Report of the Comptroller and Auditor General of India

for the year ended March 2002

Union Government (Defence Services)
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PREFACE

The post-independence scenario in the Indian Navy has been one of rapid expansion with appreciable capital investment in acquisitions of hardware.

This has resulted in large diversity in platforms and systems with attendant problems in managing the Navy's wide range of inventory; which may be gauged from the fact that the Navy's inventory of items held is now nearly eight lakh as compared to the Army, where it is only about five lakh.

This study on Inventory Management in Navy, the first of its kind, is a review covering the predominant range of inventory holdings i.e., Naval stores and Equipment and Spare Parts handled by the Naval Logistics System. It has been undertaken with the full involvement and co-operation of the Navy. Inventory of items such as weapons, armament and ammunition have not been covered in this report due to their specialised nature and separate management systems.

The large and diverse variety of inventory holdings have posed management problems in the manual mode. Automation through the Integrated Logistic Management System (ILMS) went on stream in 1997-98. As the system is still in the process of settling down, benefits and improved results could not be clearly evaluated and quantified during the period under review. Despite three years having elapsed, the Equipment and Spare Parts inventory has not been adequately linked up in the processing chain. The functioning of the ILMS, therefore, needs to be further upgraded as already mentioned.

Large number of items identified for procurement based on Annual Provision Replenishment reviews, ultimately results in only a part/fraction being procured. With the result ad hoc procurement outside the Annual Replenishment system has become the rule rather than exception. The system is reactive instead of proactive to meet the situation, indicative of system failure. This needs urgent and effective corrective action.

The present organisational model for integrated logistic working, combining naval stores and technical spares management under a "single umbrella" concept, seems to have been evolved in the late seventies. The technical spares inventory of specialized items has now grown to over 70 *per cent* of total items. Its logistics management requires clearer professional focus as spelt out in this report.

Based on the findings in the study, we have made certain recommendations, the major ones being:

a) Standardisation and variety reduction to contain range of inventory

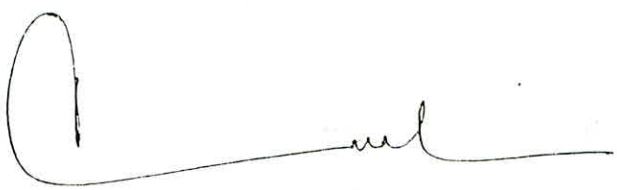
b) Reduction in procurement lead times and better data base of vendor
c) Overcoming lacunae in Inventory Management, Automation particularly in respect of technical inventory
d) Strengthening the replenishment provisioning system
e) Improving induction and training standards of manpower
f) Restructuring the present inventory management system
g) Improving focus in inventory cost management.

Naval Headquarters are in agreement with most of the recommendations in this study report, except those pertaining to organizational constraints. We consider that implementation of the recommendations will go a long way in improving the existing systems leading to the following benefits:-

a) Rationalisation leading to trimmer inventory and effective controls.
b) Containing variety proliferation through standardization enabling reduction in range of items, better focus and advantages of commonality.
c) Improved lead times in procurement and economies in inventory carrying costs.
d) Better demand satisfaction leading to improved ship refits, turn around time and operational effectiveness.
e) Improved stock visibility, facilitating selective inventory control, replenishment provisioning and cost effectiveness.
f) Quicker identification and disposal of surplus stores

I commend implementation of recommendation of the study report both by Ministry and the Navy in the interest of system improvement and ensuring "Value for Money" for the Nation.

The Report has been prepared for submission to President under Article 151 of the Constitution.



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LIST OF ABBREVIATIONS

ABC	Always Better Control
ABER	Anticipated Beyond Economical Repairs
ACL	Annual Consumption Level
AOG	Aircraft On Ground
ARD	Annual Review of Demands
ARS	Automatic Replenishment System
ASD (MB)	Admiral Superintendent Naval Dockyard, Mumbai
ASD (V)	Admiral Superintendent Naval Dockyard, Visakhapatnam
B&D Spares	Base and Depot Spares
BER	Beyond Economical Repairs
BLR	Beyond Local Repairs
CAAT	Computerised Assisted Audit Techniques
CAT 'A'	Critical Items 'A'
CCM	Category Coefficient for Minimum Stock Level
CCU	Category Coefficient for Upper Stock Level
CDA (Navy)	Controller of Defence Accounts (Navy)
CFA	Competent Financial Authority
CGDA	Controller General of Defence Accounts
C-in-C	Commander-in-Chief
CM (K)	Controllerate of Materials (Kochi)
CMP	Controller of Material Planning
CNO	Confidential Navy Order
COL	Controller of Logistics

COM	Chief of Material
CP,CPV	Central Purchase, Provisioning
CPL	Comprehensive Parts List
CPRO	Controller of Procurement
CQA	Controllerate of Quality Assurance
CRV	Certified Receipt Voucher
CTS	Controller of Technical Services
CWH	Controller of Warehousing
D787	Ship's Allowance List of Spares
DGQA	Director General of Quality Assurance
DGS&D	Director General of Supplies and Disposals
DLS	Directorate of Logistics Support
DPRO	Directorate of Procurement
E & SP	Equipment and Spare Parts
FA	Financial Advisor
FOC-in-C	Flag Officer Commanding-In-Chief
FODA	Fleet Operational Demand
FPQ	Final Procurement Quantity
FSU/EE	Former Soviet Union / East European
GUI	Graphics User Interface
HQ	Head Quarters
IFA	Integrated Financial Advisor
IIM	Indian Institute of Management
IIMM	Indian Institute Of Materials' Management
ILMS	Integrated Logistics Management System
INBR	Indian Navy Book of Reference

INCAT	Indian Naval Catalogue of Stores
INSMA	Indian Naval Ship Maintenance Authority
IOC	Indian Oil Corporation
LOGDEL	Logistics Delegation
LP, LPV	Local Purchase, Provisioning
LRU	Line Replacement Unit
LTE	Limited Tender Enquiry
M&S	Machinery and Spares
MIS	Management Information System
MO (MB)	Material Organisation (Mumbai)
MO (V)	Material Organisation (Visakhapatnam)
MOD	Ministry of Defence
MPM	Material Planning Manual
MRLS	Manufacturer's Recommended List of Spares
MS	Material Superintendent
MSL	Minimum Stock Level
MSTC	Metal Scrap Trading Corporation
NA	Not Available
NAC	Non-Availability Certificate
NHQ	Naval Headquarters
NIC	Not In Catalogue
NIV	Not In Vocabulary
NLC	Naval Logistics Committee
NMS	New Management Strategy
NPE	Not Procured Earlier
NR	Non-Russian

NS, NSO	Naval Stores, Naval Stores Organisation
NSB	Not Stocked Before
NSD (G)	Naval Store Depot, Goa
NSD (K)	Naval Store Depot, Kochi
OBS	On Board Spares
OC	Officer Commanding
OEM	Original Equipment Manufacturer
PAC	Proprietary Article Certificate
PC	Personal Computer
PIL	Parts Identification List
POER, POVE	Provisioning Officer's Expert Value
PPQ	Provisional Procurement Quantity
PQ	Procurement Quantity
PSO	Principal Staff Officer
R	Russian
RC	Rate Contract
RIO	Raised In Office
RP	Reserve Price
RPP	Refit Planning Procedure
SK, SSK	Store Keeper, Senior Store Keeper
SLMS	Ship's Logistics Management System
SPDC	Spare Parts Distribution Centre
SSK	Submarine Stores (Ex German Design)
SQL	Structured Query Language
SSS	Serviceable Surplus Stores
SSSDC	Surplus Special Stores Disposal Committee

STE	Single Tender Enquiry
TVs	Transfer Vouchers
USL	Upper Stock Level
VED	Vital, Essential, Desirable
WNC	Western Naval Command

GLOSSARY OF TERMS

1. After Action Damage

Loss of equipment/stores caused by enemy action.

2. AHSP

The establishment responsible for maintaining technical information, including drawings and specifications in respect of stores of their responsibility. The AHSP is also responsible for scrutiny of tenders against defence demands; laying down inspection criteria; drafting technical documents for introduction of stores; and guidance for procurement and production of stores by the industry.

3. AOG

A situation where an aircraft has to be grounded for want of critical spares.

4. Base and Depot Spares

B&D spares constitute the spare equipment and spare parts estimated as required to maintain a ship during the first five years of commission. They also include insurance spares. These spares are replenished based on consumption.

5. Benchmarking

A process by which an organisation seeks to determine and introduce best practice, and assess programme performance. Benchmarks can operate as standards or targets for performance levels by using comparisons of products, services, practices and processes with similar programmes either within the organisation or in the other organisations or countries. Benchmarks usually operate as best practice standards.

6. B Form

It is quantified requirement for equipment, spare parts or stores placed on DLS by another directorate in NHQ.

7. Cash and Carry power

It is a power to resort to purchase of store by designated officer, only in the case of exceptional urgent requirements, payment for which is made on the spot.

8. Combat ships

Ships, including submarines and auxiliary vessels, meant to protect coastal boundary of a nation and equipped with offensive and defensive warheads for the purpose.

9. Downtime of ships

Ships undergo various types of repair and refits at prescribed interval or on arising of major breakdown. The period of repair is termed as downtime.

10. Earmarking

It is a process of setting apart stocks of an item for a specific user and must not be issued to others. Earmarked item is issued under specific authority.

11. Exponential Smoothing

This is a method of manipulating past consumption data to assess future requirements. It is a form of weighted moving average, which can cater for trend and the calculations are much simpler to make. In this method, sensitivity to recent calls is adjusted in a desired manner. Only minimal past data is required for its computation.

12. Force level

Ships are inter-dependant while in operation. Absence of one-ship or war systems affects the operational capability of another ship or war system and consequently the force level refers to the optimum number of a particular type of ship that should be maintained for operational efficiency

13. Initial provisioning

It is a process, which aims at catering to ship's "On Board" spares for the first year of commissioning, and "Base and Depot" spares for 5 years.

14. Lead time

Represents the estimated average period, in months, which elapses between the date of placing of demand by the provisioning authority and the physical receipt of stores in the consignee establishment.

15. Lead ship

The first ship of a particular class or under a particular project under construction. The subsequent ships are called follow on ships.

16. Long cast

Anticipated requirement over a period, estimated based on past experience.

17. Long Term exploitation Spares (LTE)

Long-term exploitation spares are also supplied in ship sets and stocked in depots. These cater for the maintenance and repair of the Soviet Origin ship for the first five years and therefore broadly correspond to B & D Spares.

18. Obsolescent

An equipment/store for which no further provision will be made but the existing stocks, if any, will be used till these are exhausted.

19. Obsolete

An equipment/store for which approval has been given for its withdrawal from service.

20. On Board Spares

On board spares are spare parts estimated as required to operate and maintain a ship during the first year of commission. The shipyard positions them on board. These are to be replenished thereafter from stocks held in depots.

21. Obsolescence

It is a stage when function of store disappears or when they are substituted by new items. Spares, both equipment and spare parts, become obsolescent when it is decided to phase out that equipment.

22. Patternised item

Item which are allotted a definite pattern number in the Indian Naval Catalogue of Stores.

23. Ranging and Scalling

Ranging and Scalling is a process of assessing the requirement of spares, based on various factors viz. life, population of equipment, periodicity routines/overhauls etc. in respect of each equipment fitted on a ship. The provisioning of B & D spares is governed by the information generated through this process. The technical directorates are responsible for the 'Ranging and Scaling'. The spares recommended by the manufacturer are the basis of ranging and scaling.

24. Rate Contract

A contract for purchase of items, which is operative for a period with, fixed price for duration with upper and lower ceiling of quantity to be purchased.

25. Repair Part/Spare

A repair part is an item/component of equipment or an assembly/sub-assembly thereof, which is capable of being replaced at an appropriate repair echelon.

26. Replenishment Provisioning

The process done in Material Organisation, taking into account stock held, dues in and dues out, lead time in procurement, Shelf life of item, Criticality of the item etc. , to replenish the usages from the initial procurement.

27. Replenishment Provisioning Loop

It is a iterative process after a fixed interval to replenish stock exhausted from the minimum stock level, taking into account stock held, dues in and dues out, lead time in procurement, Shelf life of item, Criticality of the item etc. , to replenish the usages from the initial procurement.

28. Rotables

A part of equipment or sub-system , which needs overhauling/repair at periodical interval prior to overhaul of equipment or whole system. These parts or sub-systems are replaced with working parts or sub-system from stock and sent for repair/overhaul. After repair/overhaul these parts/sub-system are kept in stock as working spares/sub-systems.

29. Stock outs

Stock outs are a situation when the particular store or part of equipment is not available in store depots to meet the demands from users/customers.

30. STOP

It is strategy to decentralise responsibility for budget formulation and financial control to enhance 'value for money' in revenue expenditure. In this strategy year-wise plan is prepared by Budget Centre projecting (a) Carry forward liability (b) Committed liability (c) Anticipated liability and (d) additional requirements.

31. War Reserve

These are stocks of material, which are required to be maintained to meet the needs of operations. These are held in addition to Minimum Stock Level. Dipping into war reserves must be authorised by a competent officer.

CHAPTER 1: INTRODUCTION

1.1 General

The efficiency of the Naval logistics hinges on the sufficient and timely supply of materials. The logistics pipeline providing this is large and complex, and consists of several segments stretching from suppliers to far-flung combat ships. During peacetime, and more so during war, huge volume of materials is acquired, maintained and transported. For instance, during 1999-2000, the Indian Navy spent over Rs. 500 crore replenishing an inventory of close to 800,000 different items. In addition, material support personnel costs, both direct and indirect, have to be factored in. Considering the huge volume of public resources expended, the Inventory Management system of the Navy needs to be geared to ensure efficiency. This is the subject of this review.

1.2 Types of Inventory

Inventory of the Indian Navy are broadly grouped as under:

- Naval Stores (NS)
- Marine Equipment & Spare Parts
- Air Equipment & Spare Parts
- Weapon Equipment & Spare Parts
- Armament Stores
- Fuels & Lubricants
- Clothing Stores
- Victualling Stores
- Medical Stores

1.3 Stores Depots

Weapons and Armament stores are stored at Weapon Equipment Depots (WEDs) and Naval Armament Depots (NADs). All other stores are stocked and supplied by Naval Stores Depots (NSDs), as under:

Material Organisations (MOs): These are the main depots, located at Mumbai and Visakhapatnam. They are designated as MO (MB) and MO (V).

Naval Stores Depots (NSDs): These are smaller depots located at Kochi and Goa, and designated as NSD (K) and NSD (G). Though these were primarily set up for Air Stores of the Indian Navy, they also handle some Naval Stores. A satellite depot at Port Blair NSD (PB) stocks Naval / General Stores and limited spare parts.

1.4 Organisational set up

The Controller of Logistics (COL), in the rank of Vice Admiral and functioning under the Chief of Material (COM), is responsible for logistics management in the Navy, excluding Air Stores and Weapons Equipment. The organisational chart for Naval logistics is given below:

Figure 1.1: Organisational chart at NHQ

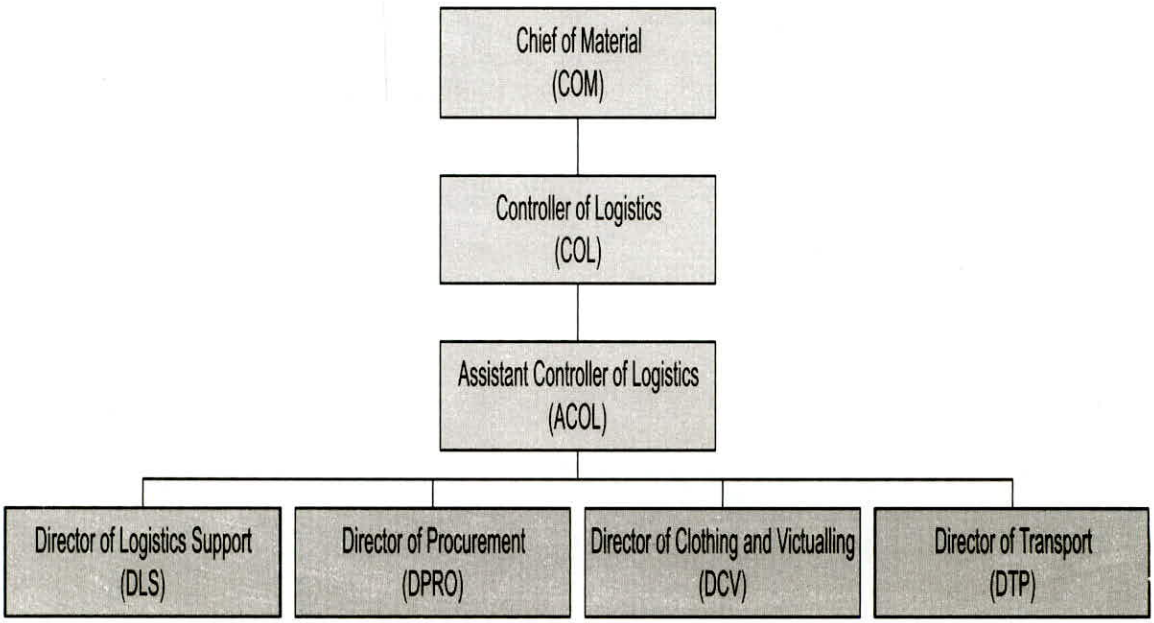
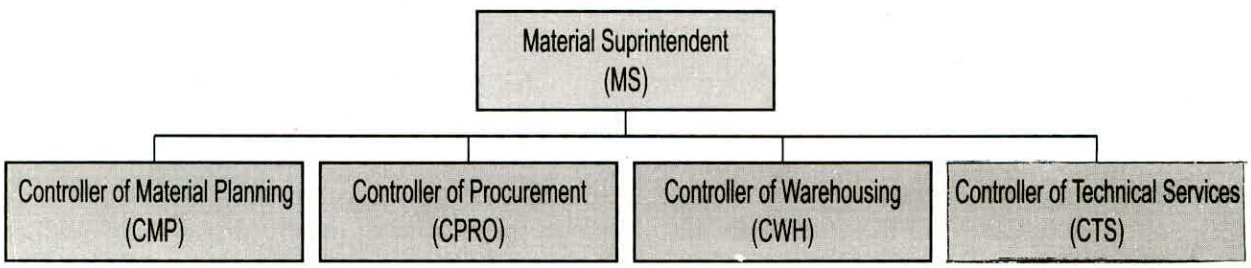


Figure 1.2 Organisational Chart at Depots



At Naval Headquarters: The COL is assisted by an Asst. Controller of Logistics (ACOL) in the rank of Rear Admiral. Four Directors in the rank of Commodore, namely, Director of Logistics Support (DLS), Director of Procurement (DPRO), Director of Transport (DTP) and Director of Clothing and Victualling (DCV), are placed under him.

At Depot Level: MO (MB) and MO (V) are headed by Material Superintendents (MSs) of the rank of Commodore. A Controller of Materials, CM (K), from the civilian NSO cadre heads NSD (K). DLS at NHQ coordinates the activities of the depots. Four Controllers for Material Planning (CMP), Procurement (CPRO), Warehousing (CWH) and Technical Services (CTS) assist the Material Superintendents. These Controllers are of the rank of Captain. CWH is normally a civilian officer.

1.5 Historical Background and Development in Logistics

Knowledge of the genesis and evolution of the Material Support and Logistics Organisation of the Indian Navy is necessary for an appreciation of factors that influence the consolidation of expertise in the management of naval inventories. This as ascertained from Naval HQrs is briefly mentioned in Appendix 1.1 to this Chapter.

1.6 Main organizational changes

The pressures of expansion were particularly acute in the seventies and eighties due to impetus in Shipbuilding within the country and large ship acquisition programmes from Russia/FSU states. Logistics infrastructure had to be created virtually de-novo on the East Coast and the material support system respond to the demands of different operational and maintenance systems. In efforts to re-orient the traditional and well established system inherited from the UK, series of organizational changes were wrought. The major changes that have a bearing on the consolidation and performance of the present material support systems are:

i) The winding up of the Logistics Branch in the seventies and its re-creation in the eighties.
ii) The amalgamation of general stores and Equipment and Spare Parts management under a 'single logistics umbrella' concept as against the earlier concept of Inventory Management in specialized streams.
iii) Transfer of procurement functions to the Navy consequent to cessation of procurement by DGS&D and closure of Indian Supply Mission abroad.
iv) System changes from 1997 - the introduction of Integrated Logistics Management System (ILMS), improved Material Handling facilities in depots and enhanced delegated financial powers for procurement under the New Management Strategy (NMS).

The impact of the above on the Inventory Management system have been considered in the course of this review, and major organizational constraints summarized in Chapter 11.

1.7 Inventory Management Philosophy

Downtime of ships considerably affect force levels in the Navy. Material support, thus, has the responsibility of ensuring force levels through a well-sustained inventory management system that will minimise downtime during peace operations, and result in efficient maintenance cycles.

As 'stock outs' seriously impair capability, demand satisfaction level has been used as an important criterion in this audit examination of Depots and their major users, viz., Fleet and Dockyards. Further, naval support systems and structures are designed to be efficient and effective under worst-case wartime situations. This implies that, there will be some unused reserve capacity during the reduced or less complex operations in peacetime. At the same time, a ship by itself constitutes a major platform, and non-availability of an item, e.g., ship's propeller, may cause down time of many months, which has serious implications even in peacetime.

1.8 Scope and Audit Objectives

This is the first time that Audit has reviewed the logistics systems of the Indian Navy on such a large scale. Even here, it has been necessary to limit the study, given the size and complexity of the inventory system. Further, due to mandatory provisioning, scales of holding and maintenance, Weapons and Armament stores, though of high value, allow relatively less latitude in effecting economy; consequently, this area has also been omitted from the study.

The Audit Objective focuses on the policies and practices relating to Material support functions in the Navy as discharged by Naval Headquarters and Naval Store Depots at Mumbai, Visakhapatnam, Kochi and Goa. To this end, audit examination covered Naval Stores (NS), Marine Equipment and Spare Parts (E&SP), and to a lesser extent, Air Stores.

The audit addresses the following areas of material support functions in the Navy, viz.,

i) **Provisioning**
ii) **Demand satisfaction**
iii) **Procurement**
iv) **Inventory Levels**
v) **Human Resources Management**
vi) **Automation Policies – ILMS**
vii) **Budget & Cost Management**

1.9 Methodology and Focus Areas

The audit methodology identified high-risk areas of Naval Inventory Management, and further refined it by identifying critical success factors and key processes within each risk area. Suitable indicators to measure the efficacy of the processes were developed, and proforma for data collection devised. The primary focus of the study has been to arrive at constructive recommendations, which would lead to better inventory management in Navy.

a) ***At Naval Headquarters***

As Budget and the bulk of Provisioning and Procurement of the Indian Navy is handled at Naval Headquarters (DLS and DPRO), Audit examined these aspects in detail. Information and data were collected through questionnaires, proforma, and discussions. Documents pertaining to inventory management and shipbuilding were also examined.

b) ***At Depots***

Aspects pertaining to the seven material support function areas were addressed at Depots, primarily in the form of data acquisition through proforma. Since the depots have been computerised since 1997 through ILMS, Computer Assisted Audit Techniques (CAAT) in the form of Structured Query Language (SQL) were employed to extract data from the system.

The special focus areas for audit examination were as under:

Table 1.1 Special Focus Areas at Depots.

Depot	*Special Focus Area*
Material Organisation (Mumbai)	• Non Russian Equipment and Spare Parts Management • Integrated Logistics Management System
Material Organisation (Visakhapatnam)	Russian Equipment and Spare Parts
Naval Store Depots, Kochi and Goa	Air Stores

1.10 Sampling

Initially, Audit proposed to utilise data of the last five years. However, most of the depots stated that, after having transited to the automated (ILMS) mode in 1997-98, they were unable to retrieve data held earlier in the manual mode. Consequently, analysis of data had to be restricted, primarily, to a three year (1997-2000) timeframe.

Largely, the Audit sample size ranged between 50% to 100%. However, in a few cases, where the data was not computerized, and manual data was also difficult to come by, Audit examined a representative sample of about 20 to 30 cases per year (sample size: approximately 5% to 10%).

1.11 Constraints

The task of looking at data of over 600,000 items and close to 300,000 transactions a year was a Herculean exercise. Also, since different depots went on-line to ILMS at different times, and also because of their individual peculiarities in maintenance of data and reporting, uniformity could not always be achieved. Further, an almost total absence of cost data in the logistics realm meant that monetary quantification of lack of control was rarely possible.

Appendix 1.1

Historical Background and Development in Logistics

(refers to para 1.5)

a) Post Independence to the Sixties

- The Logistics system inherited from the Royal Navy, UK, is in place. Different organisations handle provisioning, stocking and distribution.
- NSD (B) is established for general stores, ship fittings, electrical items etc., under a Senior Naval Stores Officer -SNSO (B)-who is responsible for provisioning and stocking.
- Provisioning functions of SNSO (B) with staff are transferred in 1958 to Director of Stores (DOS) at NHQ, New Delhi.
- Spare Parts Distribution Centre (SPDC) is set up at Naval Dockyard, Bombay under the Admiral Superintendent - ASD (B). Technical Directorates at NHQ are responsible for provisioning. Technical management is essentially by service officers.
- Procurements are centralised through DGS&D (for indigenous stores) and India Supply Missions (for imported stores).
- The Supply & Secretariat (S&S) Branch of the Navy, comprising of Service Logistics Officers, is responsible for Afloat and Base Logistics Management.
- A Logistics Branch is formed under COL in 1967.
- A Combined Equipment Depot -CED (V)- is established at Visakhapatnam to stock Russian spares, supplementing the existing NSD (V) for Naval Stores.

b) The Seventies

- Major Material and Technical Spares problems are experienced due to rapid expansion of fleet, as a result of shipbuilding projects in India and Russian acquisitions.
- Administrative Staff College of India (ASCI) study recommends service management of material support functions through 'Technicalisation'. SNSO (B) and SPDC are merged to form Material Organisation under ASD (B).
- In 1972, Director of Stores (DOS) is re-designated as Director of Logistics Support (DLS). Stores and Technical provisioning functions are merged under DLS, and headed by a Technical Officer.

- In 1973, CED (V) and NSD (V) are merged and later upgraded to MO (V) with structure similar to MO (MB).

- In 1978, the Logistics Branch is abolished and merged with the Executive Branch. DLS is henceforth responsible for Material transferred to Material Branch.

c) The Eighties

- As Material support continues to be under stress, MO (MB) control is transferred from ASD (MB) to FOC-in-C West as recommended by the Admiral Mookerjee Report. ACOM (Logistics) is set up at NHQ

- Material support continues to worsen.

- Based on a study by IIM Bangalore, MOD introduces highly restrictive controls on procurement. This results in more problems and unacceptably long lead times.

- Procurement functions are shifted from DGS&D and India Supply Missions to NHQ. Indigenous and foreign procurement cells are formed at NHQ (DLS) without additional resources despite NHQ projection of requirement of 8 officers and 31 staff.

d) The Nineties

- The break up of the Soviet Union compounds procurement difficulties.

- Directorate of Procurement (DPRO) is formed in 1994, without additional staff, by merging Indian and Foreign Purchase Cells at NHQ.

- DPRO is hard put to cope with the entire revenue procurement of Rs. 150 crores per annum.
- Revenue Budget powers are decentralised under the New Management Strategy (NMS) of 1997.

- The Integrated Logistics Management System (ILMS) is introduced in 1997.

- Modernisation and Automation of Warehouses is undertaken in 1997-98

CHAPTER 2: INITIAL PROVISIONING

Initial Provisioning process aims at catering to a ship's "On Board" spares for the first year of commissioning, and "Base and Depot" spares for 5 years.

Audit found that the selection of equipment did not facilitate standardisation, resulting in proliferation of varieties, thereby complicating the Initial Provisioning process and management of inventories as a whole.

There were delays of up to 3 years in informing material depots of the nature of spares procured under initial provisioning. This resulted in inability to identify and meet demands raised by the users.

Navy's own channel of procurement of initial provisioning spares was prone to delays. The shipyard route adopted on a test basis resulted in materialization of spares in about 9 months as compared to 18-24 months through the Navy's Route.

Funds for initial provisioning are sanctioned at 15% of the cost of ship. Yet, as the cost of ship went up, timely revisions to sanctions were not made. Even the reduced funds were not utilised completely, and initial stocking guidelines were not fulfilled in many cases. Systems for revising initial provisioning lists based on consumption and other feedback were weak, or not in place.

The documentation accompanying the initial provisioning spares was inadequate and of poor quality.

2.1 General

The provisioning process, which is the most critical in naval inventory management, involves activities covering the determining and positioning of equipment, spare parts and stores for providing day to day fleet support, and ship's lifetime maintenance requirements. In this Chapter, we focus mainly on the provisioning of Equipment & Spare Parts (E&SP).

2.2 Provisioning Process

The provisioning process in the Indian Navy consists of "Initial Provisioning" and "Replenishment Provisioning". This Chapter covers Initial Provisioning. Chapter 3 covers Replenishment Provisioning.

2.3 Basis of Initial Provisioning

The objective of initial provisioning is to "determine", "procure" and "position" spares needed to support equipment for an initial period of 5 years. These spares, as also, Long Term Exploitation (LTE) spares sourced from "Former Soviet Union" (FSU) States, are known as "Base & Depot" (B&D) spares, and are centrally stocked at Naval Stores Depots. The spares anticipated for consumption during the first year's operational service of a ship, are termed "On Board" (OB) spares, and stored on the ship itself. When consumed, these are replenished from B&D stocks held ashore.

The process of initial provisioning, thus, has two phases, namely, "determination of requirements" and "acquisition" of these requirements.

2.4 Scales of Provisioning

Provisioning of B&D spares is based on an initial provisioning directive issued vide Govt. of India, Ministry of Defence letter No.15 (3)/9500 – D (N-I) dated 11 January 1957. This stocking includes requirements of "After Action Damage", "War Reserves", insurance, and feeder source of spare gear for ships operational and maintenance replenishment.

Initial provisioning guidelines stipulate 25% stocking of equipment and sub-assemblies, based on total fitted population; for items requiring replenishments due to fair wear and tear, the guidelines stipulate one spare for every two such items fitted in the equipment. The scales of provisioning are susceptible to variation based on professional judgement.

Amplifying directives on stocking, ranging and scaling of spares are also contained in INBR 622, BR 1570 and 'E' lists for electronic spares and internal memoranda.

2.5 Determination of requirements for Initial Provisioning of Base & Depot spares

Supplier's norms largely govern requirements for initial provisioning of ships acquired from Russia / FSU States. However, in the case of other ships, this is determined through a process of "Ranging" and "Scaling". This process determines the range (number of items of spares or equipment) and scale (quantity of each) required to support the system for an initial period of one year's OBS and five year's B&D spares.

