CHAPTER – V

Department of Space

5.1 Computerisation in administration, finance and related areas

Computerised Working in Administrative Areas package developed by Department of Space lacked proper inbuilt validation checks and application controls. Certain business rules were not incorporated. Data entry into the system was not regular. Consequently, information generated from the system was incomplete, inaccurate and inconsistent leading to poor data integrity and significant dependence on manual operations, which defeated the purpose of working in a computerised environment.

5.1.1 Introduction

The Department of Space (DOS) is responsible for promoting development of space science and technology and space applications for national development. The Indian space programme is executed through Indian Space Research Organisation (ISRO) which is the research and development wing of DOS, along with other centres/units of ISRO.

DOS undertook computerisation in its Administration, Finance and related areas by developing Computerised Working in Administrative Areas (COWAA). COWAA is an in-house package developed in order to introduce a rationalised and standard computerised working in areas of Administration, Accounts, Finance, Payroll, Purchase and Stores. Borland C++ Builder Version 6.0 was used for development of front end Graphic User Interface (GUI) Screens and Sybase was used as database server. The executables for front end screens were developed on Windows Operating System. COWAA was deployed across all centres of DOS in a phased manner from 2002 onwards. The database server maintained by each Centre was independent and not inter connected.

Development/maintenance of the packages was undertaken by Satish Dhawan Space Centre, Sriharikota (SDSC, SHAR), a unit of DOS. The in-house development teams consisted of Scientists, Engineers and Technical Staff in addition to hired manpower for coding.

The COWAA package resided on Stratus FT Server 4500 with Intel Xeon-4 core processor and Linux RHEL 5.2 as Backend. Processors Intel Pentium IV or above and Operating System Windows 95 and above were used for Client operations.

The audit objectives were to assess whether COWAA package incorporated all the business rules, generated reliable MIS reports, maintained data integrity and application controls.

Audit was conducted at SDSC during September to November 2015. The audit process included interactions with developers and users of the packages and scrutiny of data and records. User Manuals were referred wherever found necessary. Backup of the Data covering the period from introduction of COWAA (2002) to August 2015 was obtained and analysed by using IT Audit Tools.

5.1.2 Audit findings

COWAA Package contained modules such as Administration, Accounts, Payroll, Finance, Purchase and Stores. Audit observed absence of Application Controls, Validation Checks and non-incorporation of Business Rules in many processes which are detailed in subsequent paragraphs.

Chart 5: Modules of COWAA

5.1.2.1 Administration module

The Administration module was used to capture the general information and personnel information of each employee as well as for processing claims relating to Loans and Advances, Personal Claims, etc. Since all the basic information was captured here, this needed to be robust and it was to be ensured that the data was complete and accurate. The deficiencies noticed in four sub-functions of Administration module are elaborated below:

(1) Personnel/General Information System

The General Directory System containing basic information on an employee such as employee code, personal bio-data and service particulars was built through this system. The entries relating to bio-data were made at the time an employee joined ISRO/DOS. The employee code was generated automatically through COWAA. Audit observed incomplete data entry by DOS and deficiencies in validation checks in the system.

(a) *Incomplete data entry and gaps in system*

i) The Employee Table had 4,303 records. However, there were 799 gaps with 1,553 employee codes missing at various places giving room for manipulation. DOS stated (November 2015) that the gaps were due to

migration of data from legacy system. Audit, however, observed gaps in the employee codes generated as late as 2012.

ii) The Bio-data table contained 4,257 records which contained blank fields. Even important entries of permanent nature such as "Character Verification" and "Personal Identification Marks" were not entered in respect of 1,510 records and 1,228 records respectively. Information such as "Spouse Employed", "Home Town", which had a bearing on the assessment of eligibility criteria for entertaining various claims, also remained blank in respect of 2,243 and 90 records respectively. DOS stated (November 2015) that data was migrated from legacy system and certain data which was not available at that juncture was left blank. DOS agreed to review the gaps for correction by administrative users.

iii) In five cases, date of joining Government service entered was later than date of joining ISRO.

iv) Out of 904 employees who joined service after 1 January 2006, the Joining Grade Pay was not entered in respect of 193 cases (21 *per cent*). DOS agreed (November 2015) to review the cases and carry out necessary corrections.

The above incomplete data entry and gaps in the system showed that due caution was not exercised while entering and verifying the data.

(b) *Absence of validation checks*

Audit noticed lack of validation checks in the following fields:

i) In the screen "Employee Initial Joining Details", there was no check to see whether the Earned Leave and Half Pay Leave at credit of the employee were commensurate with the date of Joining Central Services/ date of Joining ISRO.

ii) In the screen "Previous Employment Details – Data Entry", there was no check to see whether the "Service From" and "Service To" dates were prior to "Date of joining ISRO".

iii) In the screen "Previous Pension Details – Data Entry", there was no check to see whether the "Pension from Date" was acceptable with reference to the "Date of Birth", "Date of Joining Government Service", etc.

iv) While entering details in the "Employee Transfer In/Out Details" screen, the system allowed entering details for Transfer in to SDSC of a person who was currently working in SDSC. DOS agreed (November 2015) that the bug would be reviewed and corrected.

v) There was no check to ensure that the Hometown could be changed only once after initial declaration. Further, there was no history of changes made in the Hometown. Thus, there was no check to see if at the time of changing

the Hometown, "Current Home Town" being entered was different from the Hometown previously declared.

vi) In the Employee "Study Leave – Data Entry" screen, there was no validation check to ensure that data of only eligible persons was accepted. For example, for an Administrative staff, Study Leave of five years for acquiring Ph.D. could be entered into the system.

vii) There was no validation check in the screen, "PIS – Change in Designations and Grades", to ensure that the new designation, pay and grade pay entered in the case of "Promotion" were not lower than the existing designation, pay and grade pay.

viii) In the event of change of designation, pay, etc., due to promotion, Modified Assured Career Progression (MACP), etc., the data in the screen "Employees – Change in Basic Pay & Increment Date" could be fed only after the details of change were entered in screen – "Personal Information System (PIS) – Change in Designations and Grades". However, there was no check to ensure that the same data under pay, grade pay, etc., was entered in both the screens.

ix) The date of superannuation of an employee was calculated based on date of birth of the employee entered into the system and the date of attaining the age of 60 and captured in the "TBAD_Biodata" table. The date of superannuation should be reflected as the last date of the month in which the official attained the age of 60. In the cases where date of birth fell on 1st of the month, the superannuation date should be last date of the previous month. However, this was not ensured under the system. The date of superannuation captured in 38 cases was incorrect. In one case the difference between date of birth and date of superannuation was 67 years. Similarly, the date of superannuation for the people born in February in a leap year was shown as 28 February instead of 29 February. DOS stated (November 2015) that the same would be reviewed.

x) While entering details in the screen "Employee Change in Service Status (Punishments – Data Entry)", under Service Status, though options such as "Exit from Service", "Non-duty", "Transfer", etc., were given, the option of "Service" was not given. DOS stated that options were provided based on user requirements. This showed that requirements were not projected correctly.

Thus, there were no checks to validate data entered into the system. As a result, users had to carry out necessary checks manually, process the papers/files and simultaneously feed the data at each stage in the relevant screens.

On being pointed out in audit, DOS agreed (November 2015) that the checks had to be carried out manually and that these would be reviewed for future operations.

(2) Children's Education Allowance

The purpose of this function was to process reimbursement claims of employees. The system captured Norms, Eligibility Details and Request Details. Audit observed that for the claims relating to earlier years, the system took into account the current rates instead of allowing the rates applicable for that period. This gave scope for processing claims relating to earlier periods at current rates.

DOS stated (November 2015) that the calculation was verified manually in case the claim related to old periods. This indicated that the business logic was not embedded into the system.

(3) Provident Fund System

This sub-function dealt with advances, withdrawals and conversion of advances into withdrawal from the Employees Provident Fund (PF) Account. It captured the PF details of the employees. Audit observed the following:

i) As per existing rules, there is no option to Government employees, except Technical and Scientific staff for converting the fund subscription from Contributory Provident Fund (CPF) to General Provident Fund (GPF). Audit observed that in the screen "Employee PF Details Data Entry", there was no check to see if the employee belonged to Technical/Scientific Staff. The screen also allowed change from GPF to CPF, which was incorrect.

ii) There were 28 staff members who moved from CPF to GPF during 2010-11, however, the database showed only two records. This showed that data was not entered into the system.

DOS stated (November 2015) that these should be checked manually and that the cases would be reviewed for future operations. The reply indicated that necessary checks were not built in.

