

**Report of the
Comptroller and Auditor General of India**

for the year ended March 2015

**Union Government (Defence Services)
Navy and Coast Guard
Report No. 17 of 2016**

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PREFACE

This Report for the year ended March 2015 has been prepared for submission to the President of India under Article 151 of the Constitution of India.

The Report contains significant results of the Audit of the Union Government (Defence Services)- Indian Navy and Indian Coast Guard.

The instances mentioned in this Report are those, which came to notice in the course of test audit for the period 2014-15 as well as those which came to notice in earlier years, but could not be reported in the previous Audit Reports; instances relating to the period subsequent to 2014-15 have also been included, wherever necessary.

The audit has been conducted in conformity with the Auditing Standards issued by the Comptroller and Auditor General of India.

OVERVIEW

The total expenditure of the Defence Services during the year 2014-15 was ₹2,37,394 crore. Of this, the Navy spent ₹36,622 crore while Coast Guard spent ₹2,428 crore, which constituted approximately 15.43 *per cent* and 1.02 *per cent* respectively of the total Defence Expenditure. The major portion of the expenditure of the Navy is capital in nature, constituting almost 60.81 *per cent* of the total expenditure whereas expenditure of Coast Guard was mainly revenue in nature at 52.97 *per cent* of total expenditure.

This report contains major findings arising from the test audit of transactions of the Indian Navy and the Indian Coast Guard. Some of the major findings included in the Report are discussed below.

I Performance Audit on Construction of Indigenous Aircraft Carrier

Project approval for construction of the Indigenous Aircraft Carrier had been accorded by the Cabinet Committee on Security in May 1999, with revisions in October 2002 and July 2014. The requirement for a ship of 37,500 tons was identified in 1990. However, Preliminary Staff Requirements was promulgated in August 2004, after 14 years. Delays in conclusion of external design contracts and supply of major pre-launch equipment stretched the Phase-I contract timelines. Incorrect estimation of man-hour per ton to be utilised for fabrication and outfitting in the Phase-I contract led to undue benefit to the shipyard to the tune of ₹476.15 crore. The Ministry and the shipyard are not able to assess the physical state of construction of the ship due to non-inclusion of essential formats of progress reporting in the shipbuilding contracts. MiG29K, the chosen aircraft for the carrier, continues to face operational deficiencies due to defects in engines, airframe and fly-by-wire system. The delivery of the option clause aircraft scheduled between 2012 and 2016 is much ahead of the delivery schedule of the IAC, in 2023 as projected by Cochin Shipyard Limited. With INS Vikramaditya in service and INS Viraat likely to be de-commissioned in 2016-17, continuous shifting of

timelines of delivery of the Indigenous Aircraft Carrier will adversely impact naval capabilities.

(Chapter-II)

II Non-delivery of sewage barges

Acquisition of sewage barges initiated by Indian Navy is yet to fructify because of its failure to carry out the required capacity assessment of the shipyard resulting in non-achievement of core objective of prevention of sea pollution even after spending ₹25.97 crore.

(Paragraph 3.1)

III Avoidable expenditure of ₹9.97 crore on the procurement of armament for an aircraft

The Ministry concluded a contract on 8 March 2010 with the firm for procurement of armament for MiG29K/KUB by providing price escalation to the firm although an option clause was valid till 27 March 2010 under an earlier contract, resulting in an avoidable expenditure of ₹9.97 crore.

(Paragraph 3.2)

IV Extra expenditure in procurement of Magnetrons

Integrated Headquarters, Ministry of Defence (Navy) procured Magnetrons for the refurbishment of Transmitter Receiver Units (TRUs) of Radar System of Sea King helicopters from a particular firm at an extra expenditure of ₹8.68 crore. Even after refurbishment, only five TRUs were serviceable against a requirement of 17 TRUs resulting in limited exploitation of the Sea King fleet for local missions only.

(Paragraph 4.1)

V Avoidable procurement of Radio Receiver Beacons for naval ships

Lack of coordination amongst various Directorates/establishments and ships within Navy resulted in avoidable procurement of five Radio Receiver Beacons worth ₹6.19 crore.

(Paragraph 4.2)

VI Non-levy of liquidated damages in the procurement of pumps

Ministry of Defence accorded extension for delivery of pumps with levy of liquidated damages. However, Integrated Headquarters Ministry of Defence (Navy) failed to levy liquidated damages amounting to ₹1.56 crore on the firm for the delayed supplies.

(Paragraph 4.3)

VII Under-recovery of ₹6.18 crore due to non-revision of rates of landing charges

Indian Navy's failure to submit the details of capital expenditure and maintenance charges to Airports Economic Regulatory Authority of India (AERA), denied them the revised tariff rates for the landing charges for the Goa Airport since July 2013 resulting in under recovery of ₹6.18 crore.

(Paragraph 4.4)

VIII Unfruitful expenditure of ₹5.73 crore on acquisition of land for setting up an Air Enclave by Coast Guard

Failure of the Ministry of Defence/Coast Guard/Defence Estate Office (Visakhapatnam) to take cognizance of the Gazette notification entailing requirement of 'No objection certificate' by the Navy resulted in non-setting

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up of Air Enclave for the Coast Guard on the land acquired from the Visakhapatnam Port Trust at a cost of ₹5.73 crore. This in turn affected the operational preparedness of the Coast Guard besides rendering the investment unfruitful.

(Paragraph 5.1)

GLOSSARY

Glossary of Terms	
ACCP	Assistant Controller Carrier Projects
ADS	Air Defence Ship
AFC	Aviation Facilities Complex
ALH	Advance Light Helicopter
B & D Spares	Base and Depot Spares
BHEL	Bharat Heavy Electricals Limited
BoO	Board of Officers
BR 1921	Book of References 1921
CCS	Cabinet Committee on Security
CMS	Combat Management System
CNC	Contract Negotiation Committee
CPRM	CWP&A Progress Review Meetings
CQ	Carrier Qualification
CSL	Cochin Shipyard Limited
CWP&A	Controller of Warship Production and Acquisition
DA	Diesel Alternator
DAC	Defence Acquisition Council
DAPM	Directorate of Aviation Projects Management
DASE	Directorate of Aircraft Systems Engineering
DCDA	Deputy Controller of Defence Accounts
DCN	Direction Des Constructions Et ArmesNavales
DEDC	Detailed Engineering and Documentation Contract
DFR	Design Feedback Report
DNAS	Directorate of Naval Air Staff
DND	Directorate of Naval Design
DPB	Defence Procurement Board
DPP	Defence Procurement Procedure
DPR	Detailed Project Report
DSR	Directorate of Staff Requirements
EAC	Empowered Apex Committee
EUC	End User Certificate
FMS	Full Mission Simulator
GA	General Arrangement
HQ WNC (MB)	Headquarters Western Naval Command, Mumbai

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HQNA	Headquarters Naval Aviation, Goa
HVAC	Heating, Ventilation and Air Conditioning System
IAC	Indigenous Aircraft Carrier
IFA	Integrated Financial Advisor
IHOP	Integrated Hull Outfit and Painting
IHQ	Integrated Headquarters
IN	Indian Navy
INBR	Indian Naval Book of Reference
INAP	Indian Naval Air Publication
INS	Indian Naval Ship
IPMS	Integrated Platform Management System
IPMT	Integrated Project Management Team
IRIGC	Indo Russian Inter Governmental Commission
JCL	M/s Johnson Controls Limited
KW	Kilo Watt
LOH	Labour Overheads
LPP	Last Purchase Price
LTE	Limited Tender Enquiry
MoD(N)	Ministry of Defence (Navy)
MoS	Ministry of Shipping
MTC	Military Technical Cooperation
MW	Mega Watt
MTPF	Machine Tool Prototype Factory, Ambernath
NES 33	Naval Engineering Standard 33
NM	Nautical Mile
NO	Navy Order
OBS	Onboard Spares
OEM	Original Equipment Manufacturer
PCDA(N)	Principal Controller of Defence Accounts (Navy)
PDC	Probable Date of Completion
PMB	Project Management Board
PNC	Price Negotiation Committee
PO	Purchase Order
POTS	Purchase Order Technical Specification
PSI	Propulsion System Integration

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PSR	Preliminary Staff Requirement
PSS	Power Supply System
PTS	Purchase Technical Specification
RAC	Russian Aircraft Corporation
RBI	Reserve Bank of India
RM	Raksha Mantri
RMPP	Reliability and Maintainability Programme Plan
ROE	M/s Rosoboronexport, Russia
ROS(I)	M/s Rosoboron Services, India
RWT	Russian Warranty Team
SA	Supplementary Agreement
SAC	Shipborne Aircraft
SAIL	Steel Authority of India Limited
SLD	Single Line Diagram
SRR	Software Requirement Review
SOTR	Statement of Technical Requirements
SPMT	Shipyards Project Management Team
SRs	Staff Requirements
SSR	Serviceability Status Report
TAR	Technical Acceptance Report
TEC	Technical Evaluation Committee
TNC	Technical Negotiation Committee
TPCL	M/s Tata Power Company Limited
WOT(K)	Warship Overseeing Team, Kochi
WPS	Warship Production Superintendent

CHAPTER I: INTRODUCTION

1.1 Profile of the audited entities

This report relates to matters arising from the audit of financial transactions of the following organisations under the Ministry of Defence:

1.1.1 Indian Navy

The Indian Navy is headed by the Chief of Naval Staff. Integrated Headquarters Ministry of Defence (Navy) is the apex body and chief management organisation responsible for command, control and administration of the Indian Navy. Operational and maintenance units of Indian Navy primarily consist of warships and submarines, dockyards, naval ship repair yards, armament and weapon equipment depots and material organisations. Indian Navy has an Aviation wing with air stations and allied repair facilities under them. Indian Navy also has warship overseeing teams which monitor the construction of ships and submarines at the concerned shipyards.

The objective of the Navy's military role is deterrence/ dissuasion against any intervention or act which is against our National interests, and the ability to inflict a crushing defeat on the adversary in the event of hostilities. Major contributions¹ of the Indian Navy to the nation during the year 2014-15 were:

- Search and rescue operation of missing Malaysian Aircraft.
- Deployment of Naval Ships to undertake evacuation of personnel from Iraq.
- Deployment of Indian Naval Ship for anti piracy activities and surveillance of the Exclusive Economic Zones of Maldives, Mauritius and Seychelles.
- Commissioning of National Command Control Communication Intelligence (NC3I) network.
- Commissioning of Offshore Patrol Vessels and Destroyer class of ships.
- Commissioning of operational squadron for MiG 29K aircraft at Goa.

¹ Source: Annual Report 2014-15 of Ministry of Defence, Government of India.

1.1.2 Indian Coast Guard

The Indian Coast Guard was created to protect the country's vast coastline and offshore wealth. The Director General, Coast Guard exercises general superintendence, direction and control of the Coast Guard. The Coast Guard has various types of patrol vessels for patrolling the coastline for illegal activities like smuggling, trespassing into Indian Maritime zones, etc. Coast Guard also has an aviation wing to patrol the coastal areas and carry out Search and Rescue Mission at sea with fixed and rotary wing aircraft. The aviation wing has Coast Guard Air stations and Air Enclaves for effectively carrying out its duties in all the coastal areas. Major achievements² of the Coast Guard during the year 2014-15 were as follows:

- Commissioning of Coast Guard stations at Frazerganj, West Bengal and Nizampatnam, Andhra Pradesh.
- Commissioning of five fast patrol vessels.
- Commissioning of four Air Cushion Vehicles.
- Commissioning of nine Interceptor Boats.
- Commissioning of Coast Guard Air Enclave at Bhubaneswar.

1.1.3 Defence Public Sector Undertakings

There are four Defence Public Sector Shipyards (DPSS) viz., Mazagon Dock Limited (MDL), Garden Reach Shipbuilders & Engineers Limited (GRSE), Goa Shipyard Limited (GSL) and Hindustan Shipyard Limited (HSL) under the administrative control of the Ministry of Defence. The four shipyards are engaged in building warships and vessels of various sizes for the maritime forces of the country. The management of the shipyards is vested in the Board of Directors headed by a Chairman & Managing Director who is assisted by Functional Directors. While MDL, GRSE and GSL are under the administrative control of Ministry of Defence, the administrative control of HSL was transferred from Ministry of Shipping to Ministry of Defence in February 2010. Major achievements of these shipyards during the year 2014-15 were as follows:

- MDL delivered first of P-15A Destroyers to Indian Navy and signed contract with Indian Navy for construction and delivery of four P-17A class frigates.

² Source: Annual Report 2014-15 of Ministry of Defence, Government of India.

- GRSE delivered first Anti Submarine Warfare Corvette, “INS Kamorta” to Indian Navy.
- GSL delivered fourth Naval Offshore Patrol Vessel to Indian Navy.
- HSL undertook repairs of various Indian Naval ships including refits of INS Darshak, INS Shakti and INS Kamorta.

The report also relates to matters arising from the audit of financial transactions of the following organisations under the Ministry of Defence:

- Defence Research and Development Organisation of Ministry of Defence and its laboratories dedicated primarily to Indian Navy.
- Defence Accounts Department dealing with Indian Navy and Coast Guard.
- Military Engineer Services dealing with Indian Navy and Coast Guard.

1.2 Authority for audit

Article 149 of the Constitution of India and the Comptroller and Auditor General’s (Duties, Powers and Conditions of Service) Act 1971 and Regulations of Audit and Accounts 2007, give authority for audit and detailed methodology of audit and its reporting.

Office of the Principal Director of Audit, Navy, New Delhi, and its three branch offices at Mumbai, Vishakhapatnam and Kochi are responsible for audit of Indian Navy, Indian Coast Guard and other related organisations. MDL, GRSE, GSL and HSL are audited by the Principal Director of Commercial Audit & Ex-officio Member Audit Board IV, Bengaluru.

1.3 Audit methodology and procedure

Audit is prioritised through an analysis and evaluation of risks so as to assess their criticality in key operating units. Expenditure incurred, operational significance, past audit results and strength of internal control are amongst the main factors which determine the severity of the risks. An annual audit plan is formulated to conduct audit on the basis of risk assessment.

Audit findings of an audited entity are communicated through Local Test Audit Reports/Statement of Cases. The response from the audited entity is considered which may result in either settlement of the audit observation or referral to the next audit cycle for compliance. Serious irregularities are processed as draft paragraphs for inclusion in the Audit Reports which are submitted to the President of India under Article 151 of the Constitution of India, for laying them before each House of Parliament. Performance Audits are done through structured exercise by defining scope of audit, holding entry conference, sampling of units, exit conference, inclusion of feedback on draft report and issuance of final report.

1.4 Defence Budget

The Defence budget is broadly categorised under Revenue and Capital expenditure. While Revenue expenditure includes pay and allowances, stores, transportation and work services, etc., Capital expenditure covers expenditure on acquisition of new ships, submarines, weapons, ammunition and replacement of obsolete stores, construction work, etc. Details of Defence expenditure during 2010-11 to 2014-15 is reflected in the Table below:

Table 1.1: Total Defence Budget allocation and Actual expenditure

(₹ in crore)

Description	Year				
	2010-11	2011-12	2012-13	2013-14	2014-15
Budget allocation	1,56,127	1,78,891	1,98,526	2,17,649	2,54,000
Actual expenditure	1,58,723	1,75,898	1,87,469	2,09,789	2,37,394

The Defence expenditure in the previous five years registered an increase of 49.56 *per cent* from ₹1,58,723 crore in 2010-11 to ₹2,37,394 crore in 2014-15. Defence expenditure in 2014-15 increased by 13.16 *per cent* over the expenditure of previous year. The share of Indian Navy in the total expenditure on Defence Services in 2014-15 was ₹36,622 crore *i.e.*, 15.43 *per cent*.

1.5 Budget and Expenditure of Navy

The summarised position of appropriation and expenditure during 2010-11 to 2014-15 in respect of Indian Navy is reflected in the Table below:

Table 1.2: Appropriation and Expenditure

(₹ in crore)

Description		Year				
		2010-11	2011-12	2012-13	2013-14	2014-15
Final Grant	Capital	16,905	17,922	17,066	19,386	21,807
	Revenue	10,010	12,347	12,755	13,364	14,536
	Total	26,915	30,269	29,821	32,750	36,343
Actual Expenditure	Capital	17,140	19,212	17,760	20,359	22,270
	Revenue	10,145	12,059	12,119	13,472	14,352
	Total	27,285	31,271	29,879	33,831	36,622
Total Excess/ Savings (+)/(-)	Capital	(+)235	(+)1,290	(+)694	(+)973	(+)463
	Revenue	(+)135	(-)288	(-)636	(+)108	(-)184
	Total	(+)370	(+)1,002	(+)58	(+)1,081	(+)279

Source: Year-wise Appropriation Accounts of Defence Services.

An analysis of the Appropriation Accounts, Defence Services for each of the five years had been included in the Report of the Comptroller and Auditor General of India for the relevant years, Union Government– Accounts of the Union Government.

1.5.1 Navy Expenditure

A broad summary of expenditure of Indian Navy is given in the Table below:

Table 1.3: Expenditure of Indian Navy

(₹ in crore)

Description	Year				
	2010-11	2011-12	2012-13	2013-14	2014-15
Total Defence Expenditure	1,58,723	1,75,898	1,87,469	2,09,789	2,37,394
Total Expenditure of Navy	27,285	31,270	29,879	33,831	36,622
Percentage change over previous year	(+)18.96	(+)14.61	(-) 4.45	(+)13.23	(+)8.25
As a percentage of total Defence Expenditure	17.19	17.78	15.94	16.13	15.43
Revenue Expenditure	10,145	12,059	12,119	13,472	14,352
Capital Expenditure	17,140	19,211	17,760	20,359	22,270

Source: Year-wise Appropriation Accounts of Defence Services

The total expenditure incurred by the Indian Navy during 2010-2015 ranged between 15.43 and 17.78 *per cent* of the total Defence expenditure. In the year 2014-15, the expenditure of Indian Navy rose by 8.25 *per cent* from ₹33,831 crore to ₹36,622 crore as compared to the previous year.

1.5.2 Capital Expenditure

The average annual distribution of expenditure over different categories for the last five years (2010-11 to 2014-15) for Indian Navy is depicted in the Table below:

Table 1.4: Capital Expenditure of Indian Navy

(₹ in crore)

Head	Year				
	2010-11	2011-12	2012-13	2013-14	2014-15
Naval Fleet	10,620 (62%)	10,320 (54%)	11,074 (62%)	8,151 (40%)	13,355 (60%)
Naval Dockyard	720 (4%)	648 (3%)	752 (4%)	633 (3%)	635 (3%)
Aircraft and Aero-Engine	3,187 (19%)	4,336 (23%)	1,695 (10%)	7,746 (38%)	3,248 (15%)
Construction Works	637 (4%)	515 (3%)	527 (3%)	516 (3%)	646 (3%)
Other Equipment ³	1,578 (9%)	2,583 (13%)	2,773 (16%)	2,630 (13%)	3,654 (16%)
Others	398 (2%)	809 (4%)	939 (5%)	683 (3%)	731 (3%)
Total	17,140	19,211	17,760	20,359	22,270⁴

Source: Year-wise Appropriation Accounts of Defence Services.

The Capital expenditure of the Indian Navy rose from ₹17,140 crore to ₹22,270 crore *i.e.*, by 29.93 *per cent* during five year period from 2010-11 to 2014-15. As compared to previous year, the Capital expenditure of the Indian Navy increased by 9.39 *per cent i.e.*, from ₹20,359 crore in 2013-14 to ₹22,270 crore in 2014-15. During the year 2014-15, a significant portion (60 *per cent*) of Capital expenditure was incurred on naval fleet, 16 *per cent* and 15 *per cent* was spent on

³ Other equipment includes Electrical/Electronics, Weapon, Space and Satellite, Electronic Warfare, etc.

⁴ The Actual figure is ₹22,269.66 crore, which is rounded off to ₹22,270 crore.

other equipment and aircraft and aero engine respectively and 3 per cent was spent each on naval dockyard, construction works and others.

1.5.3 Revenue Expenditure

The distribution of expenditure over different categories of Revenue expenditure for the last five years is depicted below:

Table 1.5: Revenue Expenditure of Indian Navy

(₹ in crore)

Head	Year				
	2010-11	2011-12	2012-13	2013-14	2014-15
Pay and allowances	3,731 (37%)	4,508 (37%)	4,697 (39%)	5,085 (38%)	5,788 (40%)
Stores	3,437 (34%)	4,173 (35%)	3,982 (33%)	4,619 (34%)	4,151 (29%)
Works	701 (7%)	763 (6%)	760 (6%)	1,031 (8%)	1,124 (8%)
Transport	288 (2%)	353 (3%)	380 (3%)	347 (3%)	355 (3%)
Repair/ Refit	606 (6%)	768 (6%)	654 (5%)	593 (4%)	863 (6%)
Others	1,382 (14%)	1,494 (12%)	1,646 (14%)	1,797 (13%)	2,071 (14%)
Total	10,145	12,059	12,119	13,472	14,352

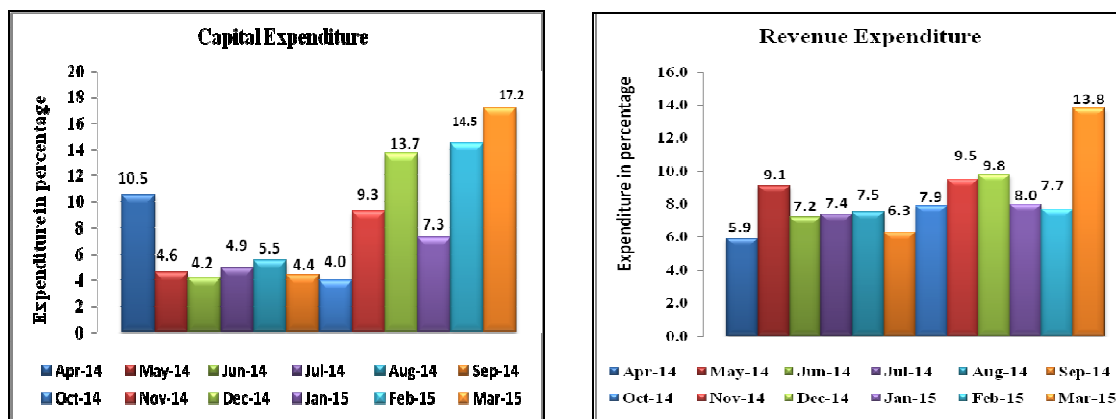
Source: Year-wise Appropriation Accounts of Defence Services

Revenue expenditure of the Indian Navy increased by 41 per cent from ₹10,145 crore to ₹14,352 crore during five year period from 2010-11 to 2014-15. As compared to previous year, the Revenue expenditure of the Indian Navy increased by 6.53 per cent i.e., from ₹13,472 crore in 2013-14 to ₹14,352 crore in 2014-15. The Revenue expenditure of the Indian Navy was mainly incurred on pay and allowances and stores contributing 40 per cent and 29 per cent respectively.