The following Directorates at Naval Headquarters are the nodal points for acquisition and production of ships:

- Directorate of Ship Acquisition (DSA) for acquisition of ships
- Directorate of Naval Design (DND) for designing and building of 'Lead' Ship of the class

- Directorate of Ship Production (DSP) for production of 'follow on' ships of the class

Professional Directorates of the Material Branch undertake the task of ranging and scaling based on INBR 622 and a variety of technical considerations, using documentation and Manufacturer's Recommended Lists of Spares (MRLS) obtained through the DSA, DND or DSP. Requisitions for initial provisioning are raised on the Logistics Branch, which translates these requirements into purchase orders through the Directorate of Logistics Support (DLS) and the Directorate of Procurement (DPRO).

The procedure and flow-chart for provisioning of B&D spares is placed at the Appendix to this chapter. It may be noted that a number of important and closely inter-connected activities are involved, commencing at (D-42) i.e. 42 months earlier, the cardinal date (D) being the date of the ship's commissioning.

2.6 Procurement Process in Initial Provisioning

Funds for OB spares, normally to the extent of 10% to 15% of cost of fitted equipment, are included in the capital cost of the ship. These spares are ordered by the shipbuilder on the basis of Allowance Lists authorised by NHQ. Funds for B&D spares however, are separately sanctioned from the Revenue Budget at 15% of the cost of the ship, or approximately 25% of the cost of the equipment.

Naval Headquarters (DLS) is responsible for procurement of initial outfit of B&D spares. The provisioning system was not effective and was prone to serious delays. In 1996, NHQ, as a test case, introduced provisioning of B&D spares through the shipyard route, commencing with Project 15 ships (Delhi class) built at MDL, with better results.

In view of the critical importance of initial provisioning, on considerations of both operational and financial efficiency, the initial provisioning process was examined through the prism of the following normative considerations:

i) Standardisation of equipment.

ii) Timely and accurate specifications of equipment and spares for inclusion in the logistics system.

iii) Acquisition requirements being timely and scientifically determined.

iv) Efficiency of the provisioning chain.

v) Budgetary and financial considerations.

2.7 *Audit Observations on Initial Provisioning*

2.7.1 Lack of Standardisation

It stands to reason that, standardisation of equipment facilitates effective support of ships. However, audit examination revealed that, a wide diversity in equipment fit on board persists even in the case of very common items. For instance, MO (MB) handles 31 types of Compressors, 42 types of Sea Water Pumps, 29 types of Fuel Oil Pumps, 26 types of Fresh and Feed Water Pumps, and 74 types of Communication Equipment. Though some amount of diversity is inescapable, the fact that even ships of the same class cannot be treated similarly, makes meaningful inventory management difficult.

2.7.2 Delays in Incorporating Items in the Logistics Chain

As per current provisioning procedure (flow chart at Appendix 2.1 to this chapter), all provisioning activity is essentially to be completed at (D-18) i.e., 18 months prior to commissioning of the ship. Supply of essential documents like, Equipment Lists, Equipment Supply Orders, Comprehensive Parts Lists (CPLs) and Parts Identification Lists (PILs) take place between (D-40) and (D-30) months. A random sampling of three ships commissioned in the last four years revealed the following:

i) Though INS Delhi, built by MDL, was commissioned in November 1997, supply of CPLs/ PILs were not complete until 2000.
ii) INS Mysore, built by MDL, was commissioned in June 99. However, no CPLs / PILs had been received until 2000.
iii) Though INS Brahmaputra, built by GRSE, was commissioned in April 2000, as many as 11 CPLs / PILs were received only after commissioning.

The professional Directorates at NHQ confirmed that:

i) Documents like CPLs / PILs, Technical Manuals, drawings etc., are received late, in many cases well after commissioning of ships.
ii) Quotations for equipment/ spares with complete technical particulars are not received by NHQ from Shipyards till just prior to commissioning of the ship.
iii) Due to documentation delays, veracity of quotations and part numbers with documents like CPL / PIL cannot be assured. Further, with the introduction of the ILMS, verifying the authenticity of item codes, combining the complete Bill of Material activity of B&D spares and OB spares, and establishing database on ILMS at one go, was not possible. Therefore, subsequent demands raised by ships are not accepted in the ILMS.

2.7.3 Delays in Procurement – Initial Provisioning

As per procedure, the provisioning of B&D spares should be completed and the stores positioned in the depot before the commissioning of the ship. A select examination of provisioning of B&D spares revealed that, in practice, the initial provisioning lags well behind, and in some cases, is completed years after commissioning of the ship. Sometimes, even indents are not raised prior to commissioning of the ship. In many cases, the time taken between raising an indent, and placing an order is around 18 to 24 months, or more. These audit findings have been confirmed by NHQ, who stated that, "the process of B&D spares procurement through Navy channels, is prone to inordinate delays due to procedural hurdles". NHQ has also stated that, attempts at provisioning of B&D spares for Delhi Class ships via the shipyard route, has been "encouraging", the average procurement time being 9 months, i.e., "halved" and that the "compliance status of B&D spares ordering is around 90%" as of December 2000.

It would be seen therefore, that, the shipyard route for initial B&D provisioning is inherently more efficient and cost effective due to better responsiveness and leverage with both, shipyards and OEMs, during the building and ordering phases of projects. Moreover, since the shipyard is, in any case, required to obtain quotations and conclude contracts for supply of main equipment and OB spares, the ordering of B&D spares also through shipyards could be conjoined, with deliveries staggered as required.

While ordering via the shipyard route has been welcomed in general, MO (MB) stated that, depots experience considerable difficulty in taking the items on charge, since item code and documentation format were not in consonance with the recently implemented ILMS. These issues are presently being addressed, with Naval Headquarters now insisting on preparation and promulgation of an ILMS compatible format, right from the stage of obtaining quotation from OEMs, to placement of orders by shipyards. The timely receipt of documents, and reconciliation at the time of vetting lists and ordering of B&D and OB spares, will, by itself, go a long way in streamlining the system.

2.7.4 Funds for Initial Provisioning

One of the reasons for inadequate B&D provisioning is lack of adequate funds, which, as per existing norms, are sanctioned at 15% cost of the ship or approximately 25% of the cost of equipment. However, though invariably, there is a cost overrun in the shipbuilding project, the budget for B&D spares remains pegged at the initial sanction. Also, when the sanction is actually exercised 5 to 7 years later, near the time for commissioning of the ships, the prices of spares would have soared. The net and inevitable result is a serious shortfall in initial provisioning even well below the initial provisioning guidelines. The table below illustrates the situation in respect of three recent shipbuilding projects.

Table 2.1 Funds for Initial B&D Provisioning

Project/ Ship	*Year*	*Original sanction (Rupees in Crore)*		*Actual Project expenditure (Rupees in Crore)*	*B&D provisioning costs as a percentage of*	
		Project	***B&D***		***Original Project Cost***	***Actual Project Cost***
Fleet Tanker ADITYA	1985	65.00	9.75	203.19	15%	4.8%
P – 16A	1986	360.00	54.00	1099.5	15%	4.9%
P – 25 A	1986	230.84	34.60	622.4	15%	5.6%

The Audit Report of 1998 of the C&AG on Construction of Frigates observed that, cost escalation was more the rule, and no sincere efforts were made in getting the cost revised by CCPA (now CCS). Audit considers that there is definitely a case for linking up funding for initial provisioning of B&D spares with actual cost of construction, and obtaining timely revisions to sanctions.

2.7.5 Delays in Utilisation of Sanctioned Funds for B&D Spares

While on the one hand, funds for initial B&D provisioning are inadequate, delays in procurement have resulted in unutilised funds. The status of funds booked by Naval Headquarters up to December 2000 in respect of some recent projects is given below.

Table 2.2 Funds booked by NHQ for B&D Spares – Ship Building Projects

Project/ Ship	***B&D funds sanctioned (Rupees in Crore)***	***B&D funds booked (Rupees in Crore)***	***Shortfall (%)***
Fleet Tanker ADITYA	9.75	7.35	25%
P – 16 A	54.00	12.99	76 %
P – 25 A	34.63	4.40	87 %
Survey Vessels	21.99	0.91	95 %

2.7.6 Indian Naval Ship Maintenance Authority (INSMA)

INSMA's function, essentially, is to assist NHQ in promulgation of maintenance schedules, in pre-service support, optimisation through user feedback, and analysis of premature/repetitive failures experienced in service. The INSMA also maintains databases of all equipment of the Indian Navy afloat. The large bank of data available with INSMA is, however, not purposefully utilised by the Logistics chain.

2.7.7 Non-Revision of Initial Provisioning Lists

The lists of B&D spares and OB spares are essentially based on "Manufacturer's Recommended List of Spares" (MRLS), and the professional judgement of technical officers at the time of ranging and scaling. Overstocking generally occurs if repeat procurement is done without accounting for past consumption and stock position. Likewise, under- stocking occurs when adequacy of fast moving components, assemblies, and rotables / modular units is not assessed on a continuum of age-related, technological and environmental considerations. Therefore, the provisioning range and scale needs to be dynamic.

Audit scrutiny revealed that the provisioning and allowance lists of equipment and spare parts are not updated, for the following reasons:

i) There is no system of reporting and analysing consumption of OB spares at any stage in the life of the ship.
ii) There is no system to ensure exchange of information of past consumption data between the logistics and professional directorates at Naval Headquarters. Nor is there visibility or generation of data through the ILMS to users.
iii) There is no system to ensure the updating and refining of standard forecast lists jointly by Dockyards and Depots after ship's refit, based on actual consumption.
iv) Feedback reports from field units like INSMA on the failure rates of equipment are not sufficiently institutionalised or recognised as inputs for modification of stocking scales/ norms.

Non-modification of the range and scale of spares is also an important reason for the high incidence of spares being reported by the Depots as 'Stock Out', or, as NSB (Not Stocked Before). Feed back mechanisms relating to consumption of spares need to be introduced and well institutionalised at all levels in the inventory management chain.

2.7.8 Inter Disciplinary Funding

The Material Branch of Naval Headquarters is responsible for interdisciplinary allocation of funds. Though, as per provisioning norms, the ratio of allocation of funds for main equipment among the Hull (H), Engineering (E), Electrical (L) and Weapon (W) disciplines is 4: 14: 28: 54, Professionals at NHQ appear to have widely differing views. Funds allotted for initial provisioning of B&D spares of recent projects, is indicated in the table below:

Table 2.3 B&D Spares – Discipline wise Allocation in Percentage

Project	*Total B& D Spares sanctioned (Rs in crore)*	*'H'*	*'E'*	*'L'*	*'W'*
P.16 – A	54.0	2%	10%	33%	55%
P.25 – A	35.0	1%	17%	6%	76%
P .15	132.3*	4%	14%	19%	32%
Survey Vessel	*22.0**	*1%*	*36%*	*29%*	*- Nil -*

** Expenditure projections, not complete*

It is evident that the discipline-wise allocation in the Indian Navy is arbitrary, and deviates from norms. Distribution obviously needs to be based on well defined ground realities of maintenance and replacement costs, since equipment and systems are prone to rapid wear and tear, corrosion, rotable / LRU changes, aging and hourly based routines, necessitating higher expenditure. Factors like modification and mid-life upgrades to electronics equipment due to obsolescence are to be taken into account, while ensuring no over stocking.

2.7.9 Documentation in the Provisioning Process

Supply of sufficient and accurate documentation facilitates clear identification of equipment items, spare parts, and item codes, and acts as an essential aid to good Inventory Management. Such clarity is vital to those in the supply management chain, predominantly, the ships' users, repair yards and depots. The following deficiencies were noticed in documentation supplied to various shipbuilding projects.

i) Poor quality technical manuals, user's hand books, CPLs / PILs. These appeared to be in all shapes, sizes and formats, and in many cases, were merely poor photocopies.
ii) Identification, in terms of illustration and part numbers is not possible in many cases, from CPLs / PILs.
iii) A number of items in ships' D.787's / Allowance Lists lacked item codes / cross-reference to drawings, etc.
iv) Documentation supplies are haphazard and lacking in timely deliveries to Naval Headquarters as per laid down norms; data base management and provisioning is seriously affected by these delays.

The above flaws are especially acute in the case of indigenously built ships. These weaknesses result in a number of user demands being categorised by depots as NA / NSB / NI. Audit notes that there has been lack of focus at all levels, viz., Naval Headquarters, Shipyards and OEMs, in producing meticulous documentation so vital to inventory management and fleet support. Efficient functioning of the ILMS necessitates the existence of accurate and timely database of item codes to enable identification of items in the B&D and OBS Inventory without ambiguity.

There is therefore, a definite need for Naval Headquarters to review and adhere to the laid down provisioning directives regarding timeliness and quality of documentation, given the vast array of modern tools available for generating quality documents.

2.8 Recommendations

a) Large proliferation of equipment types at the stage of induction has resulted in excessive stocking, huge carrying costs, non-standardisation of equipment and non-identification of items of similar use. Policies for systematic equipment selection and standardisation need to be evolved and implemented, particularly in indigenous shipbuilding.

b) Timely supply of documentation along with details of equipment, particularly item codes, at provisioning stage, need to be institutionalised in the Material logistics system.

c) As procurement of B&D spares through the shipyard route has proved to be more effective, this may be adopted as the norm. Compatible formats should be devised for identification and incorporation in the Inventory Management System (ILMS) etc., at the time of Initial Provisioning.

d) As originally budgeted amounts for initial provisioning of B&D spares are seen to be inadequate due to cost escalations of the project, the Initial Provisioning budget needs to be linked to the actual cost of the ship building project.

e) To rectify the inadequacies in the preparation of lists of OB spares, feed back mechanisms based on Analysis (consumption patterns, defect analysis etc.) be instituted and implemented for revision of Allowance lists and to facilitate inputs for future programmes.

2.9 Defence Response

Of the five recommendations made by Audit, NHQ agreed with all.

Response of NHQ to the above recommendations is summarized below, ad seriatim.

a) **<u>Standardisation:</u>** Agreed. NHQ added that, although every effort is made towards standardization, constraints in both foreign acquisitions and indigenous ship building programmes do not make this possible.

[Para 2.8 (a)]

b) **Documentation**: Agreed that quality and timely documentation is of vital importance, and that efforts are in hand to further strengthen the system. Departmental orders have been issued.

[Para 2.8 (b)]

c) **Procurement of B&D Spares:** Agreed that B&D Spares be procured on the Shipyard route to facilitate leverage with suppliers and timely provisioning. Directives have been issued in September 2001 to ensure ILMS compatible formats in ordering.

[Para 2.8 (c)]

d) **Linking of initial B&D provisioning budget with cost of ship:** Agreed, stating that NHQ has always endeavoured to do this, but are constrained by timely release of funds by MOD.

[Para 2.8 (d)]

e) **Inadequacies in revision of Initial Provisioning Lists:** Agreed and accepted the need to rationalize the lists of on Board spares holdings of ships, adding that data build up and retrieval on the ILMS would progressively facilitate the exercise.

[Para 2.8 (e)]

2.10 Conclusion

There is overall consensus between Naval Headquarters and Audit on the points bought out in this chapter. On the question of standardization, Audit is of the view that clearer long term perspectives and more effective naval equipment selection and standardization policies are evolved and implemented. On the question of non-revision of Initial Provisioning Lists, NHQ stated that there are a set of factors inherently in place to address this issue. Audit maintains otherwise, and views that a set of institutionalised practices are needed to strengthen the system. This aspect may, therefore, be examined.

The linking of initial provisioning budget for B&D Spares with the final cost of ships, and timely financial approvals, merit particular attention by the MOD.

Appendix 2.1

Flow Chart: Provisioning of Base and Depot Spares

(refers to Paras 2.5, 2.7.2, 2.7.3)

ACTION	***BY***	***SCHEDULE***
OBTAIN SANCTION LETTER COVERING 15% OF COST OF SHIP/PROJ. FOR B&D SPARES	SHIP PRODUCTION DIRECTORATE	D –42
COMPILE COMPREHENSIVE EQUIPMENT LIST AND FORWARD TO PROF. DIRECTORATES	SHIP PRODUCTION DIRECTORATE	D -40
FORWARD EQUIPMENT SUPPLY ORDER COPIES TO PROF. DIRECTORATES	SHIP PRODUCTION DIRECTORATE	PROGRESSIVE BASIS
ALLOCATE FUNDS TO PROF. DIRECTORATES	NODAL DIRECTORATE IN MATERIAL BRANCH	D -36
OBTAIN AND FWD CPLS/PILS/DRGS TO PROF. DIRECTORATES.	SHIP PRODUCTION. DIRECTORATE	D -30
FWD. QUOTATIONS FOR B & D SPARES TO PROF. DIRECTORATES	SHIP PRODUCTION DIRECTORATE	D -30 TO D -24
FORWARD PAST CONSUMPTION DATA TO PROF. DIRECTORATES	DIRECTOR OF LOGISTICS SUPPORT	ANNUAL
RANGE AND SCALE/ RAISE 'B' FORM ON DLS	PROF. DIRECTORATES	D -30 TO D -24
RAISE INDENT ON PROCUREMENT AGENCY/ DPRO	DLS	D -20
PLACE ORDER/CONTRACT	DPRO	D -18
PROVIDE FEED BACK ON PROCUREMENT PROGRESS	DLS	EVERY MONTH

CHAPTER 3: REPLENISHMENT PROVISIONING

Replenishment provisioning, based on Annual Review of Demands (ARDs), is an ongoing annual exercise for replenishment of stock as per past consumption and future requirements.

Audit found that the replenishment provisioning method in use was essentially backward looking, and did not try to anticipate future requirements properly.

On theoretical considerations and benchmarking with the methodology of leading Navies, Audit found that the method in use was adequate for fast moving items of Naval Stores, but limited in effectiveness for slow moving items of the E&SP category.

The replenishment provisioning process needed a lot of manual intervention at each step. Without this manual intervention, the method veered towards over-provisioning.

A clear trail from the stage of determining acquisition requirement to actual receipt of the item did not exist.

Replenishment provisioning failed to cover most of the requirement that actually arose in the next year. Additional procurements to the extent of 40% to 4900% had to be made outside ARD to cater to the demands during the year.

There was significant over-provisioning, as evidenced from the fact that utilisation of stores procured was slow. In MO (MB), only about 50% of the items were utilized within 3 years. In MO (V), 15 to 40% of the items were not issued in the first year.

On average, only 50% of refit forecasts were accurate. Follow up action on forecasts was also lacking in depots where indents were raised after much delay.

3.1 General

Once initial provisioning is complete, that is, once OB and B&D spares have been positioned in the Ship and Depot respectively, the Logistics Branch takes over the functions of

supplying these items as required, and replenishing the bins when depot stocks deplete. Replenishment Provisioning is the process of determining acquisition requirements on a year-to-year basis, and its philosophy is to keep three year's average consumption as stock.

The minimum and maximum stock levels prescribed for each item are based on their ABC and VED classification. Factors like shelf life and lead time are also taken into account in deciding the quantities to buy. Every year, the entire inventory is to be reviewed, and an "Annual Review of Demands" (ARD) is to be prepared.

As per the Material Planning Manual, depots are required to carry ABC and VED analysis of Naval Stores and Equipment & Spare Parts (E&SP) on 31st March and 30th September every year, for approval by the DLS.

Based on ARDs, the Procurement Quantities (PQs) generated are reflected in Indents, which are finally converted into purchase orders by Naval Headquarters, or by Material Organisations. With delegation and revision of Financial Powers under Navy Instruction 1/S/97, there has been a corresponding increase in "Local Provisioning" at Depot Level, while, "Central Provisioning" at NHQ, now caters generally to procurement under the higher financial powers.

3.2 Replenishment Provisioning Methodology

Replenishment provisioning of stores in the Navy is intended to determine the acquisition requirements for a year. The formula as reflected in the Appendix 3.1 to this Chapter determines acquisition requirements for all kinds of stores, where PPQ and FPQ are the Provisional Procurement Quantity and Final Procurement Quantity respectively.

Controller of Material Planning then subjects all the items for which PQ is positive (PPQ) to a review. The planner vets the PPQ and increases or reduces this quantity by an amount, which is termed as Provisioning Officer's Expert Value (POER). The FPQ thus arrived is to be indented for procurement.

Considering the size of the naval inventory, the reviews are undertaken in groups, in a staggered manner, with prescribed frequency, so that each item is reviewed at least once every year.

3.3 Critique of the Provisioning Methodology

The above outlined provisioning methodology followed by the Navy, falls in the category of fixed time review methods of inventory management, as distinct from self-triggering inventory management method. It is known that fixed time review methods are inherently more costly because they have to provide for possible variation in the probabilistic demands during the review period too.

Though earlier, given the size of inventory, it was not possible to have an automatic replenishment method, this should now be possible, with the introduction of ILMS.

The existing methodology was analysed in audit. The lacunae in the provisioning methodology enshrined in this formula, is discussed below:

i) The provisioning formula suffers from a major drawback, as it hinges on Annual Consumption Level (ACL). ACL is defined as last 3 year's average consumption with weightage to recency. Though ACL makes sense for fast moving items like soaps, a large number of items in the naval inventory, like E&SP items, are slow moving. Thus, any item with a consumption time lag of more than 3 years will never have a positive PPQ for the year when it is probably required

ii) The provisioning formula only accounts for stock held with the depot, and does not account for stock which may have been issued to the users but may be lying unconsumed at their end.

iii) If a slow moving item has been procured in a year, it will lead to a positive PPQ in the next year when it is not actually needed. For instance, Base Victualling Yard, Visakhapatnam procured a large quantity of polywool jackets with a shelf life of 36 months, even though, sufficient quantity was available in stock. Consequently 5715 jackets costing Rs.63.16 lakh are held in stock and have already outlived their shelf life. Thus, the provisioning would need a high level of manual intervention, which is indeed borne out by the facts discussed subsequently. Such high level of manual intervention makes inventory management susceptible to the skills and training of the manager.

3.4 Benchmarking the Provisioning Method

In order to benchmark the provisioning method of the Indian Navy, Audit compared it with the provisioning method of the US Navy, where, the requirement determination is categorised as under:

1. Program: Requirement of material to sustain authorised and well defined programs, such as new construction, conversion, alteration or outfitting of ships and other specified activities.

2. Maintenance: Random requirements for material to support or replace operational equipment. This is further subdivided as:

a) Demand based: Requirements of items for which random demands occur over a sustained period, and may be subsequently used to predict future demands. Demand based category items are those for which demands occurred at least twice in the last three years and average to more than one in that period.

b) Insurance: Requirements of items for which demand has been infrequent or lacking but prudence dictates stocking of nominal quantities due to item essentialities or procurement / repair lead times.

Thus, unlike the provisioning method of the Indian Navy where the entire determination of acquisition requirement is based on consumption of the past three years, the US Navy method segregates stores as per the intended usage and applies different methods to them. This is a more suitable method as also discussed in our critique of the existing system.

3.5 Functioning of the Replenishment Provisioning System

3.5.1 Annual Review of Demands (ARDs) at Material Organisations (1998-2000)

As discussed above, the ARD system is the mainstay of replenishment provisioning. Therefore, data pertaining to ARDs over a five-year period (1995-2000) were called for from the depots. However, depots informed that, data regarding items reviewed, demands projected etc., were not available before ILMS. Surprisingly, ARDs do not also find place in the inspection reports of Materials Organisations.

NHQ themselves highlighted the following draw backs experienced in the manual mode prior to 1998:

i) Reviews were partial and of poor quality due to numerous overlaps in item codes, errors etc.
ii) Conversion of manual ARDs into indents, and subsequent procurement on ILMS took place mostly in 1999-2000. System based checks instituted by NHQ (ACOL) on ILMS in end 2000 on new procurements vis-à-vis actual holdings in the depot revealed many cases of sufficient stocks existing in depots. A listing furnished to Audit by NHQ on indents during 1998-2000, where PQs were reduced or cancelled as stocks were available in depots, showed savings of Rs 54.25 crore.
iii) Depots considered ARD projection to NHQ, as 'anticipated dues-in', whereas, in many cases, the items did not translate into indents at NHQ due to Budgetary Quotes not materialising. This lacunae has been rectified in processing review based indents from the year 2000 onwards on ILMS, with DPRO floating tender enquiries as per provisions of the procurement manual.
iv) Large gaps between provisioning and procurement have been due to inadequate initial B&D provisioning on account of financial constraints and quality of 'ranging and scaling'.
v) Directorate of Procurement (DPRO) has no formal posts sanctioned by the Government. It has been hard put to manage functions of procurement which

were transferred to the Navy after cessation / closure of DGS&D and Supply Missions. The pace of procurement is therefore not commensurate with requirements.

vi) A lack of dedicated Branch / Cadre of officers, both service and civilian, have adversely affected Naval Inventory Management

Audit efforts to examine the effectiveness and efficiency of the Replenishment Provisioning loop over a five-year period (1995-2000) were largely unsuccessful. The efforts were mainly aimed at establishing whether ARDs are systematically carried out, the time frames taken to translate these into indents and the extent of culmination of PQs into firm orders. Naval Headquarters expressed difficulty in compiling the information, as requested, particularly prior to 1997-98, when record keeping was in the manual mode. This data was subsequently provided to Audit in May 2001, but the completeness of reviews and the provisioning / procurement linkages could not be established from the given details.

Data pertaining to the post ILMS phase i.e., after 1997-98, was however available from the two major depots, MO (MB) and MO (V). Details are given below:

Table 3.1 ARDs and PQs emerging from Depots, 1998-2000

Year	*Category*	*MO (MB)*			*MO (V)*		
		No. of items reviewed	*Items with PPQ*	*Items in Indents (FPQ)*	*No. of items reviewed*	*Items with PPQ*	*Items in Indents (FPQ)*
*1998-99**	E&SP (R)	13159	7539	63	141140	16603	NA
MO (MB)	E&SP (NR)	52971	16042	219	55480	3602	NA
1999 MO (V)	NS	26350	3428	2595	36072	1859	NA
1999-2000	E&SP (R)	15145	3189	362	160006	8276	NA
MO (MB)	E&SP (NR)	208875	31246	14486	64369	8659	NA
1999 MO (V)	NS	190452	20442	1412	30484	2997	NA
2000-2001	E&SP (R)	88113	9673	-	-	-	NA
MO(MB)	E&SP (NR)	226849	17416	5007	66484	5928	NA
2000 MO (V)	NS	194942	19953	1378	30045	2973	NA

* **MO (MB) data are as per financial year; MO (V) data as per calendar year**

As may be seen from the above table that, after reviews have been conducted, only a relatively small number of items have emerged for procurement. Further, a high degree of manual intervention can be seen in the data of MO (MB) when, items indented (FPQ) are compared with the (PPQ) figures. In this context, it may also be seen from Paragraph 3.6, that, substantial procurement has been effected outside the normal reviews. With the

stabilisation of ILMS and clearer analysis of data, more accurate FPQ figures are expected to emerge. This aspect needs to be watched and analysed, particularly with effect from 2001.

Analysis of a few select reviews confirmed the above:

1. One ARD of E&SP (Non Russian) done in March 1999 by MO (MB) was examined in detail by Audit. The ARD had projected 305 items for procurement. Of the 305 items, stock was zero (0) for 245 items. Thus, it is seen that the ARDs, which are the planning method for determining future requirements, are essentially reacting to the "dues out" position. The crucial factor, ACL, in the relevant PPQ formula was zero for 286 items.

2. In applying POER, i.e., variation based on professional judgement, the provisioning expert reduced the provisioned quantity in 64 cases and made no changes in the remaining 241 cases. Evidently, the provisioning methodology is tilted towards over provisioning.

3. For the store depot at NSD (K), the ARDs done for Air Stores were sent to NHQ for consolidation and procurement. It was discovered that feedbacks to ensure the closing of the ARD loop were absent. Even when ARDs were done and sent to Naval Headquarters, depots had no mechanism of knowing their ultimate fate. Yet, depots took these ARDs as automatic dues in. Hence, subsequent replenishment also suffered.

3.5.2 Provisioning and Procurement on the ILMS – from year 2000

NHQ admitted that Replenishment Provisioning has suffered from depth of focus and was beset with weaknesses in the past, but stated that, with the cleansing of the inventory in March 2001 on ILMS, system based reviews for the complete E&SP inventory of depots have been carried out, as below:

Table 3.2 System Based Reviews of Equipment & Spare Parts -Year 2000

Inventory Type	**Inventory Size (number of items)**		**Total number of items with FPQ**	**Indents raised (number)**
	Dec. 1999	Mar. 2001		
E&SP (R)	2,04,018	1,53,343	15,092	442
E&SP (NR)	3,37,547	2,30,388	12,888	390
E&SP (SSK)	46,674	27,334	6,655	111

The break down of the above indents at NHQ, MO (MB), MO (V), which were raised in the system based reviews carried out in 2000, is indicated below:

Table 3.3 Indent Processing at NHQ, MO (MB) and MO (V) – Year 2000

Inventory Type	NHQ	MO (MB)	MO (V)
E&SP (R)	442	Nil	Nil
E&SP (NR)	28	197	165
E&SP (SSK)	47	64	Nil

The status of Imported indents processed at NHQ in April 2001 is as follows:

Table 3.4 Status of Imported Item Indents at NHQ in April 2001

Inventory Type	Total Number	Converted into TE	Quotes Received	Cases under NLC/ IFA clearance	Contracts Placed
E&SP (R)	442	306	180	70	27
E&SP (NR)	28	Nil	Nil	Nil	Nil
E&SP (SSK)	47	41	Nil	Nil	Nil

NHQ further stated that, moving to the ILMS system has vastly improved processing time, and increased focus on procurement activities. NHQ reported that delays in the processing of cases at the IFA level, resulted in a backlog.

3.6 *Procurement outside ARD*

Since the ARD/Replenishment system as discussed above has not been meticulously followed, the situation at ground level has been one of fire fighting. indents have to be raised at the last minute to meet "stock out" situation. Thus, depots are forced to procure items for their needs outside the ARD system by raising *adhoc* demand based indents.

Details of items procured within and outside ARD are given below:

Table 3.5 Procurements made outside ARDs by MOs during 1998-2000

Year	Category	MO (MB)		MO (V)	
		Items indented / procured		Items indented / procured	
		Within ARD	Outside ARD	Within ARD	Outside ARD
1998-99 MO (MB) 1998 MO (V)*	E&SP (R)	63	3092 *(4908%)*	16603	Nil
	E&SP (NR)	210	4981 *(2371%)*	3602	2402 *(67%)*
	NS	2595	1324 *(51%)*	1859	3128 *(168%)*
1999-2000 MO (MB) 1999 MO (V)	E&SP (R)	4974	90 *(2%)*	8276	Nil
	E&SP (NR)	16533	7424 *(45%)*	8659	Nil
	NS	980	1089 *(111%)*	2997	1948 *(65%)*
2000-2001 MO (MB) 2000 MO (V)	E&SP (R)	11	959(8718%)	Nil	7563
	E&SP (NR)	4666	5234(112%)	5928	3741 *(63%)*
	NS	1645	839(51%)	2973	1254 *(42%)*

* **MO (MB) data are as per financial year; MO (V) data as per calendar year**

It may be seen from the above that, instead of meeting demands from stocks provisioned through the review system, indents raised on adhoc basis constituted 40% to 8700% of demands raised normally, rendering the ARD system virtually defunct.