(4) Nominations

This sub-function captured data related to Nominations made by the employees viz. type of Nominations, Nominee Details. The system was to generate reminders for non-submission of nominations or incomplete nominations. Audit observed the following programming errors:

i) COWAA only accepted first/alternate nominations where 100 *per cent* share was allocated to one nominee and did not accept those nominations where the share was divided among more than one nominee. In view of the deficiency, nominations received were not fed by the users. To this extent, the database remained incomplete.

ii) The report for "Reminder for DCRG nominations" showed 1,510 employees. However, as per data extracted by Audit, there were only 748 employees who were in service and had not filed their nominations. Analysis of the report showed that the report included names of persons who had retired/resigned/been transferred.DOS agreed (October 2015) that the bug had to be removed to generate the correct output.

5.1.2.2 Payroll module

The Payroll module was being used to draw the Pay and Allowances of employees. Audit observed the following deficiencies in three sub-functions of the module:

(1) Transport Allowance

According to rules, Transport Allowance is not payable to those employees who remained on leave for the entire calendar month. Audit observed five instances in which Transport Allowance was drawn even when the officials were on leave for entire calendar month(s) resulting in overpayment of ₹ 8,000. This indicated that there were no checks in the system to prevent the drawal of Transport Allowance for employees remaining on leave for an entire calendar month.

Further, in cases where leave was sanctioned after monthly salary was processed, the recovery of Transport Allowance paid was computed manually and entered in the recoveries screen. Audit observed that in all the above five cases, recovery was not effected. Therefore, even the manual process was not complied with.

(2) Interest bearing advances

The sub-function was used to handle interest bearing and non-interest bearing advances and generate broadsheets. Audit observed the following deficiencies:

i) COWAA did not calculate the interest on Long Term Advances. The interest was calculated manually and entered into the system.

ii) In the cases where remittances were made in one lump sum, the data was not automatically updated. Database showed 58 such cases of lump sum remittances where recovery of Principal/Interest was shown as stopped in between. This included 42 cases of retired employees where the advances were settled at the time of retirement but were reflected as unsettled.

iii) There was no provision to close the data on advances relating to employees who had been transferred out of the organisation. As a result, COWAA database continued to show such advances as outstanding thereby providing inaccurate position of outstanding advances.

iv) There was no check to ensure that long term advances for purchase of conveyance on second/subsequent occasion were accepted only after full repayment of first/earlier advance along with interest. In one case the database showed recovery of interest of earlier advance and recovery of Principal of subsequent advance proceeding simultaneously.

v) There were errors in broadsheets generated by the system. In one case broadsheet depicted opening balance of interest even when the recovery of Principal was continuing, which was incorrect as recovery of interest commences only after the Principal amount has been fully recovered. In contrast, there were two cases where recovery of Principal was completed but recovery of interest did not commence. In two more cases, recovery of interest was commenced after a lapse of more than two to three months from recovery of Principal amount.

DOS confirmed (November 2015) the audit observations and agreed to correct the business logic.

(3) Provident Fund

As per the provisions of GPF Rules, subscription can be enhanced twice and reduced once in a calendar year. However, COWAA did not restrict the number of times of increasing or decreasing of the subscription. This indicated inadequate input controls and validation checks. DOS replied (January 2016) that it was to be checked manually.

5.1.2.3 Accounts module

The Accounts Module of COWAA processes the generation of Personal Claims, Medical Expenses, Suppliers Bills, Miscellaneous Bills and has provision for drawal of cheques and cash. In addition, the compilation and consolidation of Monthly Accounts are run through this module. A review of this module showed that there was no provision for calculation of entitlements in respect of personal claims such as Travelling Allowance (TA) and Medical claims, etc. There was also no provision to calculate the penal interest applicable on delayed refunds. The claims were processed manually and COWAA was used only as a tool to generate bills/vouchers. Also, instances of weak Application Controls, non-incorporation of certain provisions and programming errors as elaborated below were noticed.

(1) Personal Claims

i) While processing grant of TA advances, COWAA captured only date of commencement of tour and did not capture the date of completion of tour. It also permitted drawal of advances for overlapping periods i.e. it permitted drawal of advance for a period prior to the date of completion of the earlier tour. COWAA also did not check for submission of TA adjustment

bills within the prescribed time limit. DOS accepted (October 2015) the observation.

ii) In the cases where employees were transferred out of a particular centre/ retired from service, there was no provision to settle the advances pending against their name from the database. As a result, the COWAA database could not be updated even after receipt of the refund/recovery/settlement information from the borrowing office. DOS agreed (January 2016) that provision to this extent was not made.

iii) The data extracted from COWAA database showed 904 travel advance cases ranging from the period 2001 onwards as outstanding, although there were actually only 14 outstanding advances. Analysis revealed that though a separate screen was available (AC50S) for entering details of refund of unutilised travel advances, this was not used. Instead, users entered the refund particulars under 'Miscellaneous Receipts' screen. Consequently, refunds of advances were not linked with the position of outstanding advances. Similarly, recoveries/adjustments made through Pay Bills were also not linked with the advances. The position of outstanding advances was therefore rendered inaccurate. This showed lack of integrity of data.

DOS accepted (January 2016) the above observations.

(2) Medical Expenses

The claims relating to the payment and settlement of medical advance, settlement of medical reimbursement, settlement to hospitals/laboratories were processed through this function. The details of beneficiaries, Hospital/Laboratory, Doctor, etc. were accessed from administrative function. The amount to be paid was, however, computed manually. The review of the sub-module revealed the followings:

i) COWAA did not capture the nature of illness.

ii) There was no check to ascertain if the period of treatment for a particular beneficiary was overlapping with any previous claim. Thus, it did not check for duplicate claims.

iii) There was no check to ascertain if the claim pertaining to a particular Hospital/ Diagnostic Centre was during the period of recognition of the Hospital/ Diagnostic Centre.

iv) COWAA did not capture the date of submission of medical claim. Hence there was no check to ascertain if the claim was submitted and processed within the prescribed time limit.

v) There was no check for the period of consultation. As a result, the "To date" could be entered earlier than "From date".

vi) In the case of treatments taken at an outstation location, the option "Travel" in the "Medical Reimbursement Claims – AC64S" screen was available for claiming travelling allowance. Though the option should be invoked only in cases where treatment was taken outside, it was observed that the option was accepted by the system even for the cases where treatment was taken with local Authorised Medical Officer (AMO). The option "Travel" was invoked in 12,878 cases though the treatment was taken locally. Thus, the system lacked the validation check for eligibility of travelling allowance for treatment.

vii) There was no check to link the selected AMO with the Medicine Type. For example, for the option of "Ayurvedic doctor" as AMO the system allowed selection of "Allopathy" as Medicine Type.

viii) SDSC received claims from hospitals for the treatment extended to the employees (serving and retired) and the amount was paid directly to the hospital. In cases where employees availed benefits beyond their entitlement, the excess amount in the case of serving employees, was either recovered from the employee through Pay Bill or refunded by them. In the case of retired employees, the amount was refunded by them. The refund particulars were entered through the 'Miscellaneous receipts' screen. Audit observed that such refund/recoveries were not linked to the excess claims. Due to this, amounts that had already been adjusted continued to be shown as outstanding. The table containing claims of serving employees showed 7,324 cases as outstanding even though the recovery had been effected through pay bills in 7,112 cases.

DOS accepted (January 2016) the above observations.

(3) Supplier Bills/Miscellaneous Bills

The purpose of the Supplier Bills sub-function was to process and generate bills towards Supplier Advance Payments/Bill Settlement, Letter of Credit opening/ settlement, etc. The Miscellaneous Bill sub-function was used for handling miscellaneous payments and receipts which were not covered in other COWAA functions. Audit observed the following:

i) There was no check to ensure that the "Billed Amount" was not more than the "Purchase Order (PO) Amount", and it matched the quantum of goods received. In response, DOS stated (January 2016) that the inbuilt check was removed based on the user requirement to pay extra amount after verifying the claims. The action taken by DOS to suit user needs was fraught with risk of overpayments.

ii) The screen "AC04N – Party cheque preparation" was used for preparation of cheque for issue to Suppliers, other parties, etc. Payments to employees

were processed through another screen 'Payment through Banks', in which case the account number of the employee was printed in the intimation letter, details reflected in the pay slips and database updated in the relevant table. Audit however observed that the screen for payments to suppliers also permitted processing of payments to employees. This was not correct, as in such cases, the employee database could not be updated after payment. DOS replied (January 2016) that some Centres asked for Party Cheque for employees to put in different banks for various payments. While acceding to the user request, DOS did not exercise caution to ensure that the database was uniformly updated.

iii) Although there was provision for entering details relating to payments made by Letter of Credit (LC) separately, the same was not used. Instead, the screen "AC82SN – Supplier Bills Settlement" was used by generating a note marked as "LC Payment". As a result, complete details of payments made through LC could not be generated through COWAA. DOS agreed (January 2016) that they were not using the screen.

iv) The Receipt Bills Screen "AC96S" was used for entering details relating to receipts. While operating this screen, the Accounts Clerk/Officer was unable to view the purpose for which the remittance was made though the same was available in the database and therefore, exercise a check. DOS justified (January 2016) that the screen layouts were decided based on the user inputs and modifications could be carried out based on future inputs.