1.5.4 Flow of Expenditure of Indian Navy during the year

The flow of Capital and Revenue expenditure during 2014-15 is indicated below:

Figure: 1.1 Flow of Expenditure of Indian Navy during 2014-15



Source: Information provided by Ministry of Defence (Finance) Budget-I Section.

Scrutiny of flow of expenditure revealed that Navy incurred about 17.2 per cent of Capital expenditure in the month of March 2015 and about 39 per cent in the last quarter of the financial year which exceeded the limit of 15 per cent for the month of March and 33 per cent for the last quarter as prescribed by the Ministry of Finance. The Revenue expenditure of Navy was within the limits prescribed by Ministry of Finance.

1.6 Budget and Expenditure of Coast Guard

Budget of the Coast Guard forms part of the Civil Grant of the Ministry of Defence. The amount provided for revenue and capital are under the Major Head 2037- 'Customs (Preventive and other functions- Coast Guard Organisations)' and 4047- 'Capital Outlay of Fiscal Services, Customs (Coast Guard Organisation)' respectively. Separate Major heads for Coast Guard expenditure under Ministry of Defence have not been opened.

1.6.1 Expenditure of Coast Guard

A broad summary of allotment and expenditure is given in the Table below:

Table 1.6: Expenditure of Coast Guard

(₹ in crore)

Description		Year				
		2010-11	2011-12	2012-13	2013-14	2014-15
Final Grant/ Appropriation	Capital	1,200	1,600	1,565	1,060	1,140
	Revenue	816	933	960	1,018	1,295
	Total	2,016	2,533	2,525	2,078	2,435
Expenditure	Capital	1,201	1,575	1,565	1,070	1,142
	Revenue	814	926	945	1,048	1,286
	Total	2,015	2,501	2,510	2,118	2,428

(Source: Information provided by Coast Guard Headquarters)

The total expenditure of Coast Guard ranged between ₹2,015 crore and ₹2,510 crore from 2010-11 to 2014-15. The expenditure increased by 14.64 *per cent* in 2014-15 as compared to the previous year. In absolute terms the expenditure of Coast Guard increased from ₹2,118 crore in 2013-14 to ₹2,428 crore in 2014-15.

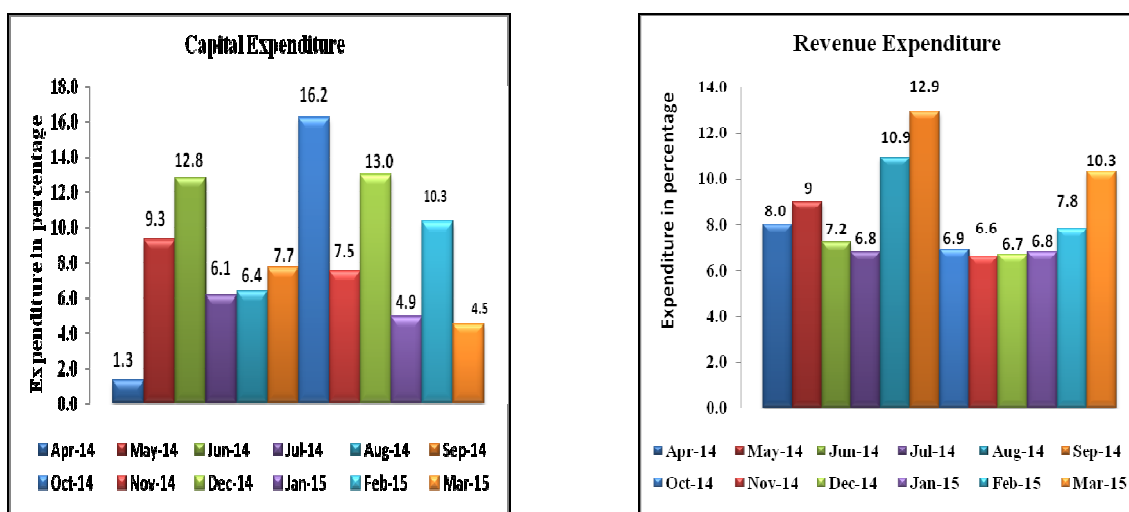
The Capital expenditure of Coast Guard ranged between ₹1,070 crore and ₹1,575 crore during the five year period from 2010-11 to 2014-15, whereas the Revenue expenditure of Coast Guard has shown an increase of 57.98 *per cent* during the five year period from 2010-11 to 2014-15 *i.e.*, from ₹814 crore in 2010-11 to ₹1,286 crore in 2014-15.

The Capital expenditure of Coast Guard increased by nearly 6.72 *per cent* from ₹1,070 crore to ₹1,142 crore in the year 2014-15 as compared to the previous year. The Revenue expenditure of Coast Guard increased by nearly 22.71 *per cent* from ₹1,048 crore to ₹1,286 crore in the year 2014-15 as compared to the previous year.

1.6.2 Flow of Expenditure during the year

Audit examined flow of Capital and Revenue expenditure during the year 2014-15, which is indicated below:

Figure: 1.2 Flow of Expenditure of Coast Guard during 2014-15



(Source: Information provided by Coast Guard Headquarters)

Scrutiny of expenditure revealed that Coast Guard incurred about 4.5 per cent of the Capital expenditure in the month of March 2015 and about 19.7 per cent in the last quarter which was within the limit of 15 per cent for the month of March and 33 per cent for the last quarter as prescribed by the Ministry of Finance. The Revenue expenditure was also within the limits prescribed by the Ministry of Finance.

1.7 Receipts of the Navy and Coast Guard

The details of receipts and recoveries pertaining to the Indian Navy and Coast Guard during the last five years ending 2014-15 for the services that they provided to other organisations/departments are given in the Table below:

Table 1.7: Revenue Receipt of Indian Navy and Coast Guard

	(₹ in crore)				
Year	2010-11	2011-12	2012-13	2013-14	2014-15
Receipt and Recoveries in respect of Navy	165.68	154.94	285.07	437.89	673.13
Receipt and Recoveries in respect of Coast Guard	13.33	06.73	34.41	27.19	24.60

Source: Figures of actual receipts as given in Defence Service Estimates for each year (For Navy) and Information provided by Coast Guard Headquarters

The receipt and recoveries in respect of Navy increased from ₹165.68 crore to ₹673.13 crore *i.e.* by 306.28 *per cent* during the five year period from 2010-11 to 2014-15, whereas the receipt and recoveries in respect of Coast Guard ranged between ₹6.73 crore and ₹34.41 crore during the five year period from 2010-11 to 2014-15.

The receipt and recoveries in respect of Navy have shown an increase of 53.72 *per cent* as compared to previous year *i.e.* from ₹437.89 crore in 2013-14 to ₹673.13 crore in 2014-15, whereas the receipts and recoveries in respect of Coast Guard have shown a decline of 9.52 *per cent* from the previous year *i.e.* from ₹27.19 crore in 2013-14 to ₹24.60 crore in 2014-15.

1.8 Response to Audit

1.8.1 Action Taken Note on Audit Paragraphs of earlier Reports

With a view to enforce accountability of the executive in respect of all issues dealt with, in various Audit Reports, the PAC desired that Action Taken Notes (ATNs) on all paragraphs pertaining to the Audit Reports for the year ended 31 March 1996 onwards be submitted to them, duly vetted by audit, within four months from the laying of the Report in Parliament.

Status of outstanding ATNs on Audit paragraphs relating to the Navy and Coast Guard as on 31 January 2016 is shown as under:

Table 1.8: Status of ATN

Status of ATN	Navy and Coast Guard	Defence Shipyards
Audit Paragraphs/ Reports on which ATNs have not been submitted by the Ministry even for the first time	3	1
Audit Paragraphs/ Reports on which revised ATNs are awaited.	27	0

1.8.2 Response of the Ministry to Draft Audit Paragraphs

The Ministry of Finance (Department of Expenditure) issued directions to all the Ministries in June 1960 to send their response to the Draft Audit Paragraphs proposed for inclusion in the Report of the Comptroller and Auditor General of India within six weeks.

Draft Performance Audit Report on “Construction of Indigenous Aircraft Carrier” was forwarded to the Secretary, Ministry of Defence through demi-official letter in February 2015 and revised Draft was issued in October 2015. Similarly, Draft Paragraphs were also forwarded between December 2015 and January 2016 drawing attention to the audit findings and requesting a response within six weeks.

Despite the instructions of the Ministry of Finance, no replies to the Audit Paragraphs including Performance Audit mentioned in this Report were received. Thus, the response of the Ministry could not be included in respect of these Paragraphs.

1.9 Savings at the instance of Audit

Following savings of prominent nature were made at the instance of Audit amounting to ₹4.09 crore:

A. Cancellation of sanction for construction of Shopping Complex

Para 3.42.1 of Scales of Accommodation, Defence Services (SADS) stipulates that a shopping centre may be provided if no shopping facility exists within two kms from the main married complex.

Audit observed (October 2011) that Administrative Approval (AA) was accorded (March 2011) by Headquarters Western Naval Command (HQWNC), Mumbai for the work “Provision of Deficient Integrated Shopping Centre, Bank and Post Office at Sailors Married Accommodation at Colaba, Mumbai” at an estimated cost of ₹3.38 crore despite the fact that two shopping complexes existed within a distance of two kms of the planned facility.

In pursuance of the audit observation (October 2011), the user unit, *i.e.*, INS Angre recommended (April 2014) to HQWNC that the work be cancelled due to the changed socio-economic aspirations of its personnel. HQWNC intimated (February 2015) that the AA for the work at a cost of ₹3.38 crore was cancelled (April 2014) at the instance of audit.

The Ministry, in its reply (March 2016) accepted that AA was cancelled at the instance of Audit.

B. Cancellation of sanction for construction of Unit Run Canteens

Unit Run Canteens (URCs) are the retail face of Canteen Store Department. There is no provision in the Scale of Accommodation for construction of URCs.

Audit observed (May 2014) that three sanctions⁵ were issued by Coast Guard Headquarters (CGHQ), New Delhi between October 2006 and February 2013 at a total cost of ₹90.04 lakh⁶. Construction of two out of three URCs⁷ costing ₹42.79 lakh had been completed.

Accepting the audit contention, CGHQ stated (September 2015) that the two URCs already constructed would be re-appropriated. CGHQ further intimated (February 2016) that the sanction for the third URC for ₹39.35 lakh had been cancelled (December 2015).

The fact remains that notwithstanding the cancellation of third sanction, re-appropriation of two URCs constructed at a cost ₹42.79 lakh is also irregular.

C. Cancellation of supply orders for transmitters

Audit observed (August 2014) that none of the communication equipment was received *vis-à-vis* three supply orders placed by the Coast Guard (CG) between May

⁵ For construction of URC at three CG stations *viz*; Okha, Daman and Kochi

⁶ ₹90.04 lakh (Okha ₹23.14 lakh + Daman ₹27.55 lakh + Kochi ₹39.35 lakh)

⁷ Construction of URCs completed at Okha in September 2008 and at Daman in January 2012

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and September 2013 at a total cost of ₹31.94 lakh and the requirements were being met through alternate sets⁸.

The CG intimated (January 2015) audit that all the three supply orders placed on the firm had been cancelled thereby resulting in a saving of ₹31.94 lakh.

The matter was referred to the Ministry (January 2016); their reply was awaited (April 2016).

1.10 About the Report

This report contains a Performance Audit and 10 Audit Paragraphs included in four chapters namely:

- Chapter-II containing a Performance Audit on “Construction of Indigenous Aircraft Carrier”
- Chapter-III on issues related to Ministry of Defence containing two Audit Paragraphs.
- Chapter-IV on issues related to Indian Navy containing seven Audit Paragraphs.
- Chapter-V on issues related to Indian Coast Guard containing one Audit Paragraph.

⁸ The units are additionally supplied with communication sets which serves for redundancy in the event of any of the set becoming defective/obsolete

CHAPTER II: PERFORMANCE AUDIT ON CONSTRUCTION OF INDIGENOUS AIRCRAFT CARRIER

2.1 Executive Summary

Background

India's aircraft carrier construction programme is driven by certain imperatives of Naval Plans critical to the development of our maritime capabilities, which, *inter alia*, provide for ready combat availability of two aircraft carriers for East and West coast at any given time. Project approval for construction of the Indigenous Aircraft Carrier had been accorded by the Cabinet Committee on Security in May 1999, with revisions in October 2002 and July 2014.

Audit Approach

Audit examination consisted of scrutiny of documents/records at various Directorates at Integrated Headquarters of Ministry of Defence (Navy) and its field formations *viz.* Warship Overseeing Team, Kochi, Headquarters Naval Aviation, Goa as well as at Cochin Shipyard Limited, Kochi, the selected shipyard.

Key Findings

(i) Planning and Design

The selected shipyard had no previous experience of warship construction and DCN¹ recommendations to augment capabilities of the yard were partially implemented. Project approval (October 2002) was obtained before promulgating Preliminary Staff Requirements for a ship of 37,500 tons. Delays in completion of Aviation Facilities Complex and Propulsion System Integration designs affected project timelines. The Indian Navy envisioned adoption of the Integrated Hull Outfit and Painting (IHOP) approach to reduce the build period and increase productivity. However, adoption of concurrent design approach compromised the IHOP method. The Build Strategy has not

¹ DCN - Direction Des Constructions Et Armis Navales, French Naval Design and Shipbuilding Authority engaged for concept design.

been finalised and continues to be revised with progress in project activities/timelines, preventing the benefits of a credible and comprehensive build strategy from accruing to the project. The General Arrangement² has undergone more than 4,000 changes and thus, the design of the ship is yet to be finalised.

(Para 2.3)

(ii) Carrier Construction

The Indian Navy and the shipyard did not carry out a review within six months from the date of conclusion of Phase-II contract (December 2014). There is continuing disagreement over project timelines between the Indian Navy and Cochin Shipyard Limited, with realistic dates for delivery yet to be worked out. Non-availability of steel delayed commencement of hull fabrication whereas late receipts of critical equipment like Diesel Alternators and Gear Boxes delayed launching of the ship. Continuing changes to HVAC³ design and delays in delivery of Aviation Facilities Complex equipment affected the construction schedule.

Delayed constitution of the Empowered Apex Committee deprived monitoring of the project at the apex level. The Steering Committee remained dysfunctional (October 2007-August 2013) for almost the entire duration of the Phase-I contract (May 2007). Shortfall in meetings of the Project Management Board and other project monitoring mechanisms, ranged from 60 *per cent* to 91 *per cent*. Neither the Ministry nor the shipyard could assess the physical state of construction of the ship as the Ministry failed to incorporate essential formats for progress reporting in the contracts.

(Para 2.4)

(iii) MiG29K/KUB Aircraft

The MiG29K, which is a carrier borne multi role aircraft and the mainstay of integral fleet air defence, is riddled with problems relating to airframe, RD MK-33 engine and fly-by-wire⁴ system. Aircraft were being technically

² General Arrangement – the basic document upon which the ship is designed and constructed.

³ HVAC – Heating, Ventilation and Air-conditioning

⁴ Fly-by-wire (FBW) is a system that replaces the conventional manual flight controls of an aircraft with an electronic interface and allows automatic signals sent by the aircraft computers to perform functions without the pilot's input, as in systems that automatically stabilise the aircraft.

accepted despite having discrepancies/anomalies. Serviceability of MiG29K was low, ranging from 15.93 *per cent* to 37.63 *per cent* and that of MiG29KUB ranging from 21.30 *per cent* to 47.14 *per cent*. The augmentation of infrastructure at Visakhapatnam is still at the Detailed Project Report stage even six years after approval (December 2009). The Full Mission Simulator was assessed to be unsuitable for Carrier Qualification (CQ) simulator training for pilots, as the visuals did not support the profile. The service life of the aircraft is 6000 hours or 25 years (whichever is earlier) and with issues facing the MiG29K/KUB, the operational life of the aircraft already delivered would be reduced. Further, the deliveries of the aircraft under the Option Clause scheduled between 2012 and 2016 are much ahead of the delivery schedule of the Indigenous Aircraft Carrier in 2023, as projected by Cochin Shipyard Limited.

(Para 2.5)

(iv) Financial Management

The Ministry failed to negotiate/quantify sub-contracting work and its cost with reference to the Phase-I contract thereby leading to undue advantage to the shipyard. There was incorrect estimation of man-hour per ton to be utilised for fabrication and outfitting in the Phase-I contract which led to undue benefit to the shipyard to the tune of ₹476.15 crore. Large unspent balances in the project account and unilateral withdrawal of funds by the shipyard were indicators of weak financial management.

(Para 2.6)

Recommendations

- ✓ The Ministry should ensure progress reporting as per essential formats stipulated by the Naval Engineering Standard 33, to enable assessment of the actual state of physical construction and monitoring ;
- ✓ The Ministry should augment efforts to build infrastructure for MiG29K/KUB at Visakhapatnam, which is the home port for the IAC ;

- ✓ The Ministry should synchronise delivery of the Option clause aircraft with the realistic delivery date of the IAC, to fully exploit the service life of the aircraft.

2.2 Introduction

An aircraft carrier is a warship designed to support and operate aircraft, engaged in attacks on targets afloat or ashore and to undertake sustained operations in support of other forces. An aircraft carrier is central to the operational requirements and fleet doctrine⁵ of the Indian Navy and is the only means of ensuring air defence⁶ of sea. The Indian Navy commissioned its first aircraft carrier, INS Vikrant⁷ in March 1961.



The Indian Navy Perspective Plan (1985-2000) envisaged a requirement of three aircraft carriers, with two to be operational (East and West coast) and one in refit at any time. This requirement was also reiterated in the Maritime Capability Perspective Plan (2012-27). Meanwhile, the Indian Navy commissioned its second aircraft carrier, INS Viraat⁸ in May 1987.

⁵ Fleet Doctrine - Naval Doctrine stipulating control of the sea

⁶ Air defence – measures designed to nullify or reduce the effectiveness of hostile actions by aircraft, missiles or other airborne objects

⁷ INS Vikrant – aircraft carrier (ex HMS Hercules) acquired from the UK in January 1957 and commissioned in March 1961 as the INS Vikrant with a displacement of 19500 tons

⁸ INS Viraat - an aircraft carrier with a displacement of 28,700 tons, commissioned in 1959 as the British Navy's HMS Hermes and transferred to India in 1987

The Indian Navy formulated (September 1985) Staff Requirements⁹ (SRs) for a ship of approximately 35,000 tons. Subsequently, a contract was concluded (December 1988) by the Indian Navy with DCN¹⁰, France for the concept design of the Sea Control Ship¹¹. The concept design received in March 1990, based on the operational requirements of the Navy, concluded that a ship of around 37,500 tons was required. However, as seen from the Ministry's proposal (October 2002) to the Cabinet Committee on Security (CCS), the resource crunch of the early 1990s forced the Indian Navy to prune down (1992-93) the SRs and limit the size of the carrier to 19,500 tons. Subsequently, the length of the Flight Deck of the envisaged carrier was increased (1995) by about 15 meters and the tonnage to around 24,000 tons.

The Ministry informed (May 1999) the CCS that INS Vikrant had been decommissioned (January 1997) and INS Viraat was due for major repairs and refit¹² and proposed the construction of an indigenously designed Air Defence Ship (ADS)¹³ at an estimated cost of ₹1,725.24 crore, with delivery in 8-10 years, without mentioning the tonnage of the ship. Subsequently, the Ministry informed (October 2002) the CCS that in view of the changed operational scenario, revision to the proposal was necessary. Further, considering the strategic importance and role of the aircraft carrier envisaged for the 21st century and studies carried out by the Indian Navy concluded that an aircraft carrier of around 37,000 tons was required. Accordingly, the Ministry proposed (October 2002) to the CCS, a revision in cost of design/construction of the ADS from ₹1,725.24 crore to ₹3,261 crore¹⁴, with delivery in December 2010 (*i.e.*, eight years). Thereafter,

⁹ Staff Requirement – a staff statement in broad terms of function, main features and performance

¹⁰ DCN - Direction Des Constructions Et Armes Navales

¹¹ Sea Control Ship - aircraft carrier capable of destroying enemy naval forces, suppressing enemy sea commerce, protecting vital sea lanes, and establishing local military superiority in vital sea areas

¹² Repairs and refit – Refit of INS Viraat was done in July 1999

¹³ Air Defence Ship – Name of the IAC in the Ministry's proposals of May 1999 and October 2002

¹⁴ ₹3261 crore - the approved cost was further enhanced to ₹3912.77 crore to cater to additional infrastructure at Cochin Shipyard Limited and fund requirement for ship construction activities. As of March 2014, the total funds released to the project were ₹3717.93 crore

the Ministry again proposed (March 2014) to the Cabinet Committee on Security (CCS) a revision in cost of the aircraft carrier to ₹19,341 crore along with revision in its delivery schedule from December 2010 to December 2018, which was approved (July 2014) by the CCS. As of 30 June 2015, against the total sanction (July 2014) of ₹19,341 crore for the Indigenous Aircraft Carrier (IAC), the expenditure incurred is ₹5,035.13 crore. However, the overall physical progress was not assessable as discussed in Para 2.4.5.5

Even as the IAC continues to be constructed in Cochin Shipyard Limited and the fact that INS Viraat is expected to be decommissioned in 2016-17, the Indian Navy's operational readiness and maritime capability will be affected due to the availability of only one aircraft carrier, INS Vikramaditya¹⁵ till delivery of the IAC.



2.2.1 Requirements of the IAC

As per the Preliminary Staff Requirements (August 2004), the maximum speed of the ship would be 28 knots while the cruising speed¹⁶ would

¹⁵ INS Vikramaditya- erstwhile Admiral Gorshkov commissioned in the Indian Navy in November 2013.

¹⁶ Cruising speed – speed at which the vessel travels in most fuel efficient manner along with other fleet ships

be 18 knots. The ship would have a 45 days logistics endurance and a range¹⁷ of 7,500 Nautical Miles (NM) at 18 knots. The propulsion package would consist of twin shaft arrangement with each shaft line having two Gas Turbines, a combining Gear Box and associated auxiliaries. The main machinery/auxiliaries would comprise of Diesel Alternators, AC plants, Reverse Osmosis Plants, Air Compressors, etc. The ship would be designed to have a complement of 160 officers and 1400 sailors.