3.7 *Utilisation of Stores Procured*

Utilisation of procured stores i.e., to what extent have the procured stores been utilised, is another measure of efficiency of the provisioning process. This analysis was facilitated by the fact that, the ILMS system stock of each item is kept as a separate record each time it is received.

Test check of receipts of the last 3 years to ascertain the extent of unutilisation revealed the following:

a) ***At MO (MB)***

Table 3.6 Percentage of items lying unutilised in year 2000

Procured in year	Naval Stores	Equipment and Spare Parts	LP Indented	CP Indented
1997	40%	75%	57%	48%
1998	34%	57%	45%	41%
1999	36%	62%	54%	40%

The following observations are made based on the above data:

i) More than 50% of the local procurement of Equipment and Spare Parts have remained unutilised. In other words, the requirement at the time of procurement was non-urgent, and could have been deferred.

ii) Even in the case of Naval Stores, utilisation is only of 60% after three years of procurement.

iii) Central Provisioning has been marginally more efficient than Local Provisioning.

b) ***At MO (V)***

Table 3.7 Items Provisioned and Issued at MO (V) in 1998-2000

Year	*Category*	*Number of Items Provisioned*	*Number of issues made within a year*
1998	E&SP (NR)	3903	2752 *(70%)*
1998	E&SP (R)	756	462 *(61%)*
1998	NS	1118	1015 *(90%)*
1999	E&SP (NR)	5243	3548 *(67%)*
1999	E&SP (R)	870	508 *(58%)*
1999	NS	1527	1298 *(85%)*
2000	E&SP (NR)	8336	4110 *(49%)*
2000	E&SP (R)	512	328 *(64%)*
2000	NS	1288	1001 *(77%)*

Though the objective of provisioning is to determine acquisition requirements for the next year, a substantial number of items received every year are not issued. Further, utilisation is

to some extent more in the case of Naval Stores than in the E&SP categories. This finding substantiates our earlier premise that the methodology followed is unsuitable for slow moving E&SP stores.

3.8 Replenishment Provisioning Other Planning Methods

Refit, Repairs and Modification constitute a major requirement of ships maintenance between operational cycles. Reduction in downtime being of paramount importance, three other planning methods have been introduced by the Navy over the years to fine tune replenishment of Spare Parts, Yard Material and Stores. These are:

- Refit Planning Procedure (RPP)
- ASD Critical List
- ASD Forecast List

3.8.1 Refit Planning Procedure (RPP)

This procedure was introduced in the seventies (updated under CNO 2/96) essentially to obviate or minimise "stock-outs" by examining the availability position of equipment and spare parts a year in advance of ship refits, and ordering replenishment of bins in good time. This is undertaken in addition to normal ARDs.

RPP stipulates that the work order for a ship's normal or long refit refit is opened at (D-52) or 52 weeks in advance of the refit. The dockyard accordingly raises forecast demands for spares at (D-52) based on the ship's "Part I Defect List" of mandatory routines and major anticipated scope of work. The final requirements of spares from the forecast list are activated through firm demands by the yard when the ship commences refit and additional demands are raised for spares as requirements arise in the course of refit.

The success of the RPP method rests on two considerations, viz.,

1. Accuracy of forecasts made by the Dockyard.
2. Timely action by the MOs to indent and order stock out items in the forecast list.

Audit examination revealed that the system was found wanting on both these counts. It was found that the method was not operating as intended, due to differing perceptions between the MOs and the dockyards. Specific cases on RPP demand satisfaction are also discussed in the chapter on Demand Satisfaction.

3.8.2 Mismatch in Perceptions on RPP

One measure of accuracy of forecast is the activation percentage by the dockyard, which is the percentage of items actually demanded from the forecast list on commencement of the ship's refit. Audit observed that this percentage has been around 50 % for the last three years. It was also observed that there were a large number of items demanded outside the forecast- on occasions, this number was more than the items demanded within the forecast. This meant that the supply chain had little time to replenish items in cases of "stock out".

The dockyards stated that there are a number of factors responsible for variations from forecasts, the more important of these being a re-assessment of routines actually due and revisions in scope of work at the time of commencement of refit. Also, the defects actually noticed on opening of equipment are in many cases at variance with expected defects.

The dockyards are of the view that their forecasts are only to supplement the ARD procedure followed by the depot. As opposed to this, the perception of the depot is that since RPP demands are to be treated as firm demands as per procedure, the depots would be saddled with a large non-moving inventory for items not subsequently demanded. Thus, depots appeared to go slow on forecast demands, and react mainly to firm demands with low success, due to lead-times involved in supply, thereby affecting the schedule of refit completion or quality of the refit.

As a remedy to the above situation, Western Naval Command, Mumbai has proposed the concept of overhaul kits, wherein items would be procured in sets for equipment overhaul routines falling due for refit. This is yet to be implemented. Audit recommends that a long-cast of requirements based on anticipated arisings will considerably ease refit bottlenecks.

3.8.3 Audit Observations on RPP

Audit considers that there is a need for comprehensive method of material planning for ship's refits, ensuring that, *interalia*:

i) Strengthening of material planning groups to ensure that post-refit analysis, refinement and updating list of spares are compiled meticulously between MOs and dockyards as stipulated in CNO 2/96.
ii) Provisioning Reviews, ARD based and RPP, take into account anticipated requirements of overhaul spares and kits to be procured.
iii) Replenishment Provisioning data is reported by MOs as part of Annual Inspections, including procurement linkages and "dues-in" to earlier reviews.
iv) Half-yearly reports be rendered to Naval Headquarters (COM) prior to Annual Refit Conferences (ARCs), and mid-year refit reviews in respect of provisioning reviews and procurement status.

3.9 ASD Critical and Forecast Lists

As a tacit admission to the inadequacy of MOs to plan for requirements, naval dockyards have been entrusted with the task of giving the ACL for such items of Yard Material and Naval Stores that are on the ASD Critical list. Forecast Lists (FCLs) are provided for certain other items of Naval Stores for which dockyards are not in a position to determine ACLs on a well defined long term basis. The depots treat these as firm demands for purposes of material planning.

The ASD critical list contains many common use, but nonetheless critical items, such as steel plates, steel sections, ferrous/ non-ferrous metals, fasteners, insulants, adhesives etc. The ASD critical list is progressively refined, and currently, there are about 1000 items in the list. Forecast Lists for Yard Material are based on a forecast of specific requirements for refits two years hence. Paints, special steels, electrodes are typical examples.

The demand satisfaction levels of ASD Critical Lists and Forecast Lists are better than the other lists, as discussed in the chapter on demand satisfaction.

3.9.1 Audit Observations

Since most of the items in the ASD critical list are industrial items of repeated use, procurement of items in the ASD critical list should be made the responsibility of the dockyard. Rate contracts be established where economic pricing is feasible for high frequency items.

3.10 Recommendations

a) ***The methodology for replenishment provisioning of all types of stores is inadequate. It is essentially suited to fast moving items, and is deficient in the case of Equipment & Spare Parts. Inventory Management of Equipment & Spare Parts should be segregated from that of Naval Stores, and its replenishment be considered on its own life cycle maintenance considerations, as in other leading Navies.***

b) ***The provisioning formula applied in the case of Naval Stores is liable to lead to over-provisioning wherever there is sporadic or heavy one-time consumption. Therefore, the existing provisioning formula should be given a re-look and safeguards incorporated.***

c) ***The provisioning methodology provides for three years consumption in stock at the beginning of the year. Given the growing pace of liberalisation and indigenous production, many of the items in stock are readily available in the market. The uncertainty in lead-time has also gone down. The norms for target stocking level may be examined and brought down substantially below 3 ACL. This will help bring inventory to more manageable levels.***

d) Presently there is no system of monitoring the conduct of reviews, subsequent indenting and procurement. Quarterly / Half yearly reports of reviews due, done, and consequent action thereon be submitted to top management for fixing responsibility and taking appropriate corrective action.

e) As a corollary to the above, reports on ARD based provisioning should be submitted to the Material Branch on half yearly basis prior to Annual and mid-year Refit conferences.

f) It is seen that, depots often have little knowledge of the fate of reviews sent for consolidation to Naval Headquarters. Yet they are counted as 'dues in', hampering further replenishment. There have also been delays in converting the reviews into purchase orders. It is recommended that full powers for procurement on review based indents / indigenous procurement be delegated to the depots.

g) It is noticed that appreciable procurement is being done outside the Review based (ARD) System. Steps should be taken to reduce this procurement.

h) Refit Planning Procedure has failed to achieve its objective due to poor ARD replenishment, as also inaccuracy of forecasts. The Replenishment system be strengthened by :

- *Provisioning of overhaul kits based on anticipated arisings*
- *Improved accuracy of forecasting by dockyards and methodical post-refit analysis by both depots and dockyards.*

i) Planning for Yard Material/ Naval Stores in the ASD critical list is done by dockyards, who are among the biggest consumers of stores, by estimating ACLs. Therefore, the provisioning of ASD critical list items should also preferably be made the responsibility of dockyards.

3.11 Defence Response

Of the nine audit recommendations, NHQ agreed with four, partially agreed with three and did not agree with two.

Response of NHQ to the above recommendations is given below, ad seriatim.

a) **Methodology for Replenishment Provisioning:** Agreed and confirmed that the replenishment provisioning of E&SP inventory necessitated better attention to life cycle maintenance considerations and professional inputs through feed back linkages and involvement of agencies within the naval system.

[Para 3.10 (a)]

b) **Replenishment Provisioning Formula:** Not agreed, stating that the provisioning formula applied to naval stores has adequate safeguards to meet the existing

requirements. Nevertheless, with an increased data base obtaining on the system, the provisioning formula would be re-considered after two years.

[Para 3.10 (b)]

c) **Reduction in Provisioning norm of 3 ACL:** Agreed partially, stating that flexibility in stocking policy needs to be retained and in case of items readily available in the market, target stocking level of 2 ACL is being adopted as has been recommended by Audit. Audit is of the view that provisioning norms can be rationalised on scientific basis by adopting any of the selective inventory control techniques including Matrices Combining Consumption Value, Criticality and Availability of the inventory items. This should result in differential periodicity being prescribed for different groups of items. One such model of combined matrices indicating different assurance levels acceptable for various categories is attached for reference as Appendix 3.2 to this chapter

[Para 3.10 (c)]

d) **Monitoring of provisioning reviews :** Agreed partially stating that the review calendar is promulgated by Naval Headquarters and being adhered to by MOs. A reporting system to top management would be set in place.

[Para 3.10 (d)]

e) **Refit Specific Reviews :** Agreed partially, stating that reports on review provisioning and FCL status are communicated to Refit agencies and Material Branch. Efforts will be made to ensure 'more timely' reporting.

[Para 3.10 (e)]

f) **Procurement by Depots :** Agreed that full powers of procurement based on review indents should be delegated to the depots, subject to provision of additional manpower and other resources.

[Para 3.10 (f)]

g) **Procurement outside review based system :** Agreed and amplified that steps have been taken to reduce the procurement outside the review as a result of progressive data refinement on the ILMS.

[Para 3.10 (g)]

h) **Weaknesses in Refit Planning Procedure (RPP) :** Agreed in toto that the RPP system needed strengthening in terms of accuracy of forecasting, post refit analysis and provision of overhaul kits.

[Para 3.10 (h)]

i) **Procurement of ASD Critical List Items :** Not agreed, adding that procurement of 'Dockyard Specific' materials by the yard will detract from the

core function of repair. Besides, MOs also procure such materials for its other customers.

[Para 3.10 (i)]

3.12 Conclusion

NHQ have brought out that the nomenclature of 'ARD Provisioning' used in the pre-ILMS area has now given way to 'review provisioning' on a more dynamic basis and incorporated in the annual review calendar promulgated by Naval Headquarters; some classes of inventory may then be more frequently reviewed in the annual cycle.

Audit critique of the replenishment provisioning methodology and bench marking techniques have been discussed by Naval Headquarters at length with certain observations that are considered valid. The model for replenishment provisioning based an Annual Consumption Level (ACL), however, needs to be more judiciously applied recognizing greater intricacies of the slower moving, yet critical requirements of E&SP inventory, as compared to that of Naval stores. In particular, analysis based on past consumption and long cast or futuristic requirement of kits for ship refits need to be strengthened in the E&SP provisioning process. In addition, NHQ may consider refinements to forecasting techniques like exponential smoothening.

Procurement outside annual reviews were seen to be substantial during the period analysed by Audit, i.e., 1998-2000. NHQ have since indicated that with stabilisation and progressive build-up of data on ILMS as well as planned provisioning, the element of *adhoc* / local provisioning is steadily reducing.

NHQ is in consonance with Audit that full powers of procurement on review based indents should be delegated to the depots, with the provision that proportionate additional manpower and other resources be positioned in the MOs. In the light of repeated observations by NHQ on manpower constraints despite having taken on vastly enhanced procurement over the years, it is considered that this aspect merits particular examination by MOD.

Audit maintains that there is considerable merit in Dockyards themselves procuring their critical list of items and yard materials, although NHQ holds a different view. The question of 'Direct Demanding', either through an expanded system of rate contracts, or self procurement by the repair yards, may be further debated 'in house' with a view to easing material bottlenecks and stepping-up efficiency of ship refits.

APPENDIX 3.1
ESTIMATION OF ACQUISITION REQUIREMENTS

(refers to Para 3.2, 3.3)

Replenishment provisioning of stores in the Navy is intended to determine the acquisition requirements for a year. The following formula determines acquisition requirements for all* kinds of stores, where PPQ and FPQ are the Provisional Procurement Quantity and Final Procurement Quantity respectively.

PPQ** = **ACL (CCU – CCM + PLT/12) + MSL – S – DI + DO**
FPQ = PPQ + POER

The various terms*** are explained below:

ACL = Annual Consumption Level. This is calculated on a weighted average of actual consumption in the last three years, with weights 3, 2 and 1

CCU = Category Coefficient Upper Stock Level.
CCM = Category Coefficient Minimum Stock Level.

These have different numerical values, 1 to 9, based on their VED & ABC classification. Pending categorisation of items, CCM is taken as 1.2 and CCU as 3.0 for all items.

MSL = Minimum Stock Level = CCM * ACL
USL = Upper Stock Level = CCU * ACL
PLT = Procurement Lead Times, in months
S = Stock in hand
DI = Dues In
DO = Dues Out

Controller of Material Planning then subjects all the items for which PQ is positive (PPQ) to a review. The planner vets the PPQ and increases or reduces this quantity by an amount, which is termed as Provisioning Officer Expert Value (POER). The FPQ (Final Provisioning Quantity) thus arrived at is to be indented for procurement. Considering the size of the naval inventory, the reviews are undertaken in groups in a staggered manner with prescribed frequency so that each item is reviewed at least once every year.

* **Para 5.36 of Material Planning Manual**
** **Para 5.42 of Material Planning Manual**
*** **Para 5.18 to 5.42 of Material Planning Manual**

Appendix 3.2

Consumption Value – Criticality – Availability Matrix

(refers to para 3.1.1 (c))

Assurance level (percentage)

		A	B	C
V	S	85	95	99.9
	D	75	80	90
	E	60	70	80
E	S	75	85	95
	D	70	75	85
	E	50	70	80
D	S	70	75	80
	D	60	65	75
	E	LOW	50	60

KEY

ABC: A system of inventory classification based on annual consumption value

VED: A system of inventory classification based on criticality of the items-Vital, Essential, Desirable.

SDE: A System of inventory classification based on ease of availability of items – Scarce, Difficult, Easy.

CHAPTER 4: PROCUREMENT

Procurement of stores is done either centrally at NHQ by Director of Procurement (DPRO), or in depots by Controller of Procurement (CPRO). Substantial delegation of financial powers are available since 1997 under the 'New Management' strategy.

Audit found that there was a predominance of Single & Limited Tendering instead of Open Tendering, even for common items, leading to instances of uneconomic procurement.

Rate contract procurements by depots were only between 8% to 13%, though many fast moving items of Naval Stores and those in ASD Critical List were commonly available.

Procurement authorities could convert only about 60% of the indents into orders. The lead-time in placing orders was high. DPRO took more than 3 months in 70% of the cases. In the depots, the average internal lead-time was upwards of 4 months, and appreciably more in case of spare parts.

In DPRO procurements, only 20% of the supplies were made in time. In the depots on an average 3 to 6 months were taken by suppliers.

The inability to convert indents into supplies in time, was attributable to lack of specifications and inadequate knowledge about suppliers. Audit noticed instances where wrong items were procured due to incorrect specifications.

The system of enlisting and evaluating vendors was weak, resulting in ineffective vendor management.

Foreign procurements are accepted subject to self-certification. Some recent supplies from Russia were defective; in one case, items worth Rs 1.63 crore were found to be substandard.

4.1 General

Procurement is intended to meet various requirements, essentially, the replenishment of stocks for the ensuing year, and to meet stock out situations. The budget for this expenditure

is categorised under the budget for Local Provisioning (LP), and the budget for Central Provisioning (CP).

The Local Provisioning Budget is distributed among the Commands and the Store Depots. DLS in Naval Headquarters controls the Central Provisioning Budget. Controller of Procurement (CPRO) in Material Organisation makes local procurement based on requirement, and delegated financial powers. Similarly, Director of Procurement (DPRO) at Naval Headquarters makes central procurements. Some Central Provisioning Indents are also raised on CPRO for which a separate budget is assigned.

Earlier, Local Purchase was limited to procurements made to meet urgent operational requirements. All review-based procurement was centralised in Naval Headquarters. However, with the introduction of the "New Management Strategy", the financial powers of the Material Superintendent have been enhanced. Further, Commanders in Chief (C in-Cs) and ASDs have also been given increased powers. As a result, the volume of indigenous procurement has become progressively decentralised and is distributed between NHQ and MOs.

4.2 Procurement Powers of Various Authorities

Delegation of powers in the Indian Navy, as revised under NMS and promulgated under NI 1/S/97, is as below:

Table 4.1 Delegated Financial Powers at NHQ Level (Rs. in Lakh)

Authority	*Indigenous Procurement*	*Foreign Procurement*	*PAC*	*Single Tendering for Non PAC item*	*Limited Tendering*
COL (NLC1)	500	300	300	100	100
ACOL (NLC2)	150	100	100	50	50
VCNS	20	20	20		
DCNS (ASPC1)	500	300	300	200	100
ACNS (ASPC2)	150	100	100	100	50

NLC - ***Naval Logistics Committee.***
ASPC - ***Air Stores Procurement Committee.***

Table 4.2 Delegated Financial powers at field level (Rs. in Lakh)

Authority	*Indigenous Provisioning*	*Foreign Provisioning*	*Office Equipment*	*Approved for Single Tendering*	*Limited Tender - ing*	*Propriety Article Certificate*	*Local Purchase*
MS (NLC3)	50	5	15	20	50		2(5)
C-in-C			25	20 (50 for Air Stores)	50 for Air Stores		2 (5)
ASD				25	25	80	1
FONA	100			25	25	80	1

Additionally, COs of ships and establishments can make local purchases up to Rs 10,000 if they are Commanders and above, and Rs. 5000 if they are Lieutenant Commanders and below. Their Cash and Carry powers are Rs.10,000 without concurrence, and Rs.25,000 with concurrence.

4.2.1 Audit Observations

Financial powers are over-centralized. For instance, MS (MB) is responsible for procuring and supplying to more than 100 ships and shore units of the Western Naval Command. These items, many of them of common use, have to be procured and received at the depot, and then transported to the units at faraway places. This is a time consuming and costly procedure, with the MS (MB) alone spending Rs. 41 lakh on transportation by road every year. The financial powers of COs are still very limited at Rs. 5,000 and Rs. 10,000 respectively. Audit considers that better value for money could be achieved by increasing the financial powers of COs for procurement, of specific common use items.

4.3 Methods of Procurement

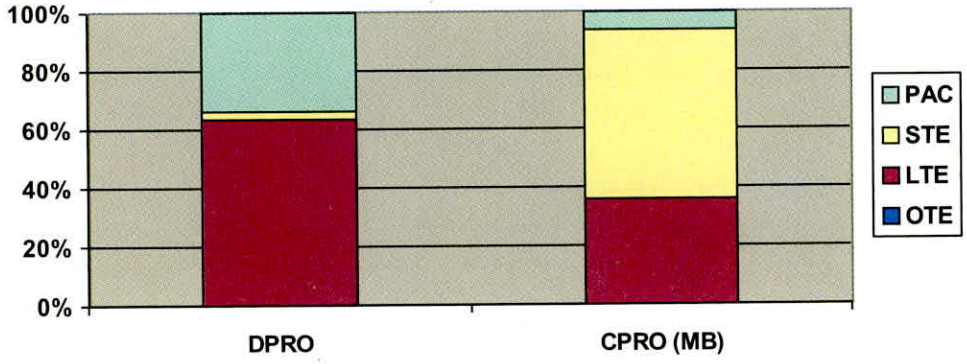
The following are the approved methods of procurement in Navy:

i) PAC (Proprietary Article Certificate) Procurement
ii) Single Tendering Enquiry
iii) Limited Tendering Enquiry
iv) Open Tender
v) Cash and Carry

Sample analysis in audit of procurement method revealed that open tender as a purchase method was rarely resorted to. In NHQ, not even one order in the sample was on open tender

basis. It was observed that single tender route was followed even in the case of common items. The break up of procurement methods in use at DPRO and CPRO (MB) were analysed by taking a sample from a period of three years. The results are depicted in the figure below:

Figure 4.1 Procurement Methods



Thus, it is seen that Limited Tender Enquiry and Single Tender Enquiry are the normal methods of procurement.

The predominant use of restrictive buying was not always economical. In certain cases, Audit noticed that a shift to a wider procurement method resulted in substantial savings. Some instances of uneconomic Single Tender Enquiry are detailed below:

4.3.1 Purchase of SPC paints by NHQ

SPC paints are a common item of use in Navy. In a case of procurement of SPC paints by NHQ, Audit noticed that PAC certificate was issued for this item to a supplier. Interestingly, the quotation was invited on Single Tender basis by FAX on 27th March 1997, while the PAC certificate was issued by DLS only later, on 24th April 1997. There are two issues here: one, that the PAC which should precede the issue of Notice Inviting Tender was issued subsequently; two, the DLS is not competent to issue PAC certificate. The files also indicated that NHQ was aware of at least another supplier for the same item, and yet, issued PAC, violating guidelines.

CPRO (MB) procured the same item from the same vendor using the PAC issued by NHQ. Subsequently, in another case, the same item was purchased through LTE, resulting in savings of Rs.5.84 lakhs.

4.3.2 Purchase of PVC strap sandals

Till 1999, MO (MB) purchased PVC strap sandals on Single Tender basis. Open tendering in 2000 resulted in cheaper rates with an annual savings of approximately Rs 16.78 lakh.

4.3.3 Purchase of Paints

In NSD (G) a common paint item was procured from a local dealer on Single Tender basis. Audit found that the same item was procured by NSD (K) from the manufacturer in Bangalore at half the price.

4.3.4 Procurement of Heliox Gas

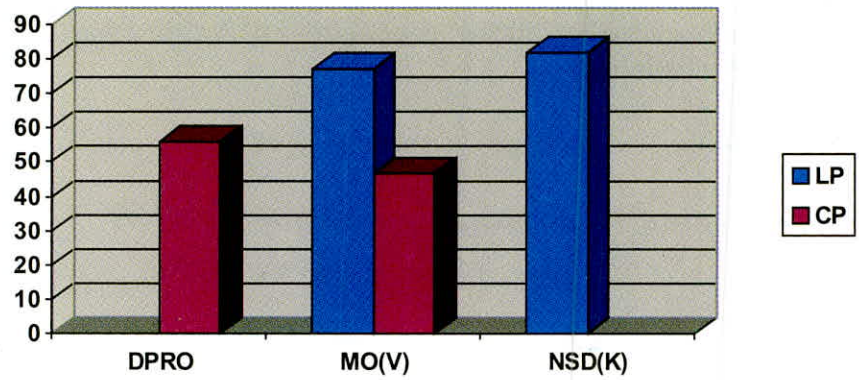
Till 1998, Heliox Gas was procured by MO (V) on Single Tender basis from one vendor at between Rs. 550 and Rs. 650 per cubic meter. In 1999, another vendor quoted and supplied the same item at Rs. 200 per cubic meter.

4.4 Conversion of Indents into Procurement Orders

In order to assess the efficiency of procurement by the various agencies, data regarding number of indents and their conversion into procurement orders was collected.

The conversion percentage so calculated are depicted in the figure below:

Figure 4.2 Percentage of Conversion of Indents into Procurement



Thus, it is seen that procurement agencies are not able to convert a substantial number of indents into orders. The position is worse in the case of NHQ (DPRO) and CP indents, which mostly pertain to the E&SP category. The reasons for pending indents as stated by the procurement agencies are:

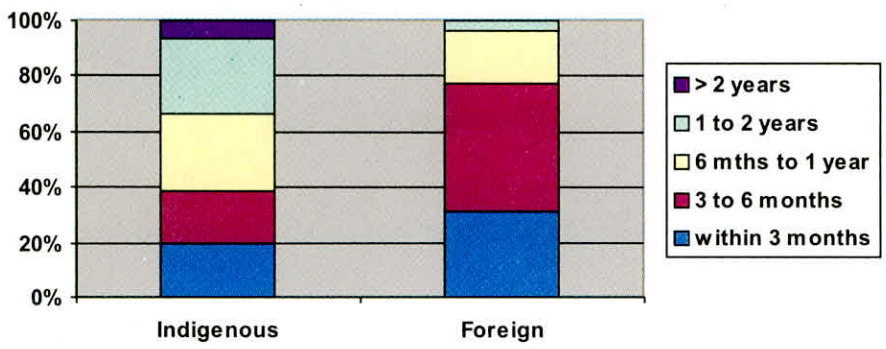
- Absence of complete item particulars
- Incorrect item codes in the Indent.
- Delay in identifying the source of supply.

4.5 Lead Time in Procurement

4.5.1 Lead time at Naval Headquarters (DPRO)

The internal lead-time in procurement for Indigenous as well as foreign purchase is summarised in the figure below:

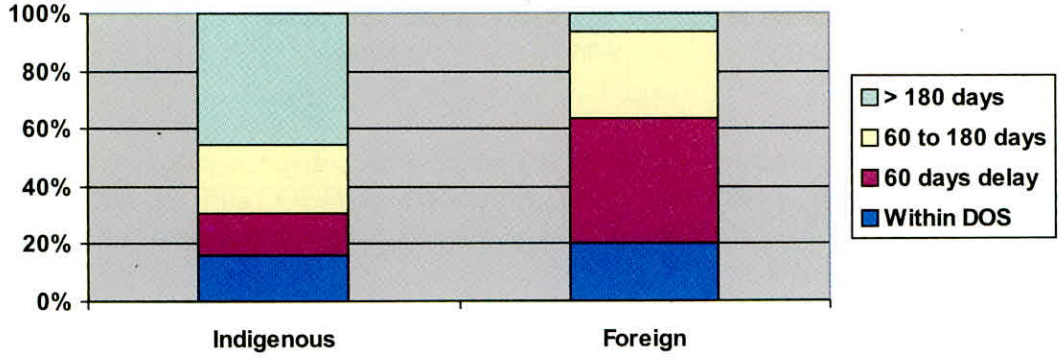
Figure 4.3 Internal Lead-Time (DPRO)



It may be seen that nearly 80% of the contracts for foreign supply were placed within 6 months whereas the internal lead-time for indigenous contracts was more than 6 months in 60% of the cases. Delays existed at all the stages, from delays in inviting bids, delays in processing, delays in negotiations etc.

Similarly, external lead-time was analysed on a sample basis and the results are given below:

Figure 4.4 External Lead-Time (DPRO)



It may be seen that less than 20% of the supplies were made in time. In the case of foreign supplies, 94% supplies were completed in six months, whereas, in indigenous supplies barely

30% were supplied within 2 months, and nearly half the orders took more than 6 months, many extending to 1 and 2 years.

4.5.2 ABER/ BER Provisioning at Naval Headquarters

Equipment outliving their useful life are declared Beyond Economical Repairs (BER), and provisioning action is initiated for replacement on anticipated or ABER basis.

Sample analysis of ABER/ BER provisioning at DPRO during 1995-99, revealed that time taken by DPRO in placing orders after BER/ ABER proceedings ranged from 13 to 44 months, and on an average, more than 27 months.

4.5.3 Lead Times in Procurement by Depots

Reduction of lead times in all stages of inventory management helps in cutting down expenditure on inventory substantially. High procurement lead times translate into higher intangible "stock out" costs, wherever procurements are made as a result of stock out.

Results of analysis of lead times of all orders placed by CPRO (MB) in the last three years are given below:

Table 4.3 Procurement Lead time in CPRO (MB)

Category of stores	*Internal Lead Time@ (days)*		*External Lead Time# (days)*	
	Sample	*Average Time*	*Sample*	*Average Time*
Naval Stores	974	154	992	100
E&SP	1140	268	616	149

@ Time taken between date of indent and date of supply order
 # Time taken between date of supply order and date of supply

Lead times in procurement by MO (V) are given below:

Table 4.4 Procurement Lead Time in MO (V)

Category of stores	*Internal Lead Time (days)*		*External Lead Time (days)*	
	Sample	*Average Time*	*Sample*	*Average Time*
Naval Stores	718	104	25	141
E&SP	311	117	25	186

It is seen from the above that, in CPRO (MB) internal lead-time itself is nearly 5 to 9 months and considerably greater than external lead-time.

Internal and external lead times are also seen to be appreciably higher for Equipment and Spare-parts (E&SP) than for Naval Stores. This is not acceptable in the case of PAC items which should have minimal internal lead time.

Procurement lead-time for NSD (K) as analysed from sample is as under:

Table 4.5 Procurement Lead Time in NSD (K)

Number of Orders	Time taken in days
191	0 to 30
128	30 to 60
348	60 to 90
357	More than 90

Further examination of procurement process at NSD (K) revealed the following:

i) The average lead-time for procurement was 312 days.
ii) The average lead-time for procurement of air stores was 367 days.
iii) The average supplier lead-time for air stores was 147 days.
iv) There was a time lag from 7 days to 592 days in issuing items after receipt through local purchase; average time was 96 days. Since NSD (K) resorts to local purchase for the stated purpose of meeting urgent requirements, the delay in issuing these items is a cause for concern.