(4) Cheques and Cash

This sub-function was used for processing and generation of bills for party/self cheque preparation, cash drawal, receipt collection, generation of cash book and cheque register. An analysis of the table containing the details of cheques issued revealed the following

i) In 25 cases the cheque amount was not entered. Out of these, in 5 cases, the cheque status[15] was shown as encashed. Permitting of generation of blank cheques and further allowing of updation of cheque status indicated lack of application control and is also fraught with the risk of misuse. DOS stated (January 2016) that these were dummy cheques that were not actually prepared. The reply is not acceptable since there was no provision to differentiate a dummy cheque and in such instances, date of encashment was also indicated.

[15] When the cheque was prepared it was represented by 0, on encashment by 1 and on cancellation by 2.

ii) In 1,160 cases the cheques were shown as "Cancelled" even though the field labelled "Encashed Date" contained information. This showed absence of validation check. DOS accepted (January 2016) the possibility of back end correction.

iii) In 140 cases, the cheque numbers were duplicate. DOS stated (January 2016) that this was due to back end corrections.

iv) There was no check on the date of issue of cheque. This gave scope for issue of cheques with ante date even after closing of the accounting year. DOS accepted (January 2016) the observation.

v) While the cheques were prepared for payment to employees/other parties, the purpose for which payment was made was not displayed and it was also not printed on the intimation letter. The same was done manually.

vi) In Government cheques, it is mandatory to mention the amount "Under ₹____". Cheques were issued by the centre without this figure as COWAA did not have the provision to fill the relevant figure. In response, DOS stated (January 2016) that the requirement was not projected by the Domain Committee. The reply is not acceptable as it was contradictory to Government procedures for issue of cheques.

vii) The field "Regtime" captured the date/time when the cheque details were first entered. This field was overwritten whenever the record was edited i.e. during registration of cheque by Officer, entering of encashment details, etc. thereby leaving no scope for audit trail or history. DOS accepted (January 2016) the observation.

5.1.2.4 Purchase module

Purchase function had six sub functions viz., vendor registration, indent processing, tender processing, indent recommendations and approvals, purchase/work order processing and exemption and clearance. In addition to Purchase Module in COWAA, DOS also deployed web based secured Electronic Government Procurement System (EGPS) from 1 July 2012. DOS issued instructions to its Centres/Units to process the indents valuing above a specified amount[16] through EGPS. Thus, both Purchase module of COWAA and EGPS were operated simultaneously. EGPS had processes only up to placement of orders, after which the data was migrated to COWAA.

Audit observed that the entire exercise of indent generation, tender, comparative statement, selection of bidders, approvals of pre-audit, approvals of committees and

[16] Purchase cases valuing above ₹ 10 lakh from April 2012 and purchase cases valuing above ₹ five lakh from April 2015

placement of order was done manually on the file and the data was fed into COWAA at every stage to generate print outs. The purchase module lacked certain important checks and was also not user friendly. Observations relating to each sub-function are elaborated below.

(1) Vendor Registration

The purpose of this function was to create vendor directory with identification of materials and services and registration of suppliers/contractors. Audit observed that there was no check to prevent addition of vendors already existing on the database. While adding a vendor to the directory, the user was required to verify the existence of same vendor in the directory through query mode. This check was however not carried out by the users with the result that there were multiple vendor codes for the same vendor. For example, there were four entries for the vendor "Beta Scan Systems" and six entries for "Kronix X-Ray and Allied Products". This led to data inconsistency and gave scope for incorrect results on querying. DOS agreed (January 2016) to modify the system in future.

(2) Indent Processing

This function was used to generate indents by entering indent items with details. On completion of data entry indent numbers were generated, which were registered by the Purchase section. Audit observed the followings:

i) There was no check for verifying if the indenter and the indent approving authority belonged to the division for which indent was raised. This posed a risk of grant of unauthorised approval of indents by the system. DOS stated (January 2016) that after indent preparation a printout was taken and checked manually and signed by both indenter and indent approving authority. The fact remained that there was no check in the system.

ii) There was no check to ensure that the item indented for and the line item code belonged to the same nature of expenditure i.e. Revenue or Capital. As a result, COWAA accepted indent raised for procurement of an asset item under revenue expenditure, which was incorrect. DOS agreed (January 2016) that this was to be done manually.

iii) Access control roles were not clearly defined in COWAA. The Purchase Clerk in the Purchase Section had access to edit the contents of the indent such as Item, Quantity, etc. which was not correct, as keeping the "EDIT" option open after the indents were approved by the indent approving authority is fraught with risk.

iv) After the indents were raised by the indentor, the Purchase Section had to "Register" the indent. If an error in the indent was identified after registration by the Purchase Section, there was no scope for editing. The

only option available was "Re-floating/ Re-tendering". Consequently, the history of the whole case was lost without trail.

v) Although there was provision in COWAA for closure of indents that did not materialise into purchase orders, the same was not done. This resulted in 39,887 such cases remaining in the database. Further, these were displayed in the drop down menu of indents making it cumbersome for the user to select. The drop down menu also displayed indent numbers of the cases for which purchase orders had already been placed. DOS accepted (January 2016) the observations and stated that there was an interface issue with regard to the data migrated from EGPS to COWAA and that the same would be addressed in future.

(3) Tender Processing

Tender Processing function covered file opening, tender enquiry/notification, advertisement, Register of valuables, technical/commercial comparative statement, etc. Audit observations are as follows:

i) Register of Valuables screen was used to record the details of demand drafts received from the vendors. The screen had provision for reflecting the status of the draft as "Validity is Over", "Realised" and "Returned". Audit observed that COWAA accepted the dates of Demand Drafts even though the same exceeded the validity indicating lack of validation check. DOS agreed (January 2016) that errors will be removed in future.

ii) Although a Technical Comparative Statement screen was provided for comparing technically qualified vendors, the comparative statement was not generated, instead, separate technical reports in respect of each vendor were generated. This did not serve the purpose of preparation of comparative statement.

iii) The Commercial Comparative Statement screen was provided for comparison of quotations of vendors who responded against tender enquiry. This facilitates preparation of Commercial Comparative Statement and generation of "Rank" based on Vendor Code and Vendor option of each case. Audit, however, observed that these processes did not work.

iv) The program did not permit horizontal data population covering both technical and commercial bid details in the relevant table. DOS agreed (January 2016) that there was a bug in the program.

v) The option to print the comparative statement item-wise did not work. It displayed an error message. DOS agreed (January 2016) that there was a bug in the program.

vi) Indented items could be deleted from the Commercial Comparative Statement screen by the user. When these were deleted, the records were completely erased from the table without trail. There was no provision for correction of errors in the Technical/ Commercial Comparative Statement once it was registered by the Officer. The Officers had to resort to "Re-floating/ Re-tendering" option wherein the indent was reverted to generation stage and all the intermediate details were lost without trail. DOS accepted (January 2016) the observation and stated that the corrections would be carried out in future.

vii) The provision to automatically generate the comparative statement and select the lowest tenderer though available was not being used. Instead, technical and commercial comparative statements were being prepared manually and fed into the database. DOS accepted (January 2016) that the task of uploading the entire bid contents was a herculean task and if there was an error in the data entry, all the procedure from Indent Generation had to be reworked. This showed that the module was not user friendly.

(4) Recommendations and Approvals

Comparative statements were to be directed back to the indenter for providing a recommendation for the purchase. The Recommendations and Approvals screen was used for entering the purchase approval dates. Audit observed the following:

i) There was no provision for pre-audit of purchase cases in COWAA. Instead only the recommendations of pre-audit were entered by the Purchase section.

ii) There was no check to ensure the chronology of events up to the date of entry of data into the system. For example, system allowed entering of dates later than current date in the fields. Also it was possible to enter the "Lack of competition approval date" prior to the "Need Aspect Committee date" which was incorrect since Need Aspect approval should/would have been taken at the indent stage itself. Similarly, the system accepted the date of pre-audit clearance which was later than current date.

iii) The system also did not contain provision to check whether the dates of approvals entered for one vendor for a file matched with the dates entered for another vendor of the same file.