2.2.2 Choice of Aircraft

The Ministry's proposal (October 2002) to the Cabinet Committee on Security (CCS) brought out that 30 aircraft of various types (twelve MiG29K, eight Advanced Light Helicopters, two Kamov-31 and eight Sea Harrier/Light Combat Aircraft (Navy) were envisaged to operate from the IAC. The MiG29K was cleared (February 2003) by the Defence Procurement Board (DPB) for INS Vikramaditya and by the Defence Acquisition Council (DAC)¹⁸ for ADS (*i.e.*, IAC) in September 2008. As per the Ministry's proposal (November 2009) for Option Clause¹⁹ aircraft, the MiG29K is a carrier

¹⁷ Range – the distance a ship can travel which is determined by fuel capacity

¹⁸ DAC is headed by the Raksha Mantri

¹⁹ Option clause - exercised by the Ministry of Defence for acquisition of 29 MiG29K/KUB aircraft in March 2010, which included 12 MiG29K and 01 MiG29KUB for the IAC. The Main Contract for acquisition of 16 MiG29K/KUB aircraft was concluded in January 2004

borne multi role aircraft and would be the mainstay of integral fleet air defence.

2.2.3 Organisational structure for project implementation

Naval shipbuilding comprises various activities as enumerated in Annexure-I. Numerous directorates/entities are involved in the construction and monitoring of the IAC as well as the MiG29K/KUB aircraft. The details are discussed in Annexure-II.

2.2.4 Reasons for Review and Review Objectives

As per the Ministry's proposal (October 2002), trials/delivery of the Indigenous Aircraft Carrier (IAC) was to be completed in 2010, however, as of August 2013, only launching²⁰ has been completed. Further, keeping in view the critical significance of IAC to the maritime capability and operational readiness of the Indian Navy as well as the fact that indigenous design and construction of the ship had been acknowledged by the Indian Navy as its most prestigious project, audit reviewed the project to ascertain whether :

- ❖ The project was being implemented with effective control and monitoring as per the Cabinet Committee on Security (CCS) approvals/contractual provisions and timelines (**Para 2.3.2, 2.3.4.1, 2.3.5, 2.3.6, 2.4.1, 2.4.2, 2.4.3, 2.4.4 and 2.4.5**)
- ❖ Acquisition of MiG29K and creation of requisite infrastructure for its exploitation and maintenance was planned and implemented properly in a timely and cost effective manner (**Para 2.5.1, 2.5.2, 2.5.3, 2.5.4, 2.5.5, 2.5.6 and 2.5.7**)

²⁰ Launching – stage of physical construction when the ship is lowered into water for the first time on completion of the ship's outer hull , major internal hull and part of machinery work, including lowering of major equipment/machineries. Ship construction involves the stages : (i) production (ii) keel laying (iii) launching (iv) outfitting (v) basin trials (vi) contractor sea trials (vii) final machinery trials

- ❖ Effective financial systems were in place and functional to ensure timely and cost effective implementation of the project (**Para 2.6.1, 2.6.2 and 2.6.3**)

2.2.5 Review Criteria

- Cabinet Committee on Security (CCS) approvals (May 1999, October 2002 and July 2014)
- Audit Report of M/s DCN France (1989-90)
- Work Orders (January 2004, November 2005), Phase-I²¹ contract (May 2007) and Phase-II²² contract (December 2014)
- Naval Book of Reference (BR) 1921, Naval Engineering Standards (NES) 33 (May 1981) and Controller of Warship Production and Acquisition (CWP&A) Memo (1998)
- MiG29K/KUB - CCS approval of December 2009 and Option Clause Contract (March 2010) of the Main Contract (January 2004)

2.2.6 Scope and methodology of audit

Review covered the period from 1999-2000 up to September 2015, with regard to construction of the Indigenous Aircraft Carrier. As regards the MiG29K/KUB, the period of audit scrutiny pertained to the period from 2009-2010 to 2014-2015.

Audit examination was carried out between June 2014 and December 2014 and again from June 2015 to September 2015 and consisted of scrutiny of documents/records of the Directorate of Naval Design and other Directorates²³ of Integrated Headquarters of Ministry of Defence (Navy),

²¹Phase-I contract – concluded in May 2007 with scope of work for hull structure construction of 15,000T and outfit of 2,500 T and procurement of materials, equipment blasting and painting, etc.

²²Phase-II contract – concluded in December 2014 with scope of work for building and floating out the completed hull of the vessel totaling approx 21500 tons of steel weight, blasting and system painting of the hull and outfit, outfitting of accommodation spaces and modular accommodation

²³Directorates- Directorate of Naval Plans, Directorate of Staff Requirements, Directorate of Electrical Engineering, Directorate of Marine Engineering, Directorate of Weapon Equipment, Directorate of Aircraft Acquisition, Directorate of Aviation Projects Management, Directorate of Naval Air Staff, Directorate of Aircraft Systems and Engineering

Headquarters Naval Aviation, Goa, the Warship Overseeing Team, Kochi and Cochin Shipyard Limited, Kochi.

The draft report was issued to the Ministry of Defence in February 2015 requesting for a written response within six weeks. Pending response, a revised draft report was issued to the Ministry in October 2015. Exit Conference was held (November 2015) with the Ministry of Defence. The reply of the Ministry is awaited (April 2016).

2.2.7 Acknowledgement

We acknowledge the support extended by Integrated Headquarters of Ministry of Defence (Navy), Warship Overseeing Team, Kochi and Cochin Shipyard Limited, Kochi in furnishing the requisite documents, information and replies to the audit queries raised during the course of the Performance Audit.

2.3 Planning and Design

2.3.1 Readiness of the selected shipyard

The Ministry's proposal (May 1999) to the Cabinet Committee on Security (CCS) brought out that a technical audit of the shipyard viz. Cochin Shipyard Limited (CSL) was carried out by DCN, France in 1989-90.



The DCN Report (1989) while confirming the capabilities of CSL, mentioned the following issues:

- CSL had never built warships and was not used to the complexity of their designs, hull and systems.
- The shipyard's organisation was mostly vertical without enough functional links between various departments. CSL had no real project management central organisation and was working with many separated departments.
- To adapt Cochin Shipyard Limited (CSL) to produce an aircraft carrier, the DCN Report prescribed basic proposals with respect to augmentation of shipyard's infrastructure, organisation and human resources, which included creation of a Shipyard Project Management Team and a liaison team.

Audit sought clarification on the extent and promptness of action taken by CSL on the basic proposals. CSL replied (May 2015) that the Report of the DCN was not traceable at their end and in the absence of the Report, they had no comments to offer.

Audit scrutiny of records showed that Indian Navy in July 2011 held that the Project Management Team of the shipyard was weak and needed to be replaced with a stronger team. The Indian Navy also contemplated appointment of a dedicated project leader at Director level with an integrated team of Naval officers and yard personnel to bring the project on track. Audit scrutiny further showed that in the revised proposal (March 2014) to the Cabinet Committee on Security, the Ministry brought out that one of the reasons for revision in delivery date was the slow progress of this maiden venture of CSL in warship construction.

The fact thus remains that since CSL was constructing an aircraft carrier for the first time, it was incumbent upon them to fully implement the DCN proposals so as to execute the project within approved timelines.

2.3.2 Preliminary Staff Requirements

Preliminary Staff Requirements (PSRs) indicate the role of the ship, its dimensions, specifications of its hull, major machinery, weapons, sensors, accommodation and manpower, endurance and fuel capacity etc.

PSRs are crucial as they lay down the benchmarks for the platform to be procured, based on which the platform is evaluated and its suitability determined for induction into the service.



Audit scrutiny revealed that:

- The concept design received from DCN in March 1990, based on the operational requirements of the Indian Navy, concluded that a ship of around 37,500 tons was required. However, for various reasons, the Navy considered different tonnage for the ship and accordingly promulgated PSRs which were not in sync with a ship of 37,500 tons. This apart, while submitting (May 1999) the proposal to the CCS, the Ministry did not indicate any tonnage of the ship, as discussed in Para 2.1. Subsequently, in its revised proposal (October 2002) to the CCS, the Ministry indicated that an aircraft carrier of around 37,000 tons was required, without firming up the requisite PSRs. PSRs for the ship of 37,500 tons were promulgated in August 2004 only.
- CCS approved the Ministry's proposal (October 2002) that the ship would be manned by 100 officers and 1350 sailors. However, subsequent to the CCS approval (October 2002), the complement of manpower for accommodation purposes was discussed (January – August 2003) in Assistant Controller of Carrier Projects (ACCP) Review meetings and the complement of manpower at 160 officers and 1400 sailors was finalised in August 2003, which was promulgated in the PSRs of August 2004.

- Even though the Preliminary Staff Requirements (PSRs) of August 2004 stipulated an increased complement of 160 officers and 1400 sailors, the Ministry in its revised (March 2014) proposal to the CCS continued to indicate the earlier approved (October 2002) complement of 100 officers and 1350 sailors, without disclosing the complement stipulated in the PSRs of August 2004.

Directorate of Naval Design (DND) accepted (November 2014) that PSRs for the ship of 37,500 tons were issued in August 2004, but added that the PSRs were processed keeping in mind that the production schedule of the ship was not affected in any way.

Despite the fact that the requirement of the Indian Navy for a ship of 37,500 tons had been identified in 1990, the different PSRs being promulgated were not firmed up in keeping with the identified operational requirement. PSRs for a ship of 37,500 tons were promulgated only in August 2004, nearly 14 years later. Besides, the Ministry did not also mention any tonnage requirement while seeking approval (May 1999) of the Cabinet Committee on Security (CCS). Further, manpower requirements promulgated in the PSRs of August 2004 were not intimated by the Ministry in its revised proposal (March 2014) to the CCS, as mentioned above.

2.3.3 General Arrangement

The General Arrangement (GA) is a document based on which the ship is designed and constructed. The GA drawings principally represent– volumes, spaces, compartments, bulkheads²⁴, hull forms, decks and main equipment. Examination of records of Cochin Shipyard Limited (CSL) and the Indian Navy revealed the following:

- There were more than 4270 changes to the GA document by the Indian Navy and due to design changes, more than 1150 modifications in hull structure had been done by the shipyard. Frequent modifications to the hull structure was one of the main reasons for a delay of approximately two years in hull fabrication. Cochin Shipyard Limited (CSL) claimed that the continuing changes had not permitted the yard to complete the design of the ship and was one of the major reasons for delay in design completion. While the

²⁴ Bulkheads – a wall within the hull of a ship which enhances structural rigidity of the vessel, splits functional areas into rooms and creates watertight compartments to contain water in the case of hull breach

Indian Navy contended that 1193 changes were proposed by Cochin Shipyard Limited (CSL), the latter observed that modifications to General Arrangement (GA) document raised by them had been done to resolve/correct issues arising out of incorrect design in GA document prepared by the Indian Navy.

- Any modification to the GA document of Indigenous Aircraft Carrier (IAC) had a consequential effect on the detailed design and construction schedule of the carrier. As hull construction was complete and further changes had larger implications, CSL requested (May 2015) the Indian Navy to restrict any more changes in order to allow the yard to proceed unhindered with building the carrier. CSL also considered it very important that the arrangements be frozen before realistic target dates for completion of the ship could be defined.

It is evident that frequent changes in GA document by the Indian Navy have had an adverse impact on the progress of the project.

2.3.4 Work Order

The Ministry decided (August 2003) that a contract could be entered into with CSL only after the design was frozen and the cost elements became clear. The Ministry, therefore, placed (January 2004) on CSL a Work Order for 'Design Development and Pre-Production Activities', to enable the design activities to proceed unhindered along with ordering of long lead items and steel. Later, an amendment to the Work Order was issued (November 2005), primarily to cater to shipbuilding charges, material procurement, payment of advances, infrastructure for IAC and validity of the Work Order till 16 April 2006 or up till the signing of the shipbuilding contract.

2.3.4.1 Contracts for External Design Inputs

The Cabinet Committee on Security (CCS) approved the Ministry's proposal (October 2002) for engaging suitable external agencies to undertake certain design modules and provide necessary consultancy inputs/design inputs of Aviation Facilities Complex (AFC), weapon/sensor systems and spaces.

Audit scrutiny of records relating to external design inputs revealed the following:

2.3.4.1 (a) Aviation Facilities Complex Design

Aviation Facilities Complex (AFC)²⁵ houses aviation armament, stationary and mobile systems, devices and aggregates for ship borne aircraft technical support and maintenance. AFC design is one of the most critical activity for design of the AFC spaces comprising composite layout of more than 300 compartments and specifications of equipment. AFC design was scheduled to be carried out between September 2002 and December 2004, however, the contract for undertaking AFC design was concluded between CSL and ROE, Russia only in April 2006 at a cost of ₹75 crore. The design was completed in January 2009, against scheduled completion by December 2004.

Audit analysed the reasons for delayed conclusion of contract and found that:

- The preliminary Price Negotiation Committee (PNC) held in January 2003 remained inconclusive as the Indian side found the cost provided by the Russian side to be insufficient as the cost did not indicate item-wise breakdown of man-hours. The Russian side expressed their inability to furnish these details as the Indian side had provided them with initial data which included only several sketches of General Arrangement²⁶.
- The subsequent PNC held in December 2003 also remained inconclusive as the Russian side could not substantiate the cost, which was eventually substantiated only in March 2005.
- There were changes (March 2005) to scope of work and the draft contract incorporating changes was made available by the Indian Navy to CSL only in August 2005 and the PNC was held and the contract concluded in April 2006.

The delay had an adverse effect on the project as discussed below :

- ✓ Delay in conclusion of the Aviation Facilities Complex (AFC) design contract was one of the reasons for shift in the ship's delivery date from December 2010 to December 2014.

²⁵ AFC - items, systems and technical devices required for using the aircraft onboard the ship

²⁶ GA- It is a document based on which the ship is designed and constructed

- ✓ AFC equipment were to be ordered by December 2006, however it was only after completion of AFC technical design²⁷ in January 2009 that the procurement action for AFC equipment could be initiated (April 2009).
- ✓ Change in specifications of Diesel Alternators (DAs) from 2 MW to 3 MW - The load chart initially developed in 2000 for Indigenous Aircraft Carrier was based on inputs from INS Viraat and did not take into account majority of the equipment forming the AFC proposed for IAC. Subsequent to progress of AFC design, the load of AFC equipment increased to 8.7 times the initial planned load. To cater to the increased load and space constraints, specifications of the Diesel Alternators were changed (November 2007) and retendering was resorted to, delaying procurement, as discussed in Para 2.4.4.2 (a) (i). Even as the specifications of DAs were intrinsically linked with the load of AFC equipment, the tenders for 2MW DAs were floated (November 2006) without firming up the AFC design inputs.
- ✓ As the AFC design was still being finalised during 2007 and 2008, there were changes to the GA document, resulting in relocation of compartments. Consequently, as seen from the Minutes of CPRM²⁸, there was loss of 4,440 design man days.

Directorate of Naval Design (DND) stated (November 2015) that the delays were unavoidable since design and construction of the Indigenous Aircraft Carrier (IAC) was being undertaken for the first time.

The reply of the DND is not acceptable as the Indian side failed to provide the complete GA document and did not work in close coordination with the Russian counterparts to finalise the contract within scheduled timelines. In spite of the fact that design and construction of the ship was being undertaken for the first time, the Ministry while seeking approval (October 2002) for construction of the ship had

²⁷ Technical design – design documents containing final technical decisions, data, drawings, technical assignments and procurement specifications developed by the Russians as per the contract

²⁸ CPRM – Controller of Warship Production and Acquisition Progress Review Meeting

scheduled the delivery in December 2010, which proved to be highly optimistic.

2.3.4.1 (b) Propulsion Systems Integration

As per the Ministry's proposal (October 2002) to the Cabinet Committee on Security (CCS), Propulsion Systems²⁹ Integration (PSI) design was scheduled to be carried out between June 2002 and March 2006, however, the contract for PSI was concluded only in May 2004.



Audit analysed the reasons for delay and found continued lack of clarity on the work package as discussed below :

The preliminary work package was prepared (July 2001) by the Directorate of Naval Design (DND), on which technical proposals of firms were obtained, leading to recasting of work package. Subsequently, draft contract and draft work package document were forwarded (September 2002) by Directorate of Naval Design (DND) for comments of firms prior to issue of tenders in January 2003. However, even after issue of tenders by Cochin Shipyard Limited (CSL), there was difference in methodology of various firms for Propulsion System Integration. This again necessitated rationalisation of the work package and its recasting to arrive at a technically common platform. This was indicative of lack of clarity on the work package at the time of

²⁹ Propulsion system - consists of two propulsion plants each comprising two Gas Turbines per shaft, each plant comprising (i)two Gas Turbine, one Gearbox, shaftlines, Thrust block, Plummer blocks, CPP hydraulic system and associated systems, Controllable pitch propeller (CPP), Gas Turbine intakes/uptakes and associated auxiliary equipment and systems.

issue of tender, which was issued after several discussions with the firms, leading to delay in conclusion of the PSI contract.

Ultimately, the PSI design was completed by October 2009 only, *i.e.*, 3 ½ years after the scheduled completion by March 2006. Delay in conclusion of the PSI contract was one of the reasons for revision in delivery date of the carrier.

2.3.5 Integrated Hull Outfit and Painting

As per the VCNS³⁰ Memo (March 2000), Integrated Hull Outfit and Painting (IHOP) method of construction reduces the build period and enhances the productivity. It involves extensive outfitting of hull blocks in the shop floor before taking them to the building dock for integration. This method of construction to be followed by Cochin Shipyard Limited (CSL) required that the equipment fit and design to be largely frozen before the production commences, as it allows only very limited telescoping of design and production. Directorate of Naval Design observed (September 2002) that Indigenous Aircraft Carrier (IAC) was to be the first Indian naval vessel to be built under IHOP.

However, the Indian Navy considered (May 2004) it desirable to commence at least hull fabrication as soon as the structural design was completed without waiting for the outfit design, which was at variance to the concept of IHOP. Audit scrutiny revealed that the concurrent design progress along with ship construction had affected the progress of the project and took more efforts and resource allocation from the yard than was originally envisaged, as discussed in Para 2.3.3, 2.4.4.2 (a) (ii), 2.4.4.2 (b) and 2.4.4.2 (d).

In response to audit query about extent of implementation of IHOP in ship construction, Directorate of Naval Design (DND) replied (December 2014) that the concept of IHOP was intended to be adopted for the Indigenous Aircraft Carrier (IAC) to allow integrated outfitting and painting of structural blocks so that there was an increase in productivity and reduction in build period. However, the design finalisation of various systems/equipment was not possible and the concept was implemented partially, to the extent possible during the Phase-I construction.

It is evident that while the Indian Navy's vision to utilize the IHOP method of construction did not fructify in the IAC project due to non-

³⁰ VCNS – Vice Chief of Naval Staff

finalisation of design and equipment fit before taking up hull construction. Further, the Navy itself took the decision to commence hull construction without waiting for the outfit design. Resultantly, the benefits to be derived in the form of a shorter build period could not be achieved.

2.3.6 Build Strategy

Build Strategy is a document which contains comprehensive plan/schedule of the yard covering all important activities of design, phases of construction, yard's procurement schedule for machineries and equipment, availability of yard resources like manpower/shop floor etc. The Naval Shipbuilding Procedure stipulates approval of the Build Strategy prior to seeking approval of the competent authority.

The Build Strategy was a deliverable of the Detailed Engineering and Documentation Contract (DEDC) concluded (May 2004) by CSL with Fincantieri, Italy.

Audit observed (July 2014) that: -

- Scrutiny of records (July 2005) of the Warship Overseeing Team revealed that Fincantieri had requested the productivity norms of CSL which the shipyard did not provide on the plea that they did not have norms relating to warship production and that CSL had an apprehension that Fincantieri might propose a Build Strategy which they would find difficult to emulate.
- Based on the document submitted by M/s Fincantieri, Cochin Shipyard Limited (CSL) prepared (November 2005) a Build Strategy which did not cover productivity norms and commitment of infrastructure, manpower, equipment etc.
- A revised Build Strategy was forwarded (February 2008) by CSL to Integrated Headquarters, Ministry of Defence (Navy) {IHQ MoD (N)}, being a deliverable of the Phase-I contract (May 2007). However, with revision in project timelines, the Empowered Apex Committee (EAC) had directed (June 2012) CSL to revise the Build Strategy, accordingly.

- The Phase-II contract (December 2014) stipulated that the Builder shall prepare a PERT showing the major milestones of the work along with a Build Strategy and progress the work accordingly.

In response to audit query (July 2014) about when the Build Strategy was finalised, the Indian Navy replied (February 2015) that the Build Strategy of November 2005 was being referred to different phases of shipbuilding.

The reply of the Indian Navy is not tenable because the Build Strategy of November 2005 was an incomplete document as it did not cover productivity norms and commitment of infrastructure, manpower, equipment etc. Frequent revisions to the Build Strategy contradicted the Naval Shipbuilding Procedure which stipulates approval of the Build Strategy prior to seeking approval of the competent authority.

2.3.7 Design Feedback Reports

Design audit of new construction ships is to be effected through the system of Design Feedback Reports (DFRs). The aim of undertaking a design audit is to methodically examine and review suggested design changes that would enhance the operational effectiveness of the ship. The reports are required to be raised by the Indian Navy to cover different phases of ship's lifecycle viz, design phase (up to launching), construction and induction (from ship's launch to guarantee period) and operational period. While forwarding the DFR to Directorate of Staff Requirement, the concerned Production Directorate is to evaluate and endorse on the DFR, the feasibility of implementing the proposals in ongoing project/delivered ships through the Builder along with cost and time penalties where applicable.

Audit scrutiny revealed that the carrier was launched in August 2013, however, no DFRs had been generated. Directorate of Naval Design (DND) accepted (May 2014) that DFRs had not been generated so far, however it stated that the initial design evolution of IAC had been in close interaction / discussions with the Professional Directorates and stake holders.

Though, DFRs are required to be raised and processed for completing the feedback-action loop to derive the benefit of inputs in ship design, the core purpose and aim of design audit, the benefits to be derived

through DFRs on the carrier were not available to the Indian Navy during the present project of IAC.

