India' in Defence Sector;

iii) Setting up of a Defence Investor Cell for Micro-Small and Medium Enterprises(*MSMEs)* and other industries to resolve difficulties in investment in Defence production;

iv) Promotion of export by private industry and DPSUs and OFs;

v) Modernization/upgradation of the facilities of DPSUs, Ordnance Factories and encouragement to private industry to meet the requirements of the Armed Forces;

vi) Upgradation of old guns;

vii) SU30 MKI of HAL;

viii) Timely delivery of LCA;

ix) Difficulties faced by HAL in production of Tejas;

x) Issues related to development and production of Bullet Proof Jackets;

xi) Order book challenges faced and steps taken by DPSUs and the Ordnance Factories;

xii) Reduction of allocations in respect of OFs;

xiii) Development of two defence industrial production corridors in the country;

xiv) Status of production of Assault Rifles;

xv) Upgradation of guns produced by Ordnance Factories;

xvi) Cost Cutting of Ordnance Factory Products;

xvii) Quality Check in Ordnance Factories; and

xviii) Issues related to R&D by Ordnance Factories.

5. Thereafter, a presentation was made on Ex-Servicemen Welfare and Ex-Servicemen Contributory Health Scheme and followed up with deliberations on the subject which included issues such as the following:

i) Broad-basing of disability element extended w.e.f 01.01.2016 to other than invalidated cases;

ii) Mechanism to resolve the complaints of Ex-Servicemen;

iii) Appointment of one-man Judicial Commission to look into the pension anomalies of ESM in respect of OROP;

iv) Exemption in income tax for contributors to the Army Battle Casualties Fund;

v) Providing ECHS Facility for war veterans of 1962, 1965 and 1971;

vi) Shortage of medical officers, other staff and medicines in polyclinics of ECHS; and

vii) Opening of ECHS Polyclinics in more parts of the country.

The Committee took break for lunch and resumed the Sitting at 1400 hrs.

6. Thereafter, Presentation on Directorate General of Quality Assurance (DGQA) was made, which was followed by discussion on the following points:

i) Changes in the role of DGQA

ii) Mechanism to check supply of low quality products and resolving complaints from the users.

iii) Quality check by DGQA.

7. Thereafter, the Chairperson welcomed the representatives of DRDO. The representatives of the DRDO commenced their briefing through a Power Point presentation on Defence Research and Development. This was followed by detailed deliberations on following issues:

i) Allocation of funds and expenditure;

ii) Requirement of additional funds;

iii) Decreasing budget of DRDO;

iv) Products developed by DRDO in the fields of Chemical, Biological and Nuclear Warfare;

v) Bullet proof jackets;

vi) Efforts towards 'Make in India'; and

vii) Export of DRDO developed equipment.

8. The Chairperson directed the representatives of the Ministry of Defence to furnish written replies to the queries raised by the Members at the earliest.

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

The Committee then adjourned.

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STANDING COMMITTEE ON DEFENCE

MINUTES OF THE EIGHTH SITTING OF THE STANDING COMMITTEE ON DEFENCE (2017-18)

The Committee sat on Friday, 12 March, 2018 from 1000 hrs. to 1030 hrs. in Committee Room 'C', Parliament House Annexe, New Delhi.

PRESENT

Maj Gen B C Khanduri, AVSM (Retd) - Chairperson

Lok Sabha

2. Shri Suresh C Angadi
3. Shri Shrirang Appa Barne
4. Col Sonaram Choudhary(Retd)
5. Shri Dharambir Singh
6. Shri Gaurav Gogoi
7. Smt Mala Rajya Lakshmi Shah
8. Smt Pratyusha Rajeshwari Singh

Rajya Sabha

9. Shri Harivansh
10. Shri Sanjay Raut

SECRETARIAT

1.	Smt. Kalpana Sharma	-	Joint Secretary
2.	Shri T G Chandrasekhar	-	Director
3.	Smt Jyochnamayi Sinha	-	Additional Director
4.	Shri Rahul Singh	-	Under Secretary

2. At the outset, the Chairperson welcomed the Members of the Committee and informed them about the agenda for the Sitting. The Committee then took up for consideration the following draft Reports:-

i) Thirty-Seventh Report on 'Action Taken by the Government on the Observations/Recommendations contained in the Twenty Eighth Report (16th Lok Sabha) on General Defence Budget, Border Roads Organisation, Indian Coast Guard, Military Engineer Services, Canteen Stores Department, Directorate General Defence Estates, Defence Public Sector Undertakings, Welfare of Ex-Servicemen, Defence Pensions and Ex-Servicemen Contributory Health Scheme'.

ii) Thirty-Eighth Report on 'Action Taken by the Government on the Observations/Recommendations contained in the Thirtieth Report (16th Lok Sabha) on Ordnance Factories, Defence Research and Development Organisation, Directorate General of Quality Assurance and National Cadet Corps'.

iii) Thirty-Ninth Report on 'Action Taken by the Government on the Observations/Recommendations contained in Thirty Fourth Report (16th Lok Sabha) on Provision of Medical Services to Armed Forces including Dental Services'.

iv) Fortieth Report of the Standing Committee on Defence (16th Lok Sabha) on 'Demands for Grants of the Ministry of Defence for the year 2018-19 on General Defence Budget, Border Roads Organisation, Indian Coast Guard, Military Engineer Services, Directorate General Defence Estates, Defence Public Sector Undertakings, Welfare of Ex-Servicemen, Defence Pensions and Ex-Servicemen Contributory Health Scheme (Demand No. 19 & 22)'.

v) Forty-First Report of the Standing Committee on Defence (16th Lok Sabha) on 'Demands for Grants of the Ministry of Defence for the year 2018-19 on Army, Navy and Air Force (Demand No. 20)'.

vi) Forty-Second Report of the Standing Committee on Defence(16th Lok Sabha) on `Demands for Grants of the Ministry of Defence for the year 2018-19 on Capital Outlay on Defence Services, Procurement Policy and Defence Planning (Demand No. 21)'.

vii) Forty-Third Report of the Standing Committee on Defence(16th Lok Sabha) on 'Demands for Grants of the Ministry of Defence for the year 2018-19 pertaining to Revenue Budget of Ordnance Factories, Defence Research and Development Organisation, DGQA and NCC (Demand No. 20)'.

3. After deliberations, the Committee adopted the above mentioned reports with slight modifications.

4. The Committee 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.

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