DOS accepted (January 2016) the above observations.

(5) Purchase order release

The Purchase and Work Order Release screen was used to enter data after successful completion of the purchase approvals. Audit observed that the system did not check for the total quantity for which order was to be placed for a particular item. For example, in an indent with quantity of 20, COWAA permitted placement of order on two vendors with quantity of 20 each. The system did not check whether the item for which the order was placed was approved by the indenter. DOS accepted (January 2016) the above observations.

5.1.2.5 Stores module

Stores module dealt with receipt of material, stock handling, inventory control and disposal of stores. Audit observations are as following:

(1) Material inward

The Material Inward function was used to record entry of lorry/rail receipts, collection of material by Collection Cell, receipt of materials at corresponding stores, intimation of arrival of material to the indenter, inspection and issuing of materials to concerned divisions. Audit observed following deficiencies:

i) The material receipt details were entered with the help of a combo-box which displayed the consignment numbers. However, the combo box also displayed those consignment numbers relating to purchase orders for which items were received earlier. Similarly, in the Stock Handling Function also the combo box displayed list of consignments which were already taken into stock. Thus, the database was not updated.

ii) The materials received and entered into the material receipt function were not registered in the system immediately, but only after the same were inspected by the indenter. Quantity of goods accepted/rejected was recorded manually by indenter and entered into the system by Stores wing after receipt of inspection report. The system is fraught with risk and leaves scope for gaps in data of material received in stores and inspected by the indenter.

iii) The Lorry Receipt (LR) pending report generated for one Stores (SHPS04) showed that 60 items of LR were pending from July 2001 onwards. The Material Inspection Receipt Voucher (MIRV) pending report generated for the same Stores showed pendency of 2,001 items. This showed that the database was not updated thus rendering it unreliable.

iv) There was no inbuilt check for verifying full supply or part supply against the ordered quantity. The same was entered manually. As a result, COWAA accepted entries of part supply even when full supply was received and vice

versa. Audit observed that in 6,110 cases, though full supply was received, the system showed it as part supply. Similarly, in 3,685 cases, full supply was reflected against actual receipt of part supply.

v) In case of part supplies, when entries relating to second and subsequent supplies were made, the records were not appended but were overwritten leaving no history of events. Only the quantity received as on date was available.

(2) Stock handling

The Stock handling function dealt with receipt, issue and transfer of stock items. Audit observed that though a provision was available for automatic generation of stock card number upon entering details of new stock card, the same was not used by the users. Instead, stock card numbers were entered manually. This resulted in 2,478 stock card numbers occurring more than once. Numbers[17] were repeated twice, thrice and even up to seven times.

(3) Material disposal

This function dealt with disposal of stock items. However, despite the fact that the stores module had provision for disposal of unserviceable and obsolete items, this was not used and was done manually.

5.1.2.6 Finance module

The Finance Module was used for preparation of budget documents in standard formats. It was also used for on-line budget checking for making commitments and expenditure. The major functions in this package are preparation of Revised Estimates, Budget Estimates, Operating Budget, Budget consolidation, Budget Re-Appropriation, Transfer of Revised Budget details, etc. Audit noticed that there were no checks in the module to ensure allotment of funds under a particular line item or activity. In the COWAA MIS report FAC004 "Activity wise Statement of Expenditure and Commitments", it was seen that in one of the activities, though there was no budget allotment, expenditure had been incurred, resulting in adverse balance under that Activity. Audit further observed that the bifurcation of expenditure between Plan and Non-plan shown in the COWAA MIS report did not tally with the report generated through COWAA. This showed that COWAA permitted mixing of Plan and Non-Plan Expenditure. There was also no mechanism to check the pace of expenditure and alert the management in the case of slow or heightened expenditure during a particular quarter of the year.

DOS confirmed (January 2016) the shortcomings and stated that the same would be addressed based on inputs from domain experts.

[17] Stock Card number occurring (i) twice – 1,808 cases, (ii) thrice – 89 cases, (iii) four times – 24 cases, (iv) five times – 139 cases, (v) six times – 73 cases and (vi) seven times – 125 cases

5.1.2.7 Inconsistent COWAA and MIS reports

The COWAA system could generate inbuilt reports in addition to standard MIS Reports. A test check of the reports generated through COWAA showed inconsistencies with the MIS reports. The management could not rely on the data extracted from the database and also the reports generated through COWAA. As a result, whenever information was required the same was extracted from manual records. Deficiencies noticed in reports covering Administration, Finance, etc. are elaborated in ***Appendix V***.

5.1.3 Conclusion

The COWAA package developed by Department of Space lacked basic validation checks, application controls and referential integrity. Certain business rules were also not embedded in the package. The system had programming errors and bugs. The data flow within a module and between various modules was also weak. There were gaps in data entry by users of the COWAA system. As a result, data was incomplete, incorrect, inconsistent and MIS reports generated through COWAA being unreliable. This led to significant dependence on manual operations which defeated the purpose of a computerised environment.

The matter was referred to DOS in January 2016, DOS accepted audit observations in the exit conference (March 2016) and stated that points raised by Audit were being addressed in the COWAA Web Interface System (COINS), which was under development. However, detailed replies were awaited as of March 2016.

5.2 Implementation of Telemedicine programme

Department of Space could not ensure effective utilisation of satellite communication for providing health services to patients in rural and remote areas even after incurring expenditure of ₹ 30.18 crore. Out of 389 networks established, only 150 were operational. In addition, selection of beneficiary hospitals was irregular, satellite capacity for remote and interior areas of the country was inadequate and Ka band ground terminals worth ₹ 14.12 crore could not be utilised.

5.2.1 Introduction

Department of Space (DOS) initiated (November 2001) Telemedicine Programme with a view to provide access of speciality health care services to rural population living in geographically distant, remote and interior parts of the country. The programme sought to connect remote/ rural hospitals to the specialty hospitals located in urban areas using satellite bandwidth of transponders on INSAT/ GSAT satellites. With the facility, medical images and records of patients in rural areas could be transmitted to the doctors in specialty hospitals who could provide diagnosis and treatment through live two-way audio and video conferencing.

Space Commission approved (August 2002) the policy paper on Telemedicine programme. Implementation of the programme was to be done in two phases. Under Pilot (Phase-I) of the programme (November 2001 to March 2003), 18 remote patient ends in nine States/ Union Territories[18] were to be connected with nine specialty hospitals (Details in ***Appendix VI***). After completion of the pilot project, the respective State/UT Governments were to take over operations and run the Telemedicine centres at the respective hospitals. Under Phase-II (April 2003 to March 2007), Telemedicine networks were to be expanded based on the commitments made by concerned State Governments and regional coordinating bodies with regard to their stake/ involvements.

After completion of the pilot phase, DOS briefed (May 2003) Space Commission on achievements and policy frame work for Telemedicine programme. Based on the proposal of DOS, Space Commission approved (June 2003) establishment of Telemedicine facilities at certain district/ other hospitals in:

i) Remote areas such as North Eastern India and Jammu and Kashmir;

ii) Interior/hilly/remote/under developed areas of some States (parts of Uttarakhand, Himachal Pradesh, Odisha, Bihar, Jharkhand and Uttar Pradesh);

iii) Islands and Union Territories; and

iv) Two to three selected hospitals in other mainland States for technology demonstration purpose only.

Implementation of the Telemedicine programme was to be done by the Ministry of Health and Family Welfare (MHFW) and the respective State Government agencies and Non-Government Organisations (NGOs). Healthcare being a State subject, identification/selection of the patient end, district hospitals/ trust hospitals as well as specialty hospitals for providing Telemedicine connectivity was vested with State Governments and its application in different parts of the country was to be pursued by the respective State Government hospitals, NGOs, etc. for delivery of such services. State Governments and the specialty hospitals were to allocate funds for their part of infrastructure, manpower and facility support. The role of DOS in the programme was limited to bringing awareness and introducing the technology of satellite based tele-connectivity in the form of pilot projects.

Under the programme Telemedicine network was to be established through Telemedicine nodes installed at Patient Ends, Specialty Hospitals, mobile vans as well

[18] Andaman and Nicobar Islands, Andhra Pradesh, Assam, Jammu and Kashmir, Karnataka, Kerala, Lakshadweep, Odisha and Tripura

as for monitoring purposes. DOS established 389[19] Telemedicine nodes upto July 2010 as shown in Table 13.