2.4 Carrier Construction

2.4.1 Introduction

The Ministry concluded (May 2007) Phase-I contract with Cochin Shipyard Limited, Kochi for construction of Air Defence Ship (later on rechristened as Indigenous Aircraft Carrier). The contract covered fixed price element for hull fabrication/erection of 15,000 tons and outfitting of 2,500 tons, with cost plus element consisting of purchase of equipment and machinery required for launching of the ship by October 2010. Thereafter, the Ministry concluded (December 2014) Phase-II contract for hull fabrication/erection of 6500 tons and outfitting of 5700 tons in fixed price scope of work, with activities up to DG sets harbour trials and setting to work of GT support systems, to be achieved by December 2016. The Ministry's proposal (March 2014) to the Cabinet Committee on Security (CCS) brought out that Phase-III would include outfitting of 1200 tons and balance work (which includes starting of Gas Turbines, Sea trials, etc) up to delivery targeted by December 2018.



2.4.2 Construction Timelines

The Ministry's proposal (October 2002) to the Cabinet Committee on Security (CCS) envisaged the construction of the ship between January 2004 and December 2010 without mentioning Phase-wise construction.

Audit scrutiny of records showed the following:

- The Ministry sought (December 2006) the approval of Raksha Mantri (RM) to conclude the Phase-I contract activities up to launching scheduled in October 2010 and rest of the activities up to delivery of the Indigenous Aircraft Carrier in Phase-II. However, in August 2010, Cochin Shipyard Limited (CSL) proposed further splitting of the activities after Phase-I, into Phase-II and III, which was deliberated and accepted (August 2010) by the 5th Empowered Apex Committee (EAC). The EAC decided that CSL was to submit offer for scope of work and yard effort cost for Phase-II as well as rough estimate for balance work till delivery.
- The Phase-I contract (May 2007) stipulated that the contract for the subsequent phase should be signed at least six months prior to completion of hull fabrication and outfitting under Phase-I contract. The launching of the carrier took place in August 2013, the final stage of Phase-I construction. However, there was undue delay in conclusion of Phase-II contract, which was concluded only in December 2014, *i.e.*, sixteen months after conclusion of Phase-I construction. There was no contractual criteria for monitoring the progress in absence of Phase-II contract for the intervening period of 16 months.
- Cochin Shipyard Limited (CSL) submitted (November 2011) a PERT chart which indicated the targeted delivery of the carrier as 2018. The Navy pointed out (May 2012) that the scope of work submitted by CSL for Phase-II planned for completion by 2016 left out a large number of critical shipbuilding activities³¹ which cannot be completed in the remaining two years. Yet, the Ministry went ahead

³¹ Critical shipbuilding activities - commissioning and trials of Aviation Facilities Complex systems, Basin Trials, Sea Trials etc

with seeking (March 2014) approval of the CCS for targeted delivery of the ship in December 2018.

- The project review was required to be carried out within six months of conclusion of the Phase-II contract *i.e.*, by June 2015. However, no project review had been undertaken as of June 2015. This is despite the fact that completion of project review was essential for CSL to continue work on the project, as per the Preamble of the Phase-II contract (December 2014).

Even as the construction of the ship was being executed in Phases, however, due to the impasse or continuing disagreement over scope of work and timelines between the Indian Navy and CSL up to June 2015, realistic dates for delivery were yet to be worked out with certainty, as discussed in Para 2.4.3. This shows that the Navy and CSL had to work in sync for ensuring delivery of the ship as per approved timelines.

2.4.3 Timelines for Final Delivery

Naval Engineering Standard (NES) 33 informs that as the shipbuilder manages and controls the entire shipbuilding process, he is the only authority able to report with complete knowledge as to his achievements, intentions and management activities.

Cochin Shipyard Limited (CSL) submitted (September 2014) a PERT chart to the Indian Navy which indicated shift in project timelines to 2023, however as seen from the records of the Indian Navy and CSL, an impasse persisted between CSL and the Indian Navy over the review of timelines even after conclusion (December 2014) of the Phase-II contract. In spite of acknowledging (May 2012) itself that Phase-II work planned for completion by 2016 left out a large number of critical shipbuilding activities which cannot be completed in the remaining two years as discussed in Para 2.4.2, the Indian Navy informed (June 2015) CSL that the delivery of the Indigenous Aircraft Carrier in December 2018, as approved (July 2014) by the Cabinet Committee on Security (CCS), should be the basis for planning / execution and project timelines be revised accordingly. This was not acceptable to CSL, which informed (June 2015) the Indian Navy that unless realistic dates were targeted, they would be

unable to plan or execute contracts with various suppliers and turnkey works including accommodation.

Audit scrutiny (September 2015) of CSL's records indicated shift in timelines as tabulated below:

Sl No.	Activity	As per PERT ³² chart of 22 November 2011	As per PERT chart of 02 September 2014*	Shift in Timelines (months)
1	Hull Structure Design	October 2012	December 2017	62
2	Ship System Drawing	January 2015	December 2018	48
3	Electrical Design Activity	July 2016	June 2020	47
4	HVAC Activity	December 2015	December 2019	48
5	AFC Equipment Procurement and Installation	August 2017	September 2021	49
6	Completion of Design & Fitting Plans for Compartments other than Accommodation	April 2014	June 2019	62

**These timelines proposed by CSL are yet to be approved by the Indian Navy*

Further scrutiny of CSL's records showed the following major reasons for shift in timelines of activities as discussed below:

- ✓ The timeline for hull structure design was revised from October 2012 to December 2017 as the completed hull structure required revisions for incorporation of Russian Aviation Facilities Complex (AFC) equipment/systems modifications, as discussed in **Para 2.3.3**.
- ✓ Production drawings for ship system piping above 4th deck can be issued only after getting details of AFC Power Supply System (PSS), Heating, Ventilation and Air Conditioning (HVAC) system, Russian equipment and inputs from the Indian Navy. Completion of detailed design and issue of production drawings were expected to be completed by Q4 2018, as discussed in **Para 2.4.4.2 (c)**.
- ✓ Electrical design activities were delayed by more than four years due to delay in finalisation of inputs from Russian AFC systems/equipment, modification of HVAC system and other equipment inputs such as oxygen system, nitrogen plant, etc. The inputs which are required for completion of electrical design are

³² PERT – Programme Evaluation and Review Technique

expected to be available by 2016, as discussed in **Para 2.4.4.2 (a) (i) and 2.4.4.2 (c)**.

- ✓ Working design documentation from Russian side needed for completion of Heating, Ventilation and Air Conditioning (HVAC) system is expected by September 2018 only with installation and setting to work by December 2019, as discussed in **Para 2.4.4.2 (a) (ii)**
- ✓ Contract and detailed design for certain Russian Aviation Facilities Complex (AFC) equipment had not been finalised and their completion date was the third quarter of 2021, as discussed in **Para 2.4.4.2 (c)**
- ✓ Completion of compartments other than accommodation areas were delayed by more than five years due to non-finalisation of inputs from AFC Russian equipment/systems, modification in HVAC system and other delayed inputs.

It is evident from the PERT chart (September 2014) of CSL that while the delivery of the carrier with completion of all activities is likely to be achieved only by 2023, the Ministry and the Indian Navy continue to hold the timelines of final delivery of the ship as December 2018.

2.4.4 Revision in Project Timelines

The Ministry's revised proposal (March 2014) to the Cabinet Committee on Security (CCS) indicated overall shift in project timelines, *vis-à-vis* the approval of October 2002, as tabulated below:

SI No.	Area/Segment	Scheduled as per CCS 2002	Actually achieved	Shift in actual time lines (in months)
1	Aviation Facilities Complex (AFC) Design	December 2004	January 2009	48
2	Propulsion System Integration (PSI) Design	January 2006	October 2009	45
3	Commencement of Ordering Long Lead Items	January 2002	January 2004	24
4	Commencement of Production (due to non-availability of steel)	January 2004	November 2006	34
5	AFC Equipment Ordering	December 2006	February 2013	74
6*	Receipt of Gear Box	August 2009	February 2013	42
7*	Receipt of Diesel Alternators	October 2009	December 2012	46
8*	Phase-I Launch	October 2010	August 2013	34
9	Trials/Delivery	December 2010	December 2018	96
* The timelines for receipt of Gear Boxes, Diesel Alternators and Launching were taken by the Ministry from the Phase-I contract (May 2007)				



The effect of conclusion of the AFC design contract and PSI contract in April 2006 and May 2004 respectively on the project have been discussed in Para 2.3.4.1 (a) and 2.3.4.1 (b). Audit analysis of other major delays which have affected the progress of the project are discussed below :

2.4.4.1 Procurement of steel

As per the Ministry's proposal (October 2002) to the CCS, ordering of steel was to commence in March 2003, however, order was eventually placed in December 2004. Non-availability of steel was one of the major reasons which affected the progress of ship construction. Audit analysis showed:

- Supply of steel from M/s Rosoboronexport (ROE), Russia did not materialise as Cochin Shipyard Limited (CSL) could not accept the Corporate Guarantee offered by ROE against the requirement of Bank Guarantee stipulated in the Reserve Bank of India (RBI) circular (December 2003). Consequently, the Indian Navy decided (February 2004) to use indigenous steel which was the equivalent of Russian steel.
- Despite the fact that Steel Authority of India Limited (SAIL) informed (May 2004) the Indian Navy that they could supply only steel plates, the Indian Navy intimated (July 2004) Cochin Shipyard Limited (CSL) that SAIL had confirmed their ability to supply all steel plates and sections (bulb bars) required. Accordingly, CSL placed (December 2004) a Purchase Order on SAIL for supply of steel plates and bulb bars.



- The supply of bulb bars from SAIL remained unsatisfactory, warranting their procurement from an alternate source, Rosoboronexport (India) Limited, Mumbai.
- Lack of timely availability of bulb-bars from SAIL severely affected production³³ which commenced in November 2006 [against the schedule of January 2004 as per the approval (October 2002) of the Cabinet Committee on Security] and postponed launching from March 2009 to October 2010.

2.4.4.2 Delivery of Equipment

2.4.4.2 (a) Major equipment

Phase-I contract (May 2007) prescribed the list of 49 major machinery/equipment to be shipped onboard the Indigenous Aircraft Carrier. Audit scrutiny revealed that delivery delays ranged from three months to 49 months in respect of 49 equipment, against scheduled delivery dates in Purchase Orders (POs), as given in Annexure-III. Audit analysed major reasons for delayed delivery which are tabulated below:

³³ Production – commencement of fabrication of blocks for construction of the ship

No of equipments	Major reasons for delay in delivery
33	Failure of the vendors to adhere to supply schedule
06	Non-adherence to inspection schedule by Quality Assurance Establishment
03	Excess time taken by the foreign collaborator in obtaining authorisation for export from their government.
07	<ul style="list-style-type: none"> ➤ Two Diesel Alternators (DA) were damaged in road accident leading to rescheduling of delivery dates by the firm, ➤ Gear Box components had repeatedly failed, ➤ Delay in finalisation of scope of work of Heating, Ventilation and Air Conditioning System (HVAC) by the Navy ➤ Approval of drawings (Oily Water Separator), ➤ Non-availability of test cell (Gas Turbine), ➤ Incorrect inspection procedures(Steering Gear), ➤ Non-availability of naval team for Factory Acceptance Trials (Sewage Treatment Plant).

Audit analysis of major equipment delays which had affected ship construction are discussed below:

(i) Diesel Alternators and Gear Boxes

A Diesel Alternator (DA) is a generator which in combination with diesel engine generates electric energy for the ship, whereas, a Gear Box is a complex arrangement controlling turbines and powering a large propeller shaft. Both are pre-requisite for launching of the ship.

Audit observed (July/October 2014) that:

Diesel Alternator

- As per the Phase-I contract (May 2007), Purchase Order (PO) for eight DAs was to be placed by August 2007 with delivery by October 2009. Tenders were floated (November 2006) for procurement of 2MW DAs, however, subsequent to progress of Aviation Facilities Complex (AFC) design with the Russian side, there was change (November 2007) in specifications of DAs from 2 MW to 3 MW, as discussed in Para 2.3.4.1 (a). As a result, tenders were re-issued and PO was placed only in September 2008 on Wartsila India (₹155.70 crore), 13 months after scheduled placement of PO. The Diesel Alternators (DAs) were to be delivered in four batches between July 2010 and April 2011.
- The delay in placement of PO got compounded with transit damage (March 2010), resulting in the first batch of two DAs being actually delivered in December 2012. Meanwhile, the remaining six DAs were delivered between September 2011 and July 2012, entailing a delay of nearly three years against scheduled delivery under Phase-I contract.

Gear Box

As per the Phase-I contract (May 2007), purchase order (PO) for Gear Boxes was to be placed by January 2007 with delivery by August 2009. The PO for design, manufacture and supply of two [Port (P) and Starboard (S)] Gear Boxes was placed (January 2007) by Cochin Shipyard Limited (CSL) on Elecon at a cost of ₹38.70 crore, with delivery within 24 months. As per the work sharing between Elecon and Renk³⁴, all main pinions, gears and shafts except bull gear of Gear Boxes were to be manufactured by Elecon, while manufacturing of bull gear, final assembly and acceptance trials would be undertaken at Renk.

Audit scrutiny (October 2014) of the Indian Navy's and CSL's records showed that :

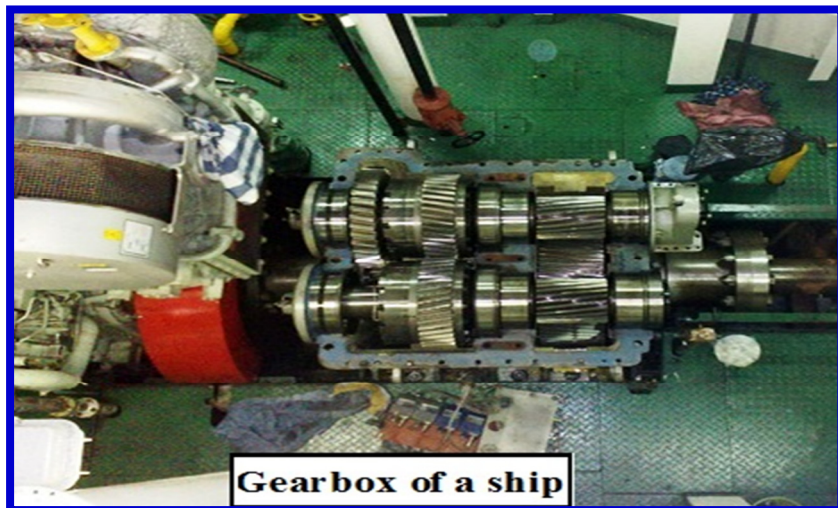
- The Quality Assurance Establishment (QAE) observed (January 2009) that during impact testing (October 2008) and re-testing (November 2008) of disc wheels, test pieces failed due to low impact value³⁵,

³⁴ Renk – Original Equipment Manufacturer / Foreign Collaborator of Elecon for the Gear Boxes

³⁵ Low impact value – the OEM indicated that low impact value could be due to high tensile strength or grain growth. Further testing ruled out grain growth.

indicating issues in quality. Low impact value was due to high tensile strength which in the opinion of the OEM, could be tolerated. However, QAE observed (January 2009) that the specification approved by the Directorate of Quality Assurance (Warship Projects) did not have any clause for acceptance of material with low impact value having high tensile strength.

- Nearly one year after, the Directorate of Marine Engineering observed (December 2009) that the manufacturing of Gear Box components had repeatedly reported defects³⁶ due to production/quality problems at Elecon.
- A joint meeting was held (February 2010) wherein non-conformities pertaining to rotating components (input shafts) and static components (casing) were discussed. It was decided that if the Gear Box components were found recoverable by Renk (foreign collaborator), they would be shifted to Renk for final machining/corrective operations. The firm committed to deliver the two Gear Boxes in October and November 2010 respectively, which was shifted (September 2010) by the firm to April 2011 and May 2011.



³⁶ Defects - including (i) delayed cracking on discs (ii) broken/damaged tooth of a gear pinion (iii) runouts beyond permissible limits on both input shafts of the Port GB (iv) bore dimensions, centre to centre distance and parallelity beyond permissible limits on Port GB casing

The Gear Boxes were finally delivered by February 2013, a delay of four years. Consequently, instead of launching, a technical float-out (an unplanned/unscheduled activity) of the ship was carried out in December 2011 without DAs/Gear Boxes. The ship was re-docked in February 2013 for installation of DAs/ Gear Boxes and launched finally in August 2013, entailing a delay of 34 months from scheduled launching in October 2010.

(ii) Heating, Ventilation and Air Conditioning System

Heating, Ventilation and Air Conditioning (HVAC) system is a vital system which impacts the overall ship thermal management system and manages supply, exhaust and recirculation of air in every ship compartment.

The Indian Navy provided the Single Line Diagram³⁷ (SLD) (September 2008) to Cochin Shipyard Limited (CSL) to proceed with modeling in Tribon³⁸. CSL placed Purchase order (PO)³⁹ (May 2010) on Johnson Controls Limited (JCL) for detailed design, fabrication and supply of HVAC system onboard IAC at a cost of ₹97.42 crore, with delivery to be completed by March 2012.

Audit scrutiny of Indian Navy's, CSL's and JCLs records showed that:

- Placement (May 2010) of the Purchase Order (PO) by CSL was prior to finalisation of the HVAC design
- JCL submitted (April 2010) a design validation report for the HVAC system to Indian Navy for approval, in which the firm had brought out design errors and inadequate calculations carried out by Indian Navy. Hence, JCL recommended essentially required modifications, which were accepted by Indian Navy.
- In September 2010, Indian Navy requested additional changes to HVAC design including change in compartment temperatures, manning policy and heat loads etc. Accordingly, JCL submitted the revised Single Line Diagram (SLD) for HVAC in June 2011 which was approved by the Indian Navy in October 2011. The new SLD was entirely different

³⁷ Single Line Diagram - is the blueprint for electric system

³⁸ Tribon – Tribon is a comprehensive 3D shipbuilding software that supports the complete the shipbuilding process material and document control and even product lifecycle after the ship is delivered. The software is being used by public sector shipyards, besides other privately owned shipyards in India

³⁹ Purchase order - for detailed design, fabrication, supply, installation and commissioning of HVAC

from the Navy's earlier (September 2008) approved SLD, thereby CSL had to undertake complete modification of HVAC. This resulted in variation in the quantity of equipment from original purchase order as well as certain technical requirements/ additional scope which were addressed through an amendment (March 2013).

- During a meeting (December 2012) for Aviation Facilities Complex (AFC) equipment, Russian delegation stated that room air requirements and duct layout inside AFC spaces would be provided by them. Accordingly, HVAC design in AFC compartments had to be modified, which resulted in technical requirements/additional scope, which was addressed by separate Work Order (March 2014).
- Russian side intimated (April 2014) that heat loads in AFC Power Supply System (PSS) compartments were on higher side than those specified initially and hence needed to be recalculated. The heat load changes in AFC PSS required a complete rework of AFC redesign work already completed by JCL. Even after meetings (July 2014 and December 2014) to discuss additional modification on HVAC and finalise redesign inputs, it was seen that Indian Navy has been forwarding further modification requests to JCL even in April 2015.

It was observed that CSL highlighted that changes to HVAC design impacted the design of 800 out of a total of 2,300 ship's compartments, which was likely to have a cascading impact on the design completed in the compartments. Consequently, CSL projected in the PERT chart (September 2014) revised timelines of December 2019 for installation and setting to work of the HVAC system, against targeted delivery of the ship in December 2018.

2.4.4.2 (b) Integrated Platform Management System

Integrated Platform Management System (IPMS) is a distributed control and monitoring system (with 13000 inputs/outputs) of the ship's machinery related to propulsion, power generation & distribution, and auxiliary machinery.

As per the Phase-I contract (May 2007), Statement of Technical Requirement (SOTR) was to be finalised by the Indian Navy by August 2007, with placement of order by CSL in June 2008 and delivery by June 2010. Purchase Order (PO) was placed (October 2010) by CSL on Bharat Heavy Electricals Limited for supply of IPMS and Onboard Spares

and Special Tools, at a total order value of ₹41.56 crore, with the scheduled date of delivery as October 2012.

Audit observed that:

- The Indian Navy finalised the Statement of Technical Requirement for IPMS in September 2008 against August 2007 as scheduled in the Phase-I contract.
- The issue of data sharing was not dealt prior to issue of tenders and was taken up by the Navy only during technical negotiations (July 2009), which caused a delay of nearly eight months in deciding technical suitability.
- Due to additional requirements projected by the Indian Navy, scope of work had been altered and two amendments were issued (June 2014 and December 2014) for change in deliverables, affecting delivery of the system.
- There were disagreements between Bharat Heavy Electricals Limited (BHEL) and Cochin Shipyard Limited (CSL) over issues relating to finalization of input/output list, documents pending with BHEL for submission to the Indian Navy/CSL, collection of interface data from various OEMs and Software Requirement Review.

Changes to the scope effected by the Indian Navy after placement of PO coupled with disagreement over issues affecting delivery of the system was affecting the cardinal dates of the ship as of June 2015.

2.4.4.2 (c) Aviation Facilities Complex equipment

Aviation Facilities Complex (AFC) ⁴⁰ design was to be completed by December 2004 which was actually completed in January 2009, as discussed in Para 2.3.4.1 (a). Therefore, procurement action for 32 AFC equipment⁴¹ could be initiated only in April 2009 as against the scheduled timeline of December 2006.

Audit scrutiny of records of Indian Navy and CSL showed that:

⁴⁰ AFC – items, systems and technical devices required for using the aircraft onboard the ship

⁴¹ 32 AFC equipment – 35 AFC equipment were there as of May 2009, which are now 32 equipment as of November 2015

- Out of 14 non-Russian origin equipment, nine were ordered between May 2010 and October 2015, indicating that even 8 years after scheduled timelines, remaining equipment were yet to be ordered. Of these, seven equipment have been received between September 2012 and May 2015, while two equipment are expected to be delivered in May 2016/June 2016.
- 17 Russian origin Aviation Facilities Complex (AFC) equipment have been ordered between January 2012 and November 2015, after conclusion (June 2011) of a General Contract⁴² between CSL and Rosoboronexport. This indicated that procurement commenced nearly 5 years after scheduled timeline of December 2006. Of these, six have been received between December 2014 and June 2015. Out of the remaining 11 equipment, four equipment *i.e.*, arresting gear, hydraulic stations, restraining gear, Navigation Complex Ilmen-71, for which deliveries were scheduled between July 2013 and October 2014, were not delivered as of November 2015. The deliveries for the remaining seven out of 11 equipment were expected between December 2015 and March 2019 (beyond ship's targeted delivery of December 2018).
- The protocol (August 2015) of the 26th meeting of Indo Russian Inter Governmental Commission–Military Technical Cooperation (IRIGC-MTC) highlighted that delay in delivery of the arresting gear and restraining gear was seriously impacting the construction schedule of the IAC.