Both the internal and external lead-time experienced by the depot were found to be high. On this being pointed out in Audit, the depot stated that the reasons for high lead times were:

(a) Absence of proper specifications.
(b) Lack of knowledge on the source of procurement

4.5.4 Lead Time in Procurement of Common Items

Even in the case of some very common items which are readily available off the shelf in the market, the lead-time in MO (MB) was approximately 140 days. Details are given in the Appendix 4.1 to this chapter.

The experience of high lead times in the procurement procedures means that the depot would need to maintain higher stock levels of the items. Further, these common items after being centrally procured at the depots are then to be supplied to the customer units which are scattered all along the long coast line. This means extra transportation costs.

If the procurement of such common use items is decentralised, it will reduce this lead-time substantially, and also, reduce the cost of transportation, which is uneconomical in many cases. Such decentralised procurement may apply to main naval bases in a "Ready use Store" concept for ships and local units, as also to depots or units located away from main depots.

4.5.5 Rate Contract Procurements in MO (MB) & MO (V)

Rate contract procurement for repetitive consumption is considered to be a more efficient method, due to reduced lead time, reduction in stock to be held, and reduced workload on the procurement system. Further, advantages accrue when rate contract firms can directly supply items to Direct Demanding Officers of units geographically scattered, leading to reduction in transportation costs. The preceding analysis of prevailing high lead-times in procurement makes a strong case for moving towards rate contracts where prices are well established and trends discernable for items in the ASD Critical List and the ARS list. A perusal of these lists shows that it should be indeed possible to conclude rate contract for these items. Further, there is good reason for concluding rate contracts for PAC items also, virtually all of which are in the E&SP category.

A summary of depot wise status of rate contracts is indicated below:

Table 4.6 Depot wise Status of Rate Contracts

Depot	*Years*	*Total Nos.*		*Total Value (Rs in crore)*		*Percentage of total based on*	
		Orders	*RCs*	*Orders*	*RCs*	*Nos.*	*Value*
MO (MB)	1997-2001	6836 *(1709)*	855 *(214)*	199.48 *(50)*	24.63	13.0%	12.3%
MO (V)	1998-2001	4437 *(1479)*	360 *(120)*	148.26 *(50)*	22.91	8.1%	15.5%
NSD (K)	1998-2001	-	394 *(197)*	-	7.25	-	-

**Figures in brackets are the annual average*

It is seen that presently, the percentage of rate contract is relatively small, leading to extra strain on the procurement system and higher lead times.

4.6 Lack of Specifications

Non-availability or non-holding of proper specifications for items is one of the major bottlenecks in the procurement process. At times, the CPRO needs to revert to the indentors, and even to the demanding authority, for getting correct specifications. This adds considerably to the lead-time of procurement.

In NSD (K), specifications are available for only 12,000 out of 68227 items. The fact that only 4 out of the 12 civilian store officers in the depot have some kind of technical qualification does not help matters.

Each specification should have a unique item code and vice versa. However, there are numerous instances where there is more than one code for a single item, and also when the specification of an item code takes different meanings. For example, a single item code is allotted to all executive chairs, and different chairs with a wide range of price are procured under the same code. This can easily lead to incorrect procurement.

Incorrect and incomplete specifications have resulted in items being procured on the wrong specification and later found unfit for use, as in the two cases discussed below.

4.6.1 Loss due to Procurement of incorrect propeller shafts from Russia

In July 1995, NHQ concluded a contract with a Russian firm for supply of 12 propeller shafts at a total cost of USD 624,000. However, the drawing number of the propeller shaft quoted in the contract was incorrect. Out of 12 propeller shafts, two propeller shafts and accessories costing USD 200,000 were received in March 1997. As these propeller shafts could not be utilised in ships, the amount of USD 104,000 (Rs. 32.81 lakh) paid to the Russian firm in September 1996 as cost of the propeller shafts was infructuous.

Subsequently, another contract had to be concluded with the same Russian firm in January 1997 at a higher cost of USD 420,000 (Rs.1.80 crore) for supply of two propeller shafts and accessories incurring extra expenditure. Thus, the failure of NHQ to indicate the correct drawing number in the contract concluded in July 1995 has resulted in infructuous expenditure Rs. 32.81 lakh, and extra expenditure of Rs.1.80 crore.

4.6.2 Procurement of clutch plates of wrong specifications

Clutch plates for INS Matanga were imported from Netherlands in January 1998 for a refit at a cost of Rs 16 lakh. The dimensions of the clutch plate were not indicated in the schedule of requirements. On receipt of the item it was found that the dimensions did not suit the requirement, and as of now, the item is lying unutilised.

4.7 Absence of indicative price/ source

Absence of cost data in inventory management has been commented upon elsewhere in this report. Indenting procedure prescribes that all the indents will indicate the last purchase price, which should be a guideline for the procurement officer. However, due to inadequate documentation and non-maintenance of historical prices, this was rarely done. This, coupled

with lack of knowledge of the possible suppliers, leads to delays and avoidable procurement at high rates.

4.8 Vendor Management

Development of a good vendor base is an important ingredient of efficient procurement. This is even more important in the case of Naval procurements because of scarcity of vendors for many peculiar items. Vendors in the Navy are required to be classified in laid down categories and they move up or down the ladder as per their performance.

Audit found that the process of vendor registration and evaluation was slow, as shown in the table below. The procurement agencies rarely attempted reaching potential vendors by publicizing their requirements. Evaluation of vendors and their movement from one category to another was also not a systematic process. This led to extended time in converting indents to tenders since vendors had to be located through *adhoc* methods.

The year-wise registration of vendors by MO (MB) is indicate below:

Table 4.7 Vendor Registration in MO (MB)

Year	*Number*
1997	25
1998	31
1999	19
2000	62
Total	137

4.8.1 Vendor Utilisation

In the post ILMS era, the Vendor Master has been populated with an internationally recognised vendor database "kompass" (Compendium of dealer's address). Thus, the ILMS vendor database was initially populated with 13647 vendors. However, in practice, it has been found that these vendors are of low relevance to the system, and also did not have DGQA approval. Vendor compilation needs to be more carefully thought out and meaningful to the Navy's needs. Intensive appreciation of directories of manufacturers and assistance of organisations like the CII and similar bodies, is desirable.

4.9 Outstanding Advances

Advance payments should be made only when unavoidable, like, when the monopolistic firm insists or where lead-time is long, and considerable investments by the firms are necessary.

Analysis of the 60 cases of advance payments on purchase orders placed by MO (MB) during September 1995 to March 2000 revealed that Rs.2.82 crores paid as advances are outstanding as of February 2001

These advances have remained with the firms for inordinately long periods. Further, in a number of cases, bank guarantee was not taken from the firm before paying advances. It is therefore evident that a thorough streamlining is required in this area to evolve a system for effective monitoring and to obtain adequate bank guarantee for the advances paid to the firms.

4.10 Foreign Procurement

Foreign purchase is mainly resorted to for E&SP items where only the OEMs or designated agencies in FSU states are approached. Foreign purchases are carried out after being "Cleared for Import" (CFI) by the DGQA. These foreign supply items are accepted on the certification of the supplier, and there is no further inspection by DGQA agencies.

In the recent past, some of the items supplied by the Russian suppliers were found to be substandard. As a result of administrative delays, the defect report was raised after the warranty period. Consequently, the items are lying without utilisation in MO as detailed below:

4.10.1 Procurement of substandard Anchor Chain Cables and Accessories

Anchor chain cables and accessories costing Rs 172.19 lakh procured from Russia under two contracts concluded in July 1995 and March 1997 are held at MO (MB) without utilisation or replacement, resulting in infructuous expenditure of Rs 172.19 lakhs as below:

Case –I

One set of eight anchor chain cables costing USD 26,801 (Rs 8.46 lakh at the rate of 1 USD = Rs 31.55) procured under a contract concluded in July 1995 by NHQ with a Russian firm was received at MO (MB) in February 1997. The entire consignment was issued to INS Ratnagiri and INS Porbandar in August 1997, and was found to be substandard in December 1997 and February 1998 respectively. Though NHQ took up the matter in July 1998, the Russian firm refused to replace the defective items as the defects were not reported to them within 15 days from the date of receipt of the items, as required under the contract.

Case-II

In another contract, for anchor chain cable and accessories, concluded by NHQ in March 1997, with a Russian firm, the size of the chain cable was wrongly indicated as 32 mm instead of 31 mm. The item was received at MO (MB) in July 1998, and issued to ships between July 1998 and September 1998. At the time of fitting the anchor chain cable and

accessories, the incorrect size and several other defects were detected. Though defect report was raised by MO (MB) in November 1998/ June 1999, no replacement of the defective items costing USD 453,915 (Rs 163.73 lakh, at the rate of 1 USD = Rs 36.07) could so far be obtained.

4.11 Foreign Procurement through Logistics Delegation

Consequent to disintegration of the USSR, Russian sources of supply had largely dried up, and the planning mechanism of conducting Annual Reviews and placement of orders, was in disarray. In order to tide over the situation, three logistics delegations were sent to Russia/ FSU states in 1994, 1995 and 1997, for directly concluding contracts for critical spares.

However, Audit examination did not reveal any linkage of the "shopping list" carried by these delegations with revealed demands. There was also no record available to analyse the utilisation of these items later. Naval Dockyard, Mumbai reported that barely 10% of the items projected had materialised.

In one case, Audit found that LOGDEL of 1995 had procured propeller shafts, at a cost of Rs 32.81 lakh, for INS Porbandar without liners, fittings and epoxy coating. The shaft could not therefore, be utilised in the refit Evidently, there has been a lack of professional involvement, and understanding, in the procurement of spares though LOGDEL.

4.12 Procurement through Ship Chandlers

Procurement through ship chandlers are resorted to only in extreme cases for meeting urgent operational demands. Audit however found instances of purchases made through this route lying unutilised for a long time, indicating thereby, that these purchases had been unnecessary. Some examples are given below:

Requirements of items for NR of SDB 59 were projected to FOC-in-C (East) in July 1997. Approval to procure the items from a ship chandler was given in January 1998 and the order was placed in the same month. These items are still lying in stock, unutilised.

In another instance, items worth Rs. 1.35 crores procured through ship chandlers between May 1994 and July 1995 are also lying in stock unutilised in MO (V).

MO (MB) procured dynamic positioning system / computers through ship chandlers, even though a quotation cheaper by Rs. 70,000 was received by FAX from the OEM in Singapore.

4.13 Inadequate System for Procurement of gases

A number of industrial gases critical in nature, are procured for consumption by ships and shore establishments. These gases are supplied in cylinders, which are to be returned to the

supplier after consumption. Rent, as also security deposits, are to be paid for retention of cylinders owned by the suppliers; penal rent is to be paid for retention beyond a permissible period. The Indian Navy also owns some cylinders.

Audit found that the systems for monitoring movement of cylinder and their rent accruals were weak. This led to situations where the rent on the cylinders often exceeded the price of gas in these cylinders.

The following were noticed in procurement of gases at MO (MB).

i) Two different rates of Rs. 2,500 and Rs. 3,500 were adopted for payment of cylinder advances in LP orders and CP orders placed in the year 2000.

ii) Cylinder deposits amounting to Rs 42,500 in respect of four LP orders and Rs 24,21,600 in respect of four CP orders placed during 1997 to 2000 are yet to be paid by the firm even though empty cylinders have been returned.

iii) Cylinder deposits amounting to Rs 30,37,500 was paid in excess under one LP order and two CP orders.

iv) No cylinder deposits are obtained from the firm while giving cylinders owned by Navy. Presently, 655 empty cylinders belonging to the Indian Navy are held by firms, of rental value Rs 26.20 lakh.

v) No adequate monitoring system exists at CPRO/FA to MS/CDA (Navy) to keep a watch on the refund of cylinder deposits by firms.

Thus, the system of procurement of industrial gases needs to be strengthened.

4.14 Recommendations

a) The procurement method through the centralized channel of DPRO / CPRO is prone to delays. The Navy may examine feasibility of decentralizing procurement and issues of common use items, including the following:

(i)Revision of financial powers of Commanding Officers of ships and major units.

(ii)"Ready Use Stores" concept at major naval bases wherein fast moving, low value, low shelf life items are stocked and issued. Decentralization be done within the logistics framework.

b) Canteen Stores type counters may be considered as an extension of a(ii) above.

c) ***The tendency of limiting competition by resorting to Single Tender and Limited Tender needs to be discouraged. Navy should identify high consumption and common use items and slot them for procurement through Open Tender/ Rate Contract only.***

d) ***As vendor knowledge base needs improvement, a time bound plan be implemented to link all the items in the inventory with the vendors. Naval Headquarters as well as depots should publicize their annual requirements and solicit registration of vendors for expanding the vendor base. Application forms could be kept on the Navy web sites for ease of use by potential vendors.***

e) ***Presently the progress of having item specifications on the system is tardy. There is a need to capture the specifications of all the items on the ILMS in a time bound manner.***

f) ***At the time of making an indent the indent raiser should indicate a tentative price, as a control against problems of absurdly high price quoted & accepted.***

g) ***Internal lead-time of the system is too high. Navy should examine and lay down reasonable standards of time for converting indents into procurement orders and include this as a yardstick for assessing the effectiveness of procurement.***

h) ***External lead-time is also too high, even for very common items. Navy may explore the possibility of concluding rate contracts for common use items. Evolution of rate contracts with OEMs needs to be explored and implemented.***

i) ***Foreign procurement items are accepted on self-certification and are subjected to inspection only when they are to be put to use. In most cases, it is too late for raising a claim on defective items of supply. For foreign procurements, a system of quick inspection of the items received should be instituted, so as to enable raising of warranty claims in time***

j) ***System needs to be strengthened for strict watch on advances paid to suppliers.***

k) ***Navy should evolve a system of procuring gases whereby economy is ensured on rents and deposits paid on cylinders.***

4.15 Defence Response

Of the eleven recommendations made by Audit, NHQ agreed with six, partially agreed with three and did not agree with two.

Response of NHQ to the above recommendations is summarized below, ad-seriatim.

a) **Decentralised Procurement :** Partially agreed and explained that with the decentralisation of revenue budget, procurement of indigenous items has already been appreciably decentralized with ability to obtain spares / stores up to Rs 50 lakhs per indent and likewise for import, though to a lesser extent. Further

devolution of powers to ships and establishments is not concurred in by NHQ stating that these units neither have the wherewithal nor time and that such procurement would detract from the ships operational role.
Regarding the concept of "Ready use Stores" stocking and issue of fast moving consumables, NHQ stated that the concept is already under examination.

[Para 4.14 (a)]

b) **Canteen Stores type counters :** Agreed. As discussed in Para (a) above

[Para 4.14 (b)]

c) **Open Tender Procurement :** Agreed partially and explained that a number of items being 'Navy Specific' are better suited to limited tendering. It was conceded that open tendering be resorted to for items of common use and commercial specifications.

[Para 4.14 (c)]

d) **Vendor management :** Agreed that the system needed to be strengthened. To this end, a time bound plan has also been instituted to link items in the inventory with vendors, by December 2002. The task, being voluminous, is being carried out by Command teams.

[Para 4.14 (d)]

e) **Availability of item specifications :** Agreed and added that item specifications are being progressively compiled by interaction with various agencies and making them available on the ILMS.

[Para 4.14 (e)]

f) **Indicative price on indents :** Agreed partially and stated that this is being done wherever previously established data exists. NHQ also indicate that POV rates are often off the mark due to diverse range of products, their vintage, and sources of supply. For new items, where last purchase price is not available, budgetary offers are called for by professional directorates.

[Para 4.14 (f)]

g) **Internal Lead Time :** Agreed and added that serious constraints of manpower, lack of specifications and processing delays (particularly with internal finance) preclude laying down definite time frame.

[Para 4.14 (g)]

h) **External Lead Time :** Agreed and explained that obsolescence was a major cause. However, determined efforts through dialogue with OEMs and concluding of rate contracts are helping in reduction of both internal and external lead time.

[Para 4.14 (h)]

i) **Inspection of imported items :** Agreed and confirmed that instructions have been issued in September 2001 for quick inspection of items received in the depots.

[Para 4.14 (i)]

j) **Economy in procurement of gases:** Not agreed and indicated that payments on account of rentals and deposits on cylinders were being closely monitored despite peculiarities of the naval system which necessitate separate practices in accounting for ships and shore establishments.

[Para 4.14 (j)]

4.16 Conclusion

Audit maintains that the weaknesses and deficiencies brought out in this chapter need to be addressed. NHQ have undoubtedly over the last three decades taken on ever increasing quantum of procurement from diverse sources with constraints of manpower as well as processing in dents in the manual mode. While automation is now considerably helping in processing of indents, quality of inputs relating to vendors, item specifications and data on prices are vital towards better 'purchase management'.

On tendering procedures, NHQ have discussed at length the drawbacks in the open tendering system, many of which have validity and breed inefficiency. Notwithstanding these, open tendering can and should be adopted for common use commercial items since economy is possible, as conceded by NHQ. Audit opines that while limited tendering may necessarily be resorted to 'Navy Specific' items, the data base of registered vendors needs to be enlarged and strengthened. Procedure for issue of PAC should be more vigilantly scrutinised to insure that such certificates are issued only for those items for which there is no manufacturer other than OEM.

Procurement lead time, both internal and external, particularly the former, needs to be brought down. NHQ have attributed major delays in processing to internal finance, including the system of dual processing i.e., on the automated system as well as on file. Bottlenecks that impede lead time need to be vigorously addressed and over come in consultation with Ministry.

NHQ is not in favour of further decentralized procurement by ships and establishments, for reasons explained by them; the increase in financial powers for emergent 'Cash & Carry' purchase by Commanding Officer has, however, been supported. Audit considers that comprehensive assessment of the existing system including revision to delegation of financial powers under NI 1/S/97 be undertaken in the light of experience gained over the last five years.

On economy in procurement of industrial gases, Audit opines that the present systems be restudied in the light of observations that have been made.

Appendix 4.1
Procurement Lead Times of Common Items

(refers to Para 4.5.4)

Illustrative list of common Items and Procurement Lead Time (in days)

Description	*LPO date*	*SRV Date*	*Lead Time (in days)*
Tube Light Starter 230 watt	18-Jan-00	17-Apr-00	90
Cable 3 x 1.5 Sq.m.m.	20-Jan-00	24-Feb-00	35
Fixture Lighting for Temporary	16-Nov-99	2-Jun-00	199
Globe Electric Plastic	16-Nov-99	2-Jun-00	199
Wire Winding Copper	22-Feb-00	23-Jun-00	122
Battery Dry 1.5 v.	5-Apr-00	1-Jul-00	87
Lamp Holder	12-Nov-97	1-Jun-99	566
Plug Electrical	15-Oct-98	11-Jan-99	88
Switch	4-Jun-98	24-Feb-99	265
Plug Telephone	30-Oct-98	12-Oct-99	347
Case Torch Electric	20-Dec-99	8-Feb-00	50
Naphthalene Balls 420/G/Bag x 30 Kg	8-Nov-97	11-Apr-98	154
Toilet paper 8540-000001	6-Apr-98	15-Apr-98	9
Material tracing paper	14-Mar-98	2-Jun-98	80
PU Foam mattress	14-May-98	29-Jun-98	46
Tumbler Glass	15-Jul-97	7-Jul-98	357
Brush Varnish	27-Feb-97	7-Jul-98	495
Broom Country	2-Apr-98	20-Aug-98	140
Towel Cotton	12-Jan-98	1-Sep-98	232
Thread Sealing	30-Aug-98	18-Dec-98	110
File cover plastic coated	24-Jul-98	1-Feb-99	192
Water Bottle	25-Sep-98	10-Feb-99	138
Polythene Bags	9-Sep-98	10-Feb-99	154
Insulation Tape	26-Oct-98	23-Feb-99	120
Bucket Polythene 15.5 lt.	24-Jul-98	24-Mar-99	243
Chalk	20-Jan-00	6-Mar-00	46
Detergent Powder	22-Apr-99	31-May-99	39
Soap - Liquid	20-Mar-99	8-Jun-99	80
Soap-Toilet	11-May-99	30-Jun-99	50
Lime-Slaked	13-Feb-99	23-Jul-99	160
Soap Soft	31-Aug-99	12-Nov-99	73
Paint Remover	16-Dec-99	14-Feb-00	60
Cement Portland	29-Jan-00	14-Mar-00	45
Soap Laundry	21-Jun-00	7-Jul-00	16
Distemper White	28-Mar-00	3-Aug-00	128
Bleaching Powder	9-Feb-98	15-Apr-98	65
Baygon Spray	30-May-98	3-Oct-98	126
Powder Cleaning	13-Jul-98	7-Oct-98	86
Candle - Wax	6-Jul-98	13-Jan-99	191
Movicol	19-Apr-99	1-Jul-99	73
M-Seal	24-Jan-00	22-Mar-00	58
Average Lead Time			142
Maximum Lead Time			566
Minimum Lead Time			9

CHAPTER 5: DEMAND SATISFACTION

Demand satisfaction is an important indicator of performance in the logistics chain. In addition to the normal user generated demands, special procedures have been instituted in the form of depots supplying ships through an Automatic Replenishment System (ARS) and in the dockyards raising forecast demands 52 weeks in advance for refit of ships through the Refit Planning Procedure (RPP).

Audit found that between 20 to 40 percent of the demands raised by the users were either cancelled or rejected by the depots. Of the registered demands, the overall satisfaction was about 50 percent. In all depots, satisfaction was less in E&SP category than for Naval Stores. It took more than three months to meet urgent demands in more than 15% of the cases.

In the cases of refits by Naval Dockyards, the satisfaction ranged from 22% to 66%. The Refit Planning Procedure introduced to streamline and improve the availability of spares for refit suffered from poor forecast, which were only about 50 percent accurate. Satisfaction of dockyards was 67% to 88% for ASD critical list and 23 to 39% for the rest.

Demand satisfaction of even high-priority air stores demand AOG (Aircraft on Ground) was on an average only 60%.

5.1 General

Store Depots of the Navy hold diverse range of items from common user items like soaps, to sophisticated electronic items. Demand compliance is defined as the percentage of demands against which issues could be made within that year. In addition, further details like time taken in issuing the demands, and satisfaction as per different categories of stores have also been examined. Demand satisfaction was further looked into within categories of stores, types of demands etc.

Apart from looking at the performance indicators of demand satisfaction, the key processes and the weaknesses therein have been identified.

5.2 Types of Demands

The demands handled in the depot fall into two broad categories and further sub-categories, as under:

a) ***User raised Demands:*** These are raised by the user units, in the form of:

i) Present Demands: To meet immediate needs. These are prioritised as:

- Normal Demand
- Urgent Demand
- Operational Demand

ii) Future Demands: Demands, which are in a nature of a forecast. These are in the nature of RPP and forecast demands for upcoming refits of ship, and are intended to aid the planning process of the Depot. They are activated at the time of actual refit of the ship.

b) ***Depot Raised Demands:*** These demands are raised by the Depots, mainly as RIO (Raised in Office) demands to facilitate Operational Turn Round, Automatic Replenishment, initial issues and inter-depot transfers.

5.3 Methods of Raising Demands

These demands can be raised in three ways, which are discussed below.

5.3.1 General Method

This method is applicable to all kinds of user raised demands.

Post computerisation, the demands are given on electronic media to Demand Registration Centers (DRC) in the bases from where the demands can be directly up-linked to the stand alone computer in the depots. There is also a provision for sending the demands on a floppy to the Material Organisation for uploading into the system.

The stores are also classified as Permanent stores and Consumable stores. When a demand is to be raised for a Permanent store item, the old item is required to be surveyed back to the depot.

In the above system, it is required that the item being demanded exists in the database of ILMS with the same transcription.

On receipt in the depot, if the demand is valid and item is available, issue authorisation is given based on which, the warehousing staff takes steps to release the item and deliver it to the user.

5.3.2 Refit Planning Procedure

As per the Refit planning procedure, dockyards give ships' requirement to the depots either 52 weeks or 26 weeks in advance for Normal refits (and above) or Short Refits respectively.

The depot, apart from intimating the status of the demanded items is required to initiate the procurement action for 'stock out' items. Based on the actual requirement after the commencement of refit, the dockyard activates the demands out of this forecast.

5.3.3 Automatic Replenishment System

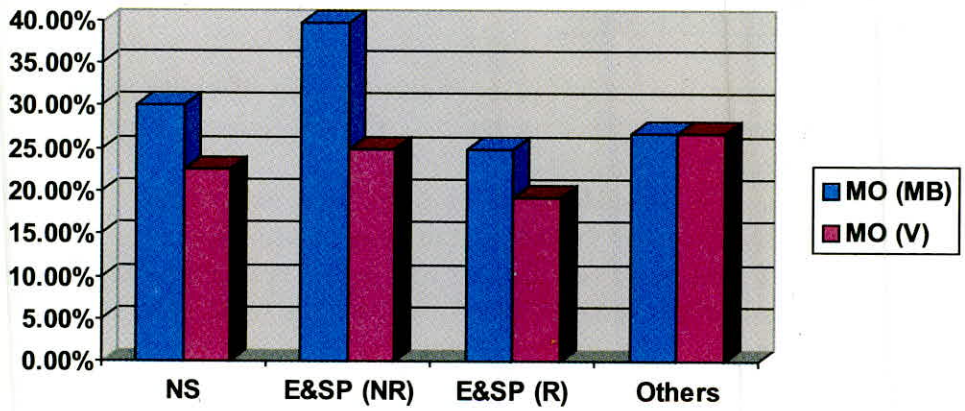
In order to minimise processing time an Automatic Replenishment System has been laid down for the most common consumable demands. Under ARS, the annual quotas of different units are laid down by the Command. RIO demands are raised by the Depots based on these quotas and items replenished on a regular basis without the user needing to raise a demand.

5.4 Cancellation/ Rejection of Demands

Audit observed that many users found the supply chain process from user to the depot not responsive enough. There was lack of controls in the process. Demands could not be pre-vetted at the users' end. This led to many demands being invalid due to reasons like incorrect item-code, unauthorised items, unauthorised quantities etc. This manifested in a large number of user demands being rejected by the depot.

Figure 5.1 Returned/ Cancelled Demands

Data for MO(MB) is for 1/3/99 to 29/2/2000 and for MO(V) from 16/12/98 to 30/11/99



The reasons for rejection of demands raised by ships to the MO was found as under:

Table 5.1 Reasons for rejection of Demands by Depots

Reasons of Rejection	*Percentage of Cases*
Invalid Pattern Number / Reference	40%
Multiple Demands	10%
Unauthorised Demand	10%
Not Stocked Before (NSB)	20%
Not Provisioned Earlier (NPE)	20%

5.4.1 Audit Observations

a) <u>On lack of Responsiveness in Demand Processing</u>

The reasons for non-responsiveness of the process as identified during audit include.

i) Description of the item in INCAT was not self-explanatory.
ii) Multiple item codes existed for same item in INCAT.
iii) No direct connectivity between SLMS (users) and ILMS (depots) and users found it tedious.
iv) Problem of data integrity between the database held at units with the database of the ILMS system.
v) No institutionalised system for feedback on demands.
vi) The documentation on the ship in the form of D787 given by the shipyards did not have part numbers at times, making recognition of item codes difficult on ILMS.

b) <u>On procedures and effectiveness</u>

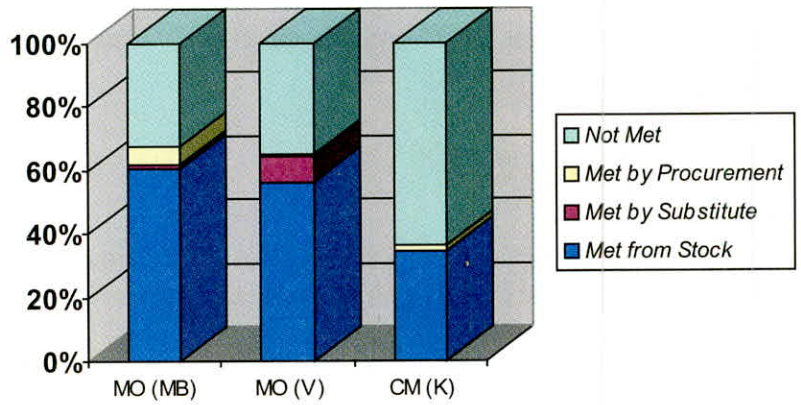
i) Ships found the survey of permanent stores of even common items like refrigerators, electric fans etc., to the MO to be time consuming and cumbersome.
ii) ARS issues were made to all the units three times a year. This resulted in crowding of work at the depot at three points of time in the year.
iii) The RPP suffered from the fact that actual activation between Depots and Dockyards of demands was far lower than the forecast, causing heartburn.
iv) The Material Management Manuals do not lay down any time frame in which demands should be serviced. They only lay down that feedback should be given to the unit within 15, 7 and 3 days in respect of Normal, Urgent and operational demands. Thus, objective targets for demand satisfaction were not set.
v) NA certificates for items not available have to be explicitly sought by users, and is a time consuming process.

5.5 Over all Demand Satisfaction of Depots

The preceding paragraphs, analysed and commented on the system of raising demands. Demand satisfaction have also been analysed in the two MOs, and in NSD (K) by collection of data of the last three years. Data regarding satisfied demands was further broken down into those for which ready stock was there, those for which a substitute was identified, and those for which Local Procurement had to be resorted to.

Data collected from the three depots is given below:

Figure 5.2 Sources of Demand Satisfaction in the Depots

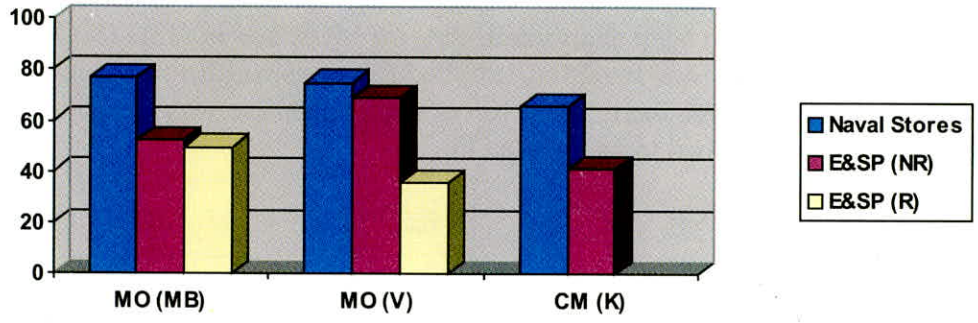


From the above it is seen that demand satisfaction from stock held has been around 60%, on average, in all the depots.

5.6 Satisfaction as per Stores Category

However, it is not enough to merely state the percentage of overall demand satisfaction. Analysis with reference to different categories of stores is needed because non-availability of different kind of stores affects naval operations differently. Therefore, demand satisfaction reported by store depots was analysed as per the category of stores. The results for the depots are as given below:

Figure 5.3 Category wise demand satisfaction in Depots



* *Data for MO (MB) is for 1/3/99 to 29/2/2000, for MO (V) from 16/12/98 to 30/11/99 and for CM (K) for 1999-2000*

Thus it is seen that the demand satisfaction on equipment spares which is a critical factor for timely completion and quality of ships refits and for naval operations, is low in itself and appreciably lower than Naval Stores of general usage.