Table 13: Distribution of Telemedicine nodes

Area	Nodes established
Mainland States	275
Remote Areas	62
Interior Areas	21
Island States and Union Territories	26
Sub Total	**384**
Monitoring Nodes	5
Total	**389**

The State wise distribution of Telemedicine nodes is given in ***Appendix VII***. There was no further expansion of nodes after July 2010; however, DOS continued to incur expenditure to cover annual maintenance of the operational nodes. As of March 2016, DOS incurred expenditure of ₹ 30.18 crore under the programme.

5.2.2 Audit findings

Audit examined records in DOS relating to establishment of Telemedicine networks and allocation of satellite capacity for the period up to March 2014. Audit observations on these areas are discussed in the succeeding paragraphs.

5.2.2.1 Planning for satellite capacity

Satellite Communication Programme Office of DOS proposed (2001) to launch a health satellite with about 10 transponders at 36 MHz each (360 MHz) to provide medical expertise to the people in remote areas. DOS decided (September 2002) to launch a technology development satellite (GSAT 4), with a satellite capacity of 1,200 MHz in Ka band[20]. The satellite was planned to be launched in April 2005 but it was delayed and launch was attempted in April 2010 using the launch vehicle GSLV D3. In addition, 40 Ka band ground terminals at a cost of ₹ 14.12 crore were established (April 2010) to receive signals from GSAT-4.

However, GSLV D3 flight was not successful and hence GSAT 4 could not be placed in orbit. In the meantime, DOS arranged for satellite capacity through its other satellites viz. INSAT 3A, GSAT 3 and INSAT 4A. DOS continued to use its other satellites for allocation of capacity for the Telemedicine programme. However, Ka band ground terminals created at a cost of ₹ 14.12 crore could not be utilised elsewhere.

Audit further observed that DOS assessed the satellite capacity requirement of 360 MHz without obtaining inputs from the States. Against the assessed capacity, the

[19] Consisting of 302 Patient End nodes, 64 specialty hospitals, 18 mobile vans, five monitoring nodes

[20] Ka band is an electromagnetic spectrum in the frequency range of 26.5–40 GHz. This spectrum is used to speed up transmission of high-rate science data from space missions.

maximum user requirement during the entire period from 2004 to 2015 was only 56.5 MHz i.e. about 1.5 transponders (as detailed in para 5.2.2.5).

Thus, Ka band terminals planned to be used for Telemedicine applications could not be utilised.

5.2.2.2 Inadequate Telemedicine connectivity

Space Commission approved (June 2003) establishment of Telemedicine facility at remote and interior areas of the country in accordance with requests received from the concerned State Governments. The status of establishment of networks in remote and interior areas was as shown in Table 14.

Table 14: Status of establishment of networks

Region/State	Nodes to be established as per request of State Government	Nodes actually established	Shortfall (%)	Private nodes established	Total nodes established
(1)	(2)	(3)	(4)	(5)	(6)=(3) +(5)
Remote Areas					
North Eastern India	94	30	68	2	32
Jammu and Kashmir	20	12	40	0	12
Armed Forces (North Eastern India and Jammu and Kashmir)	Information not available	18	-	-	18
Total		**60**		**2**	**62**
Interior Areas					
Uttarakhand	13	2	85	2	4
Himachal Pradesh	27	1	96	1	2
Odisha	32	9	72	1	10
Jharkhand	30	0	100	1	1
Uttar Pradesh	70	1	99	2	3
Bihar	Information not available	0	-	1	1
Total		**13**		**8**	**21**

The above table shows that DOS was unable to provide adequate connectivity in the remote and interior areas. Information in respect of islands and Union Territories was not available. DOS stated (March 2016) that the States did not firm up plans with necessary infrastructure. Reply confirmed the lack of management structure to address the infrastructure issues.

5.2.2.3 Irregular connectivity to mainland States

Space Commission approved (June 2003) establishment of Telemedicine facility at two to three selected hospitals in the mainland States for technology demonstration purpose only. Audit observed that against this direction DOS covered the

Telemedicine network extensively and incurred irregular expenditure as detailed below:

i) More number of nodes (275) were established in Karnataka, Maharashtra, Gujarat, Rajasthan, Kerala, Tamil Nadu, Andhra Pradesh, Madhya Pradesh, Punjab, West Bengal and Chhattisgarh in the main land, as compared to the States with more rural population and poverty such as Uttar Pradesh (three nodes), Bihar (one node) and hilly states like Uttarakhand (four nodes), Himachal Pradesh (two nodes), and in Jharkhand (one node), which were barely connected with Telemedicine networks.

While accepting this point DOS stated (March 2016) that in cases where States decided to use satellite based option with their own funding, DOS encouraged the States by providing appropriate satellite resources to serve the lesser priority areas. Thus, DOS allocated scarce and valuable satellite resources to lesser priority areas.

ii) Space Commission had approved establishment of only two to three nodes in Andhra Pradesh. However, DOS set up Telemedicine nodes at seven hospitals. Providing connectivity to additional four nodes at a cost of ₹ 18.00 lakh from DOS funds was irregular.

DOS stated (March 2016) that Telemedicine nodes in Andhra Pradesh were implemented with due approval process of DOS. However, the fact remained that connectivity to additional four nodes was against the direction of the Space Commission.

iii) Space Commission approved providing communication equipment, basic medical equipment etc. for State wide networks only in the State of Karnataka as a role model. However, DOS covered the States of Kerala (30 nodes) and Rajasthan (40 nodes) under Telemedicine programme at a cost of ₹ 6.35 crore from its own funds.

DOS stated (March 2016) that Telemedicine nodes were implemented with due approval process of DOS. DOS added that Telemedicine nodes in Rajasthan were implemented from funds provided by the State Government. Reply of DOS is not acceptable as connectivity to additional nodes was against the direction of the Space Commission. Further, MoU with Government of Rajasthan clearly stipulated the financial liability of DOS for hardware and equipment.

iv) In accordance with Space Commission approval, four hospitals in Kerala were connected (November 2002) and DOS provided Telemedicine systems costing ₹ 75 lakh. Subsequently, DOS established (June 2004) 16 terminals at a cost of ₹ 2.02 crore to connect all district hospitals, which was irregular.

DOS stated (March 2016) that Telemedicine systems were connected with due approval process of DOS and the matter was reported to the Space Commission. However, specific approval of the Space Commission for the deviation was not obtained.

v) ISRO/DOS entered (December 2005) into MOU with Government of Rajasthan to establish Telemedicine network linking one specialty end to 31 district hospitals, six mobile units and six medical colleges with hub at a cost of ₹ 5.94 crore. ISRO/DOS provided Telemedicine systems to additional 35 hospitals (over and above the approved number of hospitals) at a cost of ₹ 4.33 crore which was irregular.

DOS stated (March 2016) that Telemedicine facility at additional hospital was established with the funding from the State. However, MoU with Government of Rajasthan clearly stipulated the financial liability of DOS for hardware and equipment.

5.2.2.4 Execution of MoU with hospitals

As discussed in para 5.2.1, identification of hospitals for establishing Telemedicine nodes was the responsibility of the State Governments. After completion of pilot project, State Governments were to take over the operations and run the Telemedicine centres at the respective hospitals. Accordingly, DOS was to enter into MoU with participating hospitals.

Audit observed that out of 384 Telemedicine nodes (excluding five monitoring nodes) established, DOS did not execute MOUs in respect of 154 nodes (40 *per cent*) as detailed in Table 15.

Table 15: Status of MOUs executed with various agencies

Description	Nodes established		Total
	With MOU	Without MOU (Percentage)	
1) Patient End at Private/ Trust Hospitals	29	19 (*40%*)	48
2) Patient End at Government Hospitals	168	86 (*34%*)	254
Total Patient End	**197**	**105(*35%*)**	**302**
3) Speciality Hospitals	26	38 (*60%*)	64
4) Mobile Van	7	11(*61%*)	18
TOTAL	**230**	**154 (*40%*)**	**384**

DOS stated (March 2016) that MOUs were available for 115 out of 154 hospitals mentioned by Audit and MOUs of the remaining 39 hospitals could not be traced. However, DOS could not produce the MOUs for verification by Audit.

5.2.2.5 Idling of Telemedicine nodes

DOS allocated satellite capacity from different satellites for establishing Telemedicine network. The details of Telemedicine nodes established and satellite capacity allocated from different satellites are given in Table 16.

Table 16: Establishment of Telemedicine nodes

Month/Year	Nodes	Satellite	Satellite Capacity in MHz
Jan 2004	70	INSAT 3A	15.5
Jan 2005	300	GSAT 3	36
Oct 2009	14	INSAT 4A	5
Total	**384**		**56.5**

In addition to the above 384 nodes, five monitoring modes were established. GSAT 3 was decommissioned in September 2010, after which satellite capacity for Telemedicine was re-organised as shown in Table 17.