In response to audit query, Directorate of Naval Design (DND) admitted (November 2015) that delay in delivery of ordered AFC equipment and delay in concluding contracts for balance AFC equipment had affected the progress of construction of Indigenous Aircraft Carrier (IAC). DND also replied that lack of design information on some of the ordered

⁴² General Contract – an umbrella contract for placing orders on ROE under separate supplementary agreements which are concluded for manufacture and delivery of AFC equipment. Signed (June 2011) between CSL and Rosoboronexport (ROE) on turnkey basis, it stipulated that the supplier would render technical assistance in the form of documentation, installation, trials and performance of the AFC equipment within 66 months from the date on which the contract comes into effect. The general contract had come into effect from 01 August 2012

Russian equipment and unordered AFC equipment was precluding the completion of modelling of compartments above 4th deck and thereby delay in outfitting of these compartments.

2.4.4.2 (d) Combat Management System

Combat Management System (CMS) for IAC is a software/hardware integration project, designed to handle various battle scenarios.

As per the agreed schedule (July 2008) between Indian Navy and CSL, CMS was to be ordered by November 2009 and delivered by December 2011.

Audit scrutiny (September 2015) of records revealed that:

- Statement of Technical Requirement was forwarded (January 2010) by Indian Navy to CSL for initiating tendering and procurement action in January 2010, as against the scheduled date of November 2009 for ordering the equipment.
- The Indian Navy did not firm up the scope of work prior to initiating tender action and post tender opening (September 2010), more than 13 months were taken in finalising the issues in technical negotiations (November 2011).
- During and post TNC, it was seen that Indian Navy had proposed new technical requirements and changes to scope of work like (i) requirement of a design consultant for development of application software (ii) CASE⁴³ tools for development with 05 year support and upgrades to be provided by the OEM with warranty. Purchase Order (PO) was eventually placed by Cochin Shipyard Limited (CSL) on Tata Power Co Ltd (TPCL) in July 2012 .
- Post issue of purchase order (PO), TPCL raised (October 2012) certain issues about the ambiguity in the Purchase Order Technical Specification (POTS) enclosed with the PO. A meeting was held (October 2012) between Indian Navy and TPCL to convey the Navy's stand on the issues raised by TPCL, indicating lack of clarity in the scope of work even 04 months after placement of PO.
- Changes in requirement by the Indian Navy had extended the timeline for design and development stages. The Indian Navy

⁴³ CASE – Computer Aided Software Engineering

initiated more than 300 design change requests leading to rework. There were change requests which had not yet been discussed and approved (May 2015).

Consequently, as seen from the records of CSL, delay in delivery would have serious impact on the work content of the yard and IAC project timelines due to late arrival of equipment and transshipping majority of large size consoles (to be installed onboard as per Phase-II contract) in lower deck areas.

2.4.4.2 (e) Fire Fighting System for Machinery compartments

The fire fighting system for machinery compartments is designed to fight major fires in the engine room and Diesel Alternator (DA) room. It is essential for setting to work⁴⁴ and trials of equipment in the engine room and Diesel Alternator (DA) room.

Audit observed (September 2015) that changes to technical requirements/specifications of the fire fighting system and lack of decisive and timely action while tendering by IN/CSL led to repeated re-tendering (April 2011, October 2012, September 2013 and August 2014). As per the PERT chart appended to the Phase-II contract (December 2014), DA trials are scheduled between December 2015 and December 2016.

However, CSL had informed (June 2015) the Ministry of Shipping that the design of the system had not been finalised and the delay would lead to rework on the outfitting front in the engine rooms, where the yard had already gone ahead and completed issue of all drawings. Audit observed that the purchase order had not been placed till September 2015.

2.4.5 Project Management and Overseeing

The Ministry's proposal (May 1999) to the Cabinet Committee on Security (CCS) considered it necessary to have a two tier Project Management Board (PMB) under an Empowered Apex Committee⁴⁵ (EAC)

⁴⁴ Setting to Work – operation of equipment independently on completion of installation onboard and to conduct checks on the necessary parameters.

⁴⁵ Empowered Apex Committee - Ministry of Defence constituted the EAC in April 2005 with Defence Secretary (Chairman), Vice Chief of Naval Staff (Alternate Chairman) and Secretary (Defence/Finance), Special Secretary (Acq), Addl Secretary (I), Joint Secretary (Shipping), Chief of Material, Controller of Warship Production & Acquisition, Assistant Chief of Naval Staff (Policy & Plans), Director General Naval Designs, Principal Director Naval Design and Assistant Controller Carriers Projects as members

and an Air Defence Ship (ADS) Project Group headed by a Rear Admiral with a view to minimize time and cost overruns. The revised proposal (October 2002) of the Ministry further provided for the Steering Committee⁴⁶ as part of the two-tiered PMB and brought out that a Warship Overseeing Team (WOT) would also be set up to supervise and oversee the construction of the ship at Kochi.

Besides the above mechanisms, the Ministry had constituted the Assistant Controller Carrier Projects (ACCP) in May 2000 and the Integrated Project Management Committee (IPMT) in March 2006. The first CPRM for review of the project took place in May 2003.

Audit findings on the setting up and functioning of these project management and monitoring mechanisms is discussed in subsequent paragraphs:

2.4.5.1 Delayed constitution of the Empowered Apex Committee

Audit observed (July 2014) that the Empowered Apex Committee (EAC) was constituted only in April 2005, nearly six years after the project was approved (May 1999) by the Cabinet Committee on Security (CCS). Directorate of Naval Design (DND) admitted (July 2014) that the project was being monitored by the Steering Committee.

Audit, however, observed that the impasse over procurement of steel arose in December 2003 and EAC was not constituted by then, preventing the project from receiving its guidance then.

2.4.5.2 Role and Functions of the Monitoring Mechanisms

(A) Empowered Apex Committee

- Authorised to exercise full powers of the Government for project execution, review physical and financial progress and take corrective measures.
- Looks into all issues entailing time and cost overruns referred to it by the Steering Committee on the IAC project.

⁴⁶ Steering Committee - Ministry of Defence constituted the SC in June 2004 with Additional Secretary (Chairman), Principal Director Naval Plans (Member-Secretary) and Jt Secretary & Acquisition Manager (Maritime & Systems), Addl Financial Adviser in charge of Naval Acquisition and Jt Secretary (IWT) (in charge of CSL), Director (Operations), Assistant Controller Carrier Project, Principal Director Naval Design as members

(B) Steering Committee

- Monitoring the progress of work in each contract and ensuring completion of stipulated activity at each stage
- Referring all issues which entailed time/cost overruns to the Apex Committee.

(C) Integrated Project Management Team

- Examining and expediting all aspects of design, construction of the ship
- Regularly reviewing the progress against measurable targets

2.4.5.3 Shortfall in frequency of meetings

Audit observed (July 2014)

- Shortfall in frequency of meetings of the various project monitoring committees. The details from first meeting till June 2014, are tabulated below:

Mechanism	First meeting	Total number of meetings to be held since first meeting	Actual number of meetings held till June 2014	Shortfall (per centage)
EAC	August 2005	20	8	60
Steering Committee	February 2001	54	8	85
CPRM	May 2003	45	18	60
IPMT	May 2006	198	18	91

- During the entire duration (May 2007-August 2013) of execution of the Phase-I contract (May 2007), only one meeting of the Steering Committee was held (September 2007), indicating that the Committee was dysfunctional for the above mentioned duration. The next meeting after September 2007 took place only in May 2015. The absence of meetings during this period precluded any reference to the Empowered Apex Committee about issues which entailed time/cost overruns.
- Further, there was no meeting of the Steering Committee between July 2001 and May 2004 when the bottleneck over procurement of steel from Rosoboronexport arose (December 2003). The project was therefore, devoid of its guidance on this issue.

- There were no meetings of IPMT between December 2010 and June 2014, preventing examining/expediting all aspects of design, construction of the ship.

Directorate of Naval Design (DND) accepted (August 2014) that there was shortfall in meetings of project monitoring committees.

2.4.5.4 Effectiveness of CWP&A Progress Review Meeting

CWP&A Memo 01/98⁴⁷ (February 1998) stipulates that for every delay, the shipyard is to render a report to WOT, which in turn, will put up a detailed report⁴⁸ to IHQ MoD (N) whose findings should be ratified during the ensuing CWP&A Progress Review Meeting (CPRM) and the minutes of CPRM are to conclusively attribute delays along with the revised cardinal dates and cost overruns.

It was noticed in audit that only six notices of delay (with respect to equipment) were served (September 2007) by the shipyard and none thereafter. There were no reports rendered by WOT(K) as per the prescribed format of the Memo. Resultantly, CPRMs were not sufficiently apprised of delays, so revised cardinal dates and cost overruns could not be realistically determined. DND accepted (September 2014) that delays were discussed in CPRMs in the form of issues and action addressees only.

It is evident that the mechanism to capture time and cost overruns had not been scrupulously followed, depriving the project of the course of action to mitigate the effect of delay as well as preventing an assessment of the implications of delay on the sanctioned cost and time of the Project.

2.4.5.5 Monitoring of physical progress

Naval Engineering Standard (NES) 33 (May 1981) prescribes a form of reporting procedure throughout the period of building a ship, condensing any ship progress into a coherent series of documents which together allow a quick and accurate assessment of overall progress. There are 11

⁴⁷ CWP&A Memo – Procedure for Reporting and Attributing Causes for Delays in Shipbuilding

⁴⁸ Detailed report – covered aspects like (i) recommended course of action to mitigate the effect of delay (ii) implications of delay on the sanctioned cost and time of the Project (iii) revised PERT chart consequent to the delay

essential reporting subjects/groups. Formats have been prescribed for six⁴⁹ groups which include one group (Group C) for reporting on activity-wise percentage progress of work at the ship and in the shop.

Audit observed (September 2015) that the Ministry failed to incorporate tables containing the following aspects (from six essential formats for progress reporting by the shipyard) in the contracts.

- Milestones programmed but not achieved till date of report, with reasons for failure and revised date (ii) milestones at risk during next three months, with reasons for doubt and revised date
- Number of drawings programmed for completion at report date and number of drawings issued to production, with breakup of drawings between Ship, Mechanical and Electrical drawing offices etc
- Progress of work at ship and in shop showing activity-wise percentage programmed and actually completed
- Break-up of utilisation of manpower between planning office, hull drawing office, mechanical drawing office, electrical drawing office, quality assurance etc., with cumulative hours charged to ship at the date of the report.

Resultantly neither the Ministry nor CSL could assess the physical progress of construction as the reported progress of construction did not convey the true picture of the state of construction, the rate of construction and the required rate of construction to meet the targeted delivery of the ship in December 2018.

2.5 MiG29K/KUB Aircraft

2.5.1 Procurement of aircraft

MiG29K is the mainstay of the Indian Navy's fleet air defence, being the choice of aircraft for both the aircraft carriers, viz. INS Vikramaditya and

⁴⁹ Six reporting groups –Group A (Progress against Cardinal Date Programme), Group B (Drawings-Issue of drawings to production), Group C (Progress of Design/Development), Group D (Utilisation of Labour), Group E (Equipment procurement-Shipbuilder Supplies item), and Group F (Equipment Procurement-Ministry's Supplies Items)
Remaining five groups – Group G (Quality Documentation), Group H (Alterations and Changes) Group J (Weight and Stability Control), Group K (Type Testing), and Group L (Support Management)

Indigenous Aircraft Carrier (christened as INS Vikrant) as well as two naval air stations on the East and West coast.

The MiG29K of the Indian Navy is a new generation aircraft and has a newly designed airframe with latest technology, incorporating high strength composites in its construction making the structure significantly more resilient than its predecessors *i.e.*, MiG29, as indicated in the Cabinet Committee on Security approval of December 2009. The aircraft has fly-by-wire⁵⁰ technology and its RD 33 MK engines are a definitive advancement over the MiG29.



The Ministry concluded (January 2004) a contract with the Russian Aircraft Corporation (RAC) MiG for acquisition of 16 MiG 29K/KUB aircraft⁵¹ and associated equipment at a cost of USD 740.35 million (₹3,568.49 crore), which included 13 aircraft for Admiral Gorshkov (*i.e.*, INS Vikramaditya). Thereafter, the Ministry had concluded (March 2010) an Option Clause contract for acquisition of 29 MiG 29K/KUB aircraft (which included 12 MiG29K and one MiG 29KUB for the Indigenous Aircraft Carrier (IAC) at a cost of USD 1466.44 million (₹6,840.94 crore), estimating that the IAC would be delivered by 2014. The deliveries of the Option clause aircraft scheduled between 2012 and 2016 are much ahead of the delivery schedule of the IAC in 2023, as projected by Cochin Shipyard Limited.

⁵⁰ Fly-by-wire (FBW) is a system that replaces the conventional manual flight controls of an aircraft with an electronic interface and allows automatic signals sent by the aircraft computers to perform functions without the pilot's input, as in systems that automatically stabilise the aircraft

⁵¹ 16 MiG 29K/KUB aircraft– includes 12 MiG 29K, 01 MiG 29KUB for INS Vikramaditya and none for IAC

Audit scrutiny of documents relevant to the MiG 29K/KUB aircraft revealed the following issues:

2.5.2 Quality of the MiG29K/KUB

As per the Cabinet Committee on Security approval of December 2009 for acquisition of 29 MiG29K/KUB aircraft under Option clause of the Main Contract (January 2004), the carrier compatibility of MiG29K aircraft would be tested/evaluated⁵² on the Russian carrier Kuznetsov in Russia followed by certification trials from ex-Gorshkov once she is ready.

As per Clause 1.3 of the Main contract (January 2004) and Option clause contract (March 2010), aircraft shall mean MiG29K and KUB aircraft which are capable to be used from Project 11430 (INS Vikramaditya). All 16 aircraft of the Main contract were delivered between December 2009 and October 2012. The first deck landing of the MiG29K/KUB on the decks of Admiral Gorshkov was undertaken at Russia in July 2012.

Since the capability of the Main contract aircraft could not be tested/proved from the decks of INS Vikramaditya prior to exercising the Option clause, the quality of the airframe, engines as well as fly-by-wire of the MiG 29K/KUB remained un-assessable prior to exercising the Option clause.

2.5.2.1 RD-33 MK Engine

The service life of RD-33MK engine fitted on MiG29K/KUB is 10 years/4000 hours with an overhaul life of 1000 hours.

The Navy had placed on RAC MiG a total order for 113 engines along with 45 aircraft (90 installed on aircraft⁵³ and 23 spare engines) under Main and option clause contract. The Indian Navy accepted 21 aircraft up to September 2014.

⁵² Tested/evaluated – RAC MiG had successfully completed carrier demonstration trials from the Russian carrier Kuznetsov on 29 September 2009

⁵³ MiG29K/KUB-consisting of two engines



Audit observed (December 2014) that as of September 2014, a total of 65 engines (42 with 21 aircraft and 23 spare) had been accepted. However, since induction in February 2010, 40 engines (representing 62 per cent of 65 engines) had been withdrawn from service/rejected due to design related defects/deficiencies. The issue had serious flight safety implications, since in-flight engine defects had led to ten cases of single engine landings.

Audit further observed from the protocol (September 2014) of the 16th IRIGC-MTC⁵⁴ that RAC MiG had forwarded a list of 17 modifications which they had scheduled to complete on all engines held in India by November 2014. However, as of September 2015, it was seen that four modifications (out of 17) had been implemented by RAC MiG on all engines and balance 13 modifications would be implemented as and when engines were sent to OEM at Russia for overhaul/repair.

In response to audit query about status of repairs on engines withdrawn, the Indian Navy replied (November 2015) that repairs of defective engines were being taken up with RAC MiG based on warranty/non-warranty basis, adding that repair of non-warranty engines were being progressed under IHQ MoD (N) indents.

⁵⁴ IRIGC-MTC : Indo Russian Inter-Governmental Commission – Military Technical Cooperation

The fact remains that up to August 2015, the number of engines withdrawn from service/rejected was 46, indicating that even as the RD-33 MK engine was considered an advancement over the engine of the MiG29, its reliability remains questionable.

2.5.2.2 Failure of airframe parts during deck operations

Major defects arose during first (July 2012) and subsequent deck trials of the MiG 29K/KUB on Admiral Gorshkov as reported (July 2013) by Headquarters Western Naval Command, Mumbai to Directorate of Naval Air Staff. The Russian Aircraft Corporation (RAC) certified (May 2014) that aircraft performance of MiG29K/KUB aircraft under tested conditions of INS Vikramaditya operations mainly conformed to the assigned specifications, however added that weaknesses were revealed during flight tests, which were to be eliminated. Directorate of Air Support Equipment informed (June 2014) RAC MiG that numerous defects⁵⁵ pertaining to failure of airframe parts had occurred during deck operations despite modifications.

Responding to audit query (August 2014), Navy stated (September 2014) that the defects on the aircraft were being monitored and RAC MiG was being apprised of the criticality to initiate suitable remedial measures.

Audit, however observed from the protocol of the 18th Indo Russian Inter Governmental Commission – Military Technical Cooperation (IRIGC-MTC) (August 2015) that defects had occurred despite numerous design improvements and modifications and regular occurrence of these defects on sortie to sortie basis was having an adverse impact on Indian Navy pilots training and capability of aircraft for undertaking prolonged deployments.

2.5.2.3 Fly-by-wire system

Audit observed (December 2014) from the Agenda points of 6th Reliability and Maintainability Programme Plan (RMPP) for MIG29K/KUB aircraft that the reliability⁵⁶ of the fly by wire was very poor, ranging from 3.5 *per cent* to

⁵⁵ Defects - Defect of shearing of side bolt of engine mounting, failures of INCOM mounting tray, failure of Radar scanner mountings had been observed

⁵⁶ Reliability – calculated in terms of percentage of Mean Time Between Defects (MTBD) actual as against MTBD by OEM. MTBD is the arithmetic mean flying hours between defects, calculated by dividing the fleet flying hours in a given operation period by the number of defects observed in the same operating period

7.5 per cent between 01 July 2012 and 30 June 2014 and measures were to be taken by RAC MiG to improve reliability of the system.

2.5.3 Delay in build-up of aircraft

As per Clause 16 of the Option Clause contract (March 2010), post delivery of aircraft, the Russian Warranty Team (RWT) has to assemble/build up⁵⁷ the aircraft and offer to the Navy for technical acceptance.

Audit scrutiny revealed:

- The service life of the aircraft is 6000 hrs or 25 calendar years whichever is earlier, as seen from the Option clause contract (March 2010).
- Out of 19 aircraft delivered up to November 2015, 12 had been built up, with time taken for build up ranging from two months to fifteen months.
- The contract did not stipulate any timeframe for completion of build up/assembly. Therefore, the delays in build up would reduce the service life, thereby impacting the operational life of the aircraft.

2.5.4 Technical Acceptance of the aircraft

As per the Option Clause contract (March 2010), in case the customer's representatives have any observations during the aircraft technical acceptance, these shall be eliminated by the supplier's representative before the Technical Acceptance Report (TAR) is signed. As of November 2015, ten aircraft had been technically accepted.

Audit observed discrepancies/anomalies on the first MiG29K/KUB of the Main Contract technically accepted in February 2010, continued to persist on six aircraft acquired under the Option clause as discussed below :

- The Acceptance Protocols (December 2013 – March 2015) of aircraft showed discrepancies/anomalies with respect to Log cards, passport and defects during pre-flight acceptance of aircraft.
- The Russian side agreed (December 2013 – March 2015) that technical acceptance had not been undertaken in the full scope of

⁵⁷ Build up – Assembly of aircraft after delivery

the aircraft capabilities and the technical acceptance checks as per Clause 16.6 of the contract

- The Russians were paid the final 20 *per cent* towards the cost of aircraft even as the Navy signed the TAR prior to liquidation of limitations

Directorate of Aviation Projects Management (DAPM) at IHQ MoD (N) admitted (December 2014) that various defects/discrepancies/ observations were found during the technical acceptance of the individual aircraft, however stated that they were forwarded to Russian Warranty Team for liquidation.

2.5.5 Low serviceability of aircraft

‘Serviceability’⁵⁸ implies that the aircraft is technically available and is not undergoing a scheduled repair or overhaul at any level.

Audit observed from the Serviceability Status Reports (SSR) of MiG29 K/KUB aircraft at Goa, that the serviceability of aircraft was low, as tabulated below :

Year	MiG29K (per cent)*	MiG 29KUB (per cent)*
2009-10	35	30.83
2010-11	28.73	44.93
2011-12	15.93	37.88
2012-13	32.97	45.66
2013-14	30.49	21.3
2014-15	37.63	47.14

**serviceability is calculated assuming 30 days in a month.*

From the above, it is clear that the serviceability of MiG29K was unsatisfactory, ranging from 15.93 *per cent* to 37.63 *per cent*. However, the serviceability of the MiG 29KUB, i.e., trainer aircraft was comparatively better, ranging from 21.30 *per cent* to 47.14 *per cent*.

2.5.6 Infrastructure for the MiG29K/KUB

The Cabinet Committee on Security (CCS) approved (December 2009) creation of infrastructure at Visakhapatnam for operating MiG 29K/KUB

⁵⁸ *Per cent serviceability - As per Indian Naval Air Publication, percentage serviceability is equal to [(the number of days aircraft serviceable x 100)/No of days in the month].*

aircraft procured as complement of IAC, to be based on the East Coast at an indicative cost of ₹218.30 crore. As per the Option Clause contract (March 2010) 29 aircraft were to be delivered between March 2012 and November 2016. Ten aircraft, totally approximately costing ₹1,680 crore had been technically accepted by the Indian Navy between December 2013 and November 2015.



Audit, however, noticed that the Go-ahead sanction for preparation of Detailed Project Report (DPR) for infrastructure was accorded in August 2014 only and the expected date of submission of DPR is February 2016, six years after in-principle approval (November 2009).

2.5.7 Sub-optimal utilisation of Full Mission Simulator

The Full Mission Simulator (FMS) costing ₹183.16 crore, is a major training aid of the MiG29K and is designed for the ground training of a pilot. The MiG29K Simulator facility had been commissioned at INS Hansa, Goa in May 2013. The MiG29K training squadron has been earmarked at Goa, the squadron however had not been fully operationalised as of September 2015.