5.7 Time Taken in Issue Authorisation

A complete perspective of the subject needs to focus also on the time frame in which the demand has been satisfied. This is true even if one is to assess effectiveness within a category of store or a priority of demand.

Demands received from various units are vetted before issue. The process of vetting includes, ascertaining authorisation, checking previous consumption, ascertaining stock balance and issuing the item. Once the issue authorisation is given, the release and delivery of the stock is the responsibility of the warehousing staff.

As stated earlier, norms have not been prescribed for the time frame within which authorisation should be issued or an item delivered. Therefore, it was not possible to compute the delays in the process. However, data was collected from all the three depots regarding the time taken between the receipt of a demand and the issue authorisation for different types of demands. Data in respect of three depots for 1999-2000 is as under:

Table 5.2 Time taken for Issue Authorisation – MO (MB)

Type of Demand	*Number of demands for which issue authorised*	*Issue Authorised in 15 days*	*15 days to 1 month*	*1 month to 3 months*	*Beyond 3 months*
Normal	44674	7746 (17.0%)	4587(10.0%)	9395(22.5%)	22946(51.0%)
Operational	1525	569 (37%)	334 (22.0%)	285 (19.0%)	337 (22%)
Urgent	2360	766 (33.0%)	274 (12.0%)	430 (18.0%)	890 (37.0%)
RIO	794	386 (49.0%)	52 (7.0%)	104 (13.0%)	252 (31.7%)
RPP	7441	1037 (14.0%)	711 (10.0%)	1402(19.0%)	4291(57.0%)

Table 5.3 Time taken for Issue Authorisation – MO (V)

Type of Demands	*Number of demands for which issue authorised*	*Issue Authorised in 15 days*	*15 days to 1 month*	*1 month to 3 months*	*Beyond 3 months*
Normal	72399	56243 (78.0%)	3343 (5.0%)	4468 (6.0%)	7345 (11.0%)
Operational	3277	3048 (93.0%)	49 (1.5%)	48 (1.5%)	132 (4.0%)
Urgent	14196	10032 (71.0%)	973 (7.1%)	1001 (7.0%)	2190 (15.0%)
RIO	2939	2878 (98.0%)	14 (0.5%)	5 (10.3%)	42 (1.3%)
RPP	4257	3354 (77.0%)	266 (6.1%)	392 (9.2%)	345 (8.1%)

Table 5.4 Time taken for Issue Authorisation – NSD (K)

Type of Demands	*Number of demands for which issue authorised*	*Issue Authorised in 15 days*	*15 days to 1 month*	*1 month to 3 months*	*Beyond 3 months*
Normal	14278	9128 (64%)	1184(8.0%)	653 (5.0%)	2236 (16.0%)
Operational	1627	1154 (71.0%)	84 (5.0%)	86 (6.0%)	291 (18.0%)
Urgent	16951	10095 (60%)	1468(9.0%)	2174(13.0%)	3214(18.0%)

It may be seen that considerable time is taken for issue authorisation. In case of MO (MB) not even 50% of the demands in any category could be issued with 15 days.

Operational demands ranging from 4% in MO (V) to 22% in MO (MB) have been issued after expiry of more than 3 months. Since operational demands affect the operational status of ships, the delay in issue authorisation of these demands is a cause for concern.

RPP demands from 8% to 57% have been authorised after expiry of three months. In the review of the Naval Dockyard, Mumbai it was observed that non-availability of spares for refits is one of the major factors leading to delays in refit of ships.

Since, time taken in issue authorisation is internal lead-time, it is obvious that such high lead-time can be reduced.

5.8 User Demand Satisfaction

Demand satisfaction was also ascertained from various categories of users. Operational fleet ships and dockyards being major users, their demand satisfaction levels were studied.

5.8.1 Demand Satisfaction of the Fleet

Data obtained from Operational ships of the Western and Eastern Fleet are as under:

Table 5.5 Demand Satisfaction of Operational Ships in the Western Fleet between 1998 to 2000

Name of the Ship	*NS*			*E &SP*		
	Total Demands	*Demands Met*	*Percentage*	*Total Demands*	*Demands Met*	*Percentage*
INS Porbandar	647	291	45%	1086	659	61%
INS Prahar	748	635	85%	1162	897	77%
INS Veer	729	391	54%	1718	689	40%
INS Ranvijay	2328	1576	68%	3326	1513	45%
INS Godavari	2132	1320	62%	1659	501	30%

Table 5.6 Demand Satisfaction - Operational Ships – Eastern Fleet

Name of the Ship	*NS*			*E &SP*		
	Total Demands	*Demands Met*	*Percentage*	*Total Demands*	*Demands Met*	*Percentage*
INS Aditya (2000)	1731	872	50%	429	143	33%
INS Rana (2000-01)	1734	1247	72%	1482	1025	69%
INS Rajput (1998-99)	542	346	64%	560	160	29%
INS Rajput (1999-00)	723	478	66%	422	161	38%

It may be observed that, demand satisfaction for equipment and spare parts is invariably lower than the demand satisfaction of Naval Stores. Demand satisfaction in these categories is as low as 29% and averages around 40% for major vessels. Such low demand satisfaction in E&SP categories means that either the equipment onboard remains non-operational, or is over exploited where the item is stock out. Alternatively, used stocks of OB spares are not replenished.

5.8.2 Demand Satisfaction of Naval Dockyards

i) RPP Demand Satisfaction

In view of the importance of fine tuning material planning for ship's refits under the refit planning procedure, a select examination was undertaken of three ships that underwent normal refits between 1998-2000 at Naval Dockyard (Mumbai) and Naval Dockyard (Visakhapatnam).

A summary of demands – forecast, activated and issued, for the three normal refits under examination, is given below:

Table 5.7 Demand Satisfaction – Select Normal Refits – Naval Dockyard, Mumbai

Refit	*Forecast*	*Activated out of forecast*	*Fresh Demands*	*Total Firm Demands*	*Total Items Issued*	*Percentage compliance based on Firm Demands*
Shalki	4199* (1187)	455 (38%)	728	1183	786	66%
Sukanya	718	396 (55%)	327	723	408	57%
Vindhyagiri	1765	1037 (59%)	302	1339	437	33%

** Initial RPP Forecast subsequently revised to 1187 items.*

Table 5.8 Demand Satisfaction – Select Normal Refits – Naval Dockyard Visakhapatnam

Refit	*Forecast*	*Activated out of Forecast*	*Fresh Demands*	*Total Firm Demands*	*Total Items Issued*	*Percentage compliance based on Firm Demands*
Kuthar	596	332 (55%)	339	671	427	64%
Kirpan	530	390 (73%)	337	727	469	65%
Cuddalore	1591	354 (22%)	573	927	204	22%

Some of the cases are discussed below:

NORMAL REFITS

a) Shalki

Normal refit of INS Shalki was undertaken between 1.4.1998 to 1.4.2000. The dockyard initially projected a requirement of 4199 items. This was subsequently pruned down to 1187 items. Finally only 786 items were actually demanded. The depot was able to supply only 455 items. Thus the demand satisfaction with reference to activated demands was 66% only.

It is seen from the above that the items actually demanded (786) were a mere 19% of the original forecast. This inaccuracy in forecasting resulted in unnecessary procurement. Audit found that 1622 FODAs raised on the basis of forecast fell in this category of unnecessary procurement.

It was also seen that 30 items needed for the refit could not be procured before the completion of the refit.

b) Sukanya

Normal Refit of INS Sukanya was undertaken during 1.10.1999 to 30.6.2000. The dockyard initially projected a requirement of 718 items for this refit. Finally only 408 items were actually demanded. The demand satisfaction for the refit was 57%.

Audit found that 5% of the items demanded could not be identified at all. In the depots there were delays ranging from 2 ½ months to 8 months in raising the indents.

c) Vindhyagiri

Normal Refit of INS Vindhyagiri was undertaken from 1.10.1998 to 31.7.1999. The dockyard initially projected a requirement of 1765 items. Finally only 1037 items were actually demanded. The demand satisfaction for the refit was 33%. One of the reasons of low demand satisfaction was that the items were not earmarked based on the forecast.

ii) *Effects of Non-Satisfaction of Refit Demands*

It was stated that when an item is not supplied by the Material Organisation, the dockyard resorted to local purchase, in-house manufacture, cannibalisation from sister ships and utilisation of onboard spares to complete the routine. In extreme cases however, the routine itself may be deferred.

5.8.3 Summary of Audit Observations on RPP Demands

The RPP prescribes forecasting of demand for an upcoming refit in advance. This is with a view to facilitate early action by the Material Organisation for indenting and procuring these items. However, there have been serious inadequacies in RPP functioning. Audit has the following major observations:

i) The compliance rates for supply of equipment and spare parts has been abysmally low. Apart from the cases specifically examined above, the overall compliance, based on all NR / MR ships refitted by Naval Dockyard, Mumbai during 1997-98, 1998-99, 1999-2000 was 51%, 44% and 46% respectively with the variation in individual cases ranging from 25 to 62%. The situation in respect of Naval Dockyard, Visakhapatnam was poorer for ships of Russian Origin due to break down of normal supplies from FSU sources.

ii) Due to a virtually defunct ARD and Replenishment provisioning system, the MOs sought to treat the RPP forecast list at (D-52) weeks from dockyards as start points for replenishment of bins. Even so, raising of indents itself was very slow, with delays ranging from 1 to 12 months.

iii) Indents raised on RPP demands remained without action at NHQ in numerous cases and depots did not know the fate of final procurement quantities (FPQs).

iv) Percentage activation of forecast demands at commencement of refits was generally of the order of 50 to 60%. The basis of forecasting needs to be more carefully evolved through close co-operation of all authorities in the supply chain viz., Class Authority, Dockyards and MOs, post refit analysis and preparation of refined standard lists of spares for equipment routines in accordance with CNO2/96 needs to be ensured and explicitly monitored.

v) The Controllers of Material Planning in both MOs are so heavily involved in daily fire-fighting, that the entire aspect of material planning has been neglected. Reactive provisioning has largely taken the place of planned or pro-active replenishment provisioning. Database management and post refit analysis have taken a back seat.

5.9 Other than RPP Demand Satisfaction of Naval Dockyards

5.9.1 ASD Critical List

As indicated earlier, important fast moving items of Naval Stores and Yard Material for refit are segregated in a list called ASD Critical List. For these items, an Annual Consumption Level is determined by the dockyard and intimated to Material Organisation. For some of these items, MOs enter into rate contracts and dockyards made direct demanding authorities. ASD Critical List is progressively refined every year based on experience. Compliance status of ASD Critical List for the two dockyards is given below:

Table 5.9 Compliance Status – ASD Critical List – Naval Dockyard

Year	*Compliance in Naval Dockyard Mumbai*	*Compliance in Naval Dockyard Vizag*
1997-98	67%	81%
1998-99	70%	78%
1999-2000	75%	88%

Though the demand compliance here is considerably better than for equipment spares, the compliance levels should in fact be nearing 100% in view of the repetitive and critical nature of requirements.

5.9.2 Other Stores for Naval Dockyard

The ASD Critical list is just a subset of the Naval Stores needed for refit purposes. It comprises items for which the dockyard can determine its requirement fairly accurately before hand. This does not exhaust the list of materials, which the dockyards need. In order to get the complete picture in Audit data on the demands for Naval Stores other than the ASD Critical List is given below:

Table 5.10 Status of other Naval Stores Demands - Dockyards

Year	*ND (MB)*		*ND (V)*	
	Total No. of Demands	*Supplied (%)*	*Total No. of Demands*	*Supplied (%)*
1997-98	9031	2062 (23%)	3330	1295 (39%)
1998-99	10698	2809 (26%)	2451	651 (27%)
1999-2000	7567	2325 (31%)	2575	807 (32%)

5.9.3 Audit Observations

- Demand satisfaction in this category is low in absolute terms. This indicates that in the absence of concrete inputs as in the case of ASD Critical List, the MOs are handicapped in planning for dockyard requirements.

- Local purchase (LP) had to be resorted to by the yards for a substantial number of items. For instance, in 1999-2000, the ND (MB) resorted to LP of 242 patternised and 1439 non-patternised items. The large number of non-patternised items was stated to be on account of many nil pattern number items used in the shipbuilding process, indicating lack of standardisation and codification at shipbuilding stages.

5.10 AOG Demand Satisfaction

Demands for air stores are raised by user units on depots, when they do not have the spares needed for the aircraft. In the case of critical spares, AOG (Aircraft on Ground) demand is raised, which is of highest priority. These demands are to be met within 24 hours. Thus, demand satisfaction of these demands was separately analysed.

AOG demand satisfaction was analysed for four user units, namely INS Garuda, NAY Kochi, INS Hansa and NAY Goa. The demand satisfaction is also categorised into the kind of aircraft. It was seen that, the mandatory limit of servicing an AOG demand, within 24 hours was rarely maintained. In such cases, the demands were met by "retrieval and cannibalisation", of the item from another aircraft. This led to the cannibalised aircraft being out of service for a longer period. Data for the last 3 years for the four units, is tabled below:

Table 5.11 AOG Demand Satisfaction: INS Garuda

Year	*Islander*	*Sea King*	*Chetak*
1997-98	62%	59%	67%
1998-99	83%	58%	87%
1999-2000	72%	75%	88%

Table 5.12 AOG Demand Satisfaction: NAY Goa

Year	*TU 142*	*KV – 28*
1997-98	58%	42%
1998-99	50%	61%
1999-00	44%	57%

Table 5.13 AOG Demand Satisfaction INS Hansa

Year	*KA-25*	*KV-28*	*IL-38*
1998-99	40%	33%	4%
1999-00	61%	85%	73%
2000-01	38%	53%	64%

Table 5.14 AOG Demand Satisfaction: NAY Kochi

Year	*Islander*	*Sea King*	*Chetak*
1997-98	86%	75%	80%
1998-99	100%	82%	DNA
1999-00	89%	75%	72%

From the above it can be seen that AOG demand satisfaction is also on an average only about 60%. Many of these demands were satisfied outside the prescribed period.

AOG demand satisfaction is better in case of Western Origin aircraft than for the Eastern Origin.

5.11 Recommendations

a) ***The inordinate number of cancelled/ not identified items needs to be contained. Steps are needed to ensure integrity of data base of items between users and the depots. Problems of items having 'nil' pattern/ part numbers in the Inventory need to be particularly addressed.***

b) ***Allowance for items authorised for a unit should be clearly known and vetted at the stage of initiation. Thus, instances of invalid or unauthorised demands should be checked at the level of user itself.***

c) ***The present method of presenting demands at the Demand Registration Center or sending the same on magnetic media to the depot is almost as time consuming as the manual system. Provision should be made for connectivity between the user and the depot system.***

d) ***No institutionalised feed back mechanism has ever existed. Having the demand status on Intranet or similar status should be adopted.***

e) ***Presently, the status of demands is being reflected by depots under terminology of 'Not Available' (NA), 'Not Stocked Before' (NSB) or 'Not Identified' (NI). The non-availability status is often reported in clubbed fashion e.g. NA/NSB, thereby confusing the position. The status of demands should be reported by depots with clarity and under one nomenclature only.***

f) ***Standards for demand satisfaction should be clearly laid down. As the yardstick in terms of numbers or percentages is not indicative of criticality of items for ships operations or refit, time in which the demand should be met should also be prescribed as an indicator.***

g) ***For Refit Forecast Demands (RPP, ASD critical list), depots should be enjoined to take immediate indenting and procurement action for non-available items. Status Reports should be made to Dockyard and Command Headquarters periodically.***

5.12 Defence Response

Of the seven recommendations made by Audit, NHQ agreed with six, and partially agreed with one.

The essence of NHQ responses is summarized below, ad-seriatim.

a) **Integrity of data bases :** Agreed that integrity of data base between depots and user is of paramount importance and correctives are being progressively taken on a number of fronts to address difficulties / deficiencies in item codes between OEMs, PSUs, system administrators etc.,

[Para 5.11. (a)]

b) **Vetting of demands on initiation :** Agreed and indicated that directives have been issued to computerize 'on board' inventory and allowance list to facilitate matching of OB & INCAT at stage of initial demands.

[Para 5.11. (b)]

c) **Connectivity between users & Depots :** Agreed and added that while the present system of presenting demands on magnetic media is faster than the manual mode, systems for connectivity are expected to be in place by 2004.\

[Para 5.11. (c)]

d) **Demand status feed back :** Agreed and added that local web site has been set up at Visakhapatnam. Would be further strengthened with web based commissioning of ILMS – 2.

[Para 5.11. (d)]

e) **Clarity of demand status :** Agreed that the status of demands would be reported more clearly by depots i.e., in terms of items Not Available (NA), Not Identified (NI) and Not Stocked Before (NSB).

[Para 5.11. (e)]

f) **Standards for demand satisfaction :** Agreed partially and amplified that laying down uniform standards are not entirely practicable due to major constraints such as vintage of equipment, limitations / response in sourcing, obsolescence, high PSU lead times etc. Notwithstanding the observations, NHQ would endeavour to formulate standards on time frame, after adequate data build up on the ILMS.

[Para 5.11. (f)]

g) **Immediate action on RPP Demands :** Agreed, adding that slippages are largely the outcome of manpower constraints.

[Para 5.11. (g)]

5.13 Conclusion

In response to the Audit observations, Naval Heaquarters, have elaborated on the constraints in ensuring higher levels of demand satisfaction, the major ones being identification / mismatch in item codes, current limitations of the ILMS, obsolescence and constraints in sourcing from FSU States as also from Public Sector Units.

The summary of Audit observations on RPP Demands was partly contested. Audit maintains that for the period under examination, the observations on ARD, and Replenishment Provisioning System are valid. These weaknesses had also been confirmed earlier by NHQ in respect of provisioning during the period 1998-2000, i.e., while transiting to the ILMS mode. Improvement has been reported from the year 2000 onwards. The procedure stated to have been introduced in October 2000 in the form of long cast requirement of spares to be dove-tailed into the annual review cycles would go a long way in improving availability of spares. These practices would need sustained implementation, monitoring and refinement.

NHQ expressed reservations on the credibility of data pertaining to demand satisfaction of the Fleet, and the ships selected for sampling. Audit analyis is based on selection of ships by respective Command Head Quarters, and data forwarded by them.

CHAPTER 6: INVENTORY HOLDINGS

Inventory holdings of the Navy are reported as "number of items" and are not known or qualified in terms of other parameters such as value, tonnage, volume etc.

The exact number of items is not known. The pre ILMS status was reportedly around 8 lakh items in the four depots- MO (MB), MO (V), NSD (K), and NSD (G). The Material Planning Manual indicates the recorded level of inventory in the main depots as 6.7 lakhs items, whereas the rational level is estimated at 3.7 lakh items. 80% of the holdings are on account of E&SP items.

In the two major depots at Mumbai and Visakhapatnam, only 64% and 46% items were actually held. Nearly 55% of the inventory was non-moving. The fast moving items in all depots and categories were between 4% and 8% only. For Air Stores, non-moving items were even higher, going up to 86% for Sea Harriers.

Even moving items were found to be under-stocked or over-stocked. Sample examination in a depot revealed stocks of items that would last for decades. "Selective Inventory Management" techniques including ABC/VED analysis, as laid down, were not being adopted.

Stock Verification was not being done as stipulated and audit found that there were un-reconciled balances between the ledgers and the bins in 26% of the cases.

6.1 General

This section analyses the status of the holdings of stores at Material Organisations (MOs) in Mumbai and Visakhapatnam, and Naval Stores Depots (NSDs) at Kochi and Goa.

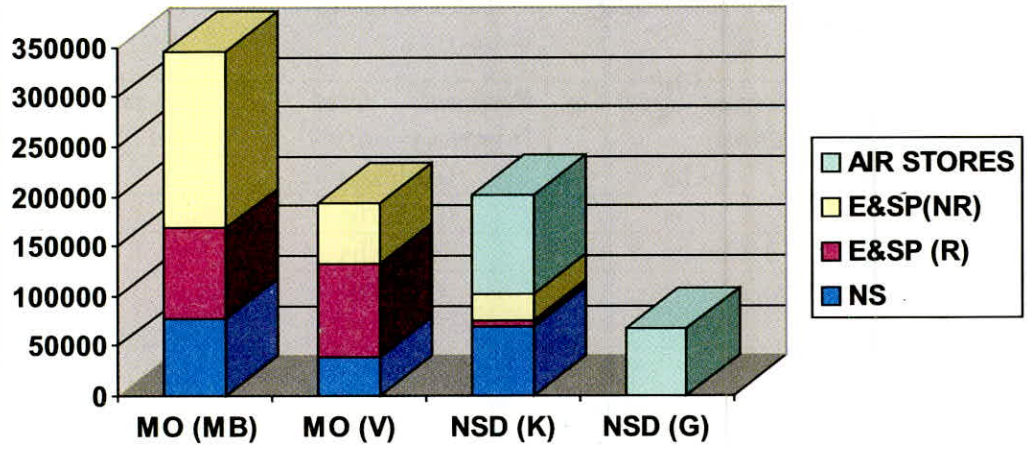
Inventory holdings in the Navy are accounted for in terms of number of items without any reference to the value, volume, or weight of the inventories held.

In the annual reporting of inventory during inspection of depots, the inventories are classified as moving and non-moving inventory. Items having at least one transaction in the last seven years are classified as "Moving Items". "Non-Moving Items" are to be examined for obsolescence, substitutes identified, or classified as "Surplus".

6.2 *Levels of Present Inventory*

Category wise levels of inventory currently held at different depots, as ascertained from the respective Annual Inspection Reports, are as under:

Figure 6.1 Depot wise Inventory Holdings



6.2.1 *Audit Observations*

The above mentioned inventory data, though stated to be in number of items, actually referred to number of ledger pages (number of records in the Item Table in ILMS) for the following reasons:

(i) A large number of items have no stock, and also, have had no transaction for long periods and are hence, notional.

(ii) Large-scale duplication exists in the ledgers, i.e., an item may be repeated in more than one ledger page.

(iii) Many items shown in the inventory belong to decommissioned ships/ aircraft but are awaiting action for segregation and disposal.

(iv) Many of the items surveyed back to the depots as repairable/ scrap etc., are lying without further action.

Though the Naval phraseology "number of items" suffers from serious limitations as mentioned above, Audit has adopted it for the purpose of uniform analysis.

6.3 Rational Levels of Inventory

Due to the above factors, the Navy realizes that its inventory holdings are in urgent need of rationalisation. Inventory could be substantially reduced by rationalizing the codification, correct identification of substitutes etc. As indicated in the Material Planning Manual (1994 ed.) the current recorded level of inventories and the rationally possible number of inventories at MOs at Mumbai and Visakhapatnam are as under:

Table 6.1 Rationally Possible Levels of Inventory

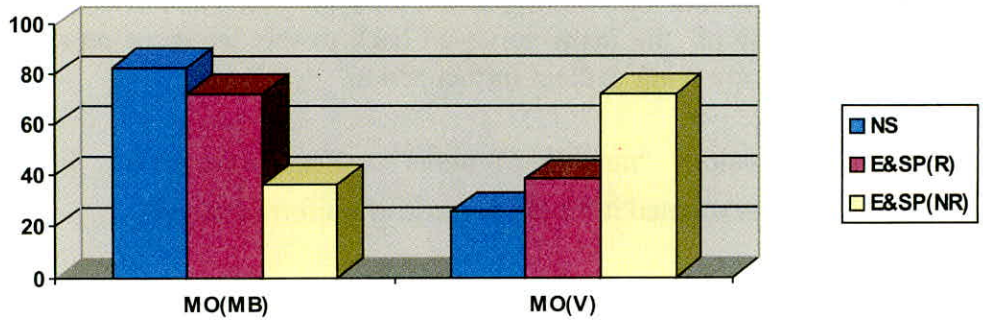
Category of items	*Recorded level of Inventory*	*Rational level of Inventory*	*Excess in recorded level of Inventory*
Naval Stores	1.5 lakhs	0.4 lakhs	1.1 lakhs
Russian Stores	2.4 lakhs	0.8 lakhs	1.6 lakhs
Non-Russian Stores	2.8 lakhs	1.8 lakhs	1.0 lakhs
Total	6.7 lakhs	3.0 lakhs	3.7 lakhs

6.3.1 Items without physical balance

As mentioned earlier, out of the total inventories held in all the depots, a considerable number are held only in the ledgers. Many of them do not have any physical balance or have had no transactions for long time. One of the reasons is that, there are superseded items in the table which should have been deleted from the item table.

Details of percentage of items physically held in the two Material Organisations in various categories are given below:

Figure 6.2 Percentage of Items Physically held in each category



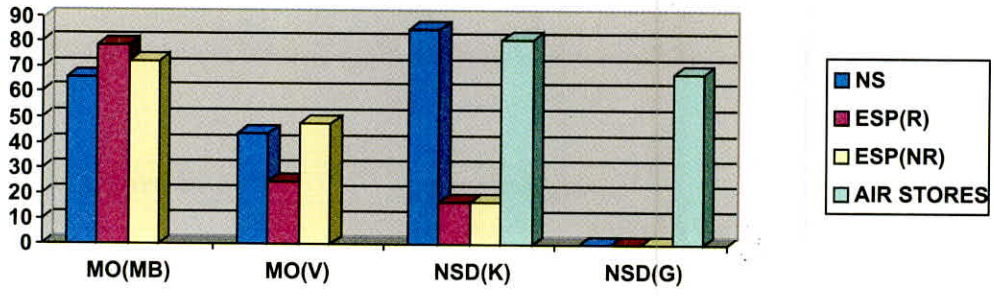
It can be seen from the above that:

i) Only an average of 63.8% is physically held in all categories in Mumbai and 45.5% in Visakhapatnam.
ii) These percentages are an indicator to the non-rationalization of inventory.
iii) Given the large percentage of such inventory, it is imperative that these items be segregated from the held inventory and given different treatment.

6.4 *Non-moving Inventories*

Large, non-moving inventories are a perennial problem for defence inventories everywhere. Status of the inventories on this basis is as under:

Figure 6.3 Percentage of Non Moving Inventory in Various Depots



From the above it is seen that approximately 55% of the total inventory is non-moving. The situation is worse in the case of Naval Stores category where the extent of non-moving inventory is over 65%. Though defence inventories necessarily carry a planned element of idle inventory, such high levels of non-moving inventory in the Naval Stores category, which comprise items of more general usage, is a cause for concern

This non-moving inventory is a pointer to excess procurements made in the past. The value of the total non-moving inventory in all the depots cannot be ascertained as no costing has been done. The holding of such huge non-moving inventories does not indicate a sound inventory management system.

6.5 *Analysis of the Moving Inventory*

The definition of Moving Inventory as having at least one transaction in 7 years, is a very broad one. Thus, a further segregation of moving inventory is made: fast moving (having transaction in last 2 years) and slow moving.

Analysis of moving inventory at MO (MB) and MO (V) in terms of the fast (issue made during last 2 years) and slower moving (issues made between 2 & 5 years) in the Annual Inspection Report of the Depots as in February 2000 revealed the following.

Table 6.2 Analysis of slow and fast moving inventory in MO (MB)

Category	*Total Inventory*	*Moving Inventories*		*Total non-moving inventories*	
		Fast Moving	*Slow Moving*	*No.*	*%*
Naval Stores	77362	3957 *(5.11%)*	22238 *(28.74%)*	51167	66.14
E&SP (R)	90435	7955 *(8.79%)*	17351 *(19.18%)*	65129	72.01
E&SP (NR)	178516	12696 *(7.11%)*	25213 *(14.12%)*	14067	78.76

Table 6.3 Analysis of Slow and Fast Moving Inventory in MO (V)

Category	*Total Inventory*	*Moving Inventory*		*Non-moving Inventory*	
		Fast Moving	*Slow Moving*	*No.*	*%*
Naval Stores	38564	3345 *(8.67%)*	18451 *(47.85%)*	16768	*43.48*
E&SP (Russian)	93521	3534 *(3.78%)*	45640 *(48.81%)*	44347	*47.41*
E&SP (Non-Russian)	60975	3821 *(6.23%)*	42205 *(69.21%)*	14949	*24.51*
Total	193060	10700 (5.*54%)*	106296 *(55.05%)*	76064	*39.39*

Thus it is seen that items which have moved in the last two years are a mere 7% to 10%.

6.6 Non Moving Air Stores

Aircraft spares are categorised in terms of aircraft. NSD (Goa) holds the spares of Eastern origin aircraft, Sea Harrier and Dornier. An analysis of non-moving stores of different aircraft at NSD (G) revealed the following:

Table 6.4 Movement of Aircraft Spares at NSD (G)

Type of Aircraft	Number of items physically held	Moved items (during last 04 years)		Non-moving items	
		Number	%	Number	%
Sea Harrier	31600	4552	14.40	27048	86
TU-142 M Aircraft	9454	2830	29.93	6624	70
IL-38	11765	1425	12.11	10340	88
KA – 25	3850	1261	32.75	2589	67
KV	3811	1030	27.62	2781	73
KR	4890	1650	33.74	3240	66
Dornier	1492	1146	76.80	346	23.19
Total	66862	13894	32.47 (Average)	52968	67.59 (Average)

It can be seen that the average percentage of non-moving items is exceptionally high in the case of Eastern Origin Aircraft, as well as Sea Harriers.

6.7 Levels of Stock Held

The Material Planning Manual stipulates that stock of an item should be between Minimum Stock Level (MSL) and Upper Stock Level (USL), which are laid down as per the category of the item and Annual Consumption Level (ACL). Since the categorisation of items into ABC and VED has not been done, MSL is presently taken as 1.2 ACL and USL as 3 ACL.

Analysis of the stock level of items at the depots revealed that this stipulation was rarely followed. A sizeable number of moving items were either below MSL or above USL. Items stocked below MSL means that necessary safety stock is not being maintained and subsequent chances of stock out are higher. Items above USL mean that extra procurement has been done and funds are being locked in inventory. This translates into avoidable

inventory carrying costs being incurred. In certain cases items had stocks, which will last for decades.

Details of items, found to be under-stocked / overstocked in various depots are summarised as under:

Table 6.5 Extent of under and overstocking of moving items at Depots

Depot	Naval Stores		E&SP (NR)		E&SP (R)	
	Below MSL	Above USL	Below MSL	Above USL	Below MSL	Above USL
MO (MB)	4566 (17.43%)	1290 (4.92%)	6079 (16.03%)	7857 (20.72%)	8105 (32.02%)	1696 (6.70%)
MO (V)	4385 (20.11%)	3678 (16.87%)	2700 (5.86%)	7871 (17.10%)	4334 (8.81%)	6310 (12.83%)
NSD (K)	3562 (5.18%)	5299 (7.71%)	488 (1.92%)	9334 (36.73%)	NA	4610 (67.29%)

6.7.1 Some cases of excess stocking

(a) Excess stocking of Steel Items in MO (M)

It was noticed that at MO (MB) 5302 steel plates costing Rs. 3.39 crore procured indigenously, and 23.05 MT of steel plates costing Rs. 36.89 lakh procured from Russia were held in stock since 1990 without utilisation.