Table 17: Position of Telemedicine nodes after decommissioning of GSAT 3

Month/Year	Nodes	Supporting Satellite	Satellite Capacity in MHz	Remarks
October 2009	384	INSAT 3A, GSAT 3 and INSAT 4A	56.5	Installed capacity at the time of decommissioning of GSAT 3.
Sept 2010	-300	GSAT 3	-36	De-activation of nodes due to decommissioning of GSAT 3.
Oct 2010	38	INSAT 3C	9	Re-activation of Nodes in INSAT 3C
Jan 2011	47	INSAT 3A	9	Re-activation of Nodes in INSAT 3A
July 2012	190	GSAT 12	36	-
March 2013	-38	INSAT 3C	-9	It was decided to allocate capacity on GSAT 12
June 2013	-117	INSAT 3A	-24.5	It was decided to allocate capacity on GSAT 12
June 2013	117	GSAT 12	36	117 nodes on INSAT 3A allocated on GSAT 12
	321	**TOTAL**	**41**	

On decommissioning of GSAT 3 (September 2010), 300 out of 384 nodes were de-activated. Subsequently, during the period from October 2010 to June 2013, 321 nodes were re-activated. The status of remaining 68 Telemedicine nodes was not on record.

Audit observed that though satellite capacity of 41 MHz was available for 321 nodes, only 150 Telemedicine nodes were operational (August 2013). The remaining 171 Telemedicine nodes were not operational even as of March 2016 and were, therefore, idling. The satellite capacity of 21.84 MHz kept idle during the period from August 2013 to March 2016 had a market value of ₹ 8.09 crore at the rate of ₹ five crore per unit (36 MHz) per annum.

Audit further observed that some of the users were not willing to continue with the Telemedicine connectivity provided by DOS. Sir Gangaram Hospital, New Delhi decided to discontinue (January 2010) the Telemedicine connectivity to three Community Health Centres[21] and two mobile vans stating that the completion of project period of three years was over. The Telemedicine connectivity was provided at a cost of ₹ 38 lakh. Similarly, Rajasthan State Government decided to pursue Telemedicine through their State owned terrestrial network and opted out (March 2013) of Telemedicine programme where 38 Telemedicine nodes costing ₹ 5.10 crore were established. DOS did not shift these unused and idling nodes to other users though there were requests from another 33 users.

Thus, idling of satellite capacity and failure of DOS to re-allocate the same to available users resulted in non-utilisation of these nodes.

DOS stated (March 2016) that the capacity earmarked for societal application has indirect value and applying market value may not be appropriate. The fact remained that satellite capacity was not provided to other users in spite of pending requests.

5.2.2.6 Irregular expenditure incurred under the programme

Audit observed instances of irregular expenditure incurred under the Telemedicine programme as listed below:

i) The Space Commission (June 2003) had not approved for providing components such as Multi Conference Unit and Internet Protocol phones, internet bandwidth cost, hub manning cost from DOS budget. However, Audit observed that in Andaman and Nicobar Islands expenditure of ₹ 47 lakh was incurred against this direction.

DOS stated (March 2016) that the network was established with the approval of DOS. However, these components of network were provided against the direction of Space Commission.

ii) As per circular issued by DOS for work done on behalf of outside bodies, DOS was required to collect funds in advance from the user, credit the same under its Deposit head and incur expenditure from the deposit head of account. Instead, DOS instructed Antrix Corporation Ltd. (Antrix), its commercial arm, to collect money from the State Governments while incurring expenditure from DOS budget for the Telemedicine programme. Audit scrutiny revealed that Antrix received amount of ₹ 1.62 crore from the State Government of Chhattisgarh and ₹ 2.60 crore from the State Government of Maharashtra, which was not credited to Government account and remained with Antrix.

[21] At Gohana, Sonepat in Haryana and Kethun in Rajasthan

While accepting the point, DOS stated (March 2016) that a detailed account of transaction of funds had been sought from Antrix.

iii) Space commission (June 2003) had not approved providing mobile vans under Telemedicine programme. Against the direction, DOS established 18 mobile Telemedicine units at a cost of ₹ 2.51 crore. Of these, two mobile Telemedicine buses costing ₹ 47.50 lakh were provided (May 2003/ July 2004) to two corporate hospitals viz. Vittala International Institute of Opthalmology, Bengaluru, Sankara Netralaya, Chennai thereby extending undue benefit. Sankara Netralaya, Chennai was also provided with spectrum analyser and multi casting video conferencing equipment.

While accepting the position DOS stated (March 2016) that with respect to distribution of mobile vans ISRO supported the hospitals which showed interest in the project without any preference to the region.

5.2.2.7 Avoidable expenditure on providing annual maintenance

In terms of MOU entered with State Governments and private/trust hospitals, annual maintenance of communication equipment and medical equipment provided by DOS was the responsibility of State Governments/private/trust/specialty hospitals after one year of warranty of the equipment. However, DOS entered into comprehensive Annual Maintenance Contracts (AMC) for 100 nodes[22] and incurred avoidable expenditure of ₹ four crore on AMC during the period 2010-16.

While admitting the Audit observation, DOS stated (March 2016) that though AMC was the responsibility of the States as per MOU, it was not practicable to implement. The fact remained that DOS went against the provisions of its own MOU.

5.2.2.8 Wasteful expenditure in procuring VSAT terminals

Prior to 2005, DOS utilised a version of VSAT systems costing ₹ five lakh. A new version of VSAT systems capable of providing data on real time basis was available (2005) with Bharat Electronics, Bangalore (BEL) costing ₹ 1.50 lakh. As the older version was costlier by ₹ 3.50 lakh, DOS decided (2005) to procure new version of VSAT systems from BEL.

Audit, however, observed that DOS procured (March 2005) 40 numbers of old version of VSAT system costing ₹ two crore from another vendor which could not be put to use. In contrast, the cost of new version of system would be only ₹ 60 lakh for 40 systems. Thus, DOS incurred avoidable expenditure in procurement of the older version which worked out to ₹ 1.40 crore (₹ two crore - ₹ 60 lakh).

[22] AMC of 100 nodes was awarded in 2013 at a cost of ₹ 1.75 crore and 100 computers were also replaced. In addition, DOS sanctioned an amount of ₹ 11.50 lakh to Amrita Institute of Medical Sciences (AIMS), Kochi for repair/replacement of equipment and payment of around ₹ 10 lakh for all applicable duties and taxes extra.

DOS stated (March 2016) that old VSAT systems were needed to meet the connectivity requirement in the groups which were based on old systems during the time frame of 2004-05. Reply is not acceptable since DOS had decided in 2005 itself to procure new version of VSAT system since older version was costlier.

5.2.3 Conclusion

The mandate of Department of Space (DOS) in satellite based application projects was demonstration of satellite based application technology catering to the requirement of the user and its transfer to the user.

DOS planned a satellite with capacity more than the estimated requirement which resulted in idling of Ka band ground terminals worth ₹ 14.12 crore. DOS could not achieve its objective of demonstration of a cost effective technology even after incurring expenditure of ₹ 30.18 crore under the programme. As on March 2016, out of 389 networks established, only 150 were operational. The selection of super specialty/ private hospitals for the programme was arbitrary. DOS selected the hospitals directly without involving the State Government. There was inadequate connectivity for remote and interior areas. In contrast, DOS established more number of nodes in the mainland area against the direction of Space Commission. DOS incurred avoidable expenditure on Telemedicine nodes and the purchase of VSAT system.

5.3 Wasteful expenditure on material for propellant tanks

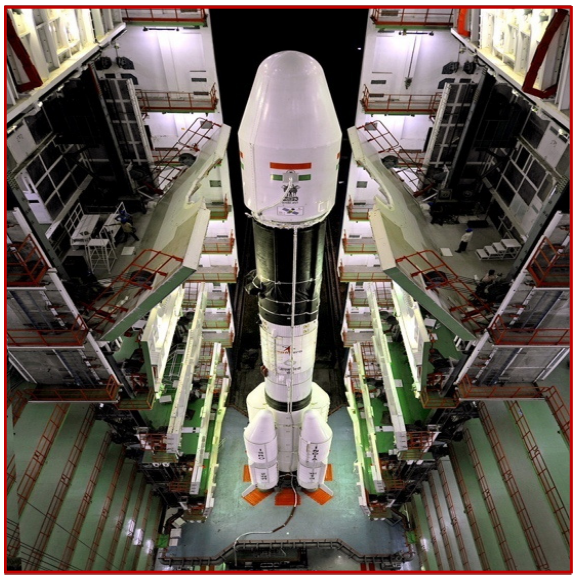
Department of Space did not prepare a definite time based action plan for phasing out a material found to cause failures in propellant tanks of launch vehicles. This resulted in wasteful expenditure of ₹ 3.49 crore towards the cost of one propellant tank and 65 tonnes of the material kept in stock that was ultimately quarantined.