Audit scrutiny (August 2014) of records showed that:

- The simulator remained unserviceable (July 2014) due to defects in three out of nine visual channels and was being used for training for basic flying profile akin to a procedure trainer.

- As per the protocol of the 16th Indo-Russian Inter Governmental Commission – Military Technical Cooperation (IRIGSC-MTC) (September 2014), un-serviceability of the simulator had prevented its optimum utilization for training of IN pilots.

In reply to an audit query, Directorate of Aviation Projects Management (DAPM) admitted (December 2014) that the simulator was assessed to be unsuitable for Carrier Qualification (CQ) simulator training for pilots, as the visuals did not support the profile which required high accuracy and fidelity. As of 31st July 2015, the OEM was still in the process of software corrections as required to make the simulator as realistic as aircraft.

2.6 Financial Management

2.6.1 Financial implications (Fixed Cost scope of work)

The Ministry concluded the Phase-I (May 2007) and Phase-II (December 2014) contracts with Cochin Shipyard Limited (CSL) on Fixed Price⁵⁹ and Cost Plus⁶⁰ basis. The Fixed Price scope of work under Phase-I included building and launching the hull of 15,000 tons, outfitting of 2,500 tons and detailed engineering design/drawings whereas Phase-II⁶¹ provided for 6,500 tons of hull fabrication/erection and 5,700 tons of outfitting.



⁵⁹ Fixed Price – building and launching the hull of approx 15,000 tons steel weight and outfitting consisting of approx 2500 tons and detailed engineering design/drawings

⁶⁰ Cost Plus – mainly purchasing of equipment and machinery

⁶¹ Phase-II contract comprised fixed price scope of work and outfitting

2.6.1.1 Sub-contracting by the shipyard

Phase-I contract permitted the shipyard to sub-contract any portion of the steel/outfit work except bow and stern, within the contracted cost of ₹1,040 crore.

Audit scrutiny revealed that the Ministry failed to negotiate/quantify the sub-contracted work/cost, benefitting CSL to the extent of 40 *per cent* as evident in CSL's admission (January 2013) to the Contract Negotiation Committee of Phase-II contract.

In response to an audit query the Indian Navy stated (August 2014) that Cochin Shipyard Limited (CSL) was not contractually bound to furnish details, whereas CSL stated (May 2015) that no separate account was maintained for this purpose.

The fact remains that the Ministry failed to negotiate/quantify sub-contracting work and its cost under the Phase-I contract, thereby, resulting in undue advantage to the shipyard.

2.6.1.2 Manpower and salary hike at CSL

As per Contract Negotiation Committee (CNC) held between July and October 2006 for the Phase-I contract, CSL had considered increase of their direct workers from the then existing strength of 1156 to 1760, *i.e.*, an increase by 52 *per cent*, to ensure launching on or before 31st October 2010. While determining labour-hour rates, CSL had considered 52 *per cent* hike in salary of direct labour, as well as proportionate increase in Labour Overheads consisting of salary of officers, supervisors and indirect workers. CNC finally agreed for 35 *per cent* increase and negotiated the fixed price cost of the Phase-I contract to ₹1,040 crore.

Audit noticed from the Annual Reports of CSL that even the aggregate of direct and indirect workers at CSL never reached 1760 between 2007-08 to 2013-14, as evident from the bar chart given in Annexure-IV. Thus, the yard derived undue benefit owing to no increase in manpower.

2.6.1.3 Incorrect estimation of man-hours

The Phase-I contract (May 2007) covered 15,000 tons of hull fabrication/erection and 2,500 tons of outfitting under fixed price scope of work.

Audit observed from the Contract Negotiation Committee (CNC) (February 2013) for Phase-II contract that CSL consumed 8.58 lakh man days 'in-house labour' (68.64 lakh man-hours) to achieve 12,894 tons of fabrication/erection and 1,310 tons of outfitting under Phase-I contract (May 2007) by the end of March 2012. With this input, audit calculated (October 2014) that, as of March 2012, the shipyard effort was to the tune of ₹358.53 crore only with reference to man-hour rates accepted whereas the yard received ₹834.68 crore (worked out proportionately for the *ibid* quantity of work) under Phase-I contract. Due to overestimation of per ton man-hours to be utilised for fabrication and outfitting on one hand and actual consumption of lesser man hours in comparison on the other under Phase-I contract, led to inflated reimbursement to Cochin Shipyard Limited (CSL), which according to audit estimation works out to ₹476.15 crore, as tabulated in Annexure -V.

In response to audit query (October 2014), Directorate of Naval Design (DND) stated (February 2015) that the payments made to CSL were in accordance with the milestones as agreed by the CNC and as mentioned in the contract.

The reply is evasive because the Contract Negotiation Committee for the Phase-I contract had negotiated the fixed cost to ₹1,040 crore, while incorrectly estimating the man-hours.

2.6.2 Fund Releases and Flexi Account

The Work Orders (January 2004 and November 2005) stipulated that the shipyard would submit forecast of funds required to Integrated Headquarters Ministry of Defence (Navy) [IHQ MoD(N)] and advances would be paid for incurring expenses, which would be kept in a separate account and any interest earned on such advances shall be credited to the project with effect from 1 April 2005.

CSL opened (August 2006) a Flexi Account⁶² with the Union Bank of India, to receive funds released by the Owner (Navy) against projections by the Builder on quarterly basis for the financial year.

Audit observed that:

- (a) Huge amounts ranging from ₹186 crore to ₹602 crore, were lying unutilised in the Flexi Account at close of the financial years ending 2006-07 to 2012-13, as given in Annexure-VI. WOT(K) accepted (September 2014) that amounts were not utilised by CSL as projected, citing delays in fund outgo on account of equipment delivery as well as stage payments.
- (b) CSL withdrew unilaterally a total of ₹51.75 crore on three occasions between March 2009 and March 2014, which were later adjusted/deposited back.

Therefore, the Flexi Account was being operated with weak financial controls and there was a need to bring robustness in the operation of the flexi account.

2.6.3 Financial implications (Cost Plus scope of work)

The Phase-I contract (May 2007) and Phase-II contract (December 2014) included Cost Plus activities in their scope of work, which mainly comprised purchase of equipment and machinery.

Audit scrutiny revealed the following:

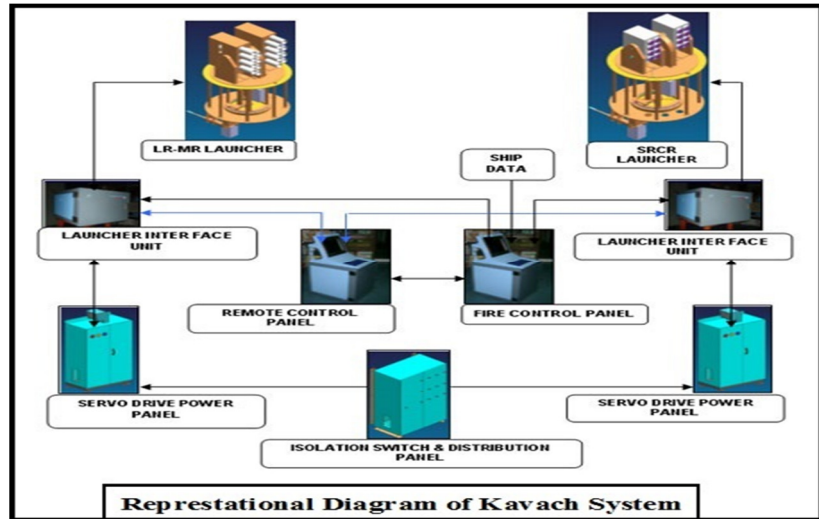
2.6.3.1 Procurement of KAVACH MOD-II

Based on the nomination of the Indian Navy, Cochin Shipyard Limited (CSL) floated a tender enquiry to MTPF⁶³ in March 2011 for procurement of Kavach MOD-II (Anti-missile Chaff System). The technical evaluation of the bid, received in June 2011 with validity up to 31 August 2013, was carried out in

⁶² Flexi Account - a special kind of account offered by banks, which is a combination of demand deposit and a fixed deposit. The depositor is able to enjoy both the liquidity of savings and current accounts as well as the high returns of fixed deposits.

⁶³ Machine Tools Prototype Factory, Ambernath under Ordnance Factory Board.

October 2012 and the Indian Navy technically accepted the offer in June 2013. Subsequently, the PNC was held in August 2013 wherein MTPF put forward additional commercial conditions. However, Integrated Financial Advisor (Navy) did not approve of placement of order on these conditions and asked the Indian Navy to obtain waiver from the Ministry.



Meanwhile, Cochin Shipyard Limited (CSL) sought six extensions for validity of the bid, the last extension being up to 28 Feb 2014. The requisite waiver from the Ministry was received in January 2014. CSL asked MPTF to extend the validity up to 30 April 2014, which was not agreed to by MTPF. Finally, the purchase order was placed by CSL at a cost of ₹24.57 crore against the negotiated quote of ₹21.91 crore, resulting in avoidable expenditure of ₹2.66 crore.

2.7 Conclusion

Even though the operational requirement for a ship of 37,500 tons was identified in 1990, the Preliminary Staff Requirements for the Indigenous Aircraft Carrier of 37,500 tons were not promulgated before obtaining approval (October 2002) of the Cabinet Committee on Security. The Build Strategy has undergone numerous revisions, preventing the project from reaping the benefits of a finalised Build Strategy. The Indian Navy envisioned

adoption of the Integrated Hull Outfit and Painting (IHOP) approach to reduce the build period and increase productivity. However, adoption of concurrent design approach compromised the IHOP method. There were delays in conclusion of the contract for the Aviation Facilities Complex design and Propulsion Systems Integration, which had a cascading effect on the project timelines.

The Phase-II contract was to be concluded six months prior to completion (August 2013) of the Phase-I contract, however, there was undue delay in conclusion of the Phase-II contract (December 2014). As a result, there was no contractual monitoring of the project during the intervening period of 16 months. The shipyard projected that delivery schedule of the aircraft carrier would be in 2023, against December 2018 as per approval of the Cabinet Committee on Security. The Indian Navy and the shipyard were not operating in sync, which was reflected in lack of agreement on project timelines as well as lack of review of project timelines, for arriving at realistic delivery date. Commencement of production had been delayed due to non-availability of requisite steel. Launching of the ship under Phase-I contract could not be achieved as per schedule due to non-availability of major equipment. The Ministry did not incorporate stipulated progress reporting formats in the contracts. Thus, an objective assessment of the actual state of physical construction was not possible.

Effective project management is imperative to project success, yet there was shortfall in the frequency of meetings of the project management committees. Failure to negotiate/quantify the sub-contracting work and its cost led to undue advantage to the shipyard. Further, incorrect estimation of man-hours resulted into inflated reimbursement to the yard.

MiG29K, the chosen aircraft for the Indigenous Aircraft Carrier continues to face operational deficiencies due to defects in engines, airframe and fly-by-wire. Carrier compatibility of the aircraft during deck operations is yet to be fully proved and multiple modifications are being carried out to liquidate defects. Further, the aircraft continues to suffer from low serviceability. As a result of issues facing the MiG29K/KUB and the delayed delivery of the IAC, the service life of the aircraft would be reduced, thereby affecting the

operational life of the aircraft already delivered. The delivery of the Option clause aircraft scheduled between 2012 and 2016, is much ahead of the delivery schedule of the IAC, in 2023 as projected by Cochin Shipyard Limited.

In sum, while the Indian Navy envisions ready combat availability of two aircraft carriers at any given time, with INS Vikramaditya in service and INS Viraat likely to be decommissioned in 2016-17, continuous shifting of timelines of delivery of the Indigenous Aircraft Carrier will adversely impact naval capabilities.

CHAPTER III: MINISTRY OF DEFENCE

3.1 Non-delivery of sewage barges

Acquisition of sewage barges initiated by Indian Navy is yet to fructify because of its failure to carry out the required capacity assessment of the shipyard resulting in non-achievement of core objective of prevention of sea pollution even after spending ₹25.97 crore.

Indian Navy proposed (November 2007) to induct six sewage barges having capability to collect, treat and discharge the treated sewage from warships and other crafts at sea/ harbour.

Amongst the five shipyards¹ who were technically compliant and had submitted their techno-commercial bids, a contract was concluded (March 2012) with M/s Bharati Shipyard Limited (BSL) Mumbai, the lowest bidder, at a total cost of ₹102.67 crore. The delivery schedule for the first sewage barge was 18 months from the date of signing of the contract *i.e.*, in September 2013 and thereafter, one sewage barge each was to be delivered at an interval of three months.

On an Audit query (January 2015) regarding the delivery of sewage barges and the system followed by Indian Navy for collection and treatment of sewage, Indian Navy intimated (March 2015) Audit that none of the sewage barges had been delivered and further added that the sewage was collected in internal tanks of the ships and discharged at high seas.

Audit observed (October 2015), that Indian Navy did not assess² the capacity of M/s BSL before concluding the contract (March 2012) with them, even

¹ a) M/s. Bharati Shipyard Ltd, Mumbai b) M/s. Shoft Shipyard, Thane c) M/s Modest Shipyard, Mumbai d) M/s Corporated Shipyard, Kolkata e) M/s Temba Shipyard, Chennai.

² Capacity assessment is carried out prior to issue of RFPs for ship/ yard craft building in order to determine the capability of the shipyard to undertake the required ship building activity. The assessment includes Technical capacity and Financial strength of the shipyard. The validity of capacity assessment is for two years.

though previous capacity assessment of the shipyard was done in February 2009, wherein review was recommended after a period of two years (February 2011). Audit further observed (October 2015) from records that Indian Navy had called for (February 2013) the credit rating of M/s BSL and in their reply BSL had intimated (March 2013) Indian Navy that it faced liquidity mismatch since 2009 due to which the shipyard went into an unhealthy financial state and was undergoing debt restructuring since January 2012. Had Indian Navy carried out the required capacity assessment in February 2011, it would have detected the unhealthy financial state of the shipyard since 2009 and could have avoided entering into a contract with M/s BSL in March 2012.

In reply to further audit observations (October 2015) on the proposed date of delivery of the sewage barges, Indian Navy stated (December 2015) that the proposed delivery dates had now been revised as between 31 May 2016 and 31 December 2016.

Thus, failure of Indian Navy to assess the capacity of the shipyard in February 2011, prior to conclusion of the contract in March 2012, has resulted in non-delivery of the barges and discharge of untreated sewage at high seas thereby defeating the core objective of prevention of sea pollution. Further, even after payment of ₹25.97 crore (March 2015), the delivery of the six barges in near future appears bleak as four out of the six barges were still at the planning stage³ and balance two were at the initial construction stage⁴(December 2015).

The matter was referred to the Ministry (December 2015); their reply was awaited (April 2016).

³ Out of the total fifteen stage payments, the Stage three payment consists of 10 *per cent* on signing the contract, 10 *per cent* on proof of ordering steel, finalisation of build specifications and GA drawings, submission of cardinal date and production PERT and 5 *per cent* on submission of drawing schedule and order of all major pre launch items.

⁴ Stage five consists of details of stage three and 10 *per cent* payment on erection of 60 *per cent* hull and completion of auxiliaries seatings as applicable to erection of 60 *per cent* hull

3.2 Avoidable expenditure of ₹9.97 crore on the procurement of armament for an aircraft

The Ministry concluded a contract on 8 March 2010 with the firm for procurement of armament for MiG29K/KUB by providing price escalation to the firm although an option clause was valid till 27 March 2010 under an earlier contract, resulting in an avoidable expenditure of ₹9.97 crore.

A contract was concluded (March 2006) with Russian Aircraft Corporation MiG, Russia (RAC MiG) for the supply of armament, associated equipment and services for the MiG29K/KUB aircraft. The contract (March 2006) carried an option clause which gave the purchaser a right to purchase additionally from the same firm at the same terms and conditions within four years from the effective date of contract *i.e.*, up to 27 March 2010. The contract had a provision that after expiry of the validity of option clause up to 27 March 2010, the contracted prices would be adjusted by the price escalation at 2.5 *per cent* per annum.

The Ministry of Defence (MoD) obtained (December 2009) approval of Cabinet Committee on Security (CCS) for the procurement of the armament and associated equipment from M/s RAC MiG under the option clause valid up to 27 March 2010.

Audit observed that the contract was signed on 8 March 2010 at a cost of USD 148,755,486.50 (₹693.94 crore) for the armament and associated equipment inclusive of escalation of USD 2,136,962 (₹9.97 crore). This was not correct as the validity of the option clause under the armament contract was till 27 March 2010.

Integrated Headquarters, Ministry of Defence (Navy) stated (November 2015 and February 2016) that reason for the escalation was not found in the file notings and, therefore, could not be commented upon.

Thus, an avoidable expenditure of ₹9.97 crore was incurred by way of price escalation, within the validity of option clause under the contract (March 2006).

The matter was referred to the Ministry (January 2016); their reply was awaited (April 2016).

CHAPTER IV: INDIAN NAVY

4.1 Extra expenditure in procurement of Magnetrons

Integrated Headquarters, Ministry of Defence (Navy) procured Magnetrons for the refurbishment of Transmitter Receiver Units (TRUs) of Radar System of Sea King helicopters from a particular firm at an extra expenditure of ₹8.68 crore. Even after refurbishment, only five TRUs were serviceable against a requirement of 17 TRUs resulting in limited exploitation of the Sea King fleet for local missions only.

Magnetron is a critical sub-assembly of the Super Searcher Radar system installed on Sea King helicopters for surveillance purposes. Magnetrons are required to be integrated in the Transmitter Receiver Units (TRUs) of the Radar for its utilisation. The Indian Navy has an inventory of 17 Sea King MK42B helicopters and each helicopter is fitted with one TRU each. For operational exploitation, the Navy needs a minimum quantity of 20 TRUs (17 for helicopters, 03 as float/reserve) at any given time.

The Radar system installed on Sea King MK42B helicopters was severely affected due to obsolescence and closure of production lines in late nineties by the Original Equipment Manufacturer (OEM) *i.e.*, M/s Thales Aerospace Division (TAD), UK. The serviceability and repair feasibility of TRUs had also been affected, primarily due to non-availability of Magnetrons as these were not available commercially off the shelf (COTS) and had been declared obsolete many years back. In a meeting held (December 2009) by Navy, M/s TAD, UK, intimated that M/s TMD, UK *i.e.*, OEM of the Magnetrons had agreed to commence the production for one last time, subject to the condition that Minimum Order Quantity (MOQ) was 25. It was agreed after deliberations that M/s TAD, UK would source quantity eight Magnetrons for replacement on TRUs held on Indian Navy Repair Orders with them from

M/s TMD, UK and the balance¹ required quantity of 12 Magnetrons would be procured by the Indian Navy.

Directorate of Naval Air Material (DNAM), Integrated Headquarters Ministry of Defence (Navy) [IHQ MoD (N)] issued (February 2010) Request for Proposal (RFP) to eight firms for the procurement of 12 Magnetron. However, RFP was not issued to M/s TMD, UK who was the OEM of the Magnetron, on the assumption that the firm would not accept the terms and conditions of Defence Procurement Manual (DPM)-2009. Out of these, only four firms responded. M/s Aerospace Logistics Ltd., UK quoted PDS 59,222 (₹0.41 crore) (per unit) for Magnetrons, provided that the MOQ was 25, whereas M/s TAD, UK, L-3, quoted a unit price of PDS 118,500 (₹0.81 crore) for 12 Magnetrons. DNAM, however, placed the purchase order (June 2010) on M/s TAD, UK for 12 Magnetrons at PDS 1,379,340 (unit cost PDS 114,945), as two bids (L-1 & L-2) carried MOQ condition for supply of 25 Magnetrons. Magnetrons were supplied by the firm in June 2011.

DNAM further placed seven Repair Orders on M/s TAD, UK between June 2011 and May 2012 for repair/refurbishment of eight² TRUs at PDS 1,560,028 (₹12.86 crore) which included, *inter alia*, the cost of eight Magnetrons at PDS 919,560 (₹7.58 crore).

Audit examination (October 2012) revealed that though the Indian Navy had a requirement for 20 Magnetrons, the L-1 offer of M/s Aerospace Logistics Ltd. UK was rejected, in April 2010, due to the MOQ for 25 Magnetrons. Further, no effort was made to prevail upon M/s Aerospace Logistics Ltd., UK to reduce / delete MOQ condition from their bid. Non-acceptance of the offer led to a loss of PDS 1,115,460³ (₹8.68 crore). The action of DNAM, IHQ MoD (N) was in disregard to the fundamental principles of public buying which

¹ Headquarters Naval Aviation, Goa no. 21/328/10/RADAR dated 3.11.2009

² In one repair order 02 TRUs were repaired

³ Unit cost of Magnetrons purchased outright and under repair orders from M/s TAD, UK = PDS 114,945
Cost for 20 Magnetrons = PDS 2,298,900
Unit cost of Magnetrons from M/s Aerospace Logistics Ltd, UK = PDS 59,222
Cost for 25 Magnetrons = PDS 1,480,550
Difference in cost = PDS 819,350 + 05 Magnetrons worth PDS 296,110 = PDS 819,350 + PDS 296,110
= PDS 1,115,460 (₹8.68 crore)

stipulates that every authority delegated with the financial powers of procuring goods in public interest shall have the responsibility and accountability to bring efficiency, economy, transparency in matters relating to public procurement and for fair and equitable treatment of suppliers and promotion of competition in public procurement.

Additional Principal Director, DNAM (September 2012) admitted to Audit that against the total requirement of 20 Magnetrons, the procurement of 25 Magnetrons vis-à-vis the MOQ at almost half the rate ought to have been made. However, DNAM subsequently apprised (September 2012) Audit that the procurement of Magnetrons from M/s Aerospace Logistics Ltd, UK was not pursued as the firm was not the OEM of the system/component. DNAM also stated (September 2012) that procurement of Magnetrons from the supplier/stockist, to be integrated in the TRUs and furnished by M/s TAD, UK, would have resulted in complex after sales warranty management of dealing with two different agencies / firms.

The reply of DNAM lacks justification because if procurement through repair agency was the preferred choice for the Indian Navy, then short listing of the other seven firms was not required. Further, the issue of warranty and dealing with two agencies could have been mitigated by incorporating better contractual terms and their management. Meanwhile, six out of 12 Magnetrons procured by the Indian Navy in June 2010 were issued to the firm in June 2012 for use in refurbishment of six TRUs.