(b) Stock for decades in NSD (K)

(i) Selective analysis of non-moving Naval Store items at NSD (K) revealed that 5786 items worth Rs. 8.47 crore are held with zero ACL.

(ii) Similarly, a selective analysis of non-moving E&SP (Non-Russian) items at NSD (K) revealed that 1185 items valuing Rs. 6.38 crore are held in stock since 1993. Out of this, there were no issues, since 1990, in respect of 1109 items.

(iii) Another analysis made of 1497 items held above 3 ACL at NSD (K) revealed that 616 items out of these would be utilised only after a period of 10 to 300 years as indicated below:

Table 6.6 Analyses of 616 items having more than 3 ACL at NSD (K)

Number of items	Years to Last
312	10-20
138	20-30
83	30-50
53	50-100
30	More than 100

Out of the above 1497 items, pricing was available for 1450 items and in respect of 47 items pricing was not available. Out of the 1450 items the value of 3 ACL items authorised to be held in stock was Rs 1.22 crore as against the value of Rs 3.61 crore of the total stock of the 1450 items.

(c) Shelf life expired Items in the depots

Provisioning and storage of shelf life expired items needs to be given special attention. Many items of Naval Stores category like paints, soaps, lubricants etc., fall in this category. Chapter 20 of the Material Planning Manual has prescribed adequate instructions for the planner, purchaser and stockholder to avoid holding of shelf life expired items.

Audit analysis revealed that, shelf life expired items are lying in all the depots, though the system provides for restricting the procurement of shelf life items and also early action for their utilisation.

In MO (MB) as of 1999, 664 items were lying shelf life expired. Out of these, 499 items were lying for more than 5 years. The value of these items is not indicated. Audit analysis however revealed that 31 numbers of items valued at Rs. 50.78 lakh are held in shelf life expired condition. MO (MB) stated that items were procured based on reviews with procurement limited to 2 ACL as laid down. It would thus appear that the policy regarding shelf life items needs review.

Audit revealed that in NSD (K), life expired naval store items and aviation fuel/ lubricants were lying as non-moving items without segregating them for disposal. In MO (V) common items like soap, detergent, paints, polish etc., are lying life expired. In many cases, the quantity held is nearly the same as originally procured quantity, with no or little issues being made.

Audit also observed that the details of shelf life expired items, though required to be given, were not included in Annual Inspection Reports in all cases.

6.8 Lack of Selective Inventory Management

In the management of inventories, it is well recognized that a small proportion of items account for most of the criticality, need and value. Thus, Selective Inventory Management practices are adopted, whereby inventory is segregated into different categories which then receive focussed attention.

The Material Planning Manual prescribes that ABC / VED classification of Naval Stores and E&SP items should be carried out to identify high value items and fast moving items for effective control of activities like provisioning, stocking etc. So far, in none of the depots has such classification been implemented on a regular basis to serve as a guiding principle for stocking and provisioning, even though ILMS was introduced in 1997. Due to non-carrying out of such classification and analysis, provisioning and stocking are still done on ad-hoc basis.
In reply to an audit observation, MO (MB) had stated in February 2001 that so far no action had been taken for ABC/ VED classification as ILMS is at an infancy stage and that such analysis will be carried out in near future. This is however not tenable, since, VED analysis has to be done only manually. In the absence of this classification, all items, from toilet soaps to propeller shafts, have to perforce be treated on equal footing, resulting in lack of professional management.

6.9 Warehousing

Attempts have been made over the years to maximise warehousing in depots themselves. With the passage of time, however, stock holdings have bloated, resulting in space constraints in all depots. Therefore, a large number of items are stored in open area and are liable to suffer damage as a result of exposure to weather. Audit found that many steel and marine items are also stored in the open, suffering from the deleterious effects of coastal environment. Recently, warehousing in the Navy has been modernized, using modern Material Handing Equipment and improving space utilization, with the result that the state of storing items and visibility has improved dramatically.

6.10 Stock Verification

Stock verification is one of the most important processes in the management of the warehouses. Regular stock verification not only facilitates reconciliation of differences between ground and ledger balances but also ensures preventive control against risks like items becoming life expired, obsolete etc.

Due to a variety of reasons, including stated constraints of human resources, the process of stock verification has been in arrears in the depots. This has serious implications as brought out in the Internal Audit Report of FA to MS (MB).

At the time of implementation of ILMS it was envisaged that manual forms of ledgers and bin-cards would be discontinued. This was expected to ensure the integrity between the ledger and the bin-card. However, the ledgers and bin-cards were not reconciled prior to data entry in the system.

As a result of this, a very anomalous situation of recording two separate balances for an item arose, one indicating ledger balance with cases of variance with physical balance.

Details of this discrepancy in the depot at Mumbai is summarised as under:

Table 6.7 Discrepancies in Ledger / Ground Balance – MO (MB)

Category	***Total No. of items in inventory***	***Items Showing stock discrepancies***		***Items where ledger balance is in excess of ground balance***		***Items where ledger balance is less than ground balance***	
		Number	*%*	*Number*	*%*	*Number*	*%*
Naval Stores	92732	24250	26.15	3817	4.1	20433	22.03
E&SP (R)	65983	9888	14.98	4666	7.07	5222	7.91
E&SP (NR)	138710	48817	35.19	17953	12.94	30864	22.25
SSK	24605	1913	7.78	1228	4.99	685	2.78

Thus, annual stock verification, which is a very effective tool of inventory management, is not put to effective management of inventory control in the Naval Depots. As a result, the rationalisation of inventory items and the effective identification of substitutes have suffered.

6.11 Recommendations

a) As rationalization of inventory is a major step towards reflecting the correct position of holdings, the following actions be taken in a time bound manner:

- ***Deletion of duplicate and erroneous item codes***
- ***Segregation of obsolete and obsolescent item codes.***
- ***Segregation of items for which only details are available but not physically held.***

b) Selective Inventory Management methods, as visualized in the Material Planning Manual, need to be introduced and implemented. In particular, VED analysis of E&SP category items, which is a process of exercising professional judgement, needs to be systematically carried out without waiting for ILMS to settle.

c) ***As the existing holdings of large non-moving inventory are a cause for concern, its reduction must necessarily become a "high focus" area for examination. Standing committees may be set up in the Commands to segregate inventory on a time bound basis.***

d) ***As present inventory holdings cannot be assessed in terms of value, the Navy should formulate a methodology for assessing and reporting on a regular basis the value of its inventory holdings.***

e) ***The present status of discrepancies between ledger and bin balance, is unacceptable. A committee consisting of representatives of depot and internal audit be formed to reconcile discrepancies and take follow up action.***

f) ***Stock Verification in the depots is presently not being done as laid down. It is recommended that the same be carried out regularly as prescribed.***

6.12 Defence Response

Of the six recommendations made by Audit, all were agreed to.

Response of NHQ is given below, ad seriatim.

a) **Rationalisation of inventory :** Agreed and amplified that deletion of duplicate / erroneous item codes, has since been done and continues to be done as an 'on going' exercise. The segregation and removal of nil physical balance items would be based on whether items are in use or obsolescent.

[Para 6.11 (a)]

b) **Selective Inventory Management :** Agreed and added that the stipulations of Material Planning Manual would be observed with adequate generation of data on the system, particularly in respect of E&SP inventory.

[Para 6.11 (b)]

c) **Segregation of non-moving inventory :** Agreed while qualifying that such holdings need to be analysed for retention / disposal both for range & scale. As decision making involves varied aspects of professional judgement and policies for retention of items, formation of Command teams are under consideration.

[Para 6.11 (c)]

d) **Cost / value of inventory holdings :** Agreed that cost of inventory holdings needs constant attention, and added that value of inventory cannot be used in itself for gauging efficiency in Management of Defence Inventory.

[Para 6.11 (d)]

e) **Reconciliation in ledger / bin balances :** Agreed that joint verification by depot and internal audit be carried out.

[Para 6.11 (e)]

f) **Stock verification :** Agreed and added that the stock verification cycle be increased from 18 months to 36 months due to acute manpower shortages.

[Para 6.11 (f)]

6.13 Conclusion

From the responses to the recommendations, NHQ is almost entirely in agreement with the suggestions of Audit. In discussions on various paragraphs in this chapter, NHQ have amplified reasons for various inabilities and deficiencies in management of inventory. It emerges, in particular, that the system was beset with difficulties in the manual mode. Efforts in rationalization and reconciliation of balances have since resulted in reduction of inventory from eight lakh items to five lakh items.

Excess stocking has to a large extent been attributed to multiple codes for the same item. Limitations in forecasting spares for refits / repairs by dockyards have also been a factor in over provisioning.

A major problem in E&SP inventory appears to be the absence of a systematic way of indicating part number changes by the OEM suppliers to the inventory` holders. There is a clear need for contractually binding the suppliers to continually and regularly to provide information on part number changes to the users to enable smooth performance of inventory management functions.

NHQ are not in agreement with Audit observation on the build up of inventory pertaining to decommissioned ships stating that disposal action does not commence on decommissioning of ship as the inventory is not being maintained project wise but equipment wise for which obsolescence / movement of item has to be established. Audit maintains the necessity of segregating and disposal of items in a focused, and timely manner.

As regards slow movement or inaction on items surveyed back to depots as repairable / scrap, NHQ have indicated a speeding up during the last year. In amplification, data has been provided for items held on 01st January 2001 and 31st December 2001 which shows a marked reduction in the categories of stores that have been presented.

On the question of Selective Inventory Control through ABC and VED Analysis, NHQ indicate that the application of concepts has hitherto been limited due to difficulty in data management in the manual mode and would be progressed as data acquisition takes place on the ILMS. Audit opines that an impetus be accorded to this task, even if selectively, by material planning groups on the basis of substantial data held in the manual mode between

the depots and major consumers e.g. Dockyards. Further more, important classes of ships are at stages of mid-life or beyond, for which examination of past data is vital.

The need for regular stock taking and reconciling physical balances with ledger cannot be over-emphasized. MOD can explore the possibility of prescribing different stock taking cycles for different categories / groups of items, based on their value and criticality.

CHAPTER 7: REPAIRABLE, SURPLUS AND DISPOSABLE INVENTORY

Repairable inventory is required to be refurbished and merged in stock. While nearly 80% of 'repairables' are items of naval stores, high value items are essentially in the E&SP category. In MO (MB) as of May 2001, there were188 high value items estimated at Rs.145 crores. Naval Dockyard is the main repair agency for these items.

In MO (V), it was seen that proper preservation of repairable Engines was not being done.

In the case of aircraft repairables, more than 57% were in the repairable pipe line for over a year.

The system of regularly examining the inventory for purposes of 'weeding out' was found to be nearly defunct in the depots.

Stores back-loaded from decommissioned ships with a 'just in case' attitude, had accumulated with little utility in depots

Disposal actions as a whole were found to be tardy. In MO (V), only one and 510 items were disposed off in 1998 and 1999-2000 respectively.

7.1 General

Repairable, Surplus and disposable inventory represent idle funds in the logistics pipeline. Apart from blocking the funds, they also consume inventory management resources and add to the inventory carrying costs. The delay in repairing the items has a direct bearing on the expenditure to be incurred for procurement of a new item when the need arises.

Similarly, promptness in segregating the surplus inventory and disposing them off would facilitate a focussed inventory and better realisation. The exact quantum of financial resources blocked in these categories cannot be ascertained since the logistics chain does not maintain proper cost data of the inventory held. However, inferences drawn from the POER value of the repairable items in the naval inventory, indicate that the sums involved could be huge.

7.2 System

Items are surveyed back from the units in different conditions from various ships/units to the Material Organization. The items are surveyed in one of the following categories:

i) Unserviceable
ii) Obsolete
iii) Items received in improper condition
iv) Surplus
v) Loan returns
vi) De-storing on decommissioning

In MO these items are classified by CTS in one of the following categories:

i) Serviceable
ii) Locally Repairable
iii) Beyond Local Repairs, (BLR)
iv) Beyond economical repairs but can be cannibalised, BER(C)
v) Beyond Economical repairs scrap, BER (S)

Repairs of the items are done through various agencies like Naval Dockyard, Trade etc. Apart from the surveyed items, surplus inventory could arise within the depot as a result of obsolescence. As per Para 5.8 of Material Planning Manual, CMP should regularly review their inventories which have not moved for 60 months and examine them for obsolescence. If it is felt that an item is not likely to have any future use, a decision must be taken whether the item can be used up as a substitute for another item. If not, the non-moving item should be segregated as Surplus Serviceable Stores (SSS). Surplus Serviceable Stores are then to be disposed off as per the laid down procedure.

7.3 Repairable Inventory

The source of repairable arising is from the items surveyed back. It was seen that the source of repairing these items was primarily the Naval Dockyards. Controller of Technical Services (CTS) in MO (MB) had a few items under repair in its own workshop. CTS in MO (V) did not have its own repair facility at all, and in turn surveyed (returned) these items to MO (MB).

Details of repairable holdings with the two MOs were collected and are summarized as under.

Table 7.1 Repairable Inventory in MO (MB)

	1997	*1998*	*1999*	*2000*
Repairable at the beginning of the year	8331	8404	7250	5651
Repaired by ND(MB)	2457	2086	2413	2304
Repaired by OEM/Trade	2071	1923	2031	2390

Table 7.2 Repairable Inventory in MO (V)

	1996-97	*1997-98*	*1998-99*	*1999-2000*
Repairable at the beginning of the year	5829	6867	3139	3654
Repaired by ND(V)	795	243	328	129
Repaired by OEM/Trade	1178	1467	315	476

A perusal of the above tables show that the repair output of MO (V), both through dockyard and trade, has been declining.

7.3.1 Value of the Repairable Inventory

Analysis of the inventory held with the CTS at MO (MB) showed that as of August 2000 there were 7279 numbers of items belonging to 962 unique item categories under repairable Inventory. A majority of these items (5498) were from the category of Naval Stores. 181 items of this repairable inventory are costing over Rs. 1 lakh each. The annual expenditure on the repair activities is to the tune of Rs. 3.5 crores.

As of May 2001, there were 188 high value items in the repairable pipeline with MO (MB). The cost of these 188 items was estimated at Rs.145 crores. The primary repair agency was the naval dockyard, which accounted for as many as 117 of these items.

7.3.2 Audit Observations

Bottlenecks in the repair chain were apparent from the fact that out of 117 items which were to be repaired by the dockyard as many as 69 (59%) were yet to be taken up for repairs.

An analysis of the 48 items under repair in the Naval Dockyard shows that the items have been lying in the repairable state for an average of 3.5 years, e.g. propeller shaft of INS Ajay costing Rs.1 crore was lying repairable since August 1995.

The cost of just the high value items held as repairable is very high. At Rs. 145 crores it is more than the annual expenditure on Equipment and Spare Parts.

7.3.3 Non Preservation of Repairable Engines at MO (V)

The depot is holding 43 main engines as on date. Most of them have been lying repairable for more than 3 years as evident from the table below:

Table 7.3 Repairable Engines Held at MO (V)

Held For	*Number of Engines*
Less than 3 years	5
3 to 5 years	6
5 to 10 years	28
10 years	3

Pending repair, preservation is to be carried out on these engines. Audit however, observed that no preservation has been carried out except for the engines received in the last 3 years. Thus, damage to these engines due to not carrying out the preservation cannot be ruled out.

7.4 Rotables of Aircraft

Rotables of aircraft are sub-assemblies of equipment which are replaced at the time of routines and are sent for refurbishment. Audit found that the aircraft rotables have been found to be lying with several repair agencies for a long time. Details are given below:

Table 7.4 Rotables of aircraft

Aircraft	*Total Rotables held with repair agencies*	*Outstanding for less than 1 year*	*1 year to 3 years*	*3 years to 7 years*	*More than 7 years*
Sea Harrier	1228	478	556	167	27
Kiran	498	240	199	34	25
Dornier	188	124	48	16	
IL-38	406	294	89	19	4
KA-25	48	20	23	5	
KA-28	251	120	123	8	
Chetak	1255	748	424	46	37
Sea King	1890	526	1107	220	37
Islander	328	66	204	46	12

7.4.1 Audit Observation

It is seen that as many as 57% of the rotables have been in the repair pipeline for more than one year. The time taken in repairing the rotables is directly linked with the investment required in sub-assemblies and also the time taken in routines of the aircraft. Therefore, this delay not only results in requirement for more funds in the pipeline of repairable chain but also adversely affects the defence preparedness.

Audit found that 707 rotables were lying with HAL Bangalore for a period ranging from 1988 till date.

7.5 Disposal

In an inventory as large as that of the Navy, identification and weeding out of unnecessary items is of prime importance to maintain a lean inventory. However, Audit examination revealed that efforts made in this regard were far from effective.

Naval Headquarters in April 1994 had defined Surplus Serviceable Stores (SSS) and Stores not moving for more than seven years as disposable. As per this norm, approximately 50% of the inventory held in MOs was found disposable.

Timely identification of surplus inventory and its speedy disposal is a critical process in achieving lean and effective inventory. The process of disposal comprises of two distinct processes. First is in identification of items, which need to be disposed off, and second is the process to actually disposing off these items. In Audit, we observed that the genesis of the problem of non-moving inventory was ineffective functioning of these processes.

Apart from the category of non-moving items, items surveyed back by the user also form a source of disposable items. These items received back from the user are classified into repairable, BER etc. as explained earlier. The items categorized as "Beyond Economical Repair" (Scrap) are to be disposed off as scrap.

Another source of surplus arising is decommissioning of a vessel or equipment, which renders the stores specific to them obsolete.

7.6 Non-identification of Non-moving Inventory

The first critical process in the objective of having a lean and effective inventory is identification of surplus stores as per the laid down procedure.

Audit found that this process was nearly defunct. Though year after year, thousands of items were found to be non-moving, there is little progress in identifying them as surplus and disposing them off.

Table 7.5 Items identified as surplus in the store depots

Year	MO (MB)	MO(V)
1995	24322	NA
1996	18643	Nil
1997	11071	1
1998	12300	510
1999	NIL	NA

The number of items identified as surplus, are really miniscule compared to number of non-moving items. Further, as per the Material Planning Manual this examination is presently limited to Naval Stores only. However Audit feels that all non-moving inventories, including E&SP need to be critically assessed for their utility rather than adopting a "just in case" attitude.

7.7 Stores of Decommissioned Ships

The equipment and spares held in the Navy are intended for a particular class of ships/ aircraft. Once this particular class is phased out, the equipment and spares held become surplus and should be liquidated in appropriate manner.

However, it is seen that efforts and progress made in this direction has not been adequate. It is noticed that items belonging to decommissioned ships and phased out aircraft are held with the depots for years together. Some representative samples are given in the table below:

Table 7.6 Items of decommissioned ships

Depot	*Pertaining to*	*Decommissioned in*	*Items held*
Visakhapatnam	INS Khanderi, Kalvari & Vagsheer Submarines	1994-96	14,783
Mumbai	INS Vikrant	1996	40,000
Kochi	Type 41 Frigates	1986 -92	4109

Holding this surplus inventory for long time means a drag on Inventory Management resources. Audit considers that the utility of the de-stored items should be established at the time of de-storing itself rather than let the items come to the depot and wait for years on end before disposal.

7.8 Non disposal of Identified Serviceable surplus stores

After identification of the surplus as disposables, they have to be disposed off as per the laid down procedure. Audit observed that a large number of surplus serviceable stores are held in all the depots. The progress in identification and subsequent disposal of SSS items is not adequate as can be seen from the following data.

Table 7.7 Disposal of surplus serviceable stores in MO (MB)

Year	*Number of non-moving items identified for disposal*	*Non-moving items actually disposed off*		*Value (In Rs. Lakh)*
		Number	*%*	
1995	24322	10186	42%	77.86
1996	18643	14110	76%	115.62
1997	11071	1558	14%	11.214
1998	12300	3018	25%	52.37
1999	NIL	6178		10.05

Table 7.8 Disposal of Surplus serviceable stores in MO (V)

Year	*Number of non-moving items identified for disposal*	*Non-moving items actually disposed off*		*Value (In Rs. Lakh)*
		Number	*%*	
1997	Nil	Nil	Nil	Nil
1998	1	1	100	0.04
1999-2000	510	510	100	5.9

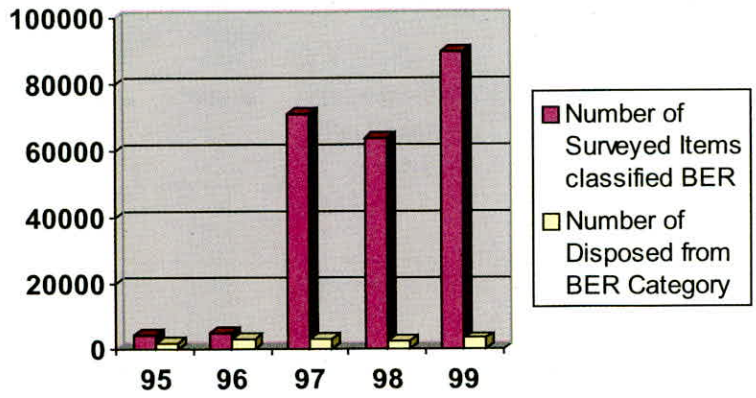
It can be seen from the above that disposal of the non-moving inventory at MO (MB) is not commensurate with the number of non-moving items identified for disposal, resulting in unnecessary accumulation of non-moving inventory.

In MO (V) the process of identification of non-moving items for disposal appears weak, with a negligible number of items identified for disposal in comparison to the number of non-moving inventories held.

7.9 Non Disposal of BER items

Items are surveyed to the depot from the user units. These items are classified by the depot into different categories. One of the categories is Beyond Economical Repairs (BER) meant for disposal. Audit observed that the disposal of this category was also very slow as indicated below:

Figure 7.1 Disposal of BER items in MO(MB)



7.9.1 Constraints in Disposal

The salient provisions regarding disposal of items in Indian Navy is that salvage scrap and surplus stores lying with stock holders must be disposed of with minimum of delay. Speedy disposal is essential to safe guard from loss through further deterioration and wastage of manpower and resources. Surplus is to be a accounted as under:

i) True surpluses: Stores which have been surplus even after ascertaining requirements from other users as per the procedure.

ii) Declared Surplus stores: Surplus stores which have been examined for usefulness and declared surplus to navy's requirements.

iii) Surplus stores: Stores which have not moved for over 7 years

iv) Undeclared surplus stores

v) Salvage and scrap stores

Disposal action for identified disposable stores is tardy. MO (MB) stated that antiquated procedures and guidelines were a bottleneck in quick disposal. Some of the reasons for poor disposal as stated were:

i) Unrealistic POV/RP
ii) Insufficient knowledge about potential buyers.
iii) Cartel formation by bidders
iv) Non involvement of OEM
v) Stringent Rules

In fact, existing NHQ guidelines do not permit fixation of realistic / realisable reserve prices, resulting in non-disposal of stores despite repeated attempts. The reserve price should be de-linked from the purchase price and be guided by prevailing market trends.

7.10 Summary of Audit Observations

Naval depots were saddled with huge repairable and surplus inventory, which were a major drag on their resources. The repair pipeline was very slack with depots primarily depending on the naval dockyards for repairs.

Because of limited financial powers for repairs at the depot level (Rs. 3 lakh) cases had to be sent to the Naval Headquarters, which added to the time taken.

Regarding the surplus and non-moving inventory the audit findings suggested a strong "just in case" mentality. At the time of de-storing, items were taken off the ships and stored in the

depot without requirement. The process of identification of surplus inventory was nearly defunct even though there were huge non-moving inventories.
Further, even the items categorised as disposables from this tedious process also could not be disposed off expeditiously owing to various constraints.

Thus, Audit concludes that the overall efforts in achieving a lean and trim inventory were not up to the mark.

7.11 Recommendations

a) ***Liquidation of Repairable Inventory through the dockyards is found to be time consuming due to non-availability of spares, capacity constraints etc. The channel of repairs through OEM/Trade needs to be explored further, along with the re-delegation of financial powers from NHQ to Command/Depot.***

b) ***Aircraft rotables are subject to in-ordinate delay and poor turnover. A system of close monitoring and reviews needs to be instituted to ensure quick turnover of rotables.***

c) ***The existing system of weeding out surplus items from the inventory was found deficient. The policies and procedures for identification and declaration of non moving inventory as "surplus" need to be clearly laid down and progress closely monitored.***

d) ***In case of de-commissioned ships, utility of items should be definitely established prior to removal and their return to depots. As far as possible the ship should be disposed off with the stores.***

e) ***The disposal of all categories of disposable items is found to be slow. It is recommended that an empowered organization on the lines of "Special Surplus Stores Disposal Committee (SSSDC)" set up earlier in the army be formed for expeditious disposal actions. Further, a re-examination of procedures in this regard may be undertaken especially of the fixation of reserve price.***

7.12 Defence Response

Of the five recommendations made by Audit, NHQ agreed with three, partially agreed with one and did not agree with one.

The main points emerging from NHQ responses to recommendations are covered below, ad seriatim.

a) **Liquidation of Repairables :** Agreed partially and stated that while repairs through OEM / trade are being resorted to, wherever feasible, limited financial powers of MOs is a constraint. Proposal for enhancement of financial powers has been taken up with MOD.

[Para 7.11 (a)]

b) **Aircraft Rotables :** Agreed that rotables are subject to poor turnover. Suitable directions are under issue by NHQ.

[Para 7.11 (b)]

c) **Segregation of surplus items in Inventory :** Not agreed and added that procedure for segregating surpluses and identifying items for disposal has been laid down. The disposal of surplus inventory is being closely monitored and progress report obtained every quarter.

[Para 7.11 (c)]

d) **Utility of items on decommissioning ships :** Partially agreed that the utility of items be closely established at the stage of decommissioning itself, shedding a 'just in case' attitude.

[Para 7.11 (d)]

e) **Procedures for Disposals:** Partially agreed, amplifying that the nature of surplus inventory as also the scale does not justify an empowered "Special Surplus Stores Disposal Committee (SSSDC)" as had been set up earlier for the Army. Further, the Navy surplus inventory is considered by NHQ to be relatively small, consisting mostly of components and spares.

NHQ however agree that a re-examination of procedures, particularly that relating to fixation of reserve price, is called for and that empowered committees at Command level identify and dispose off surplus inventory.

[Para 7.11 (e)]

7.13 Conclusion

While NHQ agreed with majority of recommendations, reasons and explanatory remarks were given by way of discussions in relevant paragraphs in this chapter. The improved status now reported on non-moving / surplus / disposal of inventory and repairables, was not visible to Audit during the period of examination. Audit therefore maintains the validity of their observations.

In summarizing, Audit highlights the following points for closer examination and implementation.

i) Improved turn around of rotables / repairables, with enhancement of delegated financial powers to MOs.

ii) Improved focus on timely segregation of surplus items in inventory and their disposal.

iii) Norms and procedures for disposal be re-examined with MOD to facilitate timely and judicious disposals. In particular, existing stipulations on fixation of 'reserve price' need to be revised.

CHAPTER 8: INVENTORY MANAGEMENT AUTOMATION

The ILMS, introduced in 1997, has been a major step in automated management of inventory. However, inadequate participation of all concerned in preparation of "functional specifications" has limited its usefulness. It thus remains a predominantly "depot" based system with low functional utility to its customers. In particular, its "item centric" Relational Data Model and lack of related data linkages are irksome to customers, and are time consuming.

The system does not integrate the user or supplier at all; nor are depots integrated completely.

To handle the discrepancy in the existing stock balance, the ILMS design provides two balances. This is improper.

The data base design allows existence of orphan records in key tables. The data bases created in ILMS are not complete and reliable due to lack of Input Controls.

ILMS processing has lack of controls: for instance, indents can be created without any basis.

Inadequate planning and inability to upgrade in time has resulted in system performance slowing down.

8.1 General

Material management procedures in the Navy had evolved over the years in a diffused and fragmented manner. The size of inventory to be managed by the logistics chain also grew exponentially. Manual processes of management of large data are known to be error prone and inaccurate.

The Integrated Logistics Management System (ILMS) Project, introduced on September 1, 1993, was intended not only to computerize the set up of inventory management but also to rationalize and integrate those procedures to serve the objectives of material management in the Navy.

In this study the planning, implementation and performance of the system has been examined. The basis of the examination were the stated objectives of the ILMS Project and certain normative considerations which any automated inventory management should have, such as:

i) Lead to a better and quicker response to customers.
ii) Assist in reducing inventory holding and thereby reducing carrying cost.
iii) Provide meaningful information to the managers and the users.
iv) Reduce manual interventions, which are "time consuming" and "error prone" by appropriate re-engineering of processes.

8.2 Audit Observations

The functional specifications of ILMS were prepared in the form of manuals, which were then approved by the Controller of Logistics for use in the Navy. Audit found that there had been inadequate participation by those affected by the system. The manuals and the system have been prepared with a depot perspective.

As a result, problems have been encountered such as users' demands not being identified on the system, details furnished by the suppliers not being incorporated in the system and the budget module being completely unused. These problems have affected the utility of the system.

8.3 The Relational Data Model of ILMS

The core of ILMS is its database. The Relational Data Model of ILMS was therefore studied and reviewed by Audit.

A good data base design should be a reflection of the data as it exists in reality. The Relational Data Model of ILMS is "item centric". This is to say that the primary data is about the item, and all other data are related to it. Thus, in its design, it is of core importance to have the "item code" for the item rather than having the code of the equipment to which it belongs (for a spare part), or the ship on which it is to be used, or the customer who may use it, or supplier who may issue it.

Study of the structure of naval inventory, which has been elaborated upon in other parts of this report, led Audit to the conclusion that this model is appropriate only for "Naval Stores" items. For a larger and more important part of the inventory consisting of "Equipment and Spare Parts" the item's existence is primarily dependent upon the equipment or the customer whom it supports. Further, the items in this category are generally procured on PAC basis, which is to say, their suppliers are pre-determined. A model starting from the class of ship then linking it to its equipment, sub-assemblies and components up to the manufacturer and

supplier is a more suitable way of modelling the inventory of this category. However, in ILMS equal treatment is given to all the items and they are also stored in the table. Identification by the Item Code is limited to categories of "Naval Stores", "E&SP", "E&SP" Russian, "Viraat" spares and SSK spares.

Keeping all the items in the same table means that the size of the table is huge and queries on the system are time consuming with performance implications.

This has led to the problem of not being able to search for an item in ILMS even when it exists, its item code is not known in the E&SP category.