Liquid Propulsion Systems Centre (LPSC), located at Valiamala (Thiruvananthapuram) and Bengaluru is a unit under Indian Space Research Organisation (ISRO) of Department of Space (DOS) responsible for development of earth storable and cryogenic engines, stages and associated components, propulsion systems, propellant tanks, etc. for launch vehicles and spacecraft. Vikram Sarabhai Space Centre, Thiruvananthapuram (VSSC) is another unit of ISRO engaged in research on launch vehicle technologies.

ISRO had been using AFNOR 7020, an alloy of Aluminium, for the construction of propellant tanks for both Polar Satellite Launch Vehicle (PSLV) and Geo-Stationary Satellite Launch Vehicle (GSLV). During 1995-96, there were failures in the propellant and water tanks using AFNOR 7020 material. Around the same time, a paper was published (June 1996) by Scientists of Materials and Metallurgy Group, VSSC wherein

it was indicated that the alloy material AA 2219 was proposed to be used for construction of tanks in Indian launch vehicle programmes. The paper also mentioned that the material "now has been indigenously developed on an industrial scale" in India.

A National Committee was constituted (April 2002) by ISRO to analyse these failures. The Committee concluded that failure was due to stress corrosion cracking and recommended migration to AA 2219 in a phased manner. The Committee also recommended continuing the use of AFNOR 7020 during the transition period. However, no time frame was suggested for migration at that time.



Geo-Stationary Launch Vehicle GSLV Mk III

However, VSSC had entered into a contract (March 2007) with Hindustan Aeronautics Limited, Bengaluru for fabrication and supply of GSLV light alloy structures and tankages including four propellant tanks. LPSC was the contract manager for development of propellant and water tanks. The tanks were to be developed using AFNOR 7020, which was to be provided by VSSC. Tanks were to be delivered in stages between July 2009 and January 2011. Of these, one tank made out of AFNOR 7020 at a cost of ₹ 1.14 crore had been delivered. LPSC also had stock of about 65 tonnes of AFNOR 7020 material worth ₹ three crore.

While discussing the status of realisation of tankages for PSLV and GSLV, Launch vehicle sub-committee decided (June 2010) that AFNOR 7020 material would be put on hold and only AA 2219 material would be used for realisation of tanks.

Based on this decision, LPSC placed the GSLV tank and balance stock of AFNOR 7020 material under quarantine. The value of the scrap material was estimated at ₹ 65 lakh.

Audit observed that even though the National Committee had recommended phasing out of AFNOR 7020 as early as 2002, DOS delayed the same for eight years. No time frame and action plan to phase out the material was prepared. In fact, DOS procured additional quantity of AFNOR 7020 material for seven PSLV tanks during the transition period (2008). Audit also noticed that DOS was also aware that other space agencies such as Ariane (French Space Agency) had also phased out the material for the same reason. Further, a GSLV-D5 launch (August 2013) had to be aborted due to leakage of propellant tank which was made out of AFNOR 7020

material, indicating that delay in phasing out the material had adversely affected DOS.

Thus, DOS did not take a definite time-based action to phase out AFNOR 7020 material which resulted in wasteful expenditure of ₹ 3.49 crore[23] due to quarantine of material.

On this being pointed out, DOS stated (March 2016) that though there was a general recommendation to change over from AFNOR 7020, considering the stable and successful performance in 21 PSLV missions, the decision to sustain its usage was pragmatic.

The reply is to be viewed in the light of the fact that LPSC had earlier (January 2015) accepted that even though tanks of AFNOR 7020 material were used in 21 PSLV flights, the material showed proneness to stress corrosion cracking in service condition in due course of usage.

Thus, failure of DOS to prepare a definite time linked action plan to phase out AFNOR 7020 resulted in stock piling of huge quantity of the material of 65 tonnes (sufficient to build about 11 propellant tanks[24]) and wasteful expenditure.

5.4 Loss due to delayed commissioning of equipment

Department of Space waived off liquidated damages for delay in supply and commissioning of a system on-board a satellite having limited operational life and thereby extended undue benefit to the contractor to the extent of ₹ 1.16 crore. Besides, the delay resulted in proportionately lesser use of its operational life.

According to Rule 204 (xiv) (a) and (b) of General Financial Rules, 2005, the terms of a contract, including the scope and specification once entered into, should not be materially varied. Wherever material variation in any of the terms or conditions in a contract becomes unavoidable, the financial effect involved should be examined and recorded and specific approval of the authority competent to approve the revised financial commitment obtained, before varying the conditions.

ISRO Satellite Centre, Bengaluru (ISAC), a constituent unit of Indian Space Research Organisation (ISRO)[25]/ Department of Space (DOS), entered (February 2010) into a contract with Thales Alenia Space, Italy (contractor) for the manufacture, integration tests and delivery of GPS Radio Occultation System (ROSA) at a total cost of Euro 28,50,000. The instrument was to be commissioned on-board Megha-

[23] ₹ 1.14 crore (cost of quarantined tank) + ₹ 3.0 crore (value of material in stock) - ₹ 0.65 crore (recovery value of scrap material)

[24] About 5.5 tonnes of AFNOR 7020 is required for fabrication of one propellant tank.

[25] ISRO is the research and development unit of Department of Space.

Tropiques, an Indo-French Joint Satellite Mission for providing scientific data for climate research and aiding scientists to refine prediction models. The main function of the ROSA instrument was to determine the atmospheric temperature and humidity profile which are essential for interpreting and modelling the atmosphere.

Payment was to be released in four instalments on achievement of specified milestones. The last instalment of five *per cent* of contract value was payable on commissioning of the system or maximum within eight months of delivery of ROSA whichever was earlier.

As per Clause 11 of the contract, supply of ROSA Proto Flight Model (PFM) and on-orbit commissioning of the system was to be completed within December 2010 and August 2011 respectively, synchronous with launch of satellite. Further, as per Clause 23 of the contract, except in the case of 'force majeure', if the contractor failed to deliver the system within the stipulated time, Liquidated Damages (LD) of 0.5 *per cent* of the contract price per calendar week of delay up to maximum of five *per cent* of the contract price was recoverable by ISAC.

Around the stipulated time of delivery, the contractor informed (December 2010) that the assembling and testing of ROSA was delayed due to internal flooding at their site. The contractor assured restoration of flooded 'pickling line' by 10 January 2011 and requested for extension of delivery period under 'force majeure'. ISAC did not accept the contractor's application for extension of time for the reason that the contractor had not completed even the assembly of the equipment by December 2010.

ROSA was ultimately received by ISAC in June 2011. The satellite was launched (October 2011) by ISRO. On-orbit commissioning of ROSA, which was to be completed within eight months after delivery, was completed by the contractor in October 2012, after 16 months from the date of delivery. The scientific data of ROSA was made available by ISRO to the scientific community from 16 October 2012 onwards after completion of on-orbit commissioning by the contractor.

However, instead of levying LD, ISAC submitted (March 2013) a proposal to DOS for extending the delivery and commissioning period of ROSA upto June 2011 and October 2012 respectively, without imposing LD and releasing the entire fourth milestone payment of five *per cent* citing delay on 'force majeure' conditions and stating that the contractor had supported test activities during space craft pre-launch and post-launch commissioning.

Accordingly, DOS approved (May 2013) extension of delivery schedule and also waived (August 2013) LD of Euro 1,42,500 equivalent to ₹ 1.16 crore. ISAC released total payment of ₹ 18.37[26] crore to the contractor.

[26] ₹ 5.13 crore (March 2010) + ₹ 2.59 crore (September 2010) + ₹ 9.53 crore (September 2011) + ₹ 1.12 crore (July 2013)

Audit observed that delay of one year in commissioning of ROSA system from launch of the satellite resulted in idling of the system on-board the satellite for one year as scientific data for climate research was not provided for the period between October 2011 and October 2012. ROSA payload and Megha-Tropiques satellite had operational lives of five years and minimum three years respectively. The delay of eight months beyond period stipulated for commissioning the system resulted in proportionately lesser use of its operational life, which expressed in terms of financial value, would be to the extent of ₹ 2.45 crore[27].