Audit further noticed (September 2015) that despite sourcing Magnetrons from M/s TAD, UK at higher rates and undertaking the repairs/refurbishment of the TRUs, through them (M/s TAD, UK), their serviceability remained poor and impacted adversely the exploitation of Sea King fleet. The details are discussed below:

- Out of eight TRUs refurbished against seven Repair Orders placed worth PDS 1,560,028 (₹12.86 crore) by DNAM, between June 2011 and May 2012, six TRUs refurbished at a cost of PDS 1,166,495 (₹9.61crore)

continue to be unserviceable as of July 2015. The firm had used their own procured Magnetrons in these TRUs.

- Out of four TRUs⁴ refurbished against four Repair Orders worth PDS 727,210 (₹7.26 crore) placed by Directorate of Aircraft System Engineering (DASE) in March 2014, two TRUs refurbished at a cost of PDS 366,082 (₹3.02 crore) continue to be unserviceable as of July 2015.
- The labour component in Repair Orders placed between June 2011 and May 2012 ranged between PDS 35,733 (₹0.29 crore) and PDS 44,166 (₹0.36 crore) whereas the labour component in Repair Orders placed in March 2014 ranged between PDS 126,507 (₹1.04 crore) and PDS 140,672 (₹1.16 crore). Thus, the labour cost paid in March 2014 was 216 to 254 *per cent* more vis-à-vis Repair Orders placed for refurbishment of TRUs on the same firm between June 2011 and May 2012, resulting in extra expenditure of PDS 353,881 (₹3.52 crore).
- The OEM viz. M/s TAD, UK in October 2013 admitted to the Navy that they did not have the capability to carry out a full overhaul/refurbishment of TRUs.
- The Indian Navy had an inventory of only five serviceable TRUs as of July 2015 against the requirement of 17 TRUs for fitment onboard Sea King helicopter fleet and six out of 12 Magnetrons were with Navy (July 2015).

Directorate of Aircraft Systems Engineering (DASE), IHQ MoD (N) accepted (September 2015) that unserviceability of TRUs had impacted the Sea King helicopters as the fleet was being exploited for local flying missions only.

Thus, the Indian Navy failed to ensure availability of serviceable radars / TRUs despite refurbishment through its OEM, who despite being L-3, were the preferred choice for sourcing Magnetrons at an additional expenditure of ₹8.68 crore. Resultantly, the Indian Navy was constrained to exploit the Sea

⁴ Two remaining TRUs were under refurbishment with the firm as of August 2015

King fleet for local missions only as only five TRUs were serviceable as against a requirement of 17 TRUs.

The matter was referred to the Ministry (January 2016); their reply was awaited (April 2016).

4.2 Avoidable procurement of Radio Receiver Beacons for naval ships

Lack of coordination amongst various Directorates/establishments and ships within Navy resulted in avoidable procurement of five Radio Receiver Beacons worth ₹6.19 crore.

Procedures for provisioning and procurement of equipment against Anticipatory Beyond Economic Repair (ABER) mandate the Board constituted for review of ABER equipment to take into view the estimated residual life of equipment, obsolescence, recurring defects and need for technological upgrade. The Board must also consider the aspect of the feasibility of installation and interface with other equipment/systems while recommending provisioning against ABER. The procedures further stipulate that items procured under the ABER requirements are replaced in due course of time as per the actual requirements and during the planned refits in case of ships/submarines. Further, the equipment shall not be replaced if the same is serviceable even if it has been declared ABER.

Navigational Radar Fitment Policy (NRFP) of Indian Navy (November 2004) mandated replacement of Rashmi radar and other non-commercial radars installed onboard all Indian Naval ships with Commercially Off the Shelf (COTS) radars as primary navigation radars. The policy approved use of Rashmi/other non-commercial radars only as secondary radars for their residual life.

Despite the promulgation of a NRFP in November 2004, wherein it was mentioned that Commercial Navigation Radars are to be fitted as primary navigation radars on all class of ships wherein the existing radar had expired

its life, Directorates of Integrated Headquarters, Ministry of Defence (Navy) [IHQ MoD (N)] viz; Directorate of Electrical Engineering (DEE)⁵ and Directorate of Procurement (DPRO) along with Material Organisation, Mumbai [MO (MB)] processed the procurement of Radar Receiver Beacons⁶ (RRBs) for the non-commercial radars fitted onboard the four naval ships. Details of the cases are as follows:

DEE, IHQ MoD (N) approved (April 2006) ABER requirement of RRBs for Radar fitted onboard Indian Naval Ship (INS) Godavari and INS Vindhyagiri. Based on the approval, MO (MB) raised an indent (October 2006) for the requirement of four RRBs from M/s Tyco Electronics, UK (M/s Tyco) on Proprietary Article Certificate (PAC) basis and DPRO, IHQ MoD (N) concluded (March 2008) an agreement with the firm at a cost of PDS 654500 (₹4.90 crore). RRBs were delivered in May 2009.

Similarly, on the basis of an ABER approval received from DEE, IHQ MoD (N) (November 2006) for the installation of RRB onboard INS Brahmaputra and INS Betwa, MO (MB) concluded (January 2010) another contract with M/s Cobham Mal Ltd UK (Ex M/s Tyco) on PAC basis for the supply of two RRBs at a cost of PDS 332980 (₹2.58 crore). RRBs were delivered in August 2010.

Audit scrutiny (March 2014) revealed that two RRBs planned for installation onboard INS Godavari were to be interfaced with the ZW-06 navigational radar,⁷ a Down mast configuration⁸ radar. However, the ZW-06 radar was replaced (by end 2007) with COTS radar,⁹ an Up mast

⁵ DEE-is responsible for all technical matters pertaining to inspection, acceptance, testing, tuning and maintenance of electrical, electronics, sensors and communication systems

⁶ Radio Receiver Beacons (RRB) are I-Band receiver systems to receive signals from helicopter borne I-band transponders and to convert them into suitable video signals for Display

⁷ ZW-06 radars was the non-commercial navigational radar fitted onboard INS Godavari to be interfaced with RRBs

⁸ Down mast configuration – In this configuration, trans-receiver assemblies are located far from the antenna assembly of the radar and the RF energy channel losses are high and the configuration is maintenance intensive

⁹ COTS Radar- The Commercially off the Shelf (COTS) radar for replacement of the installed navigational radars such as ZW-06 in case of INS Godavari

configuration¹⁰ radar during the MR of the ship. Further, since the interfacing of RRBs was feasible only with Down mast configuration radars, these could not be interfaced with the new COTS radar with the Up mast configuration. Resultantly, the RRBs were returned (April 2013) by the ship to MO (MB) stating that the RRBs are of no use to them as the ZW-06 radar had already been replaced with COTS radar. Similarly, Rashmi radar, a Down mast radar installed onboard INS Brahmaputra commissioned in the year 2000, was replaced (2011) with Vision Master E radar (COTS) of an Up mast configuration and thus the ship did not raise any demand for the RRBs due to unsuitability of the same for the newly installed COTS radar. Further, the RRBs for INS Vindhyagiri scheduled to be fitted during her refit between June and September 2011, could not be fitted as at the time of receipt of RRBs, ship was in operation and later on decommissioned (January 2011) due to sinking. In the case of INS Betwa which was commissioned in 2004, RRB was issued for installation (March 2011) on Rashmi radar which was serviceable as a secondary radar along with the newly installed COTS radar.

As a result, out of the six RRBs procured for the four ships, five RRBs remained unutilised since its receipt as the life of the existing non-commercial radar installed on INS Godavari and INS Brahmaputra had expired at the time of installation of COTS radar while INS Vindhyagiri was decommissioned. On ascertaining the reasons for holding this inventory without use, MO (MB), in its reply, stated (March 2014) that the replacement of the existing radar with COTS radar was not known at the time of provisioning. The contention of MO (MB) is not tenable because NRFP of Indian Navy (November 2004) mandated fitment of COTS radar as primary radar and considered replacement of Rashmi/other non-commercial radars on all major war vessels when their electronic life is over.

Further, the assurance of Navy (January 2015) that RRBs available with the MO (MB) would be exploited on other naval platforms fitted with Down mast

¹⁰ Up mast configuration – In this configuration, trans-receiver assemblies are placed adjacent to the antenna assembly of the radar and the RF energy channel losses are reduced

radar onboard is also not acceptable as the five RRBs are lying in stock since their receipt without utilisation, implying that the item was no longer warranted.

Thus, lack of coordination amongst various Directorates/establishments *i.e.*, DEE, DPRO, MO (MB), and ships within the Navy as they kept on pursuing for the procurement of RRBs for non-commercial radars despite promulgation of policy in 2004 for their replacement, resulted in procurement of five RRBs costing ₹6.19 crore, which was avoidable.

The matter was referred to the Ministry (December 2015); their reply was awaited (April 2016).

4.3 Non levy of liquidated damages in the procurement of pumps

Ministry of Defence accorded extension for delivery of pumps with levy of liquidated damages. However, Integrated Headquarters Ministry of Defence (Navy) failed to levy liquidated damages amounting to ₹1.56 crore on the firm for the delayed supplies.

INS Viraat, second aircraft carrier commissioned in the Indian Navy in May 1987, is fitted with two Main Feed pumps and two Auxiliary Feed pumps which had been consistently unreliable. The Anticipated Beyond Economical Repair certificate for these pumps was initiated by INS Viraat in 2002 for replacement in refit of the carrier scheduled in 2009, subsequently revised to 2012-13.

An indent was raised (December 2008) by Material Organisation (MO), Mumbai and the Directorate of Procurement (DPRO)/Integrated Headquarters Ministry of Defence (Navy) [IHQ MoD (N)] issued (November 2009) a Request for Proposal (RFP) on Proprietary Article Certificate (PAC) basis to M/s Clyde Union Pumps, UK for supply of one Main and one Auxiliary Feed pumps. DPRO/IHQ MoD (N) concluded a contract (October 2010) at a cost of GBP 1,503,280 (₹11.65 crore) with scheduled delivery of pumps in 38 weeks

i.e., by 27 June 2011 and authorised (March 2011) 15 *per cent* advance payment *i.e.*, GBP 225,492 (₹1.66 crore) to the firm without the necessary approval of the Ministry of Defence (MoD). The firm, in November 2011, sought extension of delivery period up to 31 January 2012. DPRO/IHQ MoD (N) proposed (December 2011) to the MoD to grant extension in delivery period up to 31 January 2012 with the levy of Liquidated damages (LD) as the delay was attributed to the firm and also requested the Ministry to accord *ex-post facto* approval for 15 *per cent* advance payment released to the firm in May 2011 without the approval of the Competent Financial Authority *viz.* MoD. The case was returned by the MoD (Finance) a number of times raising observations regarding procedure for opening of Letter of Credit (LC), requirement of concurrence of Principal Integrated Financial Advisor (Navy) {PIFA (N)} for authorizing payments, norms for issue of Government letter authorizing payments etc.

The Ministry of Defence accorded approvals (March 2014) to regularise the advance payment made in May 2011, extension of delivery up to May 2014 with levy of LD and release of balance 85 *per cent* payment to the firm. The firm supplied the pumps in May 2014. The replacement of Main Feed pump onboard INS Viraat was carried out in December 2014 and that of Auxiliary Feed pump in June 2015¹¹.

Audit scrutiny (December 2014) revealed the following inadequacies in procurement of these vital pumps:

- The Ministry of Defence approved the regularisation of 15 *per cent* advance payment only in March 2014 after admission (December 2011) of the lapse by DPRO, IHQ MoD (N). This delayed the opening of LC and consequently the delivery of pumps.
- The replacement of Main and Auxiliary Feed pumps was envisaged during Normal Refit (NR) 2012-13, however, these pumps could be

¹¹ Intimated by IHQ MoD (N) to Audit under letter no. EG/2501/AUDIT/STM dated 10 February 2016

replaced in December 2014 and June 2015 respectively *i.e.*, after more than two years from the scheduled date.

- The installation of pumps onboard INS Viraat was delayed despite the fact that these were critical for operational exploitation of the carrier. The non-availability of reliable pumps was likely to adversely affect the reliability of the entire propulsion package and preclude optimal exploitation of the carrier.
- The RFP provided for LD at 10 *per cent* of the value of delayed stores in line with the Defence Procurement Manual (DPM) 2009. PIFA (N) while vetting the draft contract advised (June 2010) IHQ MoD (N) that the LD leviable should be 10 *per cent* and not 5 *per cent* as included in the draft contract. However, DPRO, IHQ MoD (N) in violation of extant orders and despite the advice of PIFA (N) included LD at 5 *per cent* only in the contract. Subsequently, no effort was made to rectify this deficiency by an amendment to the contract (October 2010).
- No LD was recovered from the firm for delayed supply of pumps even though the MoD had granted extension in delivery period with levy of LD.

DPRO, IHQ MoD (N) intimated (July 2015) Audit that they had approached the firm in March 2015 for refund of LD at 10 *per cent* amounting to GBP 150,328 (₹1.56 crore). However, the firm intimated (May 2015) the Navy to withdraw the claim as the LC was opened belatedly after readiness of shipment and the firm had to incur storage cost for the pumps.

In sum, procedural delay of more than two years by the MoD in regularising the advance payment delayed the deliveries of the Main and Auxiliary Feed pumps which were replaced onboard INS Viraat only in December 2014 and June 2015 respectively. Besides, IHQ MoD (N) failed to levy LD of ₹1.56 crore for delayed supply of pumps.

The matter was referred to the Ministry (January 2016); their reply was awaited (April 2016).

4.4 Under recovery of ₹6.18 crore due to non-revision of rates of landing charges

Indian Navy's failure to submit the details of capital expenditure and maintenance charges to Airports Economic Regulatory Authority of India (AERA), denied them the revised tariff rates for the landing charges for the Goa Airport since July 2013 resulting in under recovery of ₹6.18 crore.

Goa Airport, termed as Civil Air Enclave by the Airport Authority of India (AAI) is under the control of Indian Navy (IN). Goa Airport is categorized as a Major International Airport by AAI and the responsibility for collecting Landing Charges rests with the defence authorities *i.e.*, Indian Navy, whereas other charges like Route Navigation Facility Charges (RNFC), Terminal Navigational Landing Charges (TNLC), User Development Fee (UDF), Parking and Housing Charges etc. are collected by AAI.

Indian Navy has been collecting the Landing Charges for Goa Airport at the rate fixed (as revised with effect from 01 March 2009) by AAI applicable for an International Airport.

Airports Economic Regulatory Authority of India (AERA) established (2008) to determine tariff for aeronautical services, noticed (March 2011) that in addition to the maintenance of infrastructure, Defence Forces also incur Capital Expenditure (CAPEX) for their air strategic reasons and asked AAI to ascertain such CAPEX from Defence Forces within three months for the preparation of the Multi Year Tariff Proposal (MYTP). In pursuance, Integrated Headquarters, Ministry of Defence (Navy), [IHQ MoD (N)] expressed to the Ministry of Defence (MoD) its inability (December 2011) to provide the information on the ground that computation of expenses incurred and quantification of specific end usage would be an extremely complex process. Accordingly, AAI also informed AERA (April 2012) that the defence

authorities have not provided the information relating to CAPEX, maintenance charges etc.

Audit noticed (December 2014) that the AAI with the approval of AERA had revised (July 2013) all its existing tariffs for the International Airport at Kolkata and Chennai along with other major airports at Ahmedabad, Calicut, Jaipur, Lucknow and Guwahati except the landing charges at Civil Air Enclaves¹² including the Goa International Airport.

Audit observed (December 2014) that Indian Navy continued to recover the landing charges for the Goa airport at the old prevailing rates fixed in 2009. Navy intimated (December 2015) Audit that they had initiated (January 2015) the issue with the AAI, and AERA decided (May 2015) that due to delay in submission of the MYTP at the fag end of the control period¹³, the status quo of the tariff rate for landing charges may be continued for the Goa airport till 31 March 2016 as revision at such belated stage would involve steep increase in tariffs. Navy further stated (December 2015) that the process for applicable tariff for Civil Air Enclaves of joint-user Defence airfields, was being deliberated at MoD.

Thus, failure of the Indian Navy to provide requisite information to the AERA and taking up the matter appropriately with AAI, denied Navy the revised tariff for the landing charges for the Goa Airport, a major international airport at the true deserving rates, resulting in under recovery of at least ₹6.18 crore from July 2013 to October 2015 even if compared with the rates revised for the non-major airports.

The matter was referred to the Ministry (January 2016); their reply was awaited (April 2016).

¹² Civil Air Enclaves; Pune and Srinagar are the two such major airports under the control of Air Force

¹³ Control period is the period to regulate the tariff for five years fixed by AERA. The first such control period commenced from 01.04.2011 and would end on 31.03.2016

4.5 Extra expenditure of ₹3.09 crore in procurement of spares

Integrated Headquarters, Ministry of Defence (Navy) procured aircraft spares on Proprietary Article Certificate (PAC) basis even when other firms were available for the supply of spares, resulting in extra expenditure of ₹3.09 crore.

The Proprietary Article Certificate (PAC) is issued to the Original Equipment Manufacturer (OEM) and items are procured on PAC basis from that particular firm, when such items are available only with that firm or its authorised dealers. As per Defence Procurement Manual (DPM) 2006, PAC bestows monopoly and obviates competition, and thus PAC status must be granted after careful consideration of all factors like fitness, availability, standardization and value for money. Procurement officers must keep abreast with the proper source knowledge and procure items from the right source to protect the interest of the state. Further, DPM 2006 also states that Last Purchase Price (LPP) is one of the relevant factors in deciding price reasonableness.

PAC was accorded (May 2008) to “Illyushin” Russia, being the OEM, for the supply of spares and product support services of IL-38 SD aircraft through M/s Rosoboronservice (India) Ltd (M/s ROS(I)), Mumbai. Accordingly, Integrated Headquarters, Ministry of Defence (Navy) [IHQ MoD (N)] accorded sanction (December 2009) and placed a supply order (January 2010) on M/s ROS (I) for 45 ‘by type’ spares for IL-38SD aircraft on PAC basis at a total cost of ₹4.38 crore with date of delivery as November 2010.

While scrutinising the Supply Order placed in January 2010, audit noticed (September 2013) that IHQ MoD (N) had previously accorded (August 2008) sanction for procurement of 127 ‘by type’ of spares for IL-38 SD aircraft and the supply orders were placed on five foreign firms (September 2008) which also included M/s RoS (I) although PAC status had already been granted to the firm in May 2008 itself for the supply of spares. Thus, granting PAC status to

M/s RoS (I) was not justified as there were other firms eligible for the supply of spares for IL-38SD aircraft. A comparison of the items procured from M/s ROS (I) vide supply order of January 2010 further revealed that the procurement prices of eight 'by type' spares for IL-38SD aircraft were 95 to 3245 *per cent* higher than the procurement made against supply order placed for the same spares in September 2008 resulting in excess expenditure of ₹3.09 crore.

On being pointed out by Audit (September 2013), IHQ MoD (N) stated (October 2013) that there is a quality difference between the spares supplied by Russian firms and that of Commonwealth of Independent States (CIS) firms as most major OEMs are located in Russia, whereas the firms of CIS are normally stockist. It further stated that, M/s RoS (I) does not respond to low value revenue procurement of spares and hence other firms were also approached to overcome the problem.

The reply of IHQ, MoD (N) is not tenable as it contradicts Navy's own action of procurement of spares for the same aircraft through firms of CIS in August 2008 and September 2008. Further, the contention of Navy that there would be a quality difference in the spares supplied by CIS firms is an afterthought to justify the procurement of spares from the PAC firms as the firms of CIS are merely stockist of spares.

Thus, conferring PAC status on M/s ROS (I) in violation of provisions of DPM and overlooking the earlier purchase order resulted in the procurement of eight items of aircraft spares from them at an extra expenditure of ₹3.09 crore.

The matter was referred to the Ministry (December 2015); their reply was awaited (April 2016).

4.6 Extra expenditure of ₹63.35 lakh in procurement of Transmitter due to non-availing of option clause

Failure of Material Organisation, Visakhapatnam to avail the benefit of option clause resulted in extra expenditure of ₹63.35 lakh in procurement of Transmitter.

Defence Procurement Manual-2009 prescribes for the option clause entailing that the purchaser retains the right to place orders for additional quantity up to a maximum of 50 *per cent* of the originally contracted quantity at the same rate and terms within original period of contract.

Directorate of Procurement (DPRO), Integrated Headquarters, Ministry of Defence (Navy) {IHQ, MoD (N)} had placed (November 2010) a purchase order (PO) on M/s Hindustan Aeronautics Ltd, Avionics Division [HAL (AD)], Hyderabad for supply of high frequency (HF) transmitters with accessories, installation and On Board Spares (OBS) for Indian Naval Ship (INS) Rana at a total order value of ₹4.54 crore, which included three numbers HF Transmitter along with accessories at a unit price of ₹1.21 crore. The PO (November 2010) had the option clause valid till November 2012.

Audit examination (September 2014) showed that Material Organisation, Visakhapatnam [MO (V)] placed (August 2013) a PO on M/s HAL (AD), Hyderabad for procurement of a HF Transmitter with OBS, Tool Kit and installation material for INS Karwar, at a total order value of ₹2.64 crore, which included ₹1.84 crore as the cost of HF Transmitter. However, MO (V) failed to approach IHQ MoD (N) for processing the procurement of the transmitter under the option clause although the procurement was for the same equipment and from the same vendor.

In response to audit observation (September 2014), MO (V) replied (September 2014) that IHQ was processing the case for three sets of the same equipment and order placement was not confirmed. MO (V) added that the procurement made by IHQ (November 2010) was against an indent raised in

the year 2006 and the price of this indent were updated only by March 2013. Thus, in the absence of a firm price, option clause could not be exercised.

MO (V)'s reply that order placement was not confirmed is factually incorrect as the PO of IHQ MoD (N) was placed in November 2010 and MO (V) was the consignee *vis-a-vis* the PO. Further, MO (V)'s argument about absence of a firm price is not tenable because a copy of the PO was endorsed to MO (V) in November 2010.

Thus, failure of MO (V) to approach IHQ MoD (N) for procuring an HF transmitter with OBS etc. against option clause led to an extra expenditure of ₹63.35 lakh.

The matter was referred to the Ministry (January 2016); their reply was awaited (April 2016).

4.7 Undue benefit to the shipyard due to delayed remittance of liquidated damages

The contracts for construction of four Naval Offshore Patrol Vessels had a provision for remittance of back to back Liquidated Damages (LD) recovered by the shipyard from its sub-vendors in Government account. Delay of 9 to 30 months in remittance of LD resulted in undue benefit of ₹1.03 crore to the shipyard by way of interest for the delayed period.