8.4 Design Deficiencies

The ILMS design is primarily based on the four manuals: the manuals on 'Material Management', 'Material Planning', 'Procurement', 'Warehousing and Material Handling'. An examination of the design in some of the areas revealed the following:

8.4.1 Budget Module

The functional specifications of ILMS relating to the Budget Module are contained in Chapter 4 of the Material Planning Manual (MPM). The budgeting system in this chapter was essentially centered on the item code. It was proposed that the item code itself would determine the complete classification of expenditure on it.

However, classification of the expenditure is done as per CGDA's classification handbook. Any change has to be approved by CGDA in consultation with the CAG. Yet the system was developed with the "proposed" classification' scheme. Since this proposal was not accepted by the CGDA, the budget module of the system has become dysfunctional.

8.4.2 One Item, Two Balances

In the past stock verification process, there were un-reconciled discrepancies between the balance of an item in the ledger, and the ground balance as per bin-cards. The ILMS provided an opportunity to reconcile the balances and enter one correct balance in the system. However, instead of doing so, provision was made for entering both the balances in the ILMS. Thus, these discrepancies, instead of being reconciled, got transferred to the system.

As a result, to date, the ILMS maintains two balances of the item, one, the bin-card balance, and the other, the Ledger balance. Having two balances for one item in a computerized inventory management system is unacceptable.

8.5 Non Integration of ILMS

8.5.1 Lack of Integration between Depots

ILMS, as the name suggests, was intended to be an integrated system of logistics management. The designers of ILMS have opted for a "Split Data System" among the depots as compared to a distributed data system. This means that, all the depots hold their own copies of ILMS database. The data in these databases are independent. Thus the same item could be called by various "names" in different depots. For instance, Pielstick control items have KOEL[1] part number at Visakhapatnam and CMR[2] part number at Mumbai.

This means that the items at one depot do not have a necessary link with the same item at another depot. Audit opines that it is imperative that a control mechanism should be designed for ensuring synchronization of databases for common items.

Audit further found that ILMS does not even cover all the depots. NSD (G) has been left out of the ILMS purview, and is treated as a customer by the ILMS system of MO (MB). This means that the stock held by NSD (G) is invisible to the ILMS system.

8.5.2 Non Integration of Users, Suppliers and other agencies

An Integrated Logistics System should link or integrate the suppliers. This ensures lower lead times and inventory holdings, thereby, reducing the financial burden of inventory management. However, in practice, ILMS has remained as a depot management system alone.

ILMS does not even truly integrate the users. As discussed in the Chapter on Demand Satisfaction, the procedures of raising demand have essentially remained the same, with an additional burden of conforming to the ILMS pattern. The same stipulation has been made on the suppliers, leading to problems in incorporating items of initial provisioning.

A sound planning system for inventory should have good linkages with requirements at the user level. The consumption pattern of the user, likely failure rates, and data of upcoming routines can be vital planning input. Within the Navy, there exist various systems outside the depots, which maintain useful data for logistics planning. However, the ILMS system design did not take into consideration linking these up. Illustrative examples are given below:

i) INSMA (Indian Naval Ship Maintenance Authority) maintains a complete database of all the equipment fitted on naval ships. It further keeps a database of all the defects appearing in each of these equipment. Analysis of these defects is

[1] **Name of firm i.e. Kirlosar Oil Engine Ltd., supplying equipments and parts to Navy.**
[2] **Name of firm, supplying equipments and parts to Navy.**

also carried out by INSMA. Thus, the data maintained by INSMA, gives valuable insights into estimating the "Mean Time Between Failure" of equipment, kinds of failure etc., which would be of great assistance in material planning functions. However, the opportunity to link and utilize this has not been availed of.

ii) The Material Management Section of the Dockyard maintains electronic data on the past refits, routines carried out during these refits and items of spares consumed during these refits. This data again is very vital in planning for the refit requirement. However, the ILMS does not make use of this information in any way.

8.6 Database in ILMS

8.6.1 Database Design

Any computerized system is only as good as the quality of data in it. This is even more true for the master files of a Data Base Management System, where this data not only determines the efficiency of processing, but also has an impact on the efficiency and over all usefulness of the system. The choice of Relational Data Base Management Systems (RDBMS) to manage data, is precisely for the reason that the checks on integrity and completeness of the data can be built in the RDBMS itself, and are thus separated from the application. RDBMS like Sybase provide for ensuring the integrity and completeness of data by use of column level, table level and database level constraints and use of appropriate level triggers. Further, additional input controls should be designed in the system,to ensure that master data that enters in the system is complete and accurate. These controls should be applied from the stage of data preparation itself. Refinement of data before entry ensures a certain level of quality in data processing.

It was found that the numerous checks and constraints which would have been expected on normative considerations were not built in the database itself. Thus, data completeness at the time of creation of masters could not be ensured by the system. This resulted in the data in the system being largely incomplete. In general, only the basic data to get the system up and going was entered, leaving the system severely limited in scope. Consequently data integrity in the system is not assured.

Item Table

Data relating to an item is stored in as many as 13 tables. However for purposes of processing, it is sufficient for the item to exist in just one of the tables. Accordingly only the Item Table has been completely populated. The related data tables, some of which are very crucial to the usefulness and effectiveness of the system, like linking a spare item to its equipment, linking an equipment to the customer etc, are not completely populated.

Thus Items exist in ILMS system without the knowledge of:

i) Equipment to which they belong.
ii) Who are the likely customers for the items.
iii) What is the likely price of the items
iv) If it is a spare item or whether its equipment is in service.
v) Whether the item is obsolete.
vi) Whether a substitute for the item exists.
vii) What are the specifications of the item
viii) Who are the supplier(s) of the item

This lack of completeness of data has led to a situation where the internal lead-time in procurement is still vague. Most of the time taken goes towards ascertaining the correct specifications of the item and locating the supplier.

Though reviews and procurement action should not be initiated for an obsolete item, the system-based checks for the same cannot be relied upon due to incomplete data. In a particular instance, indents were raised for steam spares of earlier versions IN ships Delhi, Mysore and Cauvery, which have long been de-commissioned. In the absence of system based checks, risk of procurement of such items persists, and may still be going on.

Equipment Table

This table keeps details of all the equipment in the Navy. Like in the item table, here too orphan records exist. The customer equipment table links the equipment with the customer. Thus, a link created through this table identifies ship(s) on which the equipment is fitted. Due to lack of such linkage, we could have equipment in the system with no links with any customer. This also means that if a ship (customer) is decommissioned, there may be no method of identifying its equipment for segregation, disposal etc on the system.

8.6.2 Data Quality

As discussed earlier, apart from the controls, which should be in the system for ensuring data integrity, there is a need to ensure correctness and completeness from the stage of data preparation itself. No system-based control can check against the entering of meaningless data in the system. Thus data refinement at the time of entry itself is very critical. Further, for an inventory management system, past data is also of great importance. This would determine vital things like consumption levels. Past data would also be critical for using the system as a viable Decision Support System

It was observed that the number of items held in the ledgers of Naval Store Depots was unnecessarily huge. The fact that there were multiple instances of the same item or erroneous and obsolete item codes in the system was well known to the planners even before the project

ILMS started. Similarly large number of items existed with zero balance and no transactions for years. These could have been either a one time buy, or have become obsolete. The right approach would have been to rationalize the data before incorporating them in the system. However, apparently, those implementing the ILMS system have assumed that these problems would automatically get resolved upon computerization. Thus, the item master was populated from the ledgers without any refinement at all.

Further, there seemed to be a lack of control in the data entry process. This was evident from the large number of transcription errors in the ILMS database. As reported by various users, due to incorrect data in the ILMS system, many valid demands do not get accessed in the ILMS system

8.6.3 Historical Data

The necessity of historical data was totally ignored by the designer. However, the implementers decided to keep no historical data at all and simply transferred the snapshot of balances in the system. This has meant that, users have to wait for a substantial amount of time before reliable figures of Annual Consumption level etc. emerge from the system. This also means that, even Audit is finding it difficult to fulfil their statutory obligations where they need to go behind the balances and look into transactions of several years.

Prior to ILMS, there existed small stand-alone fragmented systems and databases for use within a group. However, none of these were imported into ILMS. For example, in MO (MB), a Dbase based application existed which had the transaction data of procurements since 1993. But, no efforts to import the same into ILMS were made. If this data were imported into the system, a reliable database giving vital information like lead times in purchases, vendors, last price could have been incorporated. Failure to do so has deprived the users of such benefits.

8.7 Processing Controls in the System

Processing controls of the system should be so designed that they ensure not only proper and complete processing of the system but also adherence to the normative and statutory considerations. Audit found that there were several instances when these were lacking in the system. Some of the examined processes and impact of not having these controls is discussed below:

8.7.1 Refit Planning Procedure

The RPP as discussed in detail elsewhere in this report, lays down that RPP forecast when received in the depot, the following actions need to be taken.

- The available items should be earmarked.
- Indenting action should be initiated for non-available items.

However, in ILMS, none of those actions are automated. The earmarking of the item needs to be done manually. The forecast has first to be converted into an indentable forecast manually and then these indentable forecasts have to be manually indented.

This need for manual intervention leaves scope for not following the procedure. Sample check by Audit revealed the following:

i) Non-earmarking leading to issue of the items to other customers, leading to greater inability for meeting demand at the commencement of the refit.
ii) Indenting action got delayed.

8.7.2 Backward Links of Indents

An indent can be raised for stores only in one of the following situations.

i) A review of the item leads to an indent (Replenishment Provisioning Indent)
ii) A demand/forecast exists which has to be indented (Demand based Indent)
iii) An indent is to be raised based on a B-Form (Initial Provisioning Indent*)*

In the ILMS system, an Indent Table row is linked to a Equipment Table row yet, it is not mandatory to have such a link at all. Thus, it is possible to raise an indent without any basis whatsoever, as was indeed noticed in audit.

8.7.3 Procurement

The TE table contains details of the Tender Enquiries. Quotes received are stored in the Quote Table, which is linked to the Vendor Table in ILMS. Audit observed the lack of certain processing controls like:

i) The system allows the entering of a quote from a vendor who does not exist in the system.
ii) The system allows a single vendor to submit more than one quote.
iii) A quote could be entered without a corresponding TE

8.7.4 Store Receipts

Stores are received in the depot from the Supplier, by delivery consignment, and from the User, by a survey. On receipt of stores, an entry is made in the system, in the "Store Receipt" Table. However, this entry does not update the stock held. Details about stock of an item are kept in the "Stock" Table, where one entry is made for every stock receipt of the item. It is only after a record is added in this table that the stock balance of the item is revised. Audit found that this updating of stock was not mandatory in the ILMS system.

Thus, an item received in the depot and reflected in the Store Receipt Table may not be reflected against the existing balance of the item, and thus become untraceable in the system.

This was indeed the position in the case of repairable items. Surveyed items were received from the user as seen in the Survey Table and Store Receipt Table but did not get reflected in the balance. Thus accounting of these items was not done in ILMS. With the manual system also discontinued, there is no accounting at all of these items.

8.8 Security and Confidentiality of ILMS data

Confidentiality and security of ILMS data is of paramount importance. Audit sought to establish whether adequate controls are in place to safeguard against accidental and malicious tampering of data. The confidentiality of the data being maintained by having authorizations as per need to know basis and approved by competent management was also sought to be established.

8.8.1 Security of ILMS data

Every valid user of ILMS needs to be an authorized user of the server. The authorization to access the server is granted only after the necessary administrative orders are issued by way of temporary memorandum/ note/ staff minute sheet by concerned HOD of the user. The user's role is also decided on the basis of functions/tasks carried out

Based on the functional requirement of the user a permutation and combination of the database permissions namely select, insert, update and delete are accorded. The select permission on all tables is generally accorded to all users.

However, a restriction has been imposed on insert and delete permissions on tables. Similarly, restrictions on the update permission have been extended up to sensitive columns of many tables too.

When a user logs on to the system a back-end view script namely 'vPermission' is invoked to activate all permissible actions of the user. Thereafter at the time of executing any table action the triggers attached to each table perform another back-end procedure 'ipCheckPermissions' so as to prevent any unauthorized action.

8.8.2 Audit Observations

Audit concluded that there were adequate mechanisms in place to protect data from un-authorized tampering. However, it was found that there was little protection against un-authorized disclosure of data, since full select access has been granted to all users with "Graphical User Interface". This means that any user can see, retrieve and take away data from the system without any Audit Trail.

The ILMS network is implemented with leased I-net lines and also has dial-up connectivity. No encryption was apparently being followed, leading the network susceptible to wiretapping etc.

8.9 System Performance

The ILMS system has grown manifold in terms of usage in the recent years. Audit found that the system as designed did not factor in this growth. As a result, performance constraints have started surfacing in ILMS, for the following reasons:

Increase in number of users: Designers of ILMS failed to envisage the growth in number of users. As against 25 users planned at NHQ, the number of users has grown to 60. The design did not cater for so many users and resultantly system has slowed down.

Network Over-Load: The requirement of bandwidth for the Wide Area Network could never be properly anticipated. The system started with I-Net link of 9.6 KBPS. This had to be revised to 64 KBPS during implementation itself. The present estimate is that a link of 2 MBPS may be required. The inadequate network bandwidth has slowed down the performance for all remote access queries.

Retention Standards: Retention Standards for the transaction in ILMS system were not laid down. Therefore, all the transactions of the ILMS system since inception are kept in the production database. Resultantly the database size is ever growing and slowing down the system considerably.

8.10 Recommendations

a) ***Present version of ILMS suffers from inadequate participation by all concerned. Audit recommends that feedback from all concerned be sought and suitably incorporated in the next version of ILMS.***

b) ***A budget module may be developed (revised) with adequate participation of CGDA and Defence (Finance), so that budget management could be integrated in ILMS.***

c) ***Controls may be devised so that synchronization of data within the depots can be assured.***

d) ***The Item data lacks completeness. The relevant and related data of an Item e.g., links with equipment, spares ships etc, be incorporated in the system in a time bound manner.***

e) ***The data model may be considered for modification so that loop-holes like lack of backward linkage for indents may be plugged.***

f) ***The confidentiality of ILMS system with reference to a malicious insider is weak. Audit recommends that data may be classified and access to sensitive data may be restricted.***

g) There is an urgent need to upgrade the ILMS hardware. The assessment of hardware requirement for ILMS be done professionally and the system augmented suitably.

h) Retention Period for transactions should be laid down and the current database should be kept trim by archiving periodically.

8.11 Defence Response

Of the eight recommendations made by Audit, NHQ agreed with four, partially agreed with one, did not agree with two and provided clarifications on one.

Responses to the above recommendations are given below, *ad seriatim*:-

a) **Inadequate participation in ILMS development** : Not agreed and stated that while the present system was evolved with adequate participation of various agencies, wider feedback will be undertaken for the next version of ILMS.

[Para 8.10 (a)]

b) **Preparation of budget module** : Partially agreed and stated that CGDA classification has been adopted with directives for compliance by users.

[Para 8.10 (b)]

c) **Controls and synchronisation of data :** Agreed and indicated the steps towards synchronisation of data within Depots.

[Para 8.10 (c)]

d) **Item, data linkages** : Agreed and stated that linkages between ship / equipment / OEM / assembly / component and OB spares / INCAT is being done within a year through dedicated teams at Command level.

[Para 8.10 (d)]

e) **Modifications to data model for raising indents** : Agreed and clarified that modifications to data model are not required as indents should strictly not be raised without backward linkage. The necessary discipline has been re-introduced.

[Para 8.10 (e)]

f) **Confidentiality of ILMS** : Clarified that the confidentiality of the system is in itself not weak ; user authorisation and checks are well specified and that no confidential data exists on ILMS.

[Para 8.10 (f)]

g) **Hardware upgradation** : Agreed and stated that case for upgradation has been taken up with MOD.

[Para 8.10 (g)]

h) **Retention period for transactions** : Not agreed stating that retention period is as per regulations, trimming of data base is not required and that the same is being periodically archived.

[Para 8.10 (h)]

8.12 Conclusion

Inventory Management Automation conceived by the Navy in the early nineties and operationalised through Integrated Logistics Management System in 1997 has been a landmark in the management of Naval Inventory. The perceived weaknesses and observations made by Audit in this study are with the benefit of hindsight, and do not in any way minimise achievements in the face of considerable odds.

In their analysis and responses to Audit findings, NHQ have explained the rationale on the deficiencies and observations made by Audit; the lack of agreement and differing perceptions on some vital points are in need of more exhaustive discussion. In particular, Audit maintains the essence of its observations on the Relational Data Model and Data Base Design of the ILMS.

On deficiencies in capture of data, such as reconciled balances, quality of data, historical data base, non-integration of ILMS with customers etc., NHQ have cited limitations in resources, both managerial and technical. Emphasis has been on first getting the system going and thereafter attempting refinements on populating the system etc. This reasoning is not altogether invalid. Time bound steps are however essential to complete data acquisition and its linkages within the system as users are having considerable difficulty despite the system having been operationalised in 1997.

Lack of connectivity of vital users is also a major constraint and needs implementation to better realise the benefits of integrated working.

Retention standards for data need to be re-examined and implemented as recommended by Audit.

The next version of ILMS should necessarily recognise points of validity in this report, amongst others. As many users, particularly those in the Material Branch and technical field formations have suggested improvements, a wider forum for consultations seems appropriate.

CHAPTER 9: INVENTORY COST MANAGEMENT

There has been no costing of inventory held in the depots, revealing lack of cost consciousness in inventory management. There is also no system of a Priced Store Ledger in the depots.
From the Budgeted and actual expenditure figures, it was revealed that there has been no scarcity of funds.

'Short Term Operating Plans' (STOPs) linking expenditure with objectives were not even approved. In the proposed STOPs, requirement ranging from 80 to 95% was projected on adhoc basis. Unspent funds of more than 20% were seen in LP budget at Material Organisation, Mumbai.

Approximately, Rs.40 crores are spent on the cost of personnel alone in the depots, which is approximately 10% of the procurements done by them.

Though all issues are required to be priced, Audit found that the issue price given had no link with the real price.

9.1 General

Naval inventories have characteristics quite different from the majority of commercial inventories. Points of difference include:

i) The predominance of technologically complex items
ii) Slow stock turnover for many items due to small fleets they support
iii) The large number of complex items that are no longer in production
iv) The particular importance of avoiding stock-outs for critical items

These factors mean that commercial inventory management practices do not always represent an appropriate strategy or performance level for Navy. However, they do not negate the requirement for Navy to ensure it is obtaining the best return on its inventory investment achievable given its particular circumstances. In Navy terms, that return should be maximum contribution to operational capability for the resources expended.

In order to maximize the contribution of their logistics investment, many leading commercial organizations are moving towards 'integrated logistics management'. This involves

integrating functions such as transport, warehousing and inventory management to promote a synergistic effect that enhances total performance.

A key element in obtaining such benefits is a management framework that identifies the contribution each element makes to overall supply chain performance. In order to achieve this, organizations are increasingly using total cost analysis.

Total cost analysis involves developing complete and accurate cost information for all logistics functions and operations. Its greatest benefit is that it enables informed trade-off among those functions.

Making cost-effective use of Naval supply-related resources require a full understanding of the requirement for items based upon capability, preparedness and safety considerations. These factors should then, particularly in peacetime, be traded off against the costs involved in various procurement, storage and distribution strategies.

However, there has been little focus within Navy on developing a management approach for inventory from this perspective. There are few incentives within the current resource and performance management frameworks for managers to consider wider supply chain costs. For example, inventory managers have little knowledge of the additional costs associated with procurement, such as freight and storage costs.

It is against this backdrop that we attempted to analyse the cost management techniques as prevalent in the logistics management of navy.

9.2 Financial Aspects

9.2.1 Revenue vs. Capital Expenditure

Total revenue expenditure has been steadily rising and has gone above 50% of the total expenditure in 1999-2000. Stores is one of the major constituents of this expenditure.

Table 9.1 Expenditure Data (In Rs. Crore)

	(1)	*(2)*	*(3)*	*(4)*	*(5)*
	1995-96	*1996-97*	*1997-98*	*1998-1999*	*1999-2000*
Total Revenue	1866.59	2084.09	2470.53	3108.98	3541.38
Total Capital	1979.79	1930.17	2327.98	2972.59	3341.86

9.2.2 Stores Expenditure

Expenditure on stores is classified in various detailed heads. Analysis of the expenditure under the various section heads shows that Naval Stores, Oil Fuel, Equipment and Spares and Armament stores are the main expenditure sub heads.
Expenditure under each of the detailed heads under the minor head 110- Stores, over the years is as given in the table below:

Table 9.2 Expenditure under detailed heads under Minor Head 110- Stores (Rs. in Crore).

Category	Code	1995-96	1996-97	1997-98	1998-1999	1999-2000
Naval Stores	**636**	208.96	187.40	151.59	162.03	208.72
Victualling Stores	637	25.40	34.32	35.74	44.09	38.76
Petrol & Lubricants	638	10.42	12.30	9.75	14.97	16.67
Coat Fire wood & gas	639	0.78	0.89	1.03	1.01	1.10
Oil fuel	640	104.15	193.38	166.65	192.49	286.05
Armament Stores	641	174.05	137.95	243.92	316.11	343.97
Clothing Stores	642	23.03	20.22	25.53	23.01	17.44
Medical Stores	643	4.73	6.06	4.31	11.79	11.72
Transport Stores	644	3.30	10.45	14.45	11.74	10.47
E & SP	**645**	186.71	209.10	180.33	257.68	153.86
Weapon Stores	646	11.23	14.50	62.20	66.25	101.47
Aviation Stores	**648**	51.97	65.16	75.63	60.16	54.99
Aircraft						

Audit restricted itself to Naval Stores, Equipment and Spare Parts and Aviation stores which correspond to code heads 636, 645 and 648 respectively.

Store depots also incur expenditure on oil fuel (code head 640), which is stocked and supplied by IOC. Thus, the inventory management for oil fuel is not really done by Navy and was for this purpose excluded from the review.

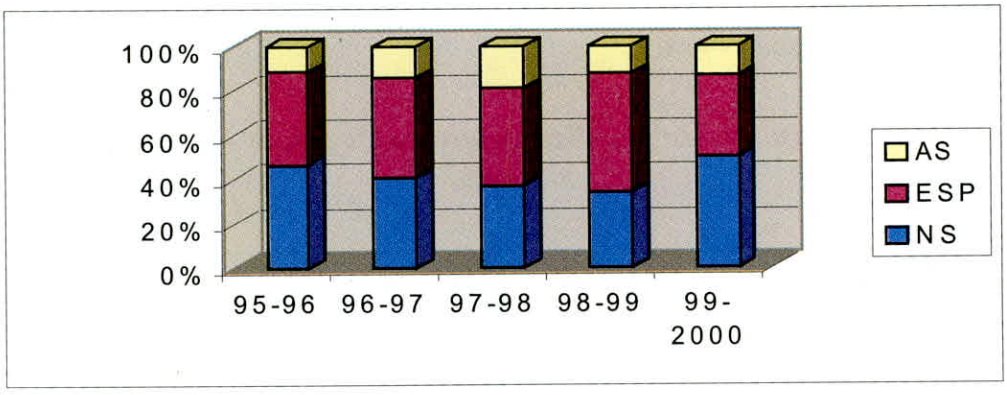
9.3 Budgeting Process

9.3.1 Over all Budget and Expenditure

The expenditure on stores, which have been a subject of this review, has been analysed for the last five years. The total expenditure has been upwards of Rs 400 crores in all these years.

It is seen that Naval Stores have now come to occupy almost half of the expenditure done by depots/DLS. Trend of expenditure on each component is shown in the chart below:

Figure 9.1 Trend of Expenditure on each component



It is seen that there is a sharp rise in Naval Stores Expenditure accompanied by decline in expenditure on E&SP in 1999-2000.

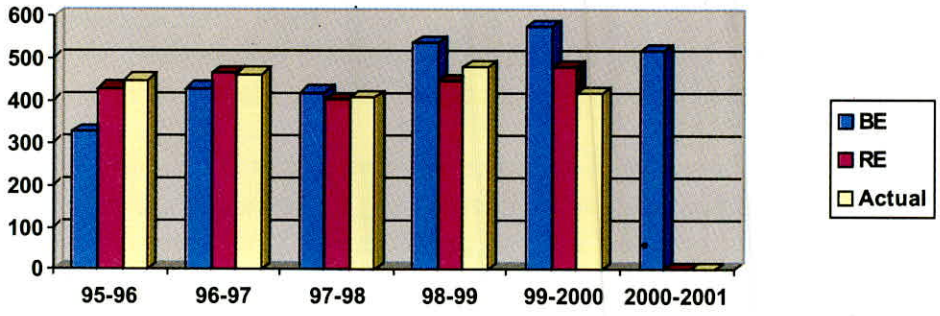
Budget allocation and corresponding expenditure under these heads was studied in detail. The allotment and expenditure under the objects of expenditure under study are as given below:

Table 9.3 Allotment and Expenditure under the Objects of Expenditure under study

(In Rs. Crores)

Year	Budget Estimate	Revised Estimate	Actual	Savings(+)/ Excess (-)
1995-96	327.1	428.87	447.64	-18.77
1996-97	428.87	463.87	461.65	+2.22
1997-98	419.6	404	407.55	-3.55
1998-99	534.5	445.75	479.87	-34.12
1999-2000	575	478	417.57	+60.43
2000-2001	515.77	0	0	

Figure 9.2 The allotment and expenditure under the objects of expenditure under study



It is thus seen that in the last three years there have always been more funds than actually required under these three heads. In 1999-2000 actual expenditure was 28% below. Thus, it can be concluded that funds are not a constraint in the stores management.

9.3.2 Non-finalisation of Short Term Operating Plans

Navy Instruction I/S/97 introduced new management strategy to enhance value for money in revenue expenditure by decentralization of responsibility for budget formulation and financial control. The strategy required preparation of short term operating cost plan by the Budget Center projecting

i) Carry forward liability
ii) Committed liability
iii) Anticipated requirement
iv) Additional requirement

After the approval of Integrated Finance, such plans form the basis for preparation of budget in future. Directorate of Logistics Support compiled and prepared the Short Term Operating Plan of various budget centers for the three years 1998-99, 1999-2000 and 2000-2001, and submitted for approval in October 1998. Similarly, Naval Headquarters submitted the Provisioning Plan for the three years 1999-2000, 2000-2001 and 2001-2002 in June 1999, and for the three years 2000-2001, 2001-2002 and 2002-2003 in July 2000. These plans are yet to be approved by Integrated Finance (Navy) as of this date.

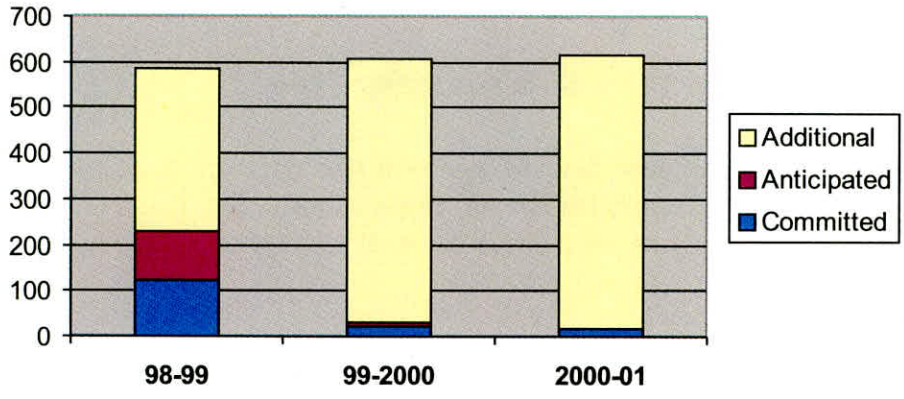
In the absence of short term operating plans (STOPs), Directorate of Logistics Support had to restrict preparation of budget to actual expenditure of previous year by addition of 10 percent which is an ad-hoc arrangement and defeats the objective of decentralization envisaged under the new management strategy.

9.3.3 Non Evaluation of Revenue Expenditure With Output

Objective of the New Management Strategy is to link resources utilized and output achieved to enhance value for money in revenue expenditure. Preparation of short-term operating plan is oriented towards expenditure to be incurred. However, there is no mechanism devised to establish linkage between resources utilized, i.e. expenditure incurred and output achieved in respect of revenue expenditure as per the requirement of New Management Strategy.

Scrutiny of the proposed short term operating plans showed that the element of planning was totally missing. The STOP prepared on the roll on basis for three years, is designed to have a clear idea of future requirement. Scrutiny of the proposed STOP showed that most of the requirement even for the second year was being projected without any basis as shown below.

Figure 9.3 Short Term Operating Plans
(Rupees in Crore)



These STOPs were prepared in October 1998. Still funds to the tune of 60% were being sought as additional requirements without any basis. For the subsequent years, funds requirement on ad-hoc basis was 94% and 96%.

Audit concludes that the objective of delegating financial powers and thereby creating budget centres has not been fulfilled.

9.4 Unspent Funds in LP Budget

Local Purchase Budget is allotted to the depots and MS keeps a watch on the expenditure against this. Though a substantial amount of expenditure of MS is met from the CP budget, till the financial year 1999-2000, no Central Purchase Budget was separately allocated to them.

Examination of budget versus expenditure data in MO (MB) showed persistent savings indicating that there was no shortage of funds as shown below:

Table 9.4 Budget versus Expenditure (In Rs. Lakhs)

Year	*Allotment*	*Expenditure*	*Savings %*
97-98	884.41	390.95	55.8%
98-99	911	666.15	26.8%
99-2000	974.5	764.82	21.5%

In view of the fact that allotment is increasing, budgeting methods needs to be looked into.

9.5 Cost of Inventory Management

As mentioned earlier, there is no formal mechanism of calculating inventory carrying costs in the navy inventory. A tentative estimate of inventory carrying cost has been given as 8% in the Material Management Manuals.

In Audit, we tried to estimate some components of inventory management costs where data was available. The expenditure on pay and allowances of the personnel in various depots was ascertained and is reproduced below:

Table 9.5 Expenditure on pay and allowances of the personnel in various depots

Depot	*Total Personnel*	*Pay and Allowances (In Rs. Lakhs)*
MO (MB)	2343	2586.4
MO (V)	1000	1087.4*
NSD (K)	226	408.5
NSD (G)	180	73.13

***Calculated on pro-rata basis.**

Thus an expenditure of Rs. 41.06 crores is incurred on the pay and allowances of personnel alone, in the depots itself. This is roughly 10% of the expenditure on the stores enumerated in earlier paragraph.

9.6 Non Costing of Inventory

Audit observed that Navy has no system for costing of inventory: no valuation is done at any time by any method like weight, volume etc. The inspection reports require that cost of inventory held, be calculated by bifurcating into moving and non-moving inventory costs.