Audit further observed that DOS/ISAC did not consider this potential loss due to non-utilisation of equipment while waiving LD for delay attributable to the contractor. Instead, fearing non-cooperation from the contractor in post-launch technical support, DOS extended undue benefit to the contractor by failing to impose LD which it was contractually empowered to levy. This was also in contravention of the provisions of GFRs.

DOS stated (February 2016) that data from ROSA was available to the scientific community from the day the instrument was powered on-board Megha-Tropiques. DOS added that LD was waived considering the extended on-orbit commissioning support provided by the contractor and in view of future cooperation.

The reply of DOS is not acceptable as the data was made available from 16 October 2012. Further, the contract originally provided for on-board commissioning within eight months from delivery, which was not achieved. The delayed delivery and commissioning of the equipment resulted in non- availability of the data for one year from the launch of the satellite.

Thus, waiving of liquidated damages for the delay in supply and commissioning of the ROSA system resulted in undue benefit to the contractor to the extent of ₹ 1.16 crore. Besides, delay in delivery and commissioning of the system having limited operational life resulted in proportionately lesser use of its operational life.

[27] 18.37/60x8 i.e. proportionate value of ROSA system costing ₹ 18.37 crore for eight months over operational life of five years.

5.5 Unfruitful expenditure on consultancy services

Department of Space hired a firm for providing architectural and other consultancy services for construction of a building in New Delhi without following due diligence in selection of the firm. The firm could not comply with the initial design requirements of the statutory authority and DOS rescinded the contract and decided to carry out the work in-house. Consequently, payment of ₹ 1.04 crore made to the firm was rendered unfruitful.

Rules 168 to 175 of the General Financial Rules, 2005 (GFRs) stipulate the procedure for selection of consultants for procurement of services. The rules prescribe that technical and financial bids should be invited from short listed consultants and the successful bidder selected after due evaluation and ranking of the bids. Rule 159 (1) of the GFRs stipulates that ordinarily payments for services rendered or supplies made should be released only after the services have been rendered or supplies made.

Ministry of Urban Development allotted (March 2006) 3,750 square metres of land to DOS/Indian Space Research Organisation (ISRO) at Sadiqnagar, New Delhi for establishing Space Complex Building to house the important wings[28] of DOS. DOS short listed five firms to undertake the architectural work of the building and invited (July 2006) them to participate in the architectural competition. During evaluation (December 2006) of drawings submitted by the five short listed firms, DOS decided to prepare detailed architectural design in-house. As such, none of the drawings submitted by the firms was considered.

Subsequently, DOS decided (April 2007) to outsource the complete design, estimation and project management work and identified STUP Consultants Private Limited, Bengaluru (Consultant), one of the five short listed firms who had submitted their drawings for the architectural competition. After negotiations, DOS entered (September 2007) into an agreement with the Consultant for planning, designing and furnishing of detailed estimates along with working drawings, etc. The scope of work included architecture, design, obtaining statutory clearances from various local bodies[29] on the design and scheme, preparation of detailed estimates, periodic visits to the site during execution of work and obtaining completion and occupancy certificates. Thus, the Consultant was to assist DOS throughout execution of the works.

DOS was to pay remuneration to the Consultant at an all-inclusive rate of 4.25 *per cent* of the completion cost of the works for which the service was being rendered by the Consultant. Payment was to be released in stages after completion of various

[28] Branch Secretariat, Laboratories for Remote Sensing, Disaster Management System, Village Resource Centre, Telemedicine, Tele-education, etc.

[29] Municipal Corporation of Delhi (MCD), Delhi Development Authority, Chief Fire Officer, Airports Authority of India, Delhi Urban Arts Commission and final clearance by MCD.

activities i.e., 45 *per cent*[30] of the payment was to be released against preparation and submission of drawings to local authorities, five *per cent* on obtaining approval from statutory authorities, 25 *per cent* on preparation of structural/ electrical/ Public Health/ water supply drawing, 10 *per cent* during the progress of work, five *per cent* on approval of power/ water supply connections from the local authorities and 10 *per cent* upon completion of the work.

Further, as per the agreement, in the event of failure of the Consultant to complete the works within the prescribed schedule and in a satisfactory manner, DOS could only levy compensation subject to a maximum of 10 *per cent* of the total fees payable.

The Consultant completed the initial planning activities and submitted (December 2007) the proposal to Municipal Corporation of Delhi (MCD). After clearance by all other agencies, the proposal was submitted to Delhi Urban Arts Commission (DUAC). DUAC reviewed (July 2010) the proposal but did not accord approval, observing that the form of the building was not appropriate to the environment and suggested that the architect attempt an alternative proposal/form.

The Consultant informed (October 2010) DOS that DUAC was not likely to consider the proposal favourably unless a totally new concept in drastic variance to the original design was developed. The Consultant also informed that if they were to revise the same, they would have to be compensated fully for the works carried out so far and also for the new proposal to be done by them.

Meanwhile, DOS constituted (August 2010) a High Level Committee to review the proposal along with observations of DUAC and recommended (November 2010) that the building may be designed afresh in-house by its Civil Engineering Programme Office (CEPO)[31] and that the agreement with the Consultant may be terminated.

Accordingly, DOS rescinded (November 2010) the contract with the Consultant. The planning of the building was taken up afresh by CEPO and the revised scheme was submitted to MCD in October 2011. DOS made total payment of ₹ 1.04 crore (January 2008 to March 2010) to the Consultant against delivery of work plan and partial work done in preparation of drawings and after adjusting compensation of ₹ 18.45 lakh, being 10 *per cent* of the total fees payable to the Consultant. The remuneration was calculated based on the approved estimated total cost of work of

[30] 10 *per cent* on preparation of conceptual drawings; 10 *per cent* on preparation of preliminary drawings and block estimates; five *per cent* on submission of drawings to local authorities and 20 *per cent* on preparation of tender drawings, detailed estimates and schedule of quantities.

[31] New nomenclature for Civil Engineering Division

₹ 43.41 crore which worked out to more than 50 *per cent*[32] of the total consultancy charges payable under the agreement.

Selection of Consultant on nomination basis and inability to obtain statutory clearance from local authorities resulted in unfruitful expenditure of ₹ 1.04 crore incurred on remuneration to the Consultant.

DOS stated (February 2016) that the Consultant was selected as it was one among the empanelled consultants of DOS. DOS further stated that general procedures for employment of consultants are different from the procedure for procurement of goods and added that stages of payment included in the contract were payments for processes involved in the development of a design.

The reply is not acceptable as DOS conducted an architectural competition for selection of consultant for the said work but later appointed the Consultant without proper evaluation and ranking of the offers submitted by all the participating firms.

Thus, selection of Consultant on nomination basis and inability to obtain statutory clearance from local authorities resulted in unfruitful expenditure of ₹ 1.04 crore incurred on remuneration to the Consultant.

5.6 Non-levy of labour welfare cess on construction work payment

Vikram Sarabhai Space Centre, Thiruvananthapuram failed to deduct statutory labour welfare cess to the extent of ₹ 71.23 lakh from payments made to contractors for execution of civil works.

In terms of section 3(1) of the Building and Other Construction Workers' Welfare Cess Act, 1996, a cess is to be levied and collected, at such rate not exceeding two *per cent*, but not less than one *per cent*, of the cost of construction incurred by an employer, as specified by the Government from time to time; and the proceeds of the cess collected are to be transferred to the Building and Other Construction Worker's Welfare Board constituted by a State Government.

For implementation of the Act, Government of Kerala followed the Central Government Rules. The Central Government Rule specified a cess at the rate of one *per cent* of the cost of construction incurred by an employer.

Scrutiny of records at Vikram Sarabhai Space Centre, Thiruvananthapuram (VSSC), a unit of Indian Space Research Organisation, revealed that VSSC executed civil works amounting to ₹ 71.23 crore through contractors between January 2011 and November 2014. However, labour welfare cess amounting to ₹ 71.23 lakh, being

[32] Total consultancy charges payable were 4.25 *per cent* of ₹ 43.41 crore i.e. ₹ 1.84 crore. Payment of ₹ 1.04 crore is more than 50 *per cent* of this amount.

one *per cent* of the work executed, was not deducted while making payments to the contractors.

Non-levy of labour welfare cess on payments for civil construction works in contravention of the statutory provision resulted in non-collection and remission of labour welfare cess to the State Government for welfare activities of labourers to the extent of ₹ 71.23 lakh.

Accepting the Audit observation, DOS stated (February 2016) that VSSC was presently recovering and remitting labour welfare cess. The fact remained that the cess was not recovered from the payments made in the earlier period.