General Financial Rules (GFRs) stipulate that it is the duty of the Department of the Central Government concerned to ensure that the receipts and dues of the Government are correctly and promptly assessed, collected and duly credited to the Consolidated Fund or Public Account as the case may be.

Government of India, Ministry of Defence (MoD) concluded (April 2007) a contract with M/s Goa Shipyard Limited (M/s GSL) for the construction of three Naval Offshore Patrol Vessels (NOPVs) at a total cost of ₹1,828 crore. Another contract was concluded (November 2007) with M/s GSL under option

clause of the contract (April 2007) for construction of one NOPV at a total cost of ₹624.48 crore. The four NOPVs were to be delivered between March 2010 and December 2011.

As per the contracts, in cases where the builder has been provided extension for delivery of the vessels for delays that are consequential to delay in supply of equipment/ machinery/items of the vessel by the Original Equipment Manufacturers (OEM)/ subcontractors of the builder, Liquidated Damages (LD) for delay in delivery of equipment/machinery/items of the vessels levied by the builder on OEMs/subcontractors would be returned to the owner i.e. Navy on 'Back to Back' basis. During the currency of the contracts, M/s GSL sought (September 2010) extension of delivery schedule up to November 2012, May 2013, November 2013 and May 2014 for the four NOPVs. While intimating the approval of Competent Authority for extension of delivery schedule without levying LD, Integrated Headquarters, Ministry of Defence (Navy) {IHQ, MoD (N)} asked (February 2012) M/s GSL that 'Back to Back LD' for all equipment recovered by the shipyard be reimbursed to MoD (N) and the modalities/details of LD reimbursement be forwarded to IHQ, MoD (Navy) by early March 2012. IHQ, MoD (N) further asked (February 2012) M/s GSL that the modalities/details of LD reimbursement were required to be intimated to PCDA during stage XI payment.

Audit observed (September 2014) that instead of reimbursing an amount of ₹12.84 crore recovered as LD from indigenous and foreign vendors immediately, M/s GSL retained the amount and remitted/adjusted the same along with stage XI payments of NOPVs, with a delay ranging from nine to thirty months. As a result of delay in remittance of LD, the shipyard earned an amount of ₹1.03 crore as interest on the amount of LD retained by it.

In pursuance of the audit observation (September 2014) Navy endorsed (December 2014), the justification of GSL by stating that the adjustment of the amount under stage XI was as per Article 5.5 of the contract.

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The contention of the Navy is not acceptable because, as per Article 5.5 of the contract, the adjustment should be only carried out in stage XI if a “reduction in the contract price is envisaged” and since the remittance of back to back LD does not have the effect of reducing the contract price, Article 5.5 cannot be invoked. Further, LD levied by M/s GSL was required to be returned to the Navy on back to back basis as reiterated by IHQ, MoD (N) to M/s GSL in February 2012. Moreover, the retention of LD charges was in violation of the provisions of GFRs which stipulates that Government dues should be promptly and duly credited in to Government without any delay.

Thus, lack of diligence on the part of IHQ, MoD (N) in ensuring timely reimbursement of back to back LD, resulted in an undue benefit to the tune of ₹1.03 crore in the form of interest earned by shipyard on Government dues.

The matter was referred (January 2016) to the Ministry of Defence; reply was awaited (April 2016).

CHAPTER V: INDIAN COAST GUARD

5.1 Unfruitful expenditure of ₹5.73 crore on acquisition of land for setting up an Air Enclave by Coast Guard

Failure of the Ministry of Defence/Coast Guard/Defence Estate Office (Visakhapatnam) to take cognizance of the Gazette notification entailing requirement of 'No Objection Certificate' by the Navy resulted in non-setting up of Air Enclave for the Coast Guard on the land acquired from the Visakhapatnam Port Trust at a cost of ₹5.73 crore. This in turn affected the operational preparedness of the Coast Guard besides rendering the investment unfruitful.

Ministry of Civil Aviation's Gazette Notification dated 14 January 2010 prescribes that for defence aerodromes, defence authorities shall be responsible for issuing 'No Objection Certificate (NOC)' and any other condition which such authorities deem fit. In consonance with the Gazette Notification, it is mandatory to obtain NOC from Navy for setting up an Air Enclave in the vicinity of naval airfield.

Audit noticed (December 2014) from records that in the aftermath of 26 November 2008, Coast Guard (CG) had proposed (June 2009) an Air Enclave at Visakhapatnam to cater to the requirement of increased coastal surveillance and to avoid unnecessary transit time and fatigue of its aviation assets which had to be mobilised from Chennai/Kolkata to meet the requirement of ensuring seaward security of the country and offshore installations.

Ministry of Defence (MoD) sanctioned (January 2010) the setting up of Coast Guard Air Enclave (CGAE) at Visakhapatnam at an estimated cost of ₹8.40 crore inclusive of land acquisition cost of ₹5.00 crore. Coast Guard Region (East) [CGR (E)] convened (January 2010) a Board of Officers to recommend 'Acquisition of five acres of land from Visakhapatnam Port Trust [VPT] for setting up of CGAE at Visakhapatnam'. In accordance with CGR (E)

stipulation, DEO (V)¹ checked (April 2010) the availability of defence land from HQENC (V)². While confirming (May 2010) to the DEO (V) the non availability of surplus land, HQENC (V) intimated that due to future induction plans of the Indian Navy, a case was considered to be taken up with MoD for leasing of VPT land around the naval area identified by the CG. Navy further added that the acquisition of the said land by the CG would be in divergence with the naval plans of constructing a parallel runway and it (*i.e.*, the Navy) would be constrained to issue NOC to the CG for establishing the Air Enclave.

Audit further noticed that despite reservations of the Navy, the Government of India, Ministry of Defence, sanctioned (October 2010) the acquisition of land on lease from VPT for an amount of ₹5.73 crore. The site was handed over (February 2011) by the VPT to the CG after payment (January 2011). Thereafter, CGR (E) accorded Administrative Approval (February 2012) for 'Provision of high security wall and levelling of the land' at an estimated cost of ₹4.25 crore. However, the civil work was stopped (December 2012) on the orders of HQENC (V) which stated that NOC for the acquisition of the land was not sought and requested CGR(E) to explore alternative sites offered (September 2012) by the Navy.

Audit observed (December 2014) that CG was unable to exploit the land for the intended purpose even after making (January 2011) payment of ₹5.73 crore.

Coast Guard stated (January 2015) that aircraft meant for the proposed squadron to be based at the Air Enclave had not been received due to uncertainty in availability of land and setting up of infrastructure therein. It further added that being the nodal agency for Maritime Search and Rescue Operations, the delay in setting up of Air Enclave had adversely affected the operational preparedness.

¹ DEO(V) – Defence Estate Office, Visakhapatnam

² HQENC(V) – Headquarters Eastern Naval Command, Visakhapatnam

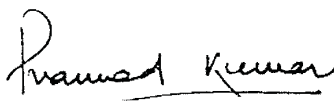
Audit further noticed from the Progress Report of Chief Engineer (Navy) Visakhapatnam [CE (N) (V)] for the quarter ending December 2015 that the work was held in abeyance after incurring an expenditure of ₹2.13 lakh.

In response to audit query (March 2016) ascertaining whether the Ministry was apprised of the progress of civil work on the land acquired, CGHQ replied that they did not intimate/apprise the Ministry about stoppage of work at site as the issue was being dealt locally by CGR (E) and HQENC (V).

Thus, failure on the part of Ministry to take cognizance of the Gazette notification (January 2010) and also failure of the CG to apprise the Ministry about hold-up on progress of the civil works resulted in non-setting up of the Air Enclave thereby affecting the operational preparedness of the Coast Guard besides rendering the investment of ₹5.73 crore on acquisition of VPT land unfruitful even after five years.

The matter was referred to the Ministry (January 2016); their reply was awaited (April 2016).

New Delhi
Dated: 02 June 2016


(PRAMOD KUMAR)
Principal Director of Audit (Navy)

Countersigned

New Delhi
Dated: 02 June 2016


(SHASHI KANT SHARMA)
Comptroller & Auditor General of India

ANNEXURES

Annexure-I

(Referred to in Para 2.2.3)

The Indian Naval Book of Reference (INBR) 31¹ specifies the following shipbuilding activities:

Activity	What happens
Production	Fabrication of blocks for construction of the ship is commenced
Keel Laying	Fabricated blocks are shifted from fabrication shop and laid on Keel Blocks at slipway for erection of the blocks/units
Launching	On completion of the ship's outer hull and major internal hull and part of machinery work, including lowering of major machineries/equipment and fitment of shaft, the ship is lowered in the water
Outfitting	After launching of the ship all outfit work is undertaken
Basin Trials	Propulsion machineries are tried out by trial agencies in the harbour
Contractor Sea Trials (CST)	Trials of all propulsion, other machineries and equipments are taken by trial agencies at sea
Final Machinery Trials	Propulsion machineries are tried out at 100% power
D-448 Reading	On completion of all trials and prior to commissioning of the ship, all balance works/contractual liabilities which the yard could not complete, gets listed as a final document

¹ INBR 31 - Hull Construction Inspection Norms for New Construction Ships

Annexure-II

(Referred to in Para 2.2.3)

The following are the agencies/entities involved in the construction and monitoring of Indigenous Aircraft Carrier :

S.No	Agency/Entity	Role	S.No	Agency/Entity	Role
1	Controller of Warship Production & Acquisition (CWP&A)	Monitoring of the ship building contracts	8	Directorate of Electrical Engineering	Technical matters pertaining to electrical, electronics, sensors and communication systems
2	Directorate of Naval Plans (DNP)	Allocation of funds	9	Directorate of Weapon Equipment	Technical matters pertaining to induction, acceptance, repairs and trials of weapon systems
3	Directorate of Staff Requirements	Formulation of Staff Requirements for the IAC	10	Directorate of Naval Air Staff	Formulates operational requirements for new inductions
4	Directorate of Naval Design	Undertaking design and co-ordinating all ship production activities	11	Directorate of Aircraft Systems Engineering	Technical aspects including installation, acceptance, inspections and trials
5	Directorate of Marine Engineering	Drawing specifications and undertaking system integration of marine engineering equipment	12	Directorate of Aircraft Acquisition	Co-ordinates the capital acquisition process for procurement of aircraft till conclusion of the contract
6	Directorate of Cost and Contract Management	Macro level financial planning for shipbuilding projects	13	Directorate of Aviation Projects Management	Execution of all contracts regarding aircraft acquisition
7	Warship Overseeing Team	Naval overseeing team supervising ship construction	14	Cochin Shipyard Ltd	Shipyard constructing the Indigenous Aircraft Carrier

Annexure-III

(Referred to in Para 2.4.4.2 (a))

Status and reasons* for delay in delivery of 49 equipment mentioned in Phase-I contract (May 2007)								
Sl No.	Equipment	PO No.	Date	Scheduled date of receipt as per PO	Actual dates as per records of CSL	Delay (in months)	Reasons for delay	Cost (in ₹Crore)
1.	Propulsion Gas Turbine	PUR/MOF/48185	30.12.05	31.10.07	31.12.08	14	Due to break down of dynamometer test facility and large volume of production engines scheduled for testing on their test cell & non-availability of test slot till early 2008 for testing of P71 GTs at GE leading to delay.	166.06
2.	Diesel Alternators	PO/IAC/AC1/000677/08-09	02.09.08	30.04.11	21.07.12	15	Delay on the part of the firm to adhere to delivery schedule. Further, delay accentuated due to accident of two sets during transportation.	155.70
3.	GT CO2 Fire Fighting module	PO/AD S/AC1/000262/08-09	30.05.08	15.12.09	31.10.10	10	Extension granted up to 31.10.10. Delay due to time taken by foreign collaborator to obtain requisite government authorisation for export.	21.30
4.	GT Local Control Panel (ECU)			15.12.09		10		
5.	CO2 Fire Fighting module LCP-NA			15.12.09		10		
6.	Bilge Pump	PO/AD S/AC1/001305/07-08	11.02.08	10.10.08	15.09.11	35	Firm failed to adhere to delivery schedule.	57.35

7.	Oily Water Separator	PO/IAC /AC1/00 0070/09 -10	06.05.09	30.08.09	23.02.10	6	Delay in supply of four months condoned by IN/CSL in view of delay in approval of L1 & L2 level documents by Navy.	0.62
8.	Propulsion Reduction Gear	PO/AC1 /000444 /06-07	10.01.07	10.01.09	25.02.13	49	Delay due to failure of few discs/wheels during heat treatment at M/s Elecon necessitating rectification at M/s Renk, Germany.	38.90
9.	RG Lube Oil Module	PO/AC1 /000444 /06-07	10.01.07	10.01.09	22.09.12	44	Firm failed to adhere to delivery schedule.	
10.	RG Local Control Panel			10.01.09	22.09.12	44		
11.	Thrust Blocks			10.01.09	06.02.11	25		
12.	Shafting Sections (Intermediate Shafts) Port & Star Board	PO/AD S/AC1/0 00552/0 7-08	07.08.07	30.09.09	30.04.11	19	Firm failed to adhere to delivery schedule.	152.09
13.	CPP Hydraulic Module			30.09.09	06.01.11	16		
14.	CPP Local Control Panel			30.09.09	06.01.11	16		
15.	Oil Supply Boxes			30.09.09	30.10.11	25		
16.	Fuel Oil Stripping Pump			PO/IAC /AC1/00 0373/09 -10	29.06.09	30.06.10		
17.	Main Fuel Oil Transfer Pump	30.06.10	06.04.13			34		
18.	Aux Fuel Oil Transfer Pump	30.06.10	10.12.12			30		
19.	Fuel Stripping Centrifuge	PO/IAC /AC1/00 1203/08 -09	16.01.09	31.12.10	08.08.11	8	Firm failed to adhere to delivery schedule.	12.81
20.	Fuel Oil Centrifuge			31.12.10	28.12.12	24		
21.	RG Lube Oil Centrifuge +Oil Heater/ Lub Oil Centrifuge			31.12.10	08.08.11	8		

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22.	Sullage Pump	PO/IAC /AC1/00 0597/10 -11	23.07.10	20.01.11	17.08.12	19	Firm failed to adhere to delivery schedule.	0.19
23.	DA Lube Oil Transfer Pump/ Lub Oil Pump	PO/AD S/AC1/0 00578/0 8-09	16.08.08	20.06.09	22.12.11	30	Firm failed to adhere to delivery schedule.	1.20
24.	LP Air Compressor	PO/IAC /AC1/00 0779/ 09-10	22.12.09	30.10.10	04.08.11	10	Firm failed to adhere to delivery schedule.	3.54
25.	HP Air compressor	PO/IAC /AC1/00 0690/09 -10	29.08.09	15.07.10	01.03.12	20	Firm failed to adhere to delivery schedule.	2.01
26.	HP Air bottles	PO/IAC /AC1/00 0631/09 -10	14.08.09	30.06.10	09.06.11	12	Firm failed to adhere to delivery schedule.	1.40
27.	LP Air Bottles	PO/IAC /AC1/00 0376/09 -10	29.06.09	30.04.10	08.10.10	6	Firm failed to adhere to delivery schedule.	2.56
28.	Salvage pump	PO/IAC /AC1/00 0997/08 -09	12.11.08	20.11.09	13.07.11	20	Firm failed to adhere to delivery schedule.	3.99
29.	GT Water washing module	001709/ 07-08	18.03.08	30.09.09	31.12.09	3	Delay was mainly due to delay in inspection by QAE (WE). Accordingly delivery date was extended 31 Jan 10.	53.03
30.	GT Lube Oil Module (LSCA)			30.09.09	31.12.09	3		
31.	GT Fuel Feeding Module			30.09.09	31.12.09	3		
32.	GT Fuel Filtering Module			30.09.09	2312.09	3		
33.	GT Hydraulic Starting Module			30.09.09	31.12.09	3		
34.	GT module Cooling e-fan			30.09.09	31.12.09	3		
35.	Sea Water Ballast Pumps	PO/IAC /AC1/00 1132/09 -10	09.12.09	20.10.10	30.01.12	15	Firm failed to adhere to delivery schedule.	6.10
36.	Fire pumps			20.10.10	30.01.12	15		
37.	Sewage Treatment Plant	PO/IAC /AC1/00 0268/09	01.06.09	05.12.09	10.05.10	5	Major delay due to non-availability of IN/CSL team at the	13.85

		-10					firm's premises for Factory Acceptance Trials.	
38.	Fresh Water Pumps	PO/IAC /AC1/00	08.04.09	31.01.10	13.09.11	20	Firm failed to adhere to delivery schedule.	0.68
39.	Fresh water Hydrophores	0041/09-10		31.01.10	13.09.11	20		
40.	Fresh Water RO Plants	PO/IAC /AC1/00 1297/08-09	15.01.09	31.01.10	02.04.11	15	Firm failed to adhere to delivery schedule.	11.48
41.	Fresh Water Chlorinators	PO/IAC /AC1/00 0755/09-10	16.09.09	30.06.10	12.04.11	10	Firm failed to adhere to delivery schedule.	0.48
42.	Sea Water Cooling Pumps	PO/AD S/AC1/0 00267/0 8-09	31.05.08	31.01.09	18.12.09	11	Firm failed to adhere to delivery schedule.	1.01
43.	Steering Gear	PO/AD S/AC1/0 00286/0 8-09	04.06.08	31.12.09	31.07.11	19	Delay in approval of binding drawings, shock test, etc which are not attributable to L&T and raising of a new control priority, which was not as per the PO/POTS, by DQA(WP) leading to delay of almost 19 months in delivery.	9.23
44.	Heat Exchangers for Machinery Ventilation Sys (HVAC)	PO/IAC /AC1/00 0273/10-11	29.05.10	31.03.12	Partial delivery	Not measurable	Frequent design changes by IN.	97.42
45.	AC Plants	PO/AD S/AC1/0 00159/0 8-09	06.05.08	15.06.09	02.03.10	9	Firm failed to adhere to delivery schedule.	78.42
46.	AC Chilled Water Pumps			15.06.09	27.09.10	15	Major reason for delay was delay in supply of pumps by Navy nominated single vendor (M/s Beacon) to AC Plant vendor (M/s KPCL). LD levied by CSL to the maximum. Firm failed to adhere to delivery	
47.	AC Sea Water Pumps			15.06.09	22.06.10	12		

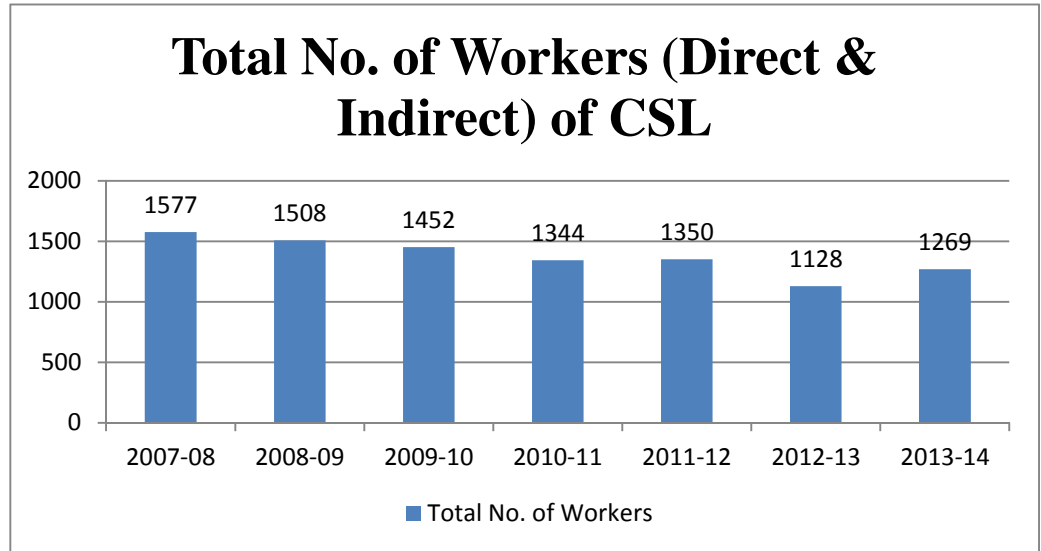
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							schedule.	
48.	Sea Water Pump for Ref Plants	PO/IAC /AC1/000004/09-10	06.04.09	31.03.10	06.06.11	15	Firm failed to adhere to delivery schedule.	9.68
49.	Refrigeration Plant			31.03.10				

**compiled from the records of CSL*

Annexure-IV

(Referred to in Para 2.6.1.2)



Annexure-V

(Referred to in Para 2.6.1.3)

SI No.	Item description	Cost of completed scope of work as per accepted rate under Phase I Contract		Cost of completed scope of work with reference to actual man days consumed		Undue benefit to the yard
		Structure	Outfit	Structure	Outfit	Difference (₹in Crore)
A	Weight in Tonnes	12894	1310	12894	1310	
B	Man-Hour per Tonne	1030	2060			
C	Labour Man-Hours A x B	15979420		6864000*		
D	Labour Rate per Man-hour (₹)	163.00		163.00		
E	Labour Cost (₹Crore) C x D	260.47		111.88		148.59
F	Overhead rate per Man-hour (₹)	322.90		322.90		
G	Overhead cost (₹Crore) C x F	515.98		221.64		294.34
H	Total yard effort without profit (₹Crore)	776.45		333.52		442.93
I	Profit @ 7.5%	58.23		25.01		33.22
J	Total yard effort (₹Crore)	834.68		358.53		476.15

*1 man-day = 8 man-hours. Thus, 8.58 lakh man days = 68,64,000 man-hours

Annexure-VI

(Referred to in Para 2.6.2)

(₹in crore)

Year	Funds available in the Flexi Account at the beginning of the F.Y.	Funds released into flexi account during the F.Y	Interest generated during the F.Y	Expenditure during the F Y (B+C+D)-F	Balance available in the account at the end of F.Y.
(A)	(B)	(C)	(D)	(E)	(F)
2006-07	(Flexi a/c opened in August 2006)	520.56	8.74	318.54	193.28
2007-08	193.28	475.53	26.59	93.31	602.09
2008-09	602.09	531.00	42.88	620.54	555.43
2009-10	555.43	378.15	37.55	634.56	336.57
2010-11	336.57	334.93	19.72	505.14	186.08
2011-12	186.08	431.00	22.24	251.63	387.69
2012-13	387.69	449.50	41.02	638.11	240.10
2013-14	240.10	326.00	11.00	577.07	0.03