However, for years, this column was not filled in the inspection report of MO (MB). The inspection report of MO (V) indicated the cost of moving inventory as Rs 267 crores, and cost of non-moving inventory as Rs 32 crores approximately. However, these figures are unrealistic given that at least 40% of the inventory is non-moving. Further, these figures could not be traced back to any valuation methodology in use.

The lack of valuation of inventory results in loss of cost consciousness by the inventory managers. It was further observed that even in the recently introduced ILMS there was no module for inventory costing. A Priced Store Ledger has not been prepared in the system. Navy has argued that cost cannot be paramount in procurement decisions. While the importance of other factors in procurements decisions like criticality for timely procurement may not be understated, cost considerations cannot be overlooked altogether, and procurement decisions need to be more focused on costs than at present.

9.7 Non Pricing of Issues

The Material Planning Manuals lay down that all the issues should be priced. The issue price should incorporate costs like handling, transportation, etc. In cases, where the price is not available in the system an estimate of the price is to be given by CMP.

Audit found that in order to fulfil this requirement a check had been built in the system requiring the issue price to be greater than zero. In practice however this check was being routinely by-passed by giving an issue price of one rupee.

Further, it was seen that the CMP gave figures of unrealistic issue price even for items which were procured through the system and hence had a price available on the system itself. Further for the same item, two widely different issue prices were given.

An item "Color Film Konica 35 mm" had a procurement price of Rs.60. However, one issue to INS Vindhyagiri on 16.12.99 was done at the rate of Rs.204 and another to INS Prahar at the rate of Rs.5.10 on 29.12.99.

9.8 Recommendations

Audit found that, on the whole, the concept of management of cost was totally absent in the naval inventory system. This leads to lack of economy in the operations going unnoticed. Therefore the following recommendations are made:

a) The Short Term Operating Plans should be approved in time and invariably accompany the budget proposals.

b) The rationale for requirement for funds as shown in the Short Term Operating Plan should be given in terms of objectives as envisaged in New Management Strategy.

c) Requirement of funds should be brought to the extent possible under committed and anticipated expenditure.

d) Navy should institute a method of costing its inventory holding. A format of Priced Store Ledger should be prescribed and prepared every year.

e) Efforts should be made to price all the issues realistically; wherever last procurement price is available on the system the issue price should not vary beyond prescribed limits.

f) Depots should prepare a cost return every year where all the expenditure on inventory and depot management should be indicated.

9.9 Defence Response

Of the six recommendations made by Audit, NHQ agreed with all.

Responses to the above recommendations are indicated below, *ad seriatim:-*

a) **Short Term Operating Plans (STOPs)** : Agreed that STOPs be approved in time and accompany the budget proposals.

[Para 9.8 (a)]

b) **Rationale for funds** : Agreed that the same be given in terms of objectives as envisaged in New Management Strategy, and added that further build up of data for analysis is required.

[Para 9.8 (b)]

c) **Requirement of funds** : Agreed that this be brought, to the extent possible, under committed and anticipated expenditure.

[Para 9.8 (c)]

d) **Costing of Inventory holdings** : Agreed that method of costing inventory holdings be instituted, including the preparation of Priced Stores Ledger

[Para 9.8 (d)]

e) **Pricing of Issues** : Agreed, and added that this is being progressively done.

[Para 9.8 (e)]

f) **Cost Return** : Agreed that expenditure on inventory and depot management be indicated in an annual cost return.

[Para 9.8 (f)]

9.10 Conclusion

NHQ and Audit are in agreement that systems for management of inventory cost be strengthened and mechanisms introduced where none are in place. The non-utilisation of annual total budgetary allotment has been attributed by NHQ to lengthy and complicated procurement procedures ; greater decentralisation and autonomy has also been suggested. The Ministry should take steps to simplify and streamline procedures, particularly those relating to irksome and prolonged financial clearance.

Definite requirement exists to establish linkages between output and resources utilised as envisaged in the New Management Strategy. This aspect necessitates closer examination by Ministry in the light of constraints highlighted by NHQ, especially that of "restrictive interpretation of rules causing serious bottlenecks in procurement".

CHAPTER 10: HUMAN RESOURCES MANAGEMENT

Logistics support in the Navy is provided through a mix of personnel with a management element of 172 officers (69 service, 103 civilians) and nearly 4000 staff manning the depots.

With a predominance of technical inventories to be managed, Audit found that Human Resources elements were lacking in terms of entry level qualifications and training inputs.

The Inventory Management organisation is virtually bereft of hard core material managers possessing the necessary background, skills and experience. Further, appointment and staffing patterns do not facilitate consolidation of expertise in the field.

Induction norms for store keeping and clerical staff (requiring a minimum qualification of Secondary School Certificate) are too low and unsuitable for the management of Naval inventories.

In the light of 'technicalisation' and 'automation' of inventory, it appears necessary to progressively replace the present categories of personnel at Naval Headquarters and in depots with those having appropriate Qualitative Requirements.

10.1 General

Human Resources have long been recognised as the most important resource in organisational effectiveness. In the world of business, the Material Manager has now come to hold an exalted position with Enterprise Resource Planning Systems according increasing focus on the management of Material in maximising profitability.

Lean inventories and low lead times through a taut supply claim are imperatives in the Business environment. In comparison, the inventory levels and lead times are relatively large in the Armed Forces, the Navy being no exception. Management of logistics is also complicated by diverse sources of procurement, national and international, often proprietary in nature and linked to a variety of compulsions. Notwithstanding these complexities, there is an on-going need for the naval Material Organisation to keep abreast of happenings, assimilate concepts vital to management of change in effecting economy, and bring these to bear on the system, wherever possible.

As brought out in the introduction in Chapter 1, the logistics support system in the Navy derived from the Royal Navy (U.K.) and was de-centralised as per the category of stores where the entire gamut of activities from provisioning to stocking and distribution was handled by separate organisations, namely, the civilian Naval Stores Organisation for naval and general stores and the Service Technical Organisations for management of spare parts.

The unification of logistics support in the seventies along with management of Russian stores which followed a different pattern, the break-up of the Soviet Union in the eighties, indigenous shipbuilding and proliferation of non-standard equipment have compounded problems and diluted the responsibility of stores management existing in earlier years.

While the proliferation of types and growth of inventory with their profound technical and technological change has necessitated professional skills to keep apace, the entry standards and professional inputs to personnel, service and civilian, have hardly undergone any change.

In this section, we have examined HR aspects relating to the manpower profile, service & civilian, in particular the adequacy of skills, training and motivational levels.

10.2 Manpower Profile

As indicated above, the present logistics establishment of the Navy is a mix of service and civilian personnel formed with the amalgamation of the earlier Naval Stores (NSO) and Spare Parts (SPDC) Cadres.

At senior managerial level, direction is provided entirely by service officers of the Logistics Branch, lower rungs being manned by service officers of Logistics or Technical specialisation and by civilian officers of the NSO cadre. Below officer level, the staffing is predominantly civilian, comprising the Non-Industrial (Storehouse, Ministerial etc.,) and Industrial categories. A small element of service sailors is provided at the depots to facilitate professional inputs at the working level.

Table 10.1 Depot-wise Summary of Personnel at Depots – MO (MB), MO (V), NSD(K)

Category	*MO (MB)*		*MO (V)*		*NSD (K)*		*Total*	
	S	***B***	***S***	***B***	***S***	***B***	***S***	***B***
Service Officers	40	44	29	28	09	10	78	72
Civilian Officers	63	60	28	25	12	12	103	97
Sailors	144	94	27	29	*	34	171	157
Ministerial	533	471	176	167	120	108	829	746
Storehouse / Non-Industrial	776	695	469	428	123	112	1368	1235
Industrial	1204	979	365	323	185	169	1754	1471

S: Sanctioned; B: Borne

***Borne on Garuda/Venduruthy as additional.**

10.3 Training for Material Management

In the civilian industry, the minimum qualification for employment in the officer cadre of Material Management Departments is B.E. / B.Tech. Supervisors in such departments are normally required to have a "GDMM" (Graduate Diploma in Material Management) qualification, which is a two years full time course conducted by the Indian Institute of Material Management (IIMM) and Senior Managers a post graduate or "PGDM" qualification obtained through a 3 years part time course conducted by the IIMM.

Armed Forces, the world over, have also come to increasingly recognise the necessity of background and specialist qualifications in managing the complex scenario of Defence Inventory. Even the Indian Army attaches great importance to the professionalism of Material Managers and offers well-structured courses with university affiliation for its officers at the College of Material Management in Jabalpur.

In comparison to the above, Material Managers in the Navy have either little or no exposure to Inventory Management. The only structured input available for logistics officers is a 7 weeks capsule in Material Management in the 46 weeks Long Logistic Management Course (LLMC) for Lieutenants of 2 to 3 years seniority. Even a cursory glance at the two syllabi, namely PGDMM, and the LLMC, will indicate that officers and supervisors in the civil sector are far more qualified than their Naval counterparts even though they handle a fraction of the inventory that the Naval Material Organisation handles. There are no other structured career updates in the service. A few officers may at best, undergo an attachment to the Long Defence Management Course (LDMC) at Secunderabad, where limited study capsules preclude in depth of study in Inventory, and more particularly Spare Parts Management.

10.4 Knowledge and skill levels

10.4.1 Service Officers

Senior Officers of the Logistics Branch holding appointments of Material Superintendent of Depots are doing so with inadequate exposure to or experience in Material management. In other cases, logistics officers, while well versed in areas of logistics expertise in Shipboard duties or those ashore, are hampered when it comes to Depot level functions.

An analysis of entry-level qualifications, training and experience of service officers is given further below:

a) ***Entry level Qualifications***

The minimum qualification for service officers in the Logistics Branch is graduation in science, economics or commerce. Based on data provided by Naval Headquarters on 281 officers, it was seen that 75% of the officers have a graduate qualification (BA/B.Com/BSc); and a mere 17% have a technical degree (B.Tech/BE). Given the complexities and technical

nature of inventory that material managers are required to handle, these qualifications are inadequate.

b) *Experience Profile*

Officers of the Logistics Branch can be posted to almost any unit to perform logistics duties on ships or shore establishments, commensurate with their seniority. The nature of duties for a Material manager in depots is rather technically specialised compared to the other assignments of logistics officers.

An attempt was made to examine whether there was any evidence of a concept of specialisation in vogue to groom and position managers of experience and expertise in the Depots. The experience profile in Material management was studied by analysing data of officers posted to MOs more than once. The results are as below:

Table 10.2 Experience Profile of Service Officers in Depots

Depot	*Total No. of Officers*	*No. positioned for the first time*	*Less than 5 years experience in depots*
MO (MB)	46	34	44
MO (V)	29	20	26

It is observed from the above that there is no systematic attempt to groom Material Managers. Over 70% of the officers are on their first appointment in the MOs. It is also gathered that most officers, whether of Logistics or Technical branches, have just one stint in the Depot over their careers.

c) *Training*

Data obtained on training imparted to service officers posted into Depots revealed the following:

Table 10.3 Specialist Qualifications - Service Officers

Depot	*Total No. of Officers*	*LDMC 'Q'*	*LLMC 'Q'*	*LEDP 'Q'*
MO(MB)	46	2	7	4
MO (V)	29	1	8	6

Many of the officers posted to the Depots are involved in planning functions in the Controllerate of Material Planning and thus involved in some crucial decision making. It may be seen that their qualifications, training and experience are not commensurate with their responsibilities.

10.4.2 Civilian Naval Store Officers (NSOs)

a) Career ***Pattern***

Civilian Officers from the NSO Cadre had been the mainstay of the erstwhile stores organization, and play a vital link in ensuring elements of experience and continuity. They are posted in all departments in Depots including planning and procurement, and play a predominant role in warehousing functions. They are also posted to NHQ directorates and MOD departments.

The entry level in the NSO cadre has been Asst. Naval Stores Officer (ANSO) with a qualification of B.Sc., with 5 years experience, or a degree in Engineering. There have been no structured training programme of courses for these officers or requirement of further qualification, as a pre-requisite for promotion. Motivational levels have also been low due to inadequate promotional avenues. Subsequent to the Vth Central Pay Commission, the prescribed entry mode is through a Combined Engineering Services Examination conducted by the UPSC.

The promotional prospects of NSOs under the direct recruitment scheme is as below:

Table 10.4 Promotional Prospects of NSOs

Entry Level	*Pay Scale (in Rs.)*	*Method of Entry*	*Average time spent in the grade till promotion (years)*
ANSO-I & ANSO-II	8000-275-13500 6500-200-10500	DR / Promotion	8 to 10 Years
NSO	10000-375-15200	Promotion	12 to 15 years
SNSO	12000-375-16500	Promotion	No Promotion since 1987 **
Jt. Director *	14300-400-18300	Promotion	**
Director *	18400-500-22400	Promotion	**

* **Sanctioned after Vth CPC.**

** **No promotions currently of SNSO and above**

It may be seen that promotional avenues are low with an average time frame of 20 to 25 years for an ANSO to reach SNSO grade. This would at best mean 2 promotions in an entire career for most officers and when compared to careers of Service Officers with whom they work, the lack of promotions is certainly de-motivating. NHQ stated that motivational levels

had been low due to the inadequate promotional avenues. It has not been possible so far to fill the senior level posts sanctioned consequent to Vth CPC.

b) *Training*

Audit found that there has been no systematic or structured training for civilian officers, particularly at the time of induction. NHQ however, indicated that various training inputs were given to NSOs in the past through short courses in Inventory Management including standardisation, preservation and transportation. Officers had also been trained in EDP and several are now employed in ILMS operation.

Audit also observed that in MO (V), only one out of 26 civilian officers had done the Long Defence Management Course. In MO (MB), one officer out of fifty-five had done the Long Logistics Management Course.

It has been further indicated by NHQ that training would hereafter be given focussed attention with grant of funds, and will feature in Annual Training Programmes.

10.4.3 Storehouse Staff

Store keeping staff are also a feeder for the NSO Cadre. Initial recruitment is at the level of Assistant Store Keeper (ASK) with a minimum qualification of matriculation. The next rungs of promotion to SK and SSK also allow for 12 ½% and 25% filling of posts by Direct Recruitment (DR) with appropriate diploma / degree stipulation.

Promotional avenues for present storehouse staff are also seen to be grossly inadequate with promotion from the grade of ASK to SK and SK to SSK taking approx. 17 and 16 years respectively; thus a maximum of 2 to 3 promotions are experienced in the career span.

The infusion of better-qualified staff through the DR mode is a step in the right direction. However, there have been no appreciable additions to the cadre by this route to make a significant impact.

As many of the storehouse staff also look after technical stores, matriculation as a qualification is definitely inadequate for the job. In MO (V), out of 17 store keeping staff looking after electrical and electronic stores, only one had any technical qualification, the majority being matriculate. It was however observed that a good number had taken enthusiastically to computerisation with the introduction of ILMS.

10.5 Summary of Audit Observations

a) Logistics officers employed in Material Management assignments are inadequately equipped to handle Equipment and Spare Parts management at NHQ and Depots.

b) Training Inputs in Inventory Management are lacking in all categories of personnel, whether they are service officers, civilian officers or staff. All seem to be learning on the job.

c) Serious imbalances are prevalent in Depot manning in terms of seniority levels and experience of service officers appointed.

d) Entry-level qualifications of storehouse and clerical staff are not commensurate with present needs.

10.6 Recommendations

a) Entry level qualifications for logistics officers in Material Management should be B.E. / B.Tech. Graduate or post-graduate in Material Management.

b) Cadre and career management policies for Logistics and Technical Branch officers be reviewed by Naval Headquarters to ensure professionalism and experience in Material Management at NHQ and in Depots.

c) Recruitment and manning policies for civilian personnel be reviewed in line with contemporary needs of scientific orientation, technicalisation and automation, some essentials being:

(i)Induction standards for storehouse and clerical staff be raised to graduate or diploma levels with specialised qualifications in computers, Material Management etc., as is being done in PSUs and other Govt. departments (Railways, P&T etc.,).

(ii) Manpower complement at NHQ, particularly provisioning and procurement directorates, and at depots be re-assessed as per modified QRs for personnel and reviewed with concerned Ministry. Phased replacement of personnel be effected against attritions.

d) For the NSO Cadre, the higher level posts sanctioned as per the recommendation of the V CPC are still lying vacant which has an adverse effect on motivation of the employees of the cadre. Navy should take urgent steps to fill up these posts.

e) Training policies be reviewed and promulgated for all categories of personnel, service and civilian, ensuring:
(i) Training on induction
(ii) Material Management upgrades at IIMMs, and Army's College of Material Management
(iii)Career updates / refresher courses, promotion linked or otherwise.

(iv) Enhanced deputation of civilian officers for middle and higher level courses.

f) Deputations to national and international conferences organised by professional bodies and Defence services to facilitate exposure and widening of perspectives.

10.7 Defence Response

Of the six recommendations made by Audit, NHQ agreed with five and did not agree with one.

Responses of NHQ to the above recommendations are given below, *ad seriatim:-*

a) **Entry level qualification for logistics officers** : Agreed that since material management needs appropriate entry level qualifications and specialised skills, this will be implemented in a phased manner.

[Para 10.6 (a)]

b) **Cadre and career management policies for service officers** : Not agreed, stating that adequate professionalism and experience exists both at NHQ and in the Depots.

[Para 10.6 (b)]

c) **Recruitment and manning policies for civilian staff** : Agreed on upward revision of induction standards and review of manpower requirements.

[Para 10.6 (c)]

d) **Promotion of NSOs** : Agreed and added that DPC for two posts of Director being held by UPSC ; no one is yet eligible for post of Senior Director.

[Para 10.6 (d)]

e) **Training Policies** : Agreed on need for revisions and stated that upgrades in training are in process for all categories of personnel.

[Para 10.6 (e)]

f) **Deputations for Courses** : Agreed and added that the same are under consideration and implementation.

[Para 10.6 (f)]

10.8 Conclusion

Audit noted that NHQ is largely in agreement with recommendations. It suggests that the deficiencies / constraints highlighted in Human Resources Management are closely followed up in consultation with Ministry.

NHQ has expressed reservations on Audit observation on lack of professionalism in management of technical logistics at NHQ and in Depots, as also imbalances in seniority and experience levels of service officers appointed to Depots. Audit maintains the validity of findings as amply brought out in this chapter as also those in Chapters 2, 3 & 5 on Provisioning and Demand Satisfaction. Further, NHQ have themselves in March 2001 indicated professional weaknesses in the HR domain by stating that "A lack of dedicated branch / cadre of officers, both service and civilian, have affected the overall functions of Naval Inventory Management".

CHAPTER 11 : ORAGANISATIONAL CONSTRAINTS

11.1 General

From the previous chapter in this report, particularly those on Provisioning, Procurement and Demand Satisfaction, it is seen that the Supply chain as a whole has been unable to deliver as required, the major points being:

i) Weakness in Initial Provisioning due to lack of inventory data inputs into the system and deficiencies in initial stocking.

ii) Inadequate perspective planning for replenishment provisioning, resulting in large percentage of items (40 % to 8700%) being indented outside the Review System.

iii) Low level of user demand satisfaction, particularly for Equipment & Spare Parts, being around 40% for operational ships and 50% for Dockyard refits.

iv) Lengthy Procurement Lead Time, with Internal Lead Time alone, for indigenous items, being generally upwards of six months.

11.2 Impact of Organisational Changes

Audit found that from the sixties onwards, the growth of inventory, in terms of complexity and diversity, has escalated steeply. Extraneous factors, notably the disruption of the supply chain from Russia/FSU States, have also imposed considerable stress on the logistics system over the past decade. Notwithstanding the external factors, it is considered that, the organisational changes have not been commensurate with the needs of Inventory Management, as see from the following:

i) In the early stages, systems for management of Naval Stores and Equipment and Spare Parts were well demarcated right through from provisioning to depot management. Naval stores were the predominant holdings at that time. The situation has now reversed, with nearly 80% of inventory items being technical in nature. While both types of inventory were being managed earlier in separate streams, these were amalgamated within a unified concept of logistics management in the eighties.

ii) Concurrent with the above re-organisation, the earlier responsibilities of Technical Branches in logistics management at NHQ and field level were withdrawn, whereas, material support requirements continued to grow steeply in

terms of equipment numbers and complexity, accentuated by non-standardisation/variety proliferation.

iii) Since management of Technical Inventory differs appreciably from management of Naval Stores, escalating requirements of the former type necessitated a corresponding change in focus, and growth in professional expertise and management. In the reorganised mode, however, the reverse has taken place due to limitations in the logistics organisation as amplified in Chapter 10 on Human Resources. The loss of professional focus has thus not been adequately compensated, and appears to be a major constraint.

iv) Weaknesses in procurement have been attributed by NHQ to lack of a well developed purchase organisation, mainly due to inadequacy of staff after the closure of DGS&D and India Supply Mission routes. Inadequate knowledge about vendors and availability of item specifications/details in the system, were found to be major limiting factors by Audit.

From the above analysis, Audit considers that Naval Head Quarters re-examine the needs of professional management and organisation, commensurate with the types of inventory being handled in the Service.

11.3 Role of Automation

In the course of this study, it was apparent that the switch to automation in Inventory Management has generated a high degree of enthusiasm and competence amongst EDP professionals involved in logistics. Whilst the ILMS is a remarkable step forward, there however, appears to be a mistaken notion in many quarters that automation is a panacea for all ills, and would compensate for past weakness in the realm of material management. This notion needs to be tempered by professional appreciation of the intricacies in management of complex technical inventories held by the Navy. The non-application of selective Inventory Control techniques and lack of perspective planning in anticipating arisings for ships refits, are typical cases in point.

11.4 Organisational Working

As well integrated structures and cohesive functioning are essentials of sound organisation working, Audit took the opportunity of interacting with a wide cross-section of officers and managers involved in the business of inventory management at NHQ, Command and Depot levels. Based on these exchanges, and audits own appreciation of ground realities and system functioning, it is considered necessary to highlight areas lacking in cohesion and

where organisational weaknesses are evident. The more important of these pertaining to Naval Headquarters, Command and Depot level working are discussed below:

11.5 NHQ Level Working

a) Hierarchical

Under the existing organisation, the Logistics Branch of the Navy headed by the COL has been placed in the Material Branch under the COM. Whereas, the span of responsibility of the COM includes providing technical and material support for the maintenance of ships and submarines, the orders in no way allow him to direct or intervene in areas of material logistics which, in any case, fall within the domain of the COL. The COL is only required to "keep the COM informed, as required".

It may be seen from the above, that, there is a lack of clarity in 'Command and Control'. In the preceding chapters, it has been analysed that there are major weaknesses in Equipment and Spare Parts management. As overcoming these need technical direction on a continuum at the senior levels, Audit considers that the organisational structure along with its institutionalised and reporting systems at NHQ need to be examined and strengthened.

b) Inventory Management inputs – Initial provisioning

Planning for material support commences at very early stages of ships' induction or building, and the effectiveness of such support rests, to a large extent, on the thoroughness of professional inputs at this stage into the inventory management system.

As has been brought out in the Chapter on 'Initial Provisioning', a number of weaknesses in documentation, lack of inventory related data, 'ranging and scaling' etc., have been indicated. These have far reaching consequences for material support.

In the formative years of ship building, ship production and ship maintenance/support functions were essentially under a single PSO, i.e., the COM. Thus, the ship production/ship support functions were closely co-ordinated or interfaced. With expansion of ship building activity and segregation of the ship production and maintenance functions under separate PSOs, the interface appears to have weakened. Further, concentration by the production group on the construction schedule has progressively led to the 'slower time' material support activity being relegated to the background. Finally, when inputs reach the Material Branch, there are areas of weaknesses between professional and logistics Directorates that compromise aspects of inventory management relating to initial provisioning.

The setting up of an Inventory Management group under the COM to effectively co-ordinate the re-establish focus on timely and quality inputs into the logistics chain, appears necessary. This group may be formed from within resources, comprising logistics and technical branch

officers and sailors to ensure book writing and inventory specific policies, interface with ship production/ support groups and strengthen data base by facilitating information and analysis from within NHQ and field groups.

c) **Inventory Management Co-ordination – Replenishment Provisioning**

As mentioned in para 11.2 above, the amalgamation of general stores and technical spares management under a single umbrella concept has resulted in a loss of professional inputs at NHQ and in Depots and in degradation of material management functions.

In discussion at NHQ, it was brought to the notice of the Audit Team that Replenishment Provisioning is mainly done by the Logistics organisation (DLS) on the basis of ARD inputs from Depots and that Professional directorates are apparently not consulted, except for occasional clarification. There appear to have been cases where indents raised by the DLS pertaining to a particular equipment comprised items of spares of other unrelated equipment or of indents being raised for spares of ships that have long been de-commissioned.

Since there is a dearth of professional expertise in the logistics directorate, it stands to reason that a close interaction is essential with parent technical directorates at NHQ in the replenishment provisioning process, considering that vital technical inputs such as balance life of equipment, replacement plans for obsolescence/obsolete equipment etc., need to be taken into account.

Audit considers that replenishment provisioning proposals at NHQ receive due professional attention. Institutionalised procedures for interactive working at NHQ need to be examined towards correctives and strengthening.

11.6 Working at Command Headquarters

Audit found that accountability and responsibility for material support at the Command level and particularly that of technical logistics lay in a vacuum. The perceived reason for having amalgamated logistics working was to ensure better command and control over refit of ships by placing the depots under the C-in-C. Whereas the Command Logistics Organisation is supposed to render staff advice to the C-in-C on logistics matters, it is unable to do so on material logistics because it has neither the experience nor the expertise and is in any case handling other wide ranging personnel and administrative functions. The vacuum is thus sought to be filled by passing on material logistics maters to the Technical Division which neither has direct organisational linkages with the logistics chain at HQ nor can effectively direct the Depots at Command Level.

This vacuum in management of material support at the Command level has been felt for a number or years and needs to be suitably resolved by having a well integrated structure and professional management through the supply chain from NHQ to Depots.

11.7 Depot level Constraints

Audit found that the four controllerates at MOs namely, Material Planning, Procurement, Warehousing and Technical Services functioned in compartmentalised groups without adequate interaction, co-ordination and prioritisation of activities. There was little exchange of information both within as well as between controllerates resulting in narrowing or loss of overall vision. With no effective co-ordinating mechanism in the system, the efforts to integrate working devolved largely on the head of organisation i.e., the Material Superintendent himself.

Within the Controllerate of Material Planning, it appeared that the CMP was overburdened with operational problems in reacting to 'stock outs' or authorising issues rather than concentrating on effective planning and follow-up. Assistant Controllers of Planning within the group were relatively junior and of inadequate experience. Consequently, the quality of replenishment reviews, which presently necessitate a high degree of manual intervention, were seen to suffer due to lack of profession appreciation. In its interaction with the Controllerate of Procurement, it was also noted that once an item had been passed on for procurement, by planning, the group either lost sight of it or was unable to ensure its prioritisation.

As had been mentioned earlier, the clubbing of general stores and spare parts has effectively diluted conceptual working and professional management. Audit found on the one hand an over emphasis on management of general stores and yet without commensurate results given the better lead time and availability. On the other hand, management of spare parts suffered from lack of professionalism and focus in the overall maze of problems. The lack of Selective Inventory Control techniques, data base management and refinements in replenishment provisioning methodology, were apparent weaknesses.

Within the MOs the system of monitoring and control need strengthening. No clear performance yardsticks or indicators are laid down. In the present system of Inspections, the methods of evaluation and assessment do not appear to be linked to performance or visible targets that have been set.

11.8 Summary of Audit Observations

From the above analysis, the organisational constraints in the system of Inventory Management are summarised thus:

i) Command and Control Structures for Material Management are diffuse and need to be strengthened at NHQ and Command levels.

ii) Expertise in Inventory Management of technical logistics is lacking within the Logistics Branch and is further accentuated due to inadequate interaction, co-ordination, and institutionalised procedures in inter directorate working at NHQ.

iii) Clubbing of Naval stores and Equipment & Spare Parts management has diluted conceptual working and professional management through the supply chain.

11.9 Recommendations

Audit recommends that the Navy reviews its logistics management structures in the light of perceived weaknesses. Suggested remedial measures are:

a) Institutionalised procedures for strengthening timely professional inputs into the initial and replenishment provisioning process at NHQ; an inventory management co-ordinating group for initial provisioning appears desirable.

b) As a long time measure, the evolution of a cadre of Inventory Management professionals, comprising both service and civilian personnel, with appropriate HRD inputs is necessary.

c) Separation of technical logistics from general stores management. At Depot level, spare parts and naval stores management are better placed under separate professional heads with responsibility to the Material Superintendent(s) for co-ordinated working between controllerates. As warehouses are largely segregated in respect of items, re-organised working is not likely to pose major difficulty on this score.

d) In the short term, senior logistics appointments at NHQ and Depots are rotated between Logistics and Technical Branches to infuse expertise in technical logistics management until a cadre of professional inventory managers is established.

11.10 Defence Response

Of the four recommendations by Audit, NHQ was partially in agreement with one, did not agree with two, and did not comment on one.

Responses to the above recommendations are given below, *ad seriatim:-*

a) **Strengthening provisioning process** : Not agreed, stating that the present institutionalised procedures and interaction between logistics / professional directorates is adequate.

[Para 11.9 (a)]

b) **Professional management** : Partially agreed and added that while a pure inventory management cadre is not recommended, specialised skills are necessary at entry and career points for a section of the logistics cadre officers.

[Para 11.9 (b)]

c) **Segregated management of general stores and technical spares** : Not agreed, staling that integrated logistics and technical groups are available with single point responsibility at NHQ (COM) and at Command (MS).

[Para 11.9 (c)]

d) **Senior logistics appointments at NHQ and Depots** : No comment.

[Para 11.9 (d)]

11.11 Conclusion

NHQ was not in agreement with summary of Audit observations on the three points namely, review of organisational structures at NHQ & Command, weakness in management of technical logistics and dilution in expertise due to clubbing of general stores and spare parts management in a single umbrella concept.

Audit maintains the validity of observations based on findings in this report as well as extensive appreciation and interaction spread over a year at NHQ Command and Depots.

NHQ confirmed that organisational ambiguity in hierarchical working at NHQ has been addressed with issuance of CNS Memo in 1999 placing COL directly under the COM. The same may be incorporated in Navy Orders.

Notwithstanding what has been stated in NHQ reply, Audit considers that the deficiencies in organisational working at Command level and within the Depots need to be addressed in the light of its findings and articulated by a wide cross section within the Navy including its own expert committees.

With major weaknesses seen in the management of Equipment & Spare Parts which constitute over 70% of inventory holdings, examination is imperative whether the present organisation, allocation of human resources and professional inputs are commensurate with the needs of managing such inventory, Audit reiterates the need for clearer professional focus and separation of technical and general stores management. To this end, detailed examination ought to be undertaken by Naval Headquarters.

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Countersigned

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Dated: 20 August